The OBG Compass: Principles, Diagnostics, and Therapeutic Pathways in Obstetrics and Gynecology

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DeepScience

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Preface

This book has been developed to serve as a clear, comprehensive, and clinically oriented resource for students, healthcare practitioners, and educators dedicated to mastering the core principles of OBG. Covering a broad range of subjects, including the anatomy and physiology of the female reproductive system, stages of fetal development, labor and delivery processes, neonatal care, and various gynecological conditions, this book offers a structured approach to understanding both normal biological functions and clinical challenges. The material is carefully organized to bridge theoretical frameworks with real-world clinical practice, promoting a well-rounded and practical grasp of obstetrics and gynecology.

Significant emphasis has been placed on detailed anatomical explanations, key clinical assessments, diagnostic methodologies, and evidence-based treatment protocols. Contemporary themes such as genetic counseling, strategies for antenatal care, and techniques for intrapartum monitoring have also been incorporated, reflecting the advancements and evolving practices within the field.

It is our hope that this book enhances your educational journey and fosters a lasting appreciation for the discipline of obstetrics and gynecology.

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Chapter 1: Female Reproductive System

1.1 External Organs

1. **Mons Pubis**
    - Size & Shape: Rounded fat pad located over the pubic bone.
    - Parts: Subcutaneous fat tissue.
    - Function: Protects the pubic bone, acts as a cushion during intercourse.

2. **Labia Majora**
    - Size & Shape: Two large, hair-covered skin folds extending from mons pubis to the perineum.
    - Parts: Outer surface (hairy) and inner surface (smooth).
    - Vascularity: Supplied by the external pudendal artery.
    - Pathologies: Vulvitis (inflammation), Bartholin cysts.

3. **Labia Minora**
    - Size & Shape: Smaller, hairless folds inside the labia majora.
    - Parts: Fused anteriorly to form the clitoral hood, extending around the vaginal opening.

- Vascularity: Supplied by the internal pudendal artery.
- Pathologies: Labial hypertrophy.

4. **Clitoris**
   - Size & Shape: Small, erectile tissue located under the clitoral hood.
   - Parts: Glans, body, and crura.
   - Vascularity: Dorsal artery of the clitoris.
   - Pathologies: Clitoral enlargement (can be congenital or hormonal).

5. **Bartholin Glands**
   - Size & Shape: Small glands located near the vaginal opening.
   - Function: Secrete mucus for lubrication.
   - Pathologies: Bartholin cyst or abscess (blockage or infection).

1.2 Internal Organs

1. **Vagina**
   - Size & Shape: Muscular tube, 7.5-10 cm long; connects the cervix to the external genitalia.
   - Parts: Vaginal vault (upper), fornix (recess around cervix).
   - Layers: Mucosa, muscularis, adventitia.
   - Vascularity: Vaginal artery (branch of internal iliac artery).
   - Pathologies: Vaginitis, vaginal prolapse.

2. **Cervix**
   - Size & Shape: Cylindrical, about 2.5-3 cm long.

- Parts: Ectocervix (outer), endocervix (inner), and cervical canal.
- Vascularity: Supplied by the uterine artery.
- Pathologies: Cervical cancer, cervicitis.

3. Uterus

- Size & Shape: Pear-shaped organ, 7-8 cm long, 5 cm wide, weighs about 50 grams.
- Parts: Fundus, body (corpus), isthmus, cervix.
- Layers: Endometrium (inner), myometrium (middle), perimetrium (outer).
- Vascularity: Uterine artery (branch of internal iliac artery).
- Pathologies: Endometriosis, uterine fibroids, adenomyosis.

4. Fallopian Tubes

- Size & Shape: 10-13 cm long, narrow tubes.
- Parts: Fimbriae, infundibulum, ampulla, isthmus.
- Vascularity: Supplied by the uterine and ovarian arteries.
- Pathologies: Ectopic pregnancy, salpingitis.

5. Ovaries

- Size & Shape: Almond-shaped, 3-5 cm long, 1.5-3 cm wide.
- Parts: Medulla (inner), cortex (outer, where follicles develop).
- Vascularity: Ovarian artery (from the abdominal aorta).
- Pathologies: Ovarian cysts, polycystic ovary syndrome (PCOS).

1.3 Common Pathologies in the Female Reproductive System

- Pelvic Inflammatory Disease (PID): Inflammation of reproductive organs due to infection.

- Endometriosis: Endometrial tissue grows outside the uterus, causing pain and infertility.
- Fibroids: Non-cancerous growths in the uterus.
- Ovarian Cysts: Fluid-filled sacs in the ovaries.
- Cervical Cancer: Malignant growth in the cervix, often linked to HPV infection.
- Polycystic Ovary Syndrome (PCOS): Hormonal disorder causing enlarged ovaries with small cysts.
- Vulvovaginitis: Inflammation of the vulva and vagina due to infection or irritation.

1.4 Vascularity in OBG

- Uterine Artery: Main blood supply to the uterus, crucial for sustaining pregnancy.
- Ovarian Artery: Supplies the ovaries, supporting follicle development and hormone secretion.
- Vaginal Artery: Supplies the vagina and parts of the uterus.

1.5 Ovulation

- Process: Release of an egg from the ovary into the fallopian tube.
- Pathologies: Hormonal imbalances leading to anovulation (absence of ovulation).

1.6 Menstrual cycle

- Menstrual Phase: Shedding of the uterine lining.
- Follicular Phase: Egg maturation, preparation of uterine lining.
- Ovulation: Release of the egg from the ovary.
- Luteal Phase: Uterine lining thickens, ready for implantation.

1.7 Spermatogenesis

1. Definition: The process by which mature sperm cells are formed through mitotic and meiotic divisions, followed by metamorphosis.
2. Location: Occurs in the testes, specifically in the seminiferous tubules.
3. Phases: It involves three key stages—spermatocytogenesis, spermatidogenesis, and spermiogenesis.
4. Initiation: Begins at puberty and continues throughout a man's life.
5. Primary Cell: The process starts with primary spermatocytes.
6. Meiosis: The first meiotic division results in two secondary spermatocytes, and the second division leads to four spermatids.
7. Mature Sperm Formation: The transformation of spermatids into sperm cells occurs in spermiogenesis.
8. Rate: Millions of sperm are produced daily.
9. Sertoli Cells: These cells nourish the developing sperm in the testes.
10. Motility: The sperm gains motility after moving to the epididymis.
11. Lifespan: Each sperm has a limited lifespan once released, usually living for 48-72 hours inside the female reproductive tract.

1.8 Oogenesis

1. Definition: The process of forming a female gamete (ovum) through a series of mitotic and meiotic divisions.
2. Location: Occurs in the ovaries.
3. Phases: It has three phases—follicular phase, ovulation, and the luteal phase.
4. Starting Cell: The process starts with the primary oocyte.
5. Early Development: Begins during fetal life, where millions of oocytes are formed but most degenerate before birth.
6. Ovulation: After puberty, one oocyte matures and is released per month during ovulation.

7. Completion: If fertilization occurs, the second meiotic division is completed, forming a mature ovum.
8. Rate: Typically, one ovum is released per month during the reproductive years.
9. Polar Bodies: During meiosis, polar bodies are formed and eventually degenerate, as they do not develop into ova.
10. Resting Phase: There is a resting period between fetal development and puberty.
11. Food Storage: The ovum stores more nutrients and cytoplasm than the sperm, aiding in the early development of the embryo.
12. Lifespan: The ovum can survive for about 12-24 hours post-ovulation unless fertilized.
13. Unequal Division: Unlike spermatogenesis, oogenesis involves unequal division of the cytoplasm, leading to the formation of one large ovum and smaller polar bodies.

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Chapter 2: Gametogenesis, Conception, Fertilization and Genetics, Fetal Development

2.1 Foetal development

1. Germinal Stage: From fertilization to 2 weeks; zygote formation and implantation.
2. Embryonic Stage: 3 to 8 weeks; organogenesis occurs, major organs begin to form.
3. Foetal Stage: 9 weeks to birth; growth and maturation of systems.
4. Week 4: Heartbeat begins.
5. Week 8: Limbs, eyes, and ears form.
6. Week 12: External genitalia form.
7. Week 20: Quickening (first movements felt by mother).
8. Week 24: Viability threshold for premature birth.
9. Week 28: Lungs mature; surfactant produced.
10. Week 40: Full-term development.
11. Foetal growth rate: Rapid in the third trimester.

2.2 Conception

1. Definition: Union of sperm and egg to form a zygote.
2. Ovulation: Release of an egg from the ovary, typically on day 14 of the menstrual cycle.
3. Fertilization: Occurs in the fallopian tube.
4. Sperm lifespan: 72 hours; egg lifespan: 24 hours.
5. Zygote: Formed by the fusion of sperm and egg nuclei.
6. Capacitation: Sperm undergoes changes to penetrate the egg.
7. Acrosome reaction: Enzymes in sperm head help break through egg's outer layer.
8. Zona pellucida: Outer covering of the egg, penetrated by sperm.
9. Cortical reaction: Prevents additional sperm from fertilizing the egg.
10. Implantation window: 6-10 days after fertilization.

2.3 Review of Fertilization

1. Site: Fertilization occurs in the ampulla of the fallopian tube.
2. Sperm travel: Guided by chemotaxis to the egg.
3. Capacitation: Enables sperm to fertilize.
4. Fusion: Sperm and egg nuclei merge, forming a zygote.
5. Zygote: Single-celled structure that undergoes cleavage.
6. Cleavage: Series of mitotic divisions forming the morula.
7. Blastocyst: Stage when the zygote implants in the uterine wall.
8. Trophoblast: Outer cells of blastocyst, help in implantation.
9. Embryoblast: Inner cell mass, gives rise to the embryo.
10. Fertilization timing: Occurs within 24 hours of ovulation.

2.4 Implantation & Development of Embryo/Placenta

1. Implantation: Occurs 6-10 days after fertilization.
2. Trophoblast: Helps embryo embed into the uterine lining.
3. Chorionic villi: Help form the placenta.
4. Placenta: Provides nutrients, oxygen, and waste elimination.
5. Functions of placenta: Hormone secretion (hCG, progesterone), immune protection.
6. Placenta abnormalities: Placenta previa, placental abruption.
7. Foetal sac: Protects the embryo; forms amniotic sac.
8. Amniotic fluid: Cushions foetus, maintains temperature.
9. Umbilical cord: Contains two arteries and one vein.
10. Placenta at term: Weighs about 500g and measures 20 cm in diameter.
11. Amniotic fluid abnormalities: Polyhydramnios (excess), oligohydramnios (deficiency).

2.5 Foetal Circulation

1. Oxygen source: Placenta via the umbilical vein.
2. Ductus venosus: Bypasses liver; sends blood to the inferior vena cava.
3. Foramen ovale: Connects right to left atrium, bypassing lungs.
4. Ductus arteriosus: Connects pulmonary artery to the aorta.
5. Umbilical arteries: Carry deoxygenated blood from foetus to placenta.
6. Changes at birth: Lungs expand, foramen ovale and ductus arteriosus close.
7. Blood oxygenation: Occurs at the placenta, not lungs.
8. Circulatory shunts: Ductus arteriosus, foramen ovale, ductus venosus.
9. Umbilical vein: Delivers oxygen-rich blood to the foetus.
10. Post-birth changes: Shunts close, normal circulation begins.

2.6 Foetal skull, bones, sutures, and measurements

1. Bones: 2 parietal, 2 frontal, 1 occipital.
2. Sutures: Coronal, sagittal, lambdoid, and metopic.
3. Fontanelles: Anterior and posterior soft spots where sutures meet.
4. Moulding: Overlapping of sutures during birth.
5. Biparietal diameter (BPD): Widest part of the foetal skull (9.5 cm).
6. Suboccipitobregmatic diameter: Smallest diameter for engagement (9.5 cm).
7. Mentoposterior diameter: Measures 13.5 cm in a brow presentation.
8. Engagement: The foetal head fits into the maternal pelvis.
9. Vertex: Most common presenting part during birth.
10. Fontanelles close: Anterior by 18 months; posterior by 2-3 months.

2.7 Review of genetics

1. Genes: Basic units of heredity.
2. DNA: Molecule containing genetic information.
3. Chromosomes: 23 pairs, with 1 pair determining sex (XX/XY).
4. Dominant and recessive: Dominant alleles mask recessive ones.
5. Genotype vs. phenotype: Genetic makeup vs. expressed traits.
6. Mendelian inheritance: Laws of inheritance patterns.
7. Mutations: Changes in DNA that can lead to disorders.
8. Genetic testing: Identifies inherited diseases.
9. Chromosomal disorders: Down syndrome (trisomy 21), Turner syndrome.
10. Prenatal genetic screening: Identifies risk of genetic disorders.

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Chapter 3: Female Pelvis

3.1 Definition

Female pelvis:

The female pelvis is a bony structure that supports the weight of the upper body, provides attachment for muscles, and serves as the passage for the fetus during childbirth.

3.2 Anatomy of the Female Pelvis

Bones Involved:

- Ilium
- Ischium
- Pubis
- Sacrum
- Coccyx

These bones form the **pelvic ring**, which is divided into the **false** pelvis (above the pelvic brim) and the **true pelvis** (below the pelvic brim).

3.3 Shape of the Female Pelvis

Gynecoid Pelvis (most common and ideal for childbirth): Rounded and wide.

Android Pelvis: Heart-shaped, less favorable for delivery.

Anthropoid Pelvis: Oval, more common in long-legged women.

Platypelloid Pelvis: Flattened and wide, less common and less favorable for childbirth.

3.4 Pelvic Inlet (Brim)

- **Diameters**:
  - **Anteroposterior diameter**: 11.5-12 cm.
  - **Transverse diameter**: 13-13.5 cm.
  - **Oblique diameters**: 12-12.5 cm.

3.5 Pelvic Cavity (Midpelvis)

- **Diameters**:
  - **Anteroposterior diameter**: 11 cm.
  - **Transverse diameter**: 12 cm.
- This portion of the pelvis determines whether the fetus can descend during labor.

3.6 Pelvic Outlet

- **Diameters**:
  - **Anteroposterior diameter**: 12.5-13 cm.
  - **Transverse diameter**: 11-12 cm.
- The **pelvic outlet** is the passage through which the baby is delivered.

3.7. Pelvic Subpubic Angle

- **Angle in Female**: Approximately 80-85°.
- It is the angle formed between the pubic bones at the symphysis pubis.

3.8. Pelvic Diagonal Conjugate

- **Length**: 12.5 cm.

- Measured from the sacral promontory to the lower border of the pubic symphysis.
- Indicates the size of the pelvic inlet for vaginal delivery.

3.9 Anterior-Posterior (AP) Diameter of the Pelvic Inlet

- **Size**: 11.5-12 cm.
- **Importance**: Essential for determining the ease of passage of the fetal head during delivery.

3.10 Fetal Head and Pelvic Diameters

- The diameter of the **fetal head** plays a role in determining the pelvic adequacy for delivery. The **biparietal diameter** (BPD) is typically 9.5-9.8 cm at term and must fit through the pelvic inlet.

3.11 Obstetric Conjugate

- **Size**: About 10.5 cm.
- It is the **shortest diameter** of the pelvic inlet, crucial for assessing the passage for the fetus during labor.

3.12 True Pelvic Measurements

- The **true pelvis** refers to the part of the pelvis below the pelvic brim, and its dimensions are important for the passage of the fetus during delivery.
    - **Sacral promontory to pubic symphysis** (true conjugate) is around 10 cm.

3.13 Diameters Based on Presenting Part

- **Cephalic presentation (head)**: The fetal head diameter should pass through the pelvic inlet, with the **biparietal diameter** as the main consideration.
- **Breech presentation (buttocks)**: The pelvic measurements should be assessed for **pelvic adequacy** for breech delivery.

3.14 Clinical Relevance

- **Pelvic Measurements** are assessed using **pelvimetry** to determine if the pelvis is adequate for vaginal delivery.
- Pelvimetry helps identify **cephalopelvic disproportion**, where the fetal head is too large to fit through the pelvis.

3.15 Pathologies Related to the Female Pelvis

- **Pelvic Inflammatory Disease (PID)**: Infection that can lead to scarring and narrowing of the pelvic cavity.
- **Pelvic Prolapse**: Descent of pelvic organs (bladder, uterus, rectum) due to weakened pelvic muscles and ligaments.

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Chapter 4: Fetal Skull

Fetal skull

The fetal head is large in relation to the fetal body compared with the adult. Adaptation between the skull and the pelvis is necessary to allow the head to pass through the pelvis without complications. The bones of the vault are thin and pliable and if subjected to great pressure damage to the underlying delicate brain may occur.

Parts/divisions of thefetal skull

Parts of fetal skull include

1. Base
2. Face
3. Vault

1. Base:

It is the lower part of fetal skull. It has the foramen magnum through which spinal cord and nerve passing it. It protects the vital organ such as Cerebrum, Cerebellum and medulla Etc.

2. Face:

It extends from glabella through root of the nose to mentum and submentum. It comprised of 14 small bones and it is non compressible.

3. Vault:

It is the large dome shaped part above an imaginary line drawn between the orbital ridges and nape of the neck.

Bones of the vault

The bones of the vault are laid down in membrane. They ossify from the centre outwards in a process known as ossification. Ossification is incomplete at birth, leaving small gaps between the bones known as the sutures and fontanelles. The ossification centre on each bone appears as a protuberance.

1. Frontal bone:

There are two frontal bone which forms the fore head or sinciput. Ossification centre of frontal bone is called as Frontal eminence or boss. Frontal bones fuse into a single bone by 8 yrs of age.

2. Parietal bone:

There are two parietal bones forms the side of the fetal skull. Ossification centre of the parietal bone is known as Parietal eminence.

3. Temporal bone:

There are two temporal bones lies at the sides of the fetal skull forms part of the vault

4. Occipital bone:

It lies at the back of the head. Part of it contributes to the base of the skull as it contains the foramen magnum, which protects the spinal cord as it leaves the skull.. Ossification centre is the occipital protuberance.

Sutures

The sutures are the cranial joints formed where two bones meet.

1. **Frontal suture:**

Frontal sutures lies in between the frontal bone

2. **Coronal suture:**

It lies in between the frontal and parietal bone and extends from one temporal bone to the other

3. **Sagittal suture:**

It lies in between two parietal bones

4. **Lambdoidal suture:**

It lies in between the Occipital bone and parietal bone

Fontanelles

Two or more sutures meet to form fontanelle.

1. **Anterior fontanelle / Bregma**

It is formed by the fusion of Frontal suture, Coronal suture and Sagittal suture. It is broad, kite shape with length 3-4 cm and width 1.5 – 2 cm. It gets closed at the age of 1½ years

2. **Posterior Fontanelle / Lambda**

It is formed by the fusion of Sagittal suture and lambdoid suture. It is small, triangular in shape and gets closed at the age of 1½ month.

Regions and landmarks of the fetal skull

The skull is further separated into regions and within these, there are important landmarks. Land marks of the fetal skull includes

1. **The Occiput region**

It lies between Foramen magnum to posterior fontanelle.

2. **Suboccput region**

The part below the Occipital protuberance is known as Subocciput region

3. **Vertex region**

It is bounded by the anterior fontanelle, two parietal eminence and posterior fontanelle

4. **Sinciput / Forehead region:**

It is bounded by anterior fontanelle, two frontal boss and orbital ridges.

5. **Glabella:**

The point between the orbital ridges is known as glabella.

6. **Mentum:**

Tip of the chin is known as Mentum

7. **Sub-mentum:**

The part below the mentum where the face and neck fuse is known as Submentum.

Diameters of the fetal skull

There are six longitudinal diameters and two transverse diameters

Longitudinal diameters

Occipito frontal diameter: (11.5 cm)

It lies between occipital protuberance to the glabella.

Subocciptobregmatic diameter: (9.5 cm)

It extends between suboccipital region to centre of the anterior fontanelle

Suboccipitofrontal diameter: (10 cm)

It lies between subocciptal region to centre of the frontal suture

Mento vertical diameter: (13.5 cm)

It extends from mentum to highest point of vertex slightly nearer to the posterior fontanelle. It is the largest diameter of the fetal skull.

Submentovertical diameter: (11.5 cm)

It lies between Submentum region to the highest point of verte

Submentobregmatic diameter: (9.5 cm)

It extends from submentum region to centre of the bregma

Bi temporal diameter: (8.2 cm)

Transverse diameters

It is the smallest diameter in the fetal skull which extends between two temporal bones.

Biparietal diameter: (9.5 cm)

It is the diameter which lies between two parietal eminence

Table 1 : Sign and Symptom of Pregnancy

Group	Signs	Symptoms	Gestational age (appearance)	Gestational age (disappearance)
A. Presumptive Signs	● Amenorrhea	Absence of menstruation	4-6 weeks	Throughout pregnancy
	● Morning sickness	Nausea and vomiting, especially in the morning	4-6 weeks	12-16 weeks
	● Breast changes	Tenderness, fullness, darkening of areola	6-8 weeks	End of pregnancy
	● Bladder irritability	Frequent urination	6-8 weeks	12-14 weeks, reappears in 3rd trimester
	● Skin changes	Darkening of skin (e.g., chloasma)	16-20 weeks	Varies, often postpartum
	● Quickening	First perception of fetal movement	18-20 weeks	Throughout pregnancy
B. Probable Signs	● Abdominal enlargement	Gradual increase in abdominal size	12-16 weeks	Throughout pregnancy
	● Braxton Hicks contraction	Irregular, painless uterine contractions	16-20 weeks	Throughout pregnancy
	● Ballottement	Fetal rebound upon tapping the cervix	16-20 weeks	Throughout pregnancy

Group	Signs	Symptoms	Gestational age (appearance)	Gestational age (disappearance)
	● Uterine souffle	Soft blowing sound due to blood flow in uterine arteries	16-20 weeks	Throughout pregnancy
	● Softening of cervix	Softening of the cervical tissue (Goodell's sign)	4-6 weeks	Throughout pregnancy
	● Hegar's sign	Softening of the lower uterine segment	6-12 weeks	Throughout pregnancy
	● Jacquemier's sign	Bluish discoloration of the vaginal mucosa	6-8 weeks	Throughout pregnancy
	● Osiander's sign	Pulsation of the uterine vessels felt in the lateral fornices	8-12 weeks	Throughout pregnancy
	● Change in shape of uterus	From a pear shape to a more rounded, globular shape	12 weeks	Throughout pregnancy
C. Positive Signs	● Fetal heart sounds (FHS)	Audible fetal heart rate detected by doppler or stethoscope	10-12 weeks	Throughout pregnancy
	● Fetal parts	Palpable parts of the fetus felt through the abdomen	20 weeks	Throughout pregnancy

Group	Signs	Symptoms	Gestational age (appearance)	Gestational age (disappearance)
	● Fetal movements	Active fetal movements felt by an examiner	20 weeks	Throughout pregnancy
	● X-rays	Imaging to visualize the fetal skeleton	16-20 weeks	Throughout pregnancy
	● Ultrasonography	Imaging to visualize the fetus and confirm viability	6 weeks	Throughout pregnancy
D. Immunological Signs	● Pregnostics test	Immunoassay test to detect pregnancy hormones	4-6 weeks	Throughout pregnancy
	● Latex particle inhibition test	Test based on inhibition of agglutination by hCG in urine	4-6 weeks	Throughout pregnancy
E. Biological Signs	● Aschheim-Zondek test	A biological test involving injecting urine into mice to detect pregnancy	4-6 weeks	Throughout pregnancy
	● Friedman test	A biological test using rabbits for pregnancy detection	4-6 weeks	Throughout pregnancy
	● Hogben's test	A pregnancy test using the South African clawed frog	4-6 weeks	Throughout pregnancy
	● Bufo-bufo test	A test using Bufo toads for detecting	4-6 weeks	Throughout pregnancy

Group	Signs	Symptoms	Gestational age (appearance)	Gestational age (disappearance)
		pregnancy hormones		
	● Oestrogen withdrawal bleeding test	Test for detecting estrogen hormone changes in early pregnancy	4-6 weeks	Throughout pregnancy

1. Antenatal Visits

1. **Initial Visit**: Conducted within the first 12 weeks to confirm pregnancy and assess overall health (blood tests, urine tests, BP measurement, etc.).
2. **Monthly Visits**: From the first trimester until 28 weeks, monthly visits monitor maternal weight, blood pressure, and fetal growth.
3. **Biweekly Visits**: From 28 to 36 weeks, visits are conducted every two weeks to check for gestational hypertension and fetal well-being.
4. **Weekly Visits**: From 36 weeks to delivery, weekly visits are essential for monitoring fetal position, maternal condition, and signs of labor.
5. **Ultrasound Examinations**: Performed between 18-22 weeks to assess fetal anatomy, detect anomalies, and confirm placental placement.
6. **Routine Blood Tests**: Includes complete blood count, Rh factor, and screening for infections like syphilis, HIV, and hepatitis B.
7. **Weight Monitoring**: Each visit includes monitoring maternal weight gain to ensure it is within recommended limits.
8. **Blood Pressure Monitoring**: Regular BP checks are done to detect conditions like pregnancy-induced hypertension or preeclampsia.
9. **Fetal Heart Rate Monitoring**: At each visit, fetal heart rate is monitored using a Doppler ultrasound.
10. **Fundal Height Measurement**: Measures the size of the uterus to assess fetal growth and development.

2. Antenatal Screening

First-Trimester Screening: Includes blood tests for hemoglobin, Rh status, and infections (e.g., HIV, hepatitis B, syphilis).

NT Scan: Nuchal translucency scan between 11-14 weeks helps assess the risk of Down syndrome and other chromosomal abnormalities.

Glucose Tolerance Test: Conducted at 24-28 weeks to screen for gestational diabetes, which can complicate pregnancy.

Quadruple Marker Test: Performed in the second trimester to screen for neural tube defects and chromosomal abnormalities.

Anomaly Scan: Detailed ultrasound performed between 18-22 weeks to check fetal anatomy and detect congenital anomalies.

Screening for Preeclampsia: Blood pressure monitoring and urine tests for proteinuria to detect early signs of preeclampsia.

Group B Streptococcus Screening: Performed between 35-37 weeks to detect bacteria that can cause newborn infections.

Fetal Well-being Tests: Non-stress test (NST) and biophysical profile (BPP) are conducted later in pregnancy to assess fetal health.

Pap Smear: Performed early in pregnancy to screen for cervical abnormalities.

Urinalysis: Routine tests for glucose, protein, and infections to monitor kidney function and detect gestational diabetes or preeclampsia.

3. Nutrition and Supplements

1. **Folic Acid**: 400 mcg of folic acid daily during the first trimester to prevent neural tube defects.
2. **Iron Supplements**: Iron supplementation from the second trimester to prevent anemia and ensure proper oxygen supply to the fetus.
3. **Calcium Supplements**: Recommended intake of 1,000-1,300 mg of calcium per day to support bone development.
4. **Vitamin D**: Supplements may be necessary to promote calcium absorption and bone health.
5. **Protein Intake**: Ensure adequate protein intake to support maternal tissue growth and fetal development (e.g., 60-75 grams/day).

6. **Hydration**: Encourage drinking at least 8-10 glasses of water daily to support increased blood volume and amniotic fluid.
7. **Avoid Certain Foods**: Avoid raw seafood, unpasteurized dairy, and deli meats due to the risk of infections like listeriosis and toxoplasmosis.
8. **Omega-3 Fatty Acids**: Essential for fetal brain development; found in fish, flaxseeds, and walnuts.
9. **Balanced Diet**: Include fruits, vegetables, whole grains, lean proteins, and dairy for overall maternal and fetal health.
10. **Limit Caffeine and Sugar**: Excessive intake of caffeine and sugary foods can lead to health issues like gestational diabetes and preeclampsia.

4. Weight Gain Monitoring

1. **Recommended Weight Gain**: 11.5-16 kg for women with a normal BMI; 7-11.5 kg for overweight women; 12.5-18 kg for underweight women.
2. **First Trimester**: Weight gain of about 1-2 kg is expected in the first trimester.
3. **Second Trimester**: Rapid weight gain occurs during the second trimester, about 0.5 kg per week.
4. **Third Trimester**: Continue gaining about 0.5 kg per week in the third trimester.
5. **Monitoring for Gestational Diabetes**: Excessive weight gain may indicate gestational diabetes, which requires dietary changes and monitoring.
6. **Monitoring for Preeclampsia**: Sudden weight gain of more than 2 kg in a week can signal preeclampsia.
7. **Nutritional Counseling**: Women who are not gaining weight adequately may need a nutritional plan to ensure proper fetal growth.
8. **Exercise Recommendations**: Light exercise like walking or prenatal yoga can help manage weight gain.
9. **Fluid Retention**: Check for signs of edema, which can contribute to weight gain and indicate possible complications.
10. **Postpartum Weight**: Addressing appropriate postpartum weight loss goals to avoid long-term maternal obesity.

5. Blood Pressure Monitoring

1. **Normal Range**: A blood pressure reading of less than 140/90 mmHg is considered normal during pregnancy.

2. **Gestational Hypertension**: Elevated BP after 20 weeks without proteinuria; managed with lifestyle changes and medication if necessary.
3. **Preeclampsia**: BP over 140/90 mmHg with proteinuria and other symptoms such as edema or headaches requires urgent management.
4. **Routine Monitoring**: BP should be measured at every antenatal visit to catch early signs of hypertension.
5. **Home BP Monitoring**: In high-risk pregnancies, women may be advised to monitor their BP at home regularly.
6. **Lifestyle Modifications**: Encourage reducing salt intake, regular light exercise, and stress management techniques.
7. **Medications**: Safe antihypertensive drugs such as methyldopa or labetalol may be prescribed if BP remains elevated.
8. **Complications of Hypertension**: If untreated, hypertension can lead to preterm birth, placental abruption, or fetal growth restriction.
9. **Delivery Consideration**: Severe preeclampsia may require early induction or cesarean section.
10. **Postpartum Follow-up**: Women with gestational hypertension should have regular BP checks postpartum, as hypertension may persist.

6. Fetal Movements

1. **Quickening**: Fetal movements are typically first felt by the mother around 18-20 weeks of gestation.
2. **Kick Counts**: Mothers are encouraged to monitor fetal movements by counting 10 movements within 2 hours.
3. **Decrease in Movements**: If movements decrease significantly, the mother should seek medical evaluation to rule out fetal distress.
4. **Active Periods**: Fetal movements may be more noticeable after meals, in the evening, or after the mother rests.
5. **Monitoring After 28 Weeks**: Fetal movements should be monitored more closely in the third trimester.
6. **Non-Stress Test (NST)**: If concerns arise about fetal movements, an NST may be conducted to assess fetal well-being.
7. **Biophysical Profile (BPP)**: Combines NST and ultrasound to evaluate fetal movement, muscle tone, amniotic fluid, and breathing movements.
8. **Variability**: Fetal movement patterns vary from one pregnancy to another, and some mothers may feel movements earlier or later.
9. **Stimulating Movements**: Drinking cold water or lying on the left side can sometimes stimulate fetal movements.

10. **Fetal Position**: Movements may feel different depending on the baby's position (breech or cephalic presentation).

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Chapter 5: Normal Pregnancy and Its Management

a) Pre-conception Care

1. **Nutritional Counseling**: Advise a balanced diet rich in folic acid (400 mcg/day) to prevent neural tube defects.
2. **Medical History Review**: Assess for chronic conditions (diabetes, hypertension) that may affect pregnancy.
3. **Immunization**: Ensure up-to-date vaccinations, especially for rubella and hepatitis B.
4. **Screening for Infections**: Screen for STDs, HIV, and TORCH infections.
5. **Weight Management**: Encourage achieving a healthy weight (BMI 18.5-24.9) before conception.
6. **Lifestyle Modifications**: Advise cessation of smoking, alcohol, and drug use.
7. **Genetic Screening**: Consider genetic testing for couples with a family history of genetic disorders.
8. **Fertility Awareness**: Educate on timing of ovulation and optimal fertility windows.
9. **Medication Review**: Discontinue teratogenic drugs and ensure safe medication alternatives.
10. **Psychological Preparation**: Assess mental health and provide counseling if needed.

b) Genetic Counseling

1. **Family History Assessment**: Evaluate family history for genetic diseases, including chromosomal abnormalities.

2. **Screening Tests**: Offer screening for conditions like cystic fibrosis, sickle cell anemia, and Tay-Sachs disease.
3. **Risk Calculation**: Use pedigree charts to determine recurrence risk in future pregnancies.
4. **Non-Invasive Prenatal Testing (NIPT)**: Conduct DNA testing for Down syndrome, trisomy 18, and trisomy 13.
5. **Carrier Testing**: Identify carriers of genetic disorders in parents.
6. **Prenatal Diagnosis**: Amniocentesis and chorionic villus sampling for definitive diagnosis of genetic conditions.
7. **Counseling for High-Risk Couples**: Provide support and information on risks and reproductive options.
8. **Ethical Considerations**: Discuss implications of genetic testing, including termination of pregnancy.
9. **Referral to Specialists**: Refer to geneticists or counselors for complex cases.
10. **Reproductive Options**: Consider options like IVF with genetic screening or donor gametes.

c) Physiological Changes in Pregnancy

1. **Cardiovascular System**: Increased blood volume and cardiac output; potential for physiologic anemia.
2. **Respiratory System**: Increased tidal volume; shortness of breath due to diaphragm elevation.
3. **Gastrointestinal System**: Nausea, vomiting, heartburn, and constipation due to hormonal changes.
4. **Renal System**: Increased glomerular filtration rate (GFR) and urinary frequency.
5. **Musculoskeletal System**: Relaxation of joints and ligaments due to relaxin, leading to back pain.
6. **Skin Changes**: Hyperpigmentation (chloasma, linea nigra), striae gravidarum, and spider veins.
7. **Endocrine Changes**: Increased levels of estrogen, progesterone, and human chorionic gonadotropin (hCG).
8. **Weight Gain**: Normal weight gain of 11.5-16 kg for women with a normal BMI.
9. **Breast Changes**: Increased size, tenderness, and darkening of areola due to hormonal stimulation.
10. **Immune System**: Slight suppression of immune response to prevent rejection of the fetus.

d) Diagnosis of Pregnancy

- **History**: Includes missed periods, nausea, breast tenderness, and fatigue. Confirmed by home pregnancy test.
- **Signs & Symptoms**: Divided into presumptive (e.g., amenorrhea), probable (e.g., Hegar's sign), and positive (fetal heart sounds, ultrasound).

e) Antenatal Care

1. **History Taking**: Detailed history of past medical, surgical, and obstetric conditions.
2. **Calculation of Expected Date of Delivery (EDD)**: Based on Naegele's rule (LMP + 9 months + 7 days).
3. **Physical Examination**: Routine blood pressure, weight monitoring, and fundal height measurement.
4. **Routine Investigations**: Blood tests for hemoglobin, blood group, Rh factor, glucose tolerance test, and urine analysis.
5. **Ultrasound**: To assess fetal development and screen for anomalies.
6. **Health Education**: Counseling on diet, exercise, and lifestyle modifications to ensure a healthy pregnancy.
7. **Counseling on Danger Signs**: Educating on warning signs like bleeding, severe headaches, or reduced fetal movements.
8. **Drugs**: Safe medications for common issues like nausea and anemia.
9. **Immunizations**: Tetanus toxoid, influenza vaccine, and in some cases, Hepatitis B vaccine.
10. **Fetal Monitoring**: Regular assessment of fetal heart rate and movements after 20 weeks.
11. **Screening for Preeclampsia**: Regular BP monitoring and urine tests to detect proteinuria.
12. **Breastfeeding Education**: Initiate counseling on breastfeeding benefits and techniques.
13. **Birth Planning**: Discussions on mode of delivery, pain management, and birth preparedness.

f) Minor Disorders and Their Management

1. **Nausea & Vomiting**: Dietary modifications, vitamin B6, and antiemetics if severe.
2. **Heartburn**: Small, frequent meals and antacids for relief.

3. **Constipation**: High-fiber diet, adequate hydration, and stool softeners.
4. **Back Pain**: Exercises, proper posture, and support belts.
5. **Leg Cramps**: Leg stretches, magnesium supplementation, and adequate hydration.
6. **Hemorrhoids**: High-fiber diet, sitz baths, and topical treatments.
7. **Varicose Veins**: Compression stockings and leg elevation.
8. **Edema**: Elevation of legs and reduced salt intake.
9. **Fatigue**: Adequate rest and balanced diet.
10. **Breathlessness**: Frequent breaks and proper body positioning.

Management of Complications During Pregnancy

A) Bleeding in Pregnancy

1. Early Bleeding

Definition: Early bleeding occurs in the first trimester of pregnancy and may result from implantation bleeding, ectopic pregnancy, or abortion.

Predisposing Factors: Advanced maternal age, history of abortions, smoking, infections, and hormonal imbalances.

Incidence: Globally, 15-20% of pregnancies end in miscarriage; in India, about 10-15%.

Etiology: Chromosomal abnormalities, uterine anomalies, trauma, infections.

Signs and Symptoms:

- Vaginal bleeding (light to heavy)
- Abdominal pain or cramps
- Passage of clots or tissue

Diagnostic Evaluation:

- Transvaginal ultrasound
- Serum beta-hCG levels

Treatment Protocols:

- Expectant management for minor bleeding
- Medical management with misoprostol (WHO recommends 800 µg vaginally)
- Surgical evacuation if incomplete abortion

2. Late Bleeding

Definition: Bleeding after 20 weeks of gestation, commonly due to placenta previa or placental abruption.

Predisposing Factors: Hypertension, multiple pregnancies, prior cesarean section.

Incidence: Accounts for 3-5% of pregnancies.

Etiology: Placental issues, trauma, uterine rupture.

Signs and Symptoms:

- Painless bleeding in placenta previa
- Painful bleeding in placental abruption

Diagnostic Evaluation:

- Ultrasound to locate the placenta
- Complete blood count (CBC)

Treatment Protocols:

- Hospitalization for monitoring
- Corticosteroids for fetal lung maturity if preterm
- Emergency delivery if hemorrhage is severe

3. Ectopic Pregnancy

Definition: Implantation of the fertilized ovum outside the uterine cavity.

Predisposing Factors: Tubal surgery, infections, in vitro fertilization (IVF).

Incidence: 1-2% globally; in India, 0.5-1.5%.

Etiology: Pelvic inflammatory disease, tubal anomalies.

Signs and Symptoms:

- Severe abdominal pain

- Amenorrhea
- Vaginal spotting

Diagnostic Evaluation:

- Transvaginal ultrasound
- Serum beta-hCG levels

Treatment Protocols:

- Methotrexate (50 mg/m² intramuscularly)
- Surgical intervention in ruptured cases

4. Abortion

Definition: Termination of pregnancy before viability (20 weeks).

Predisposing Factors: Maternal age, infections, lifestyle factors.

Incidence: Approximately 15% globally; similar rates in India.

Etiology: Chromosomal abnormalities, hormonal issues.

Signs and Symptoms:

- Vaginal bleeding
- Lower abdominal pain
- Passage of tissue

Diagnostic Evaluation:

- Ultrasound
- Beta-hCG

Treatment Protocols:

- Expectant management
- Medical termination (Misoprostol: WHO-recommended dose: 800 µg)
- Surgical evacuation if needed

5. Vesicular Mole

Definition: Abnormal trophoblastic proliferation forming a hydatidiform mole.

Predisposing Factors: Extremes of maternal age, history of molar pregnancy.

Incidence: 1 in 1,000 pregnancies globally; slightly higher in India.

Etiology: Genetic abnormalities

Signs and Symptoms:

- Dark brown vaginal discharge
- Uterine size larger than gestational age

Diagnostic Evaluation:

- Ultrasound (snowstorm appearance)
- Serum beta-hCG

Treatment Protocols:

- Evacuation via suction curettage
- Follow-up for beta-hCG regression

B) Hyperemesis Gravidarum

Definition: Severe, persistent nausea and vomiting leading to dehydration and weight loss.

Predisposing Factors: Multiple pregnancies, molar pregnancy, high beta-hCG.

Incidence: 0.3-2% globally; 1% in India.

Etiology: Hormonal changes, psychological factors.

Signs and Symptoms:

- Intractable vomiting
- Dehydration signs (dry mucosa, tachycardia)
- Electrolyte imbalances

Diagnostic Evaluation:

- Urine ketones
- Serum electrolytes

Treatment Protocols:

- IV hydration with Ringer's lactate or saline
- Antiemetics (Ondansetron: 4-8 mg IV/PO, WHO-approved)

- Thiamine supplementation (100 mg/day IV)

C) Gestational Diabetes Mellitus (GDM)

Definition: Glucose intolerance with onset or recognition during pregnancy.

Predisposing Factors: Obesity, family history of diabetes, advanced maternal age.

Incidence: 7-10% globally; 10-14% in India.

Etiology: Insulin resistance due to placental hormones.

Signs and Symptoms:

- Often asymptomatic
- Increased thirst and urination
- Fatigue

Diagnostic Evaluation:

- Oral glucose tolerance test (OGTT)
- Fasting blood glucose

Treatment Protocols:

- Diet and lifestyle modification
- Insulin therapy (starting dose 0.7-1.0 IU/kg/day)
- Metformin as per WHO guidelines (if not contraindicated)

D) Pregnancy-Induced Hypertension (PIH)

1. Pre-eclampsia

Definition: Hypertension with proteinuria after 20 weeks of gestation.

Predisposing Factors: First pregnancy, multiple pregnancies, obesity.

Incidence: 2-8% globally; 10-12% in India.

Etiology: Placental ischemia leading to endothelial dysfunction.

Signs and Symptoms:

- High BP (>140/90 mmHg)
- Proteinuria (>300 mg/24 hours)
- Edema

Diagnostic Evaluation:

- Urine protein analysis
- Serum creatinine, liver enzymes

Treatment Protocols:

- Antihypertensives (Labetalol: 200-2400 mg/day)
- Magnesium sulfate for seizure prophylaxis

2. Eclampsia

Definition: Seizures or coma in a pre-eclampsia patient.

Treatment Protocols:

- Immediate IV Magnesium sulfate (loading dose 4-6 g IV over 15-20 minutes)
- Antihypertensives
- Emergency delivery

E) Hydramnios

1. Polyhydramnios

Definition: Excess amniotic fluid (>25 cm AFI).

2. Oligohydramnios

Definition: Decreased amniotic fluid (<5 cm AFI).

Treatment Protocols:

- Amnioinfusion for oligohydramnios
- Serial amnioreduction for polyhydramnios

F) Pelvic Inflammatory Disease (PID)

Definition: Infection of the female reproductive organs.

Predisposing Factors: Multiple sexual partners, sexually transmitted infections (STIs), poor hygiene.

Incidence: Common among reproductive-age women.

Etiology: Bacterial infections such as Chlamydia trachomatis and Neisseria gonorrhoeae.

Signs and Symptoms:

- Lower abdominal pain
- Abnormal vaginal discharge
- Fever

Diagnostic Evaluation:

- Endometrial biopsy
- Transvaginal ultrasound

Treatment Protocols:

- Broad-spectrum antibiotics (Ceftriaxone 250 mg IM, Doxycycline 100 mg PO bid for 14 days)

G) Intrauterine Growth Retardation (IUGR)

Definition: Fetal weight below the 10th percentile for gestational age.

Predisposing Factors: Maternal malnutrition, smoking, hypertension.

Incidence: 5-10% globally; higher in developing countries.

Etiology: Placental insufficiency, genetic factors.

Signs and Symptoms:

- Decreased fundal height
- Reduced fetal movements

Diagnostic Evaluation:

- Doppler ultrasound
- Biophysical profile

Treatment Protocols:

- Nutritional support
- Close monitoring (NST, Doppler)
- Early delivery if necessary

H) Post-Maturity

Definition: Pregnancy lasting beyond 42 weeks of gestation.

Predisposing Factors: Primiparity, previous post-term pregnancies.

Incidence: 5-10% globally.

Etiology: Unknown in most cases.

Signs and Symptoms:

- Decreased amniotic fluid
- Macrosomia

Diagnostic Evaluation:

- Ultrasound
- Non-stress test (NST)

Treatment Protocols:

- Induction of labor
- Continuous fetal monitoring

I) Intrauterine Death (IUD)

Definition: Fetal death after 20 weeks of gestation.

Predisposing Factors: Placental abruption, infections, maternal conditions (e.g., diabetes).

Incidence: 1-2% globally.

Etiology: Umbilical cord accidents, placental insufficiency.

Signs and Symptoms:

- Absence of fetal movements
- No fetal heartbeat

Diagnostic Evaluation:

- Ultrasound
- Doppler studies

Treatment Protocols:

- Induction of labor (Misoprostol: 200 µg vaginally)
- Emotional and psychological support

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Chapter 6: Normal Labour

6.1 Definition

Labour: Labor is the process through which the body works to deliver the baby, placenta, and membranes from the womb through the vagina into the outside world.

Normal labor, also called Eutocia.

Normal labor: Spontaneous vaginal delivery of a single, mature fetus (37–42 weeks), with vertex presentation, occurring within 3 to 18 hours, without complications for the mother or fetus.

Abnormal labor also called dystocia.

Abnormal labor: Any deviation from the definition of normal labor is called Abnormal labor.

Table 1 : Difference between True Labor & False Labor

True labour	**False labour**
Regular Contraction Occurs	Irregular Contraction Occur
Interval Gradually Shorten	Interval Remain Irregular
Increased Pain Intensity	Intensity of Pain Remains
Contraction Increased	Duration of Contraction decreased
Progressive Effacement & Dilatation	No Progress in Cervical Effacement & Dilatation
Progress Of Labour Not Stopped by Sedation	After Sedation No Progress of Labour

6.2 Component of labour - 5 P's

- Passage
- Passenger
- Power
- Psyche
- Position

6.3 Prelabor (Premonitory Stage):

- **Definition**: Starts 2-3 weeks before true labor in first-time mothers, and a few days before in women who have given birth before.

Features:

- **Lightening (welcome sign)**: Lightening occurs when the baby's head drops into the pelvis, easing breathing but causing frequent urination or constipation, and signalling the baby is well-positioned for birth.
- **Cervical Changes**: The cervix becomes softer, thinner, and shorter, and can be easily stretched as it prepares for labor.
- **False Pain**: Dull, lower abdominal pain that can be relieved by enema or sedatives. No hardening of the uterus.

6.4 True labor pain characters

- Regular, painful contractions: Braxton Hicks contractions are irregular, painless contractions that occur during pregnancy.
- Increasing frequency, intensity, and duration of contractions.
- "Show": Expulsion of cervical mucus plug mixed with blood
- Cervix thinning and opening.
- Baby's head moving down.
- Formation of the "bag of waters: The "bag of waters" is the bulging of fetal membranes filled with amniotic fluid, signalling the start of labor.
- Pain not relieved by enema or sedatives.

6.5 Onset of Labour

The onset of labour is defined as the time of onset of regular, painful uterine contractions, which produce progressive effacement and dilatation of the cervix.

6.6 Causes of Onset of Labor

- **Uterine Stretching**: The growing baby and amniotic fluid stretch the uterus, which helps start labor.
- **Fetal Hormones**: The fetus releases hormones that trigger changes in the body, leading to labor.
- **Estrogen**: Increases oxytocin (a hormone that causes contractions) and prepares the uterus for labor.
- **Progesterone**: As progesterone levels drop, the balance between estrogen and progesterone helps start labor.
- **Prostaglandins**: These substances help trigger and maintain contractions. They are influenced by factors like estrogen, stretching, or infection.
- **Prostaglandin Production**: Prostaglandins are made from a fatty acid and cause contractions by increasing calcium in the uterus.
- **Oxytocin and Receptors**: Oxytocin receptors increase in the uterus before labor, and oxytocin helps trigger contractions.
- **Nerve Signals**: Nerves in the uterus help start labor by sending signals that trigger contractions.

6.7 Stages of labor

- **First stage:** It starts from the onset of regular rhythmic contractions (true labor) pain and ends with full dilatation of the cervix and effaced.
- **Second stage:** The second stage is beginning with full cervical dilation to expulsion of the fetus.
- **Third stage:** The third stage of labour is that of separation and expulsion of the placenta and membrane.

- **Fourth stage:** The fourth stage is the first one hours after delivery of the placenta.

6.8 First Stage

- It is, in other words, the "**cervical stage**" of labor.
- Its average **duration** is 12 hours in primigravida and 6 hours in multipara.
- The stages are divided into **3 phases**: latent, active and transition phase.

Table 6.8.1. Latent phase

Characteristics	Client activity
• Mild pain • Contractions every 15-20 minutes, lasting 20-30 seconds • Starts with little to no cervical dilation, ends at 3-4 cm dilation • Latent phase lasts 9 hours for primigravida's, 5 hours for multigravidas • Abdominal cramps • Backache • Rupture of membranes • Show	• Normal activity if possible • Stay distracted with other interests • Pelvic rocking for back aches • Slow abdominal breathing during contractions • Use active relaxation techniques

Table 6.8.2. Active phase

Characteristics	Client activity
Contractions occur every 3 to 5 minutes, lasting up to 60 seconds. Active phase starts at 3-4 cm dilation and ends at 8 cm. Contractions increase in intensity as labor progresses. Active phase lasts 6 hours for primigravida and 4 hours for multigravida. Dilation rate should be 1.2 to 1.5 cm per hour.	Becomes more focused on herself. Finds a comfortable position. Uses abdominal/chest breathing during contractions, breathes normally between. Tries pelvic rocking or back rubs if experiencing pain. Takes medication if unable to relax. Continues practicing relaxation techniques.

Table 6.8.3 Transition phase

Characteristics	Client activity
• Dilatation: 8-10 cm • Contractions: Every 2-3 minutes, lasting 50-60 seconds • Intensity: Very strong during the transition phase • Average length: 2 hours in primigravida, 1 hour in multigravida • Symptoms: Generalized discomfort, hiccoughing, irritable abdomen, sudden behaviour changes, marked restlessness, nausea, and vomiting.	• Relaxes as much as possible • Uses pant-blow breathing if nauseated to prevent vomiting • Takes and holds a deep breath to manage nausea • May need encouragement to avoid pushing.

6.9 Physiological process in the first stage of labor

1. Uterine action

2. Mechanical factors

6.9.1. Uterine action

Fundal Dominance: Fundal dominance is when the upper part of the uterus contracts more strongly and for longer during labor, helping push the baby downward.

- **Polarity:** Polarity refers to the difference in contraction strength between the upper and lower parts of the uterus during labor. The upper part contracts strongly, while the lower part relaxes.
- **Uterine Contraction and Retraction:**

- **Uterine Contraction**: Temporary tightening of the uterus to help dilate the cervix and push the baby down.
- **Uterine Retraction**: Permanent tightening of the uterus after contractions to aid in the baby's descent and placenta expulsion.
- **Formation of Upper & Lower Uterine Segment:**

- **Upper Segment**: The top part of the uterus that contracts strongly to push the baby downward.
- **Lower Segment**: The lower part that stretches and thins out (effaces) to allow the baby to pass through the birth canal.
- **Retraction Ring:** Permanent shortening of uterine muscle Fibers during labor
- **Cervical Effacement:** Cervical effacement is the thinning of the cervix as labor begins, measured from 0% (thick) to 100% (completely thinned). It happens along with cervical dilation to prepare for childbirth.
- **Cervical Dilatation:** Cervical dilation is the opening of the cervix during labor, measured in centimetres from 0 to 10, with 10 cm indicating full dilation for childbirth.
- **Show:** The "show" in the first stage of labor is the release of the mucus plug from the cervix, which can be tinged with blood. It happens as the cervix starts to open and prepare for delivery.

6.9.2 Mechanical factors

- **Formation of Fore Waters:** The formation of forewaters refers to the accumulation of amniotic fluid in the area between the baby's head and the cervix during labor. It forms a sac called the "forewaters" before the actual rupture of the amniotic sac (the "water breaking").
- **General Fluid Pressure:** General fluid pressure is the pressure created by fluids in a system. During labor, it refers to the pressure of amniotic fluid around the baby, helping with the baby's position and labor process.
- **Rupture of Membranes:** Rupture of membranes, or "water breaking," is when the sac holding the amniotic fluid breaks, releasing the fluid, and usually signals the start of labor.
- **Fetal Axis Pressure:** Fetal axis pressure refers to the pressure exerted by the baby’s body, particularly its head, on the cervix during labor. This pressure helps the cervix dilate and encourages the baby to move down the birth canal.
- **Descent of Presenting Part:** The descent of the presenting part is when the baby’s head (or another part) moves down the birth canal during labor, getting ready for delivery.

6.10 Management of the first stage

6.10.1 Principles

- **Non-Interference**: Let labor progress naturally while being prepared to assist if needed.
- **Monitoring**: Keep a close watch on the mother and baby to catch any problems early.

6.10.2 General Care

- Antiseptic Dressing: Ensure cleanliness with antiseptic dressing.
- Support: Provide emotional support and encouragement to boost morale.
- Supervision: Ensure constant monitoring and supervision.

6.10.3 Admission to Labor and Delivery Unit:

- **Changing Clothes:** The woman changes into a hospital gown.
- **Personal Belongings**: Safeguard her personal items or return them to family.
- **Identification:** Apply identification bands.
- **Chart Forms:** Complete necessary forms for admission.
- **Admission Orders:** Follow specific admission instructions.
- **Evaluation:** Perform a thorough evaluation, including history, physical and pelvic exams, and necessary tests.

6.10.4 Perineal shave:

To prevent infection, the perineum is shaved, including the mons pubis, vulva, and anal region. This ensures cleanliness and allows for better visibility of the perineum during delivery.

6.10.5 Bowel Care - Enema:

Bowel care with an enema stimulates uterine contractions, ensures a clean delivery area, and makes examinations more comfortable.

- Avoid enemas in late labor, ruptured membranes, unengaged presenting part, complications like bleeding or pre-eclampsia, and when stomach function is reduced (only liquids allowed).

6.10.6 Food And Fluids by Mouth:

Women in labor should not eat solid food. Clear liquids with added sugar (like tea, coffee, or water) are best for energy and hydration. Most women only need fluids to moisten their mouth and throat. If general anesthesia is expected, even fluids should be restricted.

6.10.7 Intravenous fluid infusion:

IV fluids maintain hydration, support maternal nutrition, and provide a way to administer medication, fluids, or blood during emergencies.

An IV infusion is necessary in the following cases:

1. Gravida 5 or more (5 or more pregnancies).
2. Overdistended uterus (e.g., multiple gestation, polyhydramnios, or large baby).
3. Pitocin induction or augmentation.
4. Maternal dehydration or exhaustion.
5. Complications like abruptio placentae, placenta previa, pre-eclampsia, or eclampsia.
6. Conditions that may lead to postpartum hemorrhage.

6.11 Position and ambulation

- The mother can choose a comfortable position, such as sitting, standing, or walking, unless there are complications. If the membranes have ruptured and there are risks like a breech or small baby, she should lie supine or on her side to avoid cord prolapse.
- A woman should lie on her side during the first stage of labor if she has conditions like supine hypotensive syndrome, fetal distress, severe pre-eclampsia, or ineffective contractions.

6.12 Medication

Medications used during labor serve the following purposes: pain relief, anxiety reduction, sedation, and control of vomiting.

Timing of Medication

- Medications should be given at the right time in labor to avoid affecting the baby at birth (e.g., causing sleepiness or breathing issues).
- Small doses (like 25mg of Demerol) can be given early without problems.
- Narcotics should only be given during active labor.
- Tranquilizers won't affect contractions or slow labor.
- Sedatives are used for false labor, exhaustion in early labor, or to manage abnormal contractions.

Nurse's Responsibilities

- Check the woman's knowledge and concerns about anesthesia.
- Confirm no drug allergies.
- Record baseline vitals.
- Monitor fetal heart rate (FHR) and take action if there's an issue.
- Perform a vaginal exam before giving medication.
- Review health info with care providers.
- Ensure the woman empties her bladder before anesthesia.
- Give IV fluids if needed.

- Help position the woman for anesthesia.
- Monitor for any complications like dizziness, heart rate changes, or loss of consciousness.

Monitor for Adverse Effects

- **Itching**: May occur on the chest, face, and arms within the first hour after medication.
- **Nausea/Vomiting**: Can affect up to 50% of women; treat as directed.
- **Headache**: Pain in the forehead/neck, worse when upright, may improve lying down; can include nausea and vision/hearing issues.
- **Urine Retention**: Watch for bladder swelling.
- **Labor Progress**: Monitor uterine activity, cervical dilation, and fetal descent. May slow for 30-60 minutes after medication.
- **Neonatal Effects**: Check the baby for motor tone changes and breathing issues; resuscitate if needed.
- **Catheter Removal**: Keep the woman in the same position as during insertion.

Monitor maternal physiological changes

10. **Vital Signs:**
    - **Blood Pressure**: BP rises during contractions but returns to normal between them. Changing to a lateral position can reduce BP changes.
    - **Vital Sign Checks**: Every 2 hours with intact membranes, and every 1 hour after membranes rupture.
    - **Pulse**: Increases during contractions and decreases afterward. A slightly elevated pulse is normal.
    - **Respiratory Rate**: May slightly increase. Prolonged hyperventilation can cause alkalosis.

11. Renal System:

- Bladder distension can occur; empty it every 2 hours to avoid obstruction and trauma.
- Slight proteinuria (trace to +1) is common, especially with anemia or prolonged labor.

12. Gastrointestinal Changes:

- Reduced gastric motility, slower digestion, and prolonged gastric emptying.
- Limit oral intake to liquids.
- Nausea and vomiting may occur, often due to pain, fear, or medication.

13. Hematological Changes:

- Blood coagulation improves, reducing postpartum hemorrhage risk.
- White blood cell count rises during the first stage.
- Blood glucose drops, especially in prolonged labor.

14. Fetal Monitoring:

- Examination: Check fetal lie, presentation, and heart rate.
- FHR Monitoring: Use fetoscope, Doppler, or external/internal monitoring.
- When to Check FHR: After membranes rupture, enema, labor changes, medication, or complications.

Continuing care and evaluation

15. Evaluation of the maternal well-being

- **Vital Signs:**
    - Blood Pressure: Every hour.
    - Temperature, Pulse, Respiration: Every 2 hours (or 4 if membranes intact); every hour after membranes rupture.
- **Bladder Care:** Monitor and encourage bladder emptying.
- **Urine Testing:** Check for protein and ketones**.**
- **Hydration:** Monitor fluids and manage nausea/vomiting.
- **General Condition:** Assess fatigue, behavior, pain, and coping.
- **Bladder Care:**
- Check the bladder every 2 hours for distention during active labor.
- The bladder may become distended with as little as 100ml of urine as the baby descends.

- Untreated bladder distention can lead to obstructed labor, difficulty with postpartum hemorrhage, shoulder delivery, discomfort, or bladder issues.
- **Encouraging Bladder Emptying:**
- Encourage the woman to urinate every 2 hours, aiming for at least 100ml.
- Check for bladder distention by palpating the abdomen.
- Assist with privacy, water running, or a warm perineal bottle.
- Catheterize if needed, and monitor intake and output, especially with Pitocin or MgSO4.
- **Hydration:**
- Ensure hydration during labor.
- Watch for dehydration signs like dry lips or mouth.
- Track fluid intake, urine output, and vomiting.
- If nausea/vomiting occurs, provide more IV fluids.

16. Evaluation of the fetal well-being

External Monitoring:

- Monitors contractions and fetal heart rate continuously.
- Uses ultrasound transducers on the abdomen; no need for membrane rupture.
- May be less accurate with loose straps or maternal movement.

Internal Monitoring:

- Involves placing devices directly in the uterus.
- Measures contractions and fetal heart rate via a scalp electrode.
- Requires ruptured membranes and cervical dilation.
- Provides accurate monitoring and more comfort for the patient.

17. Evaluation of the progress of labour

- Contractions: Track pattern, frequency, duration, and intensity.
- Maternal Behavior: Watch for changes.
- Signs of Transition: Identify signs of approaching second stage.

- Back Pain: Monitor location of pain.
- Fetal Heart Tones: Locate maximum intensity.
- Vaginal Exam:
    - Check cervix dilatation and effacement.
    - When to examine:
        - On admission to set a baseline.
        - Before medication.
        - As labor progresses to confirm full dilatation.
        - After membrane rupture to check for cord prolapse.
        - Limit exams if PROM occurs.

18. Screening for maternal or fetal complications

- **Fetal Heart Rate (FHR):**
    - Tachycardia: FHR > 160 bpm – could indicate maternal ketoacidosis.
    - Bradycardia: FHR < 120 bpm – suggests fetal hypoxia or cord compression.
- **FHR Variability:** Normally varies by 5 bpm. Low variability can indicate fetal hypoxia or be due to medication or fetal sleep.
- **Contraction Responses:**
    - Early Deceleration: Occurs with head compression, can be normal.
    - Late Deceleration: Occurs after contraction, suggests fetal hypoxia.
    - Variable Deceleration: Irregular pattern, may indicate fetal distress.
- **Fetal Blood Sampling:** Low pH (< 7.25) in the fetus during labor indicates acidosis, confirming hypoxia.
- **Amniotic Fluid:**
    - Green: Meconium staining.
    - Yellow/Green: Past distress.
    - Golden Yellow: Rhesus isoimmunization.
    - Blood: Suggests vasa previa.

- **Fetal Distress:**
    - **Causes**: Lack of oxygen, hypoxia, or asphyxia, leading to brain damage or stillbirth.
    - **Signs**: High fetal heart rate (tachycardia), Low fetal heart rate (bradycardia) & Meconium in the amniotic fluid
    - **Management:**

1. Call the physician.
2. Stop oxytocin.
3. Position woman on her left side.
4. Give oxygen via face mask.
5. Take a fetal blood sample.
6. First stage: Perform C-section.
7. Second stage: Consider episiotomy, forceps, or ventouse.
8. Resuscitate the baby.
9. Ensure pediatrician is present.

19. Bodily care of women

- **Bodily Care:**
- Keep the woman clean and comfortable to reduce infection risk.
- Shower or sponge bath.
- Ambulate if safe.
- Change gown, sheets, and provide perineal care.
- Wash hands frequently.
- **Mouth Care:**
- Use mouthwash, glycerine swabs, or Vaseline for cracked lips.
- Offer water or clear liquids with sugar to moisten the mouth.
- **Back Rub:**
- Provides relaxation, especially during contractions.
- **Abdominal Rub:**
- Light, circular rubbing of the abdomen to soothe the woman.

- **Leg Cramp Relief:**
- Straighten the leg and flex the foot to ease cramps.

20. Partograph:

- A partograph is a chart used to monitor labor progress, developed by Freidman in 1954. It tracks cervical dilation and fetal head descent over time.
- **Key Features:**
- Active labor starts at 3 cm dilation.
- Latent phase should last no longer than 8 hours.
- Dilation should progress by 1 cm/hour during active labor.
- Vaginal exams every 4 hours.
- **Purpose:**
- Record clinical observations.
- Track labor progress and identify any issues.
- Monitor maternal and fetal well-being.
- **How It Works:**
- **Patient Information:** Record details like name, gravida, hospital number, and membrane status.
- **Fetal Condition:**
- Fetal Heart Rate: Checked every hour in 1st stage, half-hourly in 2nd stage.
- Amniotic Fluid: Record color at each vaginal exam:
    - Clear, meconium-stained, or blood-stained.
- Moulding: Indicates how the skull bones are fitting during labor.

- **Labor Progress:**
- Cervical Dilation: Measured at each exam, starting at 3 cm.
- Alert Line: Shows expected dilation rate; if the curve moves right, it means labor is slowing.
- Action Line: 4 hours after the alert line; intervention needed if dilation slows.
- Fetal Station: Location of the baby's head in the pelvis, recorded during exams.

- **Uterine Contractions:**
- Frequency: How often contractions occur.
- Duration: How long each contraction lasts.

- **Maternal Condition:**
- Record blood pressure, pulse, temperature, and urine output.

- **Advantages:**
- All labor information on one chart.
- Helps identify problems early.
- Aids in decision-making and smooth transitions between caregivers.
- Reduces the risk of prolonged labor and unnecessary C-sections.

SECOND STAGE OF LABOUR / PUSHING STAGE / PELVIC STAGE

1. **Definition:**
   The second stage begins when the cervix is fully dilated (10 cm) and ends when the baby is born.
2. **Duration:**
    1. First-time mothers (Primigravida): About 2 hours.
    2. Experienced mothers (Multigravida): About 30 minutes.
3. **Phases of the Second Stage:**
    1. **Latent Phase / Propulsive Phase**:

- Baby moves 0-3 cm below the cervix.
- Period of rest and calm.
- Fetus moves down the birth canal and rotates into the anterior position due to uterine contractions.
- Woman stays quiet and relaxed, often with eyes closed between contractions.

- The urge to push is not strongly felt and may only happen at the peak of a contraction, if at all.

2. **Descent Phase (Active Pushing) / Expulsive Phase**:

- Strong urge to push due to Ferguson reflex, activated when the baby's head presses on the pelvic floor's stretch receptors.
- Fetal station is at 1+.
- The fetal position is anterior.

i. Baby moves from 4-10 cm below the cervix toward the vaginal outlet (crowning).

ii. **Ferguson reflex**: Pressure from the baby's head on the cervix causes stronger contractions.

3. Transition Phase / Compulsive Phase:

- Baby is born as the head and body exit the birth canal.
- The mother pushes during contractions to deliver the baby, with the presenting part on the perineum.
- Bearing down becomes more effective in promoting birth.
- The woman may become more vocal about the pain, possibly screaming or swearing, and may feel out of control.

4. Physiological changes of second stage of labour

1. Uterine Action:

- Contractions get stronger and longer but happen less often, allowing rest.
- The membranes break, releasing fluid, which helps the baby's head press against the cervix and helps it open.
- The baby's head flexes, making it easier to move down.
- The urge to push becomes stronger as the baby moves lower.

2. Soft Tissue Displacement:

- The baby's head pushes against the pelvis, moving the bladder and rectum.
- The perineum stretches, and the baby's head becomes visible at the vulva (crowning).
- The baby's head is born first, followed by the body.

3. Rupture of Membranes:

- The membranes break, and fluid helps the baby's head press against the vagina, aiding in delivery.

4. Delivery of the Fetus:

- The baby is delivered with the help of uterine and abdominal muscle contractions.

5. Recognition of the Commencement of the Second Stage of Labor:

1. Expulsive Uterine Contractions:

- Strong contractions that usually indicate full cervical dilation, though some women may feel the urge to push even before full dilation.

2. Rupture of Fore Waters:

- The water may break at any point during labor, but it often happens at the end of the first stage when the cervix is fully dilated.

3. Dilatation and Gaping of the Anus:

- As the baby's head descends and puts pressure on the pelvic floor, the anus may stretch and gape. This can lead to the release of faecal matter.

4. Appearance of the Presenting Part:

- The presenting part of the baby (usually the head) may become visible. However, excessive moulding or a breech presentation may be seen before full dilation.

5. Show:

- The loss of bloodstained mucus at the end of the first stage, indicating rapid cervical dilation. It should be distinguished from fresh bleeding, which could suggest complications.

6. Congestion of the Vulva:

- Pressure from the baby's head on the vulva causes venous congestion, which can also occur from premature pushing.

7. Appearance of Rhomboid of Michaelis:

- A dome-shaped curve in the lower back that indicates posterior displacement of the sacrum and coccyx as the baby moves into the

maternal sacral curve. This causes the mother to arch her back, push her buttocks forward, and grip nearby objects. This sign is typically seen when the woman is upright.

MECHANISM OF THE SECOND STAGE

Mechanism: Is the series of movements of the fetus in its passage through the birth canal.

Principles:

1. Descent takes place throughout the labour
2. Whichever part leads and first meets the resistance of the pelvic floor will rotate forwards until it comes under the symphysis pubis.
3. Whatever emerges from the pelvis will pivot around the pubic bone.

Mechanism of Labour in a Normal Vertex Presentation

- Lie -Longitudinal
- Presentation-Cephalic
- Position- Left or right Occipito anterior
- Attitude- Flexion
- Denominator – Occiput
- Presenting part – Posterior part of the anterior parietal bone

Cardinal Movement

- Engagement, Descent, Flexion, Internal rotation of the head, Extension of the head, External Rotation / Restitution, Internal rotation of the shoulders, Lateral flexion.
- In the Left Occiput Anterior (LOA) position, the occiput is in the left sacroiliac joint, and the sinciput is near the right iliopectineal eminence, following an oblique pelvic diameter.
- **The head engages the pelvis with the Sagittal suture in the transverse diameter of the pelvic brim**

1. **Descent**:
    - Descent of the fetal head starts before labor begins and continues throughout labor.

- Uterine contractions apply pressure, forcing the fetus down into the pelvis, speeding up after the rupture of membranes and maternal effort.

2. **Flexion:**
    - During labor, uterine contractions increase flexion of the fetal head.
    - The fetal head becomes more flexed, reducing the diameter from 10 cm (suboccipito-frontal) to 9.5 cm (suboccipito-bregmatic).
    - The occiput (back of the head) becomes the leading part.
3. **Internal Rotation of the Head:**
    - In a well-flexed vertex position, the occiput leads and meets the pelvic floor first.
    - The occiput rotates 1/8 of a circle, moving toward the symphysis pubis.
    - The sagittal suture of the head shifts from an oblique position to an anterior-posterior one.
4. **Crowning:**
    - The occiput slips beneath the sub-pubic arch, and crowning happens when the head no longer recedes between contractions.
    - The biparietal diameter (widest part of the head) is now visible, and the sub-Occipito bregmatic diameter (9.5cm) stretches the vaginal opening.
5. **Extension of the head:**
    - Once crowning occurs, the head extends around the pubic bone, pivoting on the suboccipital region.
    - The sinciput, face, and chin are born through extension, and the sub occipitofrontal diameter (10cm) stretches the vaginal opening.
6. **Restitution:**
    - The twist in the fetus' neck caused by internal rotation is corrected by a slight untwisting movement.
    - The occiput rotates 1/8 of a circle back to its original position.
7. **Internal Rotation of the Shoulders**:
    - The anterior shoulder reaches the pelvic floor and rotates under the pubic symphysis.
    - This movement occurs simultaneously with the external rotation of the head and aligns the occiput laterally.

8. **Lateral Flexion:**
    - The anterior shoulder is delivered with downward and backward movement.
    - The posterior shoulder is delivered with upward and forward movement.
    - The rest of the body is delivered through lateral flexion.

MANAGEMENT OF THE 2ND STAGE OF LABOUR

Transition Features:

1. Increasing intensity of uterine contractions
2. Bearing-down efforts
3. Urge to push or defecate with descent of the presenting part
4. Complete dilatation of the cervix (confirmed on vaginal examination)

Principles:

1. Assist in natural expulsion of the fetus slowly and steadily
2. Prevent perineal injuries

General Measures:

- **Position:** The patient should be in bed.
- **Supervision:** Constant supervision is mandatory; FHR is recorded every 5 minutes.
- **Analgesia:** Administer inhalation analgesics (N2O and O2) to relieve pain during contractions.
- **Vaginal Examination:** Confirm the onset of the second stage, check for cord prolapse, and assess the position and descent of the head.

Preparation for Delivery:

1. **Position:** Commonly dorsal position with 15° left-lateral tilt to avoid aortocaval compression and facilitate pushing.
2. **Accoucheur:** Scrub up, wear sterile gown, mask, gloves, and stand on the right side.
3. **Toileting:** Clean external genitalia and thighs with cotton swabs soaked in Savlon or Dettol.
4. **Sterility:** Place sterile sheets under the patient; use sterilized leggings.

5. **Aseptic Procedures (Three Cs):**
    - Clean hands
    - Clean surface
    - Clean cutting and ligaturing of the cord
6. **Catheterization:** If the bladder is full, catheterize to avoid obstruction.

Conduction of Delivery

1. Delivery of the Head:

- **Encourage bearing down** during contractions to help the head move down.
- **Maintain head flexion**: Push the back of the head (occiput) down and back using your fingers while pressing on the perineum with your palm.
- **Crowning**: When the head is visible and doesn't recede after a contraction, it's called "crowning."
- **Episiotomy**: If the perineum is stretching too much, especially in first-time mothers, make an episiotomy after numbing the area.
- **Slow Head Delivery**: In between contractions, gently pull the chin down and apply pressure on the occiput to help the head come out slowly and in the right order (forehead, nose, mouth, chin).

2. Care After Head Delivery:

- **Clear Airways**: Use a gauze or suction to remove mucus from the mouth and nose.
- **Clean the Eyes**: Wipe the eyelids with sterile cotton swabs.
- **Check for Cord**: Feel the neck for the umbilical cord. If it's loose, move it over the head; if tight, cut it safely.

3. Preventing Perineal Tears:

- **Avoid Early Extension**: Keep the head flexed to ensure the smaller part of the head (suboccipital diameter) comes out first.
- **Do Not Rush the Delivery**: Let the head emerge slowly.
- **Episiotomy**: Only when needed.
- **Care During Shoulder Delivery**: Be cautious when delivering the wider shoulders.

4. Delivery of the Shoulders:

- **Wait for Rotation**: Allow the head to rotate and the shoulders to line up properly with the pelvis.
- **Anterior Shoulder**: Deliver the front shoulder under the pubic bone during the next contraction.
- **Posterior Shoulder**: Gently pull the head upward to help the back shoulder come out.
- **Gentle Pull**: Use gentle traction to avoid neck injuries.

5. Delivery of the Trunk:

- After the shoulders are out, hold the baby under the arms and gently deliver the rest of the body by tilting it to the side.

Immediate Care of the Newborn

1. **Positioning and Airway:**
    - Place the baby on a tray with the head slightly downward to help drain mucus.
    - Clear the baby's airways (mouth and nose) using gentle suction.
2. **Apgar Score:**
    - Record the baby's Apgar score at 1 minute and 5 minutes.
3. **Clamping and Cutting the Cord:**
    - Clamp the cord with two forceps, 5 cm from the baby's belly button, and cut the cord between them.
    - Tie two sterile ligatures around the cord to stop bleeding.
    - Check for abnormalities in the cord, such as a single artery.
    - Cut the cord 1 cm beyond the ligatures and cover the end with sterile gauze.
4. **Cord Clamping Timing:**
    - **Delayed Clamping (2-3 minutes)**: Helps full-term babies get more blood from the placenta.
    - **Early Clamping**: Used in cases like Rh incompatibility or asphyxiation to avoid complications.
5. **Check and Wrapping:**

- Quickly check the baby for any major issues.
- Wrap the baby in a dry, warm towel.

6. **Identification:**
    - Place identification bands on the baby's wrist and the mother's wrist.
7. **After Delivery:**
    - Once the third stage of labor is complete, hand the baby to the mother or nurse for further care.

Clinical Course of the Third Stage of Labor

1. **Pain:**
    - Little to no pain, but occasional discomfort with uterine contractions.
2. **Before Placenta Separation:**
    - **Abdomen:** Uterus feels firm, flat, and non-movable, with the fundus just below the belly button.
    - **Vagina:** Small amount of blood may trickle. The umbilical cord length stays the same.
3. **After Placenta Separation (About 5 Minutes):**
    - **Abdomen:** Uterus becomes round, firm, and movable. The fundus rises slightly as the placenta moves down.
    - **Vagina:** A small gush of blood. The umbilical cord lengthens permanently.
4. **Placenta Expulsion:**
    - The placenta is expelled, either by the mother's pushing or with help from a doctor. There's mild to moderate bleeding (100-250 mL) after delivery.
5. **Maternal Signs:**
    - Chills or shivering may occur.
    - A slight drop in blood pressure is common.

Placental Separation and Expulsion

1. **Placental Separation:**
    - Uterine contractions cause the placenta to separate from the uterus, starting in the center. This creates bleeding between the placenta and the uterus.
    - **Types of Separation:**
        - **Central Separation:** Begins in the center, forming a clot that helps detach the edges.
        - **Deep Separation:** Occurs in deeply embedded placentas, making separation harder.
        - **Marginal Separation:** Starts at the lower edge of the placenta.
2. **Placenta Descent:**
    - After separation, the uterus pushes the placenta down into the lower uterus and vagina.
    - **Signs of Placenta Descent:**

- The uterus becomes firm and round.
- The fundus rises to the belly button.
- The umbilical cord seems longer.
- A gush of blood is seen.
- Suprapubic pressure doesn't retract the cord.
- The placenta can be felt during a vaginal exam.

3. **Placental Expulsion Methods:**
    1. **Fundus as a Piston:** The uterus pushes the placenta out.
    2. **Controlled Cord Traction with Oxytocin:** Using oxytocin to help expel the placenta.
    3. **Controlled Cord Traction without Oxytocin:** Gentle pulling on the cord (Brandt-

Andrew's method).

3. **Fundal Pressure:** Pressure on the uterus helps expulsion.
4. **Bearing Down:** The mother helps push the placenta out.

Management of the Third Stage of Labor

The third stage of labor involves the separation, descent, and expulsion of the placenta. Proper management is important to prevent complications like excessive bleeding.

Types of Management:

1. **Expectant Management (Traditional)**:
    - The placenta is allowed to separate and descend on its own.
    - Close monitoring is essential to ensure the placenta separates and is expelled within 15-20 minutes.
    - If necessary, the mother is asked to bear down to help expel the placenta. If the placenta doesn't come out, gentle traction may be used.
2. **Active Management (Preferred)**:
    - **Oxytocin Injection**: A 10-unit oxytocin injection is given immediately after the baby is born to help the uterus contract and expel the placenta.
    - **Controlled Cord Traction**: If the placenta doesn't come out on its own, gentle traction on the cord is applied to help deliver it. If it still doesn't expel, manual removal may be needed.
    - **Advantages**: Reduces blood loss, shortens the stage, and helps the uterus contract properly.
    - **Disadvantages**: Slightly higher risk of retained placenta.

Additional Steps:

- **Placenta and Membrane Check**: After expulsion, the placenta is examined for completeness, and the cord is checked for the correct number of blood vessels.
- **Perineal Examination**: The vulva, vagina, and perineum are checked for any tears that need stitching.
- **Uterine Massage**: After expulsion, the uterus may be gently massaged to prevent bleeding.

Fourth Stage of Labor

The **fourth stage of labor** is the recovery period that occurs **immediately after** the delivery of the baby, placenta, and membranes. It typically lasts for **at least 1 hour** and involves close observation to ensure the well-being of both the **mother and the baby**.

Key Points:

- **Maternal Monitoring**: The mother's vital signs (blood pressure, pulse, and temperature) are closely monitored to detect any signs of complications like postpartum hemorrhage or infection.
- **Uterine Contraction**: The uterus is checked to ensure it is contracting properly to reduce bleeding and return to its pre-pregnancy size.
- **Bleeding Control**: Any abnormal bleeding is addressed, and measures are taken to control postpartum hemorrhage if it occurs.
- **Baby's Condition**: The baby is assessed for breathing, warmth, and general health. Skin-to-skin contact and early breastfeeding may be encouraged.
- **Emotional Support**: The mother is offered support and reassurance as she begins to bond with her baby.

The fourth stage is a critical recovery time where both the mother and the baby are closely observed for any immediate health concerns.

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Chapter 7: Normal Puerperium

1 Introduction

1. **Definition:**

Puerperium is the period after childbirth when the body returns to its pre-pregnancy state.

This process is called **involution**, especially of the uterus and pelvic organs.

2. **Duration:**

Puerperium starts after the placenta is expelled and lasts about **6 weeks**. It is divided into:

- **Immediate puerperium**: within the first 24 hours
- **Early puerperium**: up to 7 days
- **Remote puerperium**: up to 6 weeks

3. **Involution of the Uterus:**

- **Right after delivery**, the uterus is large and firm. It measures **20 × 12 × 7.5 cm** and weighs **1,000 g**.
- By **6 weeks**, the uterus shrinks to its pre-pregnancy size and weighs around **60 g**.
- The cervix gradually tightens but never fully returns to its pre-pregnancy shape.

4. **Physiological Changes in the Uterus:**

1. **Muscles**: The uterine muscles shrink after pregnancy.
2. **Blood Vessels**: Blood vessels at the placental site shrink and form clots.
3. **Endometrium**: The lining of the uterus is shed and regenerates, but the placental site takes **6 weeks** to heal.

5. **Clinical Assessment of Involution:** The height of the uterus is measured after childbirth.

- **Immediately after birth**, it is about **13.5 cm** above the pubic bone.
- **By the 2nd week**, the uterus drops into the pelvic cavity.
- **By 6 weeks**, the uterus is back to its normal size.

6. **Involution of Other Pelvic Structures:**

- **Vagina**: The vagina shrinks over **6–10 weeks** but never fully returns to its pre-pregnancy state.
- **Cervix**: The cervix gradually shrinks but never fully reverts.
- **Ligaments**: Pelvic ligaments stretch during childbirth and take time to recover.

7. Lochia (Postpartum Vaginal Discharge):

Lochia is the vaginal discharge after childbirth, changing over time:

- **Lochia rubra (red)**: The first 1–4 days, mostly blood.
- **Lochia serosa (pink)**: Days 5–9, with fewer blood cells and more white blood cells.
- **Lochia alba (white)**: Days 10–15, made up of white blood cells and mucus.

Clinical Importance of Lochia:

- **Odor**: A foul smell suggests infection.
- **Amount**: Scanty lochia may signal infection, while too much could suggest retained placenta.
- **Color**: If red lochia persists too long, it may indicate a problem with the uterus.
- **Duration**: If lochia lasts longer than 3 weeks, it may signal an issue. Lochia typically lasts about **3 weeks**, and the total amount in the first few days is about **250 ml**.

8. General Physiological Changes After Delivery

1. Pulse:

- The pulse may increase briefly after delivery but returns to normal by the second day.
- It may rise again due to after-pains or excitement.

2. Temperature:

- Temperature should stay below 37.2°C (99°F) in the first 24 hours.

- A small rise (0.5°F) is normal for the first 12 hours, and mild temperature rise may happen on the 3rd day due to breast engorgement, but it should return to normal in 24 hours.

3. Urinary System:

- The bladder may become swollen and retain more urine, causing difficulty in urinating.
- Urinary retention and infections are common, and the kidneys return to normal size **in 8 weeks.**

4. Gastrointestinal System:

- Increased thirst occurs due to fluid loss.
- Constipation is common, and some women may have anal incontinence.

5. Weight Loss:

- Women lose 5–6 kg immediately after delivery, and another 2 kg due to fluid loss.
- Weight loss continues for up to 6 months.

6. Blood and Fluid Changes:

- Blood volume decreases right after delivery but returns to normal by 2 weeks.
- Cardiac output rises initially but returns to normal in 1 week.
- Blood cell counts (RBCs, white blood cells, platelets) adjust over the first few weeks.
- Fibrinogen levels remain high, and a temporary increase in clotting risk occurs.

7. Menstruation and Ovulation:

- Non-lactating mothers usually get their period back by the 12th week, while lactating mothers can take longer.
- Ovulation can happen before menstruation, so contraception is recommended.

8. Thyroid Function:

- Thyroid size and function return to normal within 12 weeks.
- Women on thyroid medication should check their levels.

Lactation After Delivery

1. Colostrum:

- First 2 days after delivery, **colostrum** (a thick yellow fluid) is produced.

- Colostrum is rich in **protein, vitamins (especially A)**, and **antibodies** that protect the baby.
- It has a **laxative effect** on the baby.

2. Phases of Lactation:

- **Mammogenesis (Breast Growth):**
  - Pregnancy stimulates growth in the mammary glands.
- **Lactogenesis (Milk Production):**
  - Milk starts to be produced on the **3rd or 4th day** postpartum.
  - **Prolactin** and other hormones help in milk secretion after delivery.
- **Galactokinesis (Milk Ejection):**
  - **Oxytocin** helps release milk when the baby suckles, but stress or pain can block milk release.
- **Galactopoiesis (Milk Maintenance):**
  - **Prolactin** keeps milk production going. Regular feeding is important to maintain supply.

3. Milk Production:

- A mother produces **500-800 mL of milk per day**, requiring about **700 kcal/day**.

4. Stimulating Lactation:

- Start breastfeeding within **1 hour** of delivery and continue **every 2-3 hours**.
- Avoid giving **water or honey** to the baby before breastfeeding.

5. Causes of Low Milk Production:

- Infrequent suckling, certain medications, or stress can reduce milk supply.
- Regular breastfeeding can help increase milk production.

6. Milk Boosters:

- **Medications** like **metoclopramide** or **domperidone** can help increase milk production.

7. Lactation Suppression:

- If breastfeeding isn't possible, **stop breastfeeding**, avoid pumping, and use **ice packs** for relief.
- **Medication suppression** is not recommended due to potential side effects.

8. Benefits for Premature Babies:

- **Breast milk** is especially important for premature infants, providing **nutrition**, **immunity**, and protection against health issues.

Management of Normal Puerperium

The main goals are:

1. **Restore the mother's health.**
2. **Prevent infection.**
3. **Promote breastfeeding.**
4. **Encourage contraception use.**

Immediate Care Post-Delivery:

- **Observation**: Monitor the mother closely after delivery. Emotional support is important, especially if she feels stressed or sad.

Early Movement:

- **Benefits**: After resting, encourage the mother to move around. It helps prevent complications like **bladder problems**, **constipation**, and **blood clots**, and supports the **uterus shrinking** back to normal size.

Early Discharge:

- **Discharge After 2 Days**: Healthy mothers can leave the hospital within 2 days of vaginal delivery. Some may need a longer stay due to complications.

Diet:

- **Lactating Mother**: Needs a high-calorie, nutritious diet with plenty of protein, vitamins, and fluids.
- **Non-Lactating Mother**: Can eat a regular diet.

Bladder Care:

- The mother should urinate soon after delivery. If she can't, **catheterization** may be needed.

Bowel Care:

- **Prevent Constipation**: A high-fiber diet and early movement can help. If needed, mild laxatives can be used.

Rest:

- The mother should rest physically and emotionally. **Ibuprofen** can help with pain relief.

Care of Wounds:

- Keep the **vulva clean**. Use antiseptic for perineal wounds. **Cold sitz baths** can relieve pain and swelling.

Breast Care:

- **Clean Nipple**: Wash before and after breastfeeding. Keep nipples dry to prevent soreness.
- **Breastfeeding**: Frequent, short feedings prevent nipple pain. Avoid bottles too early to prevent **nipple confusion**.

Mother-Infant Bonding:

- **Bonding**: Skin-to-skin contact, cuddling, and gazing at the baby strengthens the mother-child relationship.

Infection Prevention:

- **Clean Environment**: Use antiseptics for wound care, keep surroundings clean, and limit visitors to reduce infection risk.

Vaccinations:

- **Rh-negative mothers** with Rh-positive babies should get **anti-D gamma globulin**.
- **Rubella vaccine** is safe if given after delivery, with a 2-month wait before pregnancy.
- **Tetanus**, **Hepatitis B**, and **Tdap** booster doses should be given if not done during pregnancy.

Management of Common Postpartum Ailments

1. **After Pain**:
    - **Cause**: This pain occurs in the lower abdomen for 2–4 days, often due to uterine contractions, especially in first-time mothers (primipara) or following vigorous contractions in multipara. It is triggered by breastfeeding and the uterus trying to expel blood clots.
    - **Treatment**: Massage the uterus to expel clots, followed by **analgesics** (Ibuprofen) and **antispasmodics**.
2. **Perineal Pain**:

- **Cause**: Perineal pain may occur after delivery. Early detection of complications like **vulvo-vaginal hematoma** is essential.
- **Treatment**: Sitz baths (hot or cold) can provide relief.

3. **Anemia**:
    - **Cause**: Many women in tropical areas experience anemia after delivery.
    - **Treatment**: Iron supplements (200 mg of ferrous sulfate) should be taken for 4–6 weeks.
4. **Hypertension**:
    - **Treatment**: Manage blood pressure until it returns to normal. Consult a doctor if **proteinuria** (protein in urine) persists.

Monitoring and Exercises

1. **Postpartum Chart**:
    - **Record**: Pulse, temperature, respiration (every 6 hours or twice a day), height of the uterus, **lochia** (discharge), and bowel and urinary movements.
2. **Postpartum Exercises**:
    - **Objective**: Improve muscle tone (especially abdominal and perineal muscles) and correct posture.
    - **Benefits**: Prevent **venous thrombosis**, back pain, and **genital prolapse**.
    - **Types of Exercises**:
        - **Pelvic floor**: Contract and relax muscles like holding in urine or stool.
        - **Abdominal**: Lie on back with bent knees, contracting and relaxing abdominal muscles.
        - **Back**: Lie on stomach and gently move shoulders up and down.
    - **Duration**: Continue exercises for at least 3 months.
    - **Activity Resumption**: Physical activities can begin soon after delivery, but **sexual activity** should wait until 6 weeks after perineal healing and stopped bleeding.

Post-Discharge Advice

1. **Check-Up**:
    - A thorough check-up of both mother and baby is required before discharge.
    - Discharge certificate should include essential details about both.
2. **Post-Discharge Advice**:
    - **General Health**: Continue iron supplements.
    - **Exercises**: Keep doing postpartum exercises.
    - **Return to Activities**: Gradually resume daily activities.
    - **Breastfeeding**: Continue breastfeeding and care for the newborn.
    - **Avoid Intercourse**: Wait for 4–6 weeks for healing of lacerations or episiotomy.
    - **Family Planning**:
        - Non-lactating women: Start contraception after 3 weeks.
        - Lactating women: Start after 3 months.
    - **Postnatal Check-Up**: Schedule a follow-up after 6 weeks.
3. **Contraception**:
    - **Lactating Women**: Exclusive breastfeeding provides 98% contraception for 6 months.
    - **Non-Lactating Women**: Start **combined contraceptives** after 3 weeks or use barrier methods.
    - **IUDs**: Can be inserted right after delivery, though there is a slight chance of expulsion.
    - **Sterilization**: A permanent option for women who have completed their families.

Postnatal Care

Postnatal care involves checking the health of both the mother and the baby and giving advice during the postpartum period. The first check is done at the hospital discharge, and the second check happens **6 weeks later**.

Main Goals:

1. **Mother's Health**: Reassess conditions like diabetes, hypertension, or thyroid issues.
2. **Baby's Progress**: Track the baby's growth and immunizations.
3. **Family Planning**: Provide guidance on contraception.

Steps in Postnatal Care:

1. **Mother's Examination**:
    - Check **weight, pallor, blood pressure**, and **abdominal muscle tone**.
    - Pelvic exam and cervical smear if needed.
    - Blood tests (e.g., hemoglobin) if necessary.
2. **Baby's Examination**:
    - Done by a pediatrician to monitor growth and begin vaccinations.
3. **Advice for the Mother**:
    - **Health**: Return to normal activities if healthy.
    - **Exercise**: Continue postpartum exercises for 4–6 weeks.
    - **Vaccinations**: Get MMR and HepB vaccines.
    - **Breastfeeding**: Continue breastfeeding for 6 months.
    - **Family Planning**: Guidance on contraception.

Common Postpartum Issues and Management:

1. **Irregular Vaginal Bleeding**:
    - **Cause**: Often the first period for non-lactating women.
    - **Treatment**: No treatment needed unless bleeding persists, in which case an ultrasound may be needed.
2. **Leukorrhea (White Discharge)**:
    - **Cause**: Can be due to infection or uterine issues.
    - **Treatment**: Improve health and treat infection if necessary.
3. **Cervical Ectopy (Cervical Erosion)**:
    - **Cause**: Often hormone-induced from pregnancy.

- **Treatment**: No surgery unless symptoms persist after 6 weeks.

4. **Backache**:
    - **Cause**: From strain during pregnancy.
    - **Treatment**: Physiotherapy for relief.
5. **Pelvic Organ Prolapse** (e.g., uterine descent):
    - **Cause**: Weak pelvic muscles after childbirth.
    - **Treatment**: Pelvic floor exercises; surgery if severe.
6. **Incontinence** (Urinary or Anal):
    - **Cause**: Injury to pelvic muscles.
    - **Treatment**: Perineal exercises; surgery if symptoms persist.

Summary:

- **General Health**: Maintain a healthy diet and continue necessary treatments.
- **Exercise**: Keep doing postpartum exercises for muscle recovery.
- **Immunizations**: Ensure the baby gets all vaccines.
- **Family Planning**: Discuss contraception based on your health.
- **Follow-up**: Regular check-ups for both mother and baby.

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Chapter 8: Normal Newborn

1. **Healthy Infant Characteristics**:
    - Born at term (38-42 weeks).
    - Average birth weight usually exceeds 2,500 grams.
2. **Cry and Respiration**:
    - Cries immediately after birth.
    - Establishes independent breathing.
3. **Birth Weight in India**:
    - Typically, between 2.7 kg and 3.1 kg, with an average of 2.9 kg.
4. **Length**:
    - Measures 50–52 cm (crown to foot).
    - Length is a better indicator of gestational age than weight.
5. **Head Measurements**:
    - Occipitofrontal circumference (head size): 32–37 cm.
    - Biparietal diameter (width of the head): About 9.5 cm.

PHYSICAL FEATURES OF THE NEWBORN

1. Pre-Examination History:

- Review maternal and perinatal history (age, medical issues, pregnancy complications, labor details).

2. Vital Signs:

- **Temperature**: Record and mention site (rectal, oral, or axillary).
- **Respiration**: Normal 30-60 breaths/min, may use pulse oximetry.
- **Pulse**: Normal 100–160 bpm (70–80 bpm when asleep).
- **Blood Pressure**: Normal 45–60/25–40 mm Hg, related to gestational age and birth weight.

3. General Examination:

- **Skin Color**: Check for pallor, cyanosis, acrocyanosis, plethora, jaundice, or bruising.
- **Skin Rashes**:
    - **Milia**: White spots from plugged sweat glands.
    - **Mongolian Spots**: Bluish marks, common in Black and Asian infants.
    - **Erythema Toxicum**: Red rash with papules, resolves on its own.
    - **Diaper Rash**: Red patches, may be infected.

4. Head Examination:

- **Fontanels**: Check for size (large fontanel may suggest problems), bulging or depressed fontanels.
- **Caput Succedaneum**: Swelling from delivery pressure, resolves in days.
- **Cephalhematoma**: Blood collection under the scalp, may require monitoring.
- **Raised Intracranial Pressure**: Bulging fontanels, separation of sutures, prominent veins.
- **Craniosynostosis**: Premature skull suture closure, diagnosed by palpation and X-ray.

5. Neck Examination:

- Check for movement, goiter, cysts, or abnormal neck features (e.g., webbed neck).

6. Face and Mouth:

- Look for facial abnormalities (e.g., widely spaced eyes, low-set ears).

- Check for clefts, natal teeth, or oral thrush (treated with nystatin).

7. Eyes:

- Check for congenital cataracts, Brushfield spots (Down's syndrome), or conjunctivitis.

8. Chest:

- Look for asymmetry, respiratory issues (tachypnea, grunting), or breast enlargement (common, "Witch's milk").

9. Heart:

- Check heart rate (120–160 bpm), rhythm, heart sounds, and murmurs (may indicate heart defects).

10. Abdomen:

- Check for abnormalities like omphalocele, organ enlargement, or hernia.

11. Umbilicus:

- Look for infection, discharge, or meconium staining. Single umbilical artery may indicate genetic issues.

12. Genitalia:

- **Male**: Check for normal penis size, testes in the scrotum, or conditions like hypospadias.
- **Female**: Check for clitoral enlargement or labial fusion, blood-stained discharge (normal after estrogen withdrawal).

13. Anus and Rectum:

- Check for imperforate anus and ensure meconium is passed within 48 hours.

14. Extremities, Spine, and Joints:

- Check for abnormalities like syndactyly, polydactyly, or hip dislocation.

15. Nervous System:

- Check for irritability, muscle tone, reflexes (e.g., Moro reflex), and nerve issues like Erb's paralysis.

Reflex behaviours

1. Muscle Tone:

- **Hypotonia**: Floppy, weak muscles.
- **Hypertonia**: Increased muscle resistance.

2. Reflexes:

- **Rooting Reflex**: Stroke the cheek, and the baby turns toward it and opens their mouth.
- **Glabellar Reflex**: Tap the forehead, and the baby blinks their eyes.
- **Grasp Reflex (Palmar Grasp)**: Place a finger in the baby's palm, and the baby will grasp it.
- **Moro Reflex**: Hold the baby's back, let it fall back slightly, and the baby will extend and then flex arms. Asymmetry may indicate injury (e.g., fractured clavicle or nerve damage). Absence may suggest CNS problems.
- **Sucking and Swallowing Reflexes**: Baby starts sucking when the nipple touches the palate and swallows when their mouth is full of milk.

Assessment of Gestational Age at Birth:

Gestational Age Characteristics:

< 36 Weeks:

- **Sole Creases**: Transverse creases on the front 1/3 of the sole.
- **Breast Nodule**: 2 mm, soft.
- **Scalp Hair**: Fine, wooly, fuzzy.
- **Ear Lobe**: No cartilage.
- **Testes and Scrotum**: Testes partially descended, small scrotum with few rugae.

37–38 Weeks:

- **Sole Creases**: Multiple creases on the front 2/3 of the sole.
- **Breast Nodule**: 4 mm, moderate size.

- **Scalp Hair**: Fine, wooly, fuzzy.
- **Ear Lobe**: Moderate amount of cartilage.
- **Testes and Scrotum**: Testes partially descended, small scrotum with few rugae.

> 39 Weeks:

- **Sole Creases**: Entire sole covered with creases.
- **Breast Nodule**: 7 mm, firm.
- **Scalp Hair**: Coarse, silky.
- **Ear Lobe**: Stiff, thick cartilage.
- **Testes and Scrotum**: Testes fully descended, normal-sized scrotum with prominent rugae.

Immediate Care of the Newborn

Care at Birth:

- **Immediate Actions**: The newborn is kept with the mother for bonding and breastfeeding.
- **Common Issues Requiring Nursery Admission**: Prematurity, respiratory distress, poor circulation (pallor, cyanosis), malformations, or need for oxygen therapy.

Care in Nursery:

- **Admission Criteria**: All healthy newborns stay with the mother. Newborns requiring care are admitted based on the following:
    - Prematurity, respiratory distress, or poor perfusion.
    - Malformations or oxygen therapy needs.
- **Routine Care**:
    - **Examination**: Newborn is examined, gestational age is assessed, and weight, head circumference, and length are recorded.
    - **Temperature Control**: Maintain neutral thermal conditions (skin temperature 36.0–36.5°C, core temperature 36.5–37.5°C). Avoid heat loss through radiation, conduction, convection, and evaporation.

- **Prevention of Heat Loss**:
    - Place under a preheated radiant warmer.
    - Dry the baby immediately and cover with a warm towel.
    - Keep close to the mother's breast for Kangaroo care.
    - Start early breastfeeding.

Daily Observation and Care:

- **Rooming-in**: Baby stays beside mother to promote bonding and help the mother learn baby care.
- **Baby Bath**: Delay the first bath until the baby maintains body temperature and starts breastfeeding. Clean excess vernix and meconium with moist sterile swabs.
- **Umbilical Care**: Keep exposed to air and dry for detachment. Apply antiseptics if necessary.
- **Routine Medications**: Vitamin K1 is given to prevent bleeding, and eye prophylaxis (erythromycin or tetracycline ointment) is used to prevent infections like ophthalmia neonatorum.
- **Vaccines**: Hepatitis B vaccine is given at birth.

Screening and Vital Signs:

- **Common Screenings**: Check glucose, bilirubin, and other metabolic conditions (e.g., galactosemia).
- **Vital Signs Monitoring**: Respiratory rate, heart rate, and temperature are recorded every 6–8 hours. Daily weight is checked, and output (urine, stool) is monitored.

Feeding:

- **Feeding Schedule**: Baby should be fed on demand (8–12 times per day).
- **Weight Loss**: A loss of 7% or more may indicate insufficient feeding.

Discharge Criteria:

- Discharge is possible after 48 hours if the newborn meets the following:
    - Vaginal delivery, >38 weeks gestational age, AGA weight.

- Normal vital signs, passed urine/stool, and successful breastfeeding.
- Immunizations done.

Follow-Up:

- After discharge, newborns should be monitored for feeding issues, infections, and jaundice.
- Regular follow-up visits are important for growth and health assessment.

Infant Growth Assessment:

- **Weight**: Expect 7–10% weight loss in the first week, then daily weight gain of 20–30g.
- **Length**: Normal weekly length gain is 0.8–1.0 cm for the first 8–12 weeks.
- **Head Circumference**: Gains 0.5–0.8 cm/week in the first few months.

Infant feeding

Infant Nutritional Requirements:

1. **Fluid Intake:** Neonates require 150–175 mL of fluid per kg of body weight daily.
2. **Calorie Needs:** A healthy term infant requires 100–110 kcal/kg per day. For low birth weight infants, it increases to 105–130 kcal/kg per day. One ounce (30 mL) of breast milk provides about 20 calories.
3. **Balanced Diet Composition:** Protein (2–4 g/kg/day), fat (4–6 g/kg/day), carbohydrates (10–15 g/kg/day), and essential minerals and vitamins are necessary for proper growth and digestion.

Types of Infant Feeding:

1. **Breastfeeding** is emphasized as the "gold standard" for infant feeding due to its numerous advantages. It helps with **early bonding**, **infection protection**, and offers ideal nutrition.
2. **Artificial feeding** (using formula) is considered rare and typically necessary only under special circumstances.

Breastfeeding:

- **Exclusive Breastfeeding:** Babies should receive only breast milk (exclusive breastfeeding) for the first six months. This includes no other food or drink, except for medicine and vitamins.
- **Baby-Friendly Hospital Initiative (BFHI):** A set of ten steps promoted by WHO/UNICEF to encourage successful breastfeeding, such as starting breastfeeding within 30 minutes of birth, avoiding prelacteal feeds, and practicing rooming-in for the mother and baby.

Advantages of Breastfeeding:

- **Composition of Breast Milk:** It contains lactose (promoting intestinal flora), easily digestible fat, and proteins such as lactalbumin and lactoglobulin.
- **Protection Against Infections:** Breast milk contains immunoglobulins, enzymes (lysozyme), and omega-3 fatty acids that help protect against infections and promote neurological development.
- **Other Benefits:** It provides natural contraception, acts as a laxative, and promotes psychological bonding. It is also a cost-effective, ready-to-feed solution for the infant.

Successful Breastfeeding:

- **Preparation for Breastfeeding:** The mother should start preparations by addressing nipple issues and maintaining cleanliness, particularly during the last trimester.
- **Management:** Correct positioning and attachment are essential. Breastfeeding should start within the first hour after delivery, with frequent feedings (8-12 times per day), ensuring the baby receives both foremilk and hindmilk.
- **Hindmilk:** This is richer in fat and provides more calories for the baby, contributing to its satiety.

Challenges in Breastfeeding:

- **Mother-related Issues:** These include reluctance to breastfeed, inadequate milk production, or breast ailments like engorgement and cracked nipples. Counseling and support can help resolve these issues.

- **Infant-related Issues:** Problems such as low birth weight, nasal congestion, or congenital malformations (e.g., cleft palate) may affect feeding. These require proper medical intervention.

Contraindications of Breastfeeding:

- **Temporary Contraindications:** Include acute puerperal illness, cracked nipples, or breast abscess.
- **Permanent Contraindications:** Include conditions like active untreated pulmonary tuberculosis, certain chronic illnesses, and very low birth weight infants.

Drugs and Breastfeeding:

- Most drugs taken by the mother pass into breast milk in very small amounts. However, drugs like anticancer medications, chloramphenicol, and radioactive substances are contraindicated during breastfeeding.

Maternal Nutrition During Lactation:

- Lactating mothers require additional calories (750 kcal/day) and nutrients, including increased needs for folic acid, iron, calcium, and protein. They should also increase fluid intake to maintain milk production.
- Bone mineral density may decrease in breastfeeding mothers but returns to normal after breastfeeding stops.

Assessment of Infant Well-being:

To assess whether an infant is progressing normally with their feeding schedule, certain indicators should be observed:

1. **General Condition:** The infant should be happy, sleep well between feeds and at night, not vomit, and urinate at least six times in 24 hours.
2. **Good Vigor:** The infant should show movement of limbs and cry appropriately.
3. **Weight Gain:** The infant should stop losing weight and begin gaining as expected according to the growth curve.
4. **Stool Characteristics:** The infant should have yellow, seedy stools and should no longer pass meconium stools.
5. **Expected Weight Curve:** The weight gain should follow the expected curve for a healthy infant.

Underfeeding:

Underfeeding is often seen in artificially-fed babies. Symptoms include:

1. **Failure to Gain Weight:** The baby may fail to gain weight as expected, shown by the weight curve.
2. **Dissatisfaction with Feeds:** The baby may cry between feeds and at night, disturbing sleep, indicating inadequate nutrition.
3. **Constipation:** The infant may develop constipation due to insufficient milk intake.
4. **Scanty Urinary Output:** The baby may urinate less frequently, with a high-colored urine, which is a sign of dehydration.
5. **Test Feeding:** This method is the most reliable to diagnose underfeeding by assessing the milk deficit after a test feed.

Management: The milk deficit identified during test feeding should be supplemented with artificial milk. Once the mother's milk production increases, supplementary feeding should be gradually stopped.

Care of the Breasts:

- **Washing:** Breasts should be washed daily with clean water, and the nipple should be cleaned before and after each feed.
- **Support:** A supportive bra is important for comfort.

Feeding Difficulties Due to Nipple Abnormalities:

1. **Breast Engorgement:**
    - Commonly occurs 3-5 days postpartum, with swollen, hard breasts making it difficult for the baby to latch on.
    - Treatment includes:
        - Gentle hand expression to soften the breasts.
        - Heat and cold compresses to reduce swelling.
        - Gentle breast massage.
        - Pain relief using ibuprofen.
2. **Nipple Length Issues:**

- **Long Nipple:** May cause poor feeding due to improper latch. Mothers should assist by helping the baby latch onto the areola.
- **Short Nipple:** Usually does not pose a problem. Mothers should be reassured.
- **Inverted/Flat Nipple:** Feeding is possible, but in some cases, the nipple may need to be softened and protracted through suction, such as with a breast pump or syringe.

Expression of Breast Milk:

- **Indications for Milk Expression:**
  - When the baby is separated from the mother due to prematurity or illness.
  - If there are difficulties with breastfeeding, such as issues with attachment (e.g., cleft palate).
  - If the mother is separated from the baby due to work.
  - If the baby cannot latch properly, colostrum should be expressed and given.
- **Methods of Milk Expression:**
  - **Manual Expression:** This increases prolactin levels, supporting long-term lactation, and is free of cost. It can be done anywhere.
  - **Breast Pumps:** These may be electric or manual. They are useful for mothers who need to express regularly but may not be as effective at stimulating prolactin compared to manual methods.

Donor Breast Milk:

- **History:** Donor breast milk has been used for centuries, though its use is limited today due to safety concerns such as the potential transmission of infections (e.g., HIV, CMV, Hepatitis B, TB).
- **Storage:** Donor milk should be carefully screened and pasteurized to ensure safety.
- **Storage Guidelines:**
  - **Frozen:** Can be stored at –20°C for up to 6 months.

- **Refrigerated:** Should be used within 24 hours if stored at 4°C.
- **Room Temperature:** Can be used within 4 hours of expression.

Methods to Establish Lactation:

- **For the Baby:**
    1. Discontinue bottle feedings to promote breastfeeding.
    2. Ensure the baby is put to the breast frequently.
    3. Make sure the baby is well-attached during breastfeeding.
- **For the mother:**
    1. Encourage adequate fluid intake (at least 1 liter extra daily).
    2. Medications such as **metoclopramide** or **oxytocin nasal spray** can be used to help stimulate lactation.

Artificial Feeding (Bottle Feeding)

Artificial feeding refers to feeding an infant any preparation other than breast milk, such as cow's milk or formula. It is commonly called bottle feeding, but it can also be done without a bottle.

When to Use Artificial Feeding:

- If breastfeeding is not possible (temporary or permanent reasons).
- Due to lifestyle changes or work, where breastfeeding may not be practical.

Types of Artificial Feeding:

- **Cow's milk:** Often diluted and supplemented with sugar and fat.
- **Formula milk:** Designed to be similar to breast milk, but not a perfect replacement.
- **Goat's or buffalo milk:** Used in some regions.

Differences Between Human Milk and Cow Milk:

- **Human milk:** Higher in lactose (sweeter), easier to digest, and contains less sodium.
- **Cow milk:** Higher in protein (casein), fat globules are coarser, and sodium content is much higher.

Making Cow Milk More Like Breast Milk (Humanization):

You can dilute cow's milk and add sugar (like glucose) and fat (like cream) to make it easier to digest, but it’s still not the same as breast milk.

Sterilizing Milk:

Milk must be sterilized to prevent infections:

- **Boil the milk** and cool it quickly.
- Or **pasteurize** it by heating to 160°F (73°C) for 20 minutes.

Feeding Bottles and Utensils:

- You can use a spoon or a bottle to feed.
- **Spoon feeding** is better than bottle feeding to avoid nipple confusion.
- Bottles and teats should be sterilized after each use by boiling.

Tips for Bottle Feeding:

1. **Comfortable Position:** Hold the baby comfortably while feeding.
2. **Teat Size:** Ensure the hole in the teat allows 20–30 drops of milk per minute.
3. **Burp the Baby:** Burp in the middle and at the end of each feed.
4. **Feeding Time:** Limit feeding to 20 minutes.
5. **Clean Utensils:** Clean and sterilize bottles and teats before and after each feed.

Signs of Successful Feeding:

- **Weight gain:** A baby should gain 25–30 grams per day in the first 3 months.
- If the baby is not gaining weight or seems unhappy after feeding, the amount may need to be increased.

Weaning (Introducing Solid Foods):

Weaning is the process of transitioning from breast milk to other foods, usually between **6 months to 1 year**.

- At 6 months, the baby needs **solid foods** in addition to breast milk to meet nutritional needs.
- Typical first foods include rice, dal, boiled fish, and eggs.

- **Weaning should be gradual** to prevent nutritional issues and emotional distress for the baby.

Risks During Weaning:

1. **Nutritional Problems:** If foods are not balanced, the baby may become malnourished.
2. **Diarrhea:** Can happen if food is not prepared properly or is contaminated.
3. **Psychological Stress:** Abrupt weaning may cause emotional distress for the baby.

Weaning should be done slowly and with careful attention to the baby's needs.

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Chapter 9: Abnormal Labour

1. **Definitions:**

Anatomical: A shortening of pelvic planes by 0.5 cm.

Obstetric: Pelvic size/shape changes affecting normal labor with a typical-sized baby.

2. **Impact**:

Can cause labor issues like abnormal mechanisms or complete obstruction.

3. **Pelvic Types:**

Gynecoid (50%): Round inlet, easy labor.

Anthropoid (25%): Oval inlet, easy engagement, but flexion and rotation may be delayed.

Android (20%): Triangular inlet, difficult labor, increased perineal injuries.

Platypelloid (5%): Oval inlet, easy delivery, but face-to-pubis deliveries are more common.

Common Mixed Types: E.g., gyne-android or andro-gynecoid.

4. **Pelvic Features:**

Gynecoid: Spacious, curved sacrum, easy delivery.

Anthropoid: Oval, narrow anterior segment, challenges in rotation.

Android: Triangular, narrow anterior segment, hard engagement, and delivery.

Platypelloid: Oval, narrow segments, but easy delivery.

5. Causes of Contracted Pelvis:

Nutritional Issues: Rare now, minor variations are common.

Diseases/Injuries: Fractures, scoliosis, poliomyelitis, hip disease.

Developmental Defects: Conditions like Naegele's pelvis or Robert's pelvis.

6. Types of Contracted Pelvis:

1. **Rachitic Flat Pelvis**: Caused by rickets, leading to changes in pelvic shape.
2. **Osteomalacic Pelvis**: Due to calcium/Vitamin D deficiency, results in narrowing and poor delivery outcomes.
3. **Asymmetrical Pelvis**:
    - **Naegele's Pelvis**: Rare, caused by arrested sacral development.
    - **Scoliotic Pelvis**: Caused by scoliosis, leading to oblique contraction.
    - **Robert's Pelvis**: Extremely rare, fused sacrum and innominate bones.
    - **Kyphotic Pelvis**: Caused by kyphosis, leading to a narrow, funnel-shaped pelvis.

7. Labor Mechanism in Contracted Pelvis:

1. **Flat Pelvis**: Head struggles to pass through the brim but proceeds normally after.
2. **Contracted Pelvis**: Shortened diameters make engagement and delivery harder, sometimes causing unusual head positions.

8. Diagnosis:

1. **History**: Past difficult deliveries, fractures, or conditions like rickets or scoliosis.
2. **Physical Exam**: Look for deformities, stature, and signs of dystocia.
3. **Pelvic Exam**:
    - **Pelvimetry**: Checks pelvic size and space for delivery.

- **Imaging**: X-ray, CT, MRI, and ultrasound are used for further evaluation.

9. **Imaging Techniques:**
    1. **X-ray Pelvimetry**:
        - Takes 3 views: front, side, and outlet.
        - **Lateral view** is most informative.
    2. **CT**: Lower radiation, more accurate.
    3. **MRI**: Most accurate, no radiation, but expensive.
    4. **Ultrasound**: Measures fetal head size during labor.

DISPROPORTION

1. **Definition**: Disproportion refers to an abnormal size relationship between the fetus and the pelvis, known as cephalopelvic disproportion (CPD). This can occur when the fetus is too large for the pelvis or the pelvis is too small for the fetus.
    - **Pelvic Inlet Contraction**: Diagnosed when the obstetric conjugate is <10 cm, the transverse diameter is <12 cm, or the diagonal conjugate is <11 cm.
    - **Midpelvis Contraction**: Occurs when the combined interischial spinous and posterior sagittal diameters are ≤13 cm.
    - **Contracted Outlet**: Suspected if the interischial tuberous diameter is ≤8 cm, often linked with midpelvic contraction.
2. **Diagnosis**: CPD is best assessed clinically, with abdominal methods, bimanual (Muller-Munro Kerr) methods, and imaging techniques such as X-ray, ultrasound, and MRI.
    - **Abdominal Method**: Involves palpating the head's movement through the pelvis.
    - **Muller-Munro Kerr Method**: A bimanual technique combining internal and abdominal examination to assess the head's descent and overlap.
3. **Degrees of Disproportion**:
    1. **Severe**: Obstetric conjugate <7.5 cm.

2. **Borderline**: Obstetric conjugate between 9.5 and 10 cm, with both anteroposterior and transverse diameters reduced.

4. Effects of Contracted Pelvis on Pregnancy and Labor

- **Pregnancy**:
  - May cause retroverted uterus, pendulous abdomen, and increased malpresentations (especially in multigravida).
- **Labor**:
  - **Early Rupture of Membranes**: Increased risk.
  - **Prolonged Labor**: Slower cervical dilatation, with potential for obstructed labor.
  - **Operative Interventions**: Increased need for cesarean delivery, with higher maternal and fetal risks (e.g., trauma, asphyxia).
- **Maternal and Fetal Risks**:
  - Increased risk of genital tract injuries, maternal morbidity, and perinatal mortality.

5. Management of Contracted Pelvis

- **Minor Inlet Contraction**: Spontaneous vaginal delivery is usually possible.
- **Moderate to Severe Inlet Contraction**: Management options include:
  - **Induction of Labor**: In select cases, for minor to moderate contraction, usually 2-3 weeks before expected delivery.
  - **Elective Cesarean Section**: Common for severe contraction or in cases with complicating factors (e.g., malpresentation, elderly primigravida).
  - **Trial Labor**: May be attempted in some cases, but with close monitoring.

TRIAL LABOR

1. **Definition**: Trial labor is a supervised attempt at natural labor in women with moderate cephalopelvic disproportion (CPD), with the goal of achieving a vaginal birth. If complications arise, preparations for caesarean delivery are in place.
2. **Goals:**
    - To avoid unnecessary caesarean sections.
    - To deliver a healthy baby.
3. **Contraindications:**
    - Midpelvis or outlet contraction.
    - Complications like malpresentation, heart disease, diabetes, or pre-eclampsia.
    - Lack of facilities for a caesarean section.

4. Conducting Trial Labor

1. **Labor Onset**: Ideally, labor starts naturally. If not, induction may be used.
2. **Monitoring**:
    - No oral food, but IV fluids are given.
    - Pain relief is provided.
    - Labor progress is tracked with a **partograph**.
    - Fetal heart rate is monitored.
3. **Labor Augmentation**: If contractions aren't strong enough, oxytocin and amniotomy may be used after 3 cm of dilation.
4. **Pelvic Exam**: After the membranes rupture, check for issues like cord prolapse or the baby's head position.

5. Successful Trial Labor Depends On:

1. Degree of pelvic contraction.
2. Pelvis shape.
3. Baby's head position.
4. Effective contractions.
5. Emotional stability.

6. Unfavorable Features:

- Slow cervical dilation (<1 cm/hour).
- No descent of the baby's head.
- Fetal distress or early membrane rupture.

7. **Duration of Trial Labor**

    - Trial labor is continued if progress is made. If there's no progress for 3-4 hours despite good contractions, caesarean section is considered.

8. **Ending the Trial:**
    - Spontaneous delivery (30%).
    - Forceps or ventouse delivery (30%).
    - Caesarean section (40%).
9. **Success:**

    - Successful trial labor means a vaginal birth with a healthy baby and well mother.

10. **Pros of Trial Labor:**

    - Avoids unnecessary caesarean sections.
    - Prevents premature induction.
    - Leads to better future pregnancies if successful.

11. **Cons of Trial Labor:**

    - Disproportion may remain undiagnosed if it ends in caesarean.
    - Risks of baby distress or injury if labor is too long or difficult.
    - Maternal complications due to prolonged labor or surgery.
    - Psychological stress if the trial ends in caesarean or a difficult vaginal birth.

MIDPELVIC AND OUTLET DISPROPORTION

1. **Definition**: It is hard to tell where the Midpelvis ends and the outlet begins, and isolated outlet contraction is rare. Both issues are often treated together as outlet contraction. This occurs when the fetal head cannot pass through the outlet planes.
2. **Management**:

- **Elective Caesarean Section**: Recommended if there's significant contraction in both Midpelvis diameters or if minor contraction is combined with other complications.
- **Vaginal Delivery**: If the contraction is minor and there are no other complications, vaginal delivery may be attempted. The head may adapt to pass through the narrow pelvis. Forceps or ventouse may be used with a deep episiotomy to prevent injury.
- **Labor Monitoring**: Progress is tracked with a partograph. If the cervix doesn't dilate or the fetal head doesn't descend after two hours, labor arrest is suspected, and caesarean is needed.

3. **Cases Seen Late in Labor**:
   - **Caesarean Section**: Done to avoid difficult forceps delivery.
   - **Forceps with Episiotomy**: Used if vaginal delivery is attempted.
   - **Symphysiotomy**: Can be performed followed by ventouse.
   - **Craniotomy**: Done if the fetus is dead.

ABNORMAL UTERINE ACTION

1. **Normal Labor**: Normal labor involves regular contractions that help the cervix dilate and the baby's head move down. In first-time mothers, the cervix dilates about 1 cm per hour, and in women who have given birth before, it dilates about 1.5 cm per hour.
2. **Labor Problems**: Around 25% of first-time mothers and 10% of women who have given birth before experience labor problems, such as protraction (slow progress) or arrest (no progress).
3. **Cause of Problems**: The most common cause is weak or abnormal contractions. Any issue with contractions is called abnormal uterine action.
4. **Types of Abnormal Uterine Contractions (Abnormal Uterine Action):**
   - **Normal Polarity**
     1. Hypertonic dysfunction: 1. Obstruction (-) Precipitate labour, 2. Obstruction (+) Tonic uterine contraction and retraction (Bandl's ring) – Hypertonic uterus
     2. Hypertonic dysfunction
   - **Abnormal Polarity (Incoordinate Uterine Action):**
     1. Spastic lower segment
     2. Colicky uterus
     3. Asymmetric uterine contraction
     4. Constriction ring

5. Generalized tonic contraction
6. Cervical dystocia

5. **Causes of Abnormal Uterine Contractions:**
    - First-time births, especially in older women.
    - Prolonged pregnancy.
    - Overdistension of the uterus, like in twins or with fibroids.
    - Emotional stress or anxiety.
    - Obesity.
    - Pelvic problems or abnormal fetal positioning.
    - Improper use of medications (sedatives, pain relievers, or oxytocin).
    - Premature attempts at vaginal delivery, like early induction or rupture of membranes under light anaesthesia.
6. **Normal Uterine Contractions:**
    - There are **two pacemakers** in the uterus that control contractions.
    - Normally, when the **upper part** of the uterus contracts, the **lower part** relaxes.
    - **Contractions** start at the pacemaker and move down, with **intensity decreasing** from top to bottom.
7. **Types of Abnormal Labor:**
    1. **Primary Dysfunctional Labor**: Cervix dilates **less than 1 cm/hour** after a normal start. It's treated with **amniotomy** (breaking the water) or **oxytocin** to help contractions.
    2. **Secondary Arrest**: Labor stops progressing after initial dilation. Causes include weak contractions or **physical blockages** like **disproportion** or **malpresentation**.

8. **Measuring Uterine Contractions:**
    - **Uterine activity is measured by:**
        1. Resting tone (basal tone).
        2. Peak pressure during contractions.
        3. Contraction frequency.

- **Methods:**
    - **Palpation** (less accurate).
    - **Tocodynamometer** (external device).
    - **Intrauterine pressure catheter (IUPC)** (direct pressure measurement).
    - Normal contraction pressure values:
    - **Resting tone**: 5-20 mm Hg.
    - **Minimum pressure for dilation**: 15 mm Hg.
    - **Normal contraction pressure**: Up to 60 mm Hg.

9. **Oxytocin Use:**
    - **Oxytocin** is given if contractions are too weak.
    - The dose is increased until there are 3–4 contractions every 10 minutes, with a peak pressure of 50–60 mm Hg and resting tone of 10–15 mm Hg.

UTERINE INERTIA (HYPOTONIC UTERINE DYSFUNCTION)

1. **Uterine Inertia (Hypotonic Uterine Dysfunction)**:

    Uterine inertia is a common but less severe type of abnormal uterine contraction. It can occur at any stage of labor and may develop either from the start of labor or after a period of normal contractions.

2. **Characteristics of Uterine Inertia**:
    - Weakened contractions: Contractions are less intense, shorter in duration, and there is good relaxation between contractions.
    - Increased intervals: The time between contractions is longer.
    - Intrauterine pressure: During contractions, pressure is less than 25 mm Hg.

3. **Diagnosis**:
    1. The patient experiences less pain during contractions.
    2. Upon palpation, the uterus feels less firm.

3. The uterus is easily indented at the peak of a contraction.
4. After contractions, the uterus relaxes, the fetal parts are easy to feel, and the fetal heart rate is normal.
5. Internal examination may show:
    - Slow cervical dilatation (should be at least 1 cm per hour in a primigravida after 4 cm dilation).
    - Possible issues like cephalopelvic disproportion, malposition, deflexed head, or malpresentation.
    - The membranes usually remain intact.

4. **Effects on Mother and Fetus**:
    - Maternal exhaustion and fetal distress are rare and usually appear later.
5. **Management**:
    1. Reassess the case: Rule out causes like cephalopelvic disproportion or malpresentation.
    2. **Caesarean section**: Indicated if there is: Contracted pelvis, Malpresentation & Fetal or maternal distress.
    3. **Vaginal Delivery**:
        - **General measures**: Keep the patient calm, avoid lying flat on the back, ensure the bladder is empty, maintain hydration, and provide pain relief.
        - **Active measures**: Rupture membranes to stimulate labor, and start an oxytocin drip to increase contraction strength, adjusting the rate until effective contractions are achieved. Continue the drip for 1 hour after delivery.

INCOORDINATE UTERINE ACTION

1. Incoordinate Uterine Action refers to abnormal uterine contractions during labor, usually in the active phase. It includes conditions such as:
    - Spastic lower uterine segment
    - Colicky uterus

- Asymmetric contractions
- Constriction ring
- Generalized tonic contractions

These conditions cause more frequent and longer contractions, which can reduce blood flow to the placenta, potentially leading to fetal hypoxia.

2. Characteristics and Diagnosis:

- **Spastic Lower Segment**:
    - Abnormal contraction in the lower uterine segment.
    - Increased basal tone (>20 mm Hg).
    - Intense pain, especially in the back, with signs of dehydration and ketoacidosis.
    - Difficulty in palpating fetal parts.
    - Early fetal distress.

3. Types of Incoordinate Uterine Action:

- **Spastic Lower Segment Uterine Contraction**:
    - No fundal dominance; reversed polarity.
    - Stronger contractions in the lower segment.
    - Painful contractions with poor relaxation.
    - Associated with dehydration and ketoacidosis.
    - Fetal distress due to placental insufficiency.

4. **Treatment**:
    - **No oxytocin**; caesarean section is common.
    - Correct dehydration and ketoacidosis with Ringer's solution.

CONSTRICTION RING (SCHROEDER'S RING)

- Localized contraction around the fetus, often near the neck in a cephalic presentation.
- Caused by excessive use of oxytocics or premature rupture of membranes.
- Diagnosed during caesarean, forceps, or placenta removal.
- **Management**: Caesarean delivery. If needed, deep anaesthesia can relieve the constriction ring.

CERVICAL DYSTOCIA

- Failure of cervical dilation, often due to inefficient contractions or malpresentation.
- **Primary cervical dystocia** occurs in first births, with a rigid cervix or inefficient contractions.
- **Secondary cervical dystocia** results from scarring or previous surgeries.
- **Treatment**:
    - Cesarean section for associated complications.
    - If the head is low, manual manipulation or forceps/ventouse may be used.
    - Dührssen's incision for partially dilated cervices.

GENERALIZED TONIC CONTRACTION (UTERINE TETANY):

1. **Generalized Tonic Contraction (Uterine Tetany):**
    - The entire uterus contracts, with no distinction between the active and passive segments.
    - Causes the fetus to be actively retained inside, with poor relaxation.
    - Caused by cephalopelvic disproportion, obstruction, or misuse of oxytocics.
2. **Diagnosis:**
    - Uterus is tense, smaller, and tender.
    - Fetal parts are not well-defined, with a caput on the fetal head and a dry, oedematous vagina.
3. **Treatment:**

- Correct dehydration and ketoacidosis with rapid Ringer's infusion.
- Provide antibiotics and pain relief.
- Caesarean section if obstruction is suspected.

Hypercontractility (Tachysystole)

- **Cause:** Induced by oxytocics (more than 5 contractions in 10 minutes) or can occur spontaneously during labor.
- **Risk:** Persistent tachysystole with abnormal fetal heart rate (FHR) can lead to fetal hypoxia.
- **Management:**
  - Use tocolytics (e.g., Terbutaline 0.25 mg SC) to stop contractions.
  - Stop oxytocin infusion.
  - Cesarean section is usually required, especially if obstruction is suspected.

PRECIPITATE LABOR

1. **Definition:** Labor lasting less than 3 hours for both the first and second stages.
2. **Causes:** Rapid expulsion due to hyperactive contractions and reduced soft tissue resistance. Cervical dilation rate is more than 5 cm/hr for nulliparous women.
3. **Maternal Risks:**
   - Extensive lacerations (cervix, vagina, perineum)
   - Postpartum hemorrhage (PPH) from uterine hypotonia
   - Uterine inversion, rupture, infection, and amniotic fluid embolism
4. **Fetal Risks:**
   - Intracranial stress or hemorrhage due to rapid delivery
   - Injuries like skull fractures, brachial plexus damage, or cord bleeding
5. **Management:**
   - Hospitalize women with a history of precipitate labor.
   - Use medications like ether or magnesium sulfate to suppress contractions.
   - Control head delivery and perform episiotomy.
   - Avoid oxytocin augmentation.
   - Induction of labor with controlled delivery is beneficial.

TONIC UTERINE CONTRACTION AND RETRACTION (Syn: Bandl's ring, Pathological retraction ring)

1. **Cause:** Primarily caused by obstructed labor.
2. **Pathology:**
    - Increased intensity, duration, and frequency of contractions.
    - Gradual loss of relaxation between contractions, leading to tonic contraction.
    - The lower uterine segment elongates and thins to accommodate the fetus.
    - A circular groove (Bandl's ring) forms between the upper and lower segments due to retraction.
3. **Clinical Features:**
    - Continuous pain and discomfort, with restlessness.
    - Signs of exhaustion and ketoacidosis.
    - Abdominal palpation reveals:
        - Hard, tender upper segment.
        - Distended, tender lower segment.
4. **Progression:**
    - In primigravidae, labor may stop due to uterine exhaustion, with contractions resuming after rest.
    - In multiparae, retraction continues, leading to thinning and eventual rupture of the lower segment.
5. **Management:**
    - **Prevention:** Proper labor monitoring, early diagnosis of malpresentation, and delivery by cesarean section.
    - **Treatment:**
        - Exclude uterine rupture.
        - Correction of dehydration and ketoacidosis: Use Ringer's solution.

- Pain relief and antibiotics (Ceftriaxone 1g IV).
- Cesarean delivery is usually needed, but uterine rupture must be ruled out before any destructive procedures.

COMPLICATED LABOR MALPOSITION, MALPRESENTATION AND CORD PROLAPSE

OCCIPUT-POSTERIOR POSITION (OP)

1. **Definition:**
   Malposition refers to a vertex position other than the ideal occipitoanterior (OA). The main types are:
   - **Right occipitoposterior (ROP):** Occiput over the right sacroiliac **joint.**
   - **Left occipitoposterior (LOP):** Occiput over the left sacroiliac joint.
   - **Direct occipitoposterior:** Occiput over the sacrum**.**
2. **Causes:**
   - Pelvic shape: Anthropoid and android pelves favor OP positions.
   - Fetal factors: Head deflexion, placental position, and brachycephaly (shortened head shape) increase OP chances.
   - Uterine factors: Abnormal contractions can lead to deflexion and OP.
3. **Diagnosis:**
   - Abdominal exam: Fetal back is far from the midline, fetal heart sounds are harder to locate, especially in LOP.
   - Vaginal exam: In early labor, the posterior fontanel is near the sacroiliac joint. In late labor, caput formation may obscure the fontanels.
   - Imaging: Rarely used, but ultrasound can help assess head descent and position.

4. **Mechanism of Labor:**
    - In favourable cases (90%): The occiput rotates 135° anteriorly to move to the Occipitoanterior position, followed by restitution and external rotation, leading to delivery.
    - In unfavorable cases (10%): Malrotation occurs, delaying labor or causing obstruction.
5. **Course of Labor:**
    - First stage: Delayed engagement due to head deflexion, prolonged labor, and early membrane rupture.
    - Second stage: Delayed due to long internal rotation or possible obstructed labor if rotation fails.
    - Third stage: Higher risk of postpartum haemorrhage due to prolonged labor.
6. **Mode of Delivery:**
    - Spontaneous vaginal delivery: Most cases, though malrotation may require assisted delivery (forceps or ventouse).
    - Cesarean section: If labor fails to progress, or in cases of fetal distress or pelvic issues.
7. **Management:**
    - First stage: Monitor progress and consider interventions like oxytocin. Caesarean may be needed for labor arrest.
    - Second stage: Watch for rotation; if it fails, consider assisted vaginal delivery.
    - Third stage: Take preventive measures for haemorrhage and inspect the birth canal after delivery.

ARRESTED OCCIPITOPOSTERIOR POSITION

If labor fails to progress despite strong contractions for 1/2–1 hour after full dilation, intervention is needed. The situation should be assessed both abdominally and vaginally.

Abdominal Exam:

1. Baby’s size
2. Head engagement
3. Amniotic fluid level
4. Fetal heart sounds

Vaginal Exam:

1. Position of the head and occiput
2. Degree of head deflexion and swelling
3. Pelvic assessment (ischial spines, sidewalls, outlet size)

I. Arrest in Occipito transverse or Oblique Occipitoposterior Position

1. **Vacuum Extraction**: For adequate pelvis and weak contractions. The cup is placed to help rotation.
2. **Cesarean Section**: If rotation doesn’t work, especially with pelvic issues.
3. **Other Methods**:
    - **Manual rotation + Forceps**: Rotate the head, then use forceps to assist delivery.
    - **Forceps Rotation**: Skilled use of Kielland forceps to rotate and deliver the baby.
    - **Craniotomy**: For delivering a dead baby.

II. Occipito sacral Arrest

- If the head is low enough, **forceps** can be used. A **mediolateral episiotomy** is needed.
- If the head is higher, **cesarean section** is needed.

DEEP TRANSVERSE ARREST (DTA)

1. **Deep Transverse Arrest (DTA)** occurs when the baby's head is stuck in the transverse position and does not descend after ½–1 hour of full cervix dilation.

It may happen after incomplete rotation from the oblique occipitoposterior position or from a primary occipitotransverse position.

2. **Causes:**
    - Abnormal pelvic shape
    - Head deflexion
    - Weak uterine contractions
    - Weak pelvic floor muscles
3. **Diagnosis:**
    - Head is engaged
    - Suture is in the transverse bispinous diameter
    - Fontanel is palpable
    - Pelvic shape issues may be detected
4. **Management:**
    - **If Vaginal Delivery is Unsafe** (e.g., large baby or inadequate pelvis): **Cesarean section**
    - **If Vaginal Delivery is Safe**:
        1. Vacuum extraction (Ventouse) with careful traction
        2. Manual rotation + forceps
        3. Forceps rotation + delivery (Kielland forceps) by skilled professionals
    - If unsure, caesarean section is preferred.

MANUAL ROTATION FOR OCCIPITOPOSTERIOR POSITION

Manual rotation is used to turn the baby's head from a posterior to an anterior position during labor. There are two methods: **whole hand method** and **half hand method**.

Steps for Both Methods:

1. **Preparation**:

- The patient is given general anesthesia and positioned in lithotomy (lying on back with legs raised).
- A sterile environment is maintained, and the bladder is catheterized.
- A vaginal exam determines the direction of the baby's head.

- **Whole Hand Method:**

1. **Gripping the Head**:
   - The left hand is used for **Right Occipitoposterior (ROP)** or **Right Occipito-transverse (ROT)** positions, and the right hand is used for **Left Occipitoposterior (LOP)** or **Left Occipito-transverse (LOT)** positions.
   - The hand is introduced into the vagina and grips the baby's head.
2. **Rotating the Head**:
   - Rotate the head by turning the hand to bring the occiput (back of the head) to the front.
   - External pressure helps align the baby's back with the midline.
3. **Applying Forceps**:
   - Once the head is rotated, forceps are applied to assist in delivery.

- **Half Hand Method:**

1. **Gripping the Head**:
   - Use only the **four fingers** (no thumb) for a more controlled grip.
   - Apply pressure on the side of the baby's head to rotate it into the anterior position.
2. **Rotating the Head**:
   - Apply pressure intermittently until the occiput is positioned in front of the pubic bone.

- **Difficulties and Risks:**
  - **Difficulties**:
    - Hard to grip the head, or failure to move it.
    - Inadequate anesthesia or wrong patient choice.
  - **Risks**:
    - The head may slip back or cause cord prolapse.
    - In some cases, **cesarean section** is safer than manual rotation.
  - Manual rotation should be performed only by an experienced obstetrician.

BREECH PRESENTATION

1. **Definition:**
   - **Breech presentation** occurs when the fetus is in a longitudinal lie, with the **buttocks or feet** presenting at the pelvic brim instead of the head.
2. **Types of Breeches:**
   1. **Complete Breech (Flexed Breech)**:
      - Full flexion: Thighs at hips, legs at knees.
      - Common in **multiparas** (women with multiple births).
   2. **Incomplete Breech**:
      - **Frank Breech (Extended Legs)**: Thighs flexed, legs extended; common in **primigravidae**.
      - **Footling Breech**: One or both feet present.
      - **Knee Presentation**: Thighs extended, knees flexed, knees present.
3. **Classification:**
   1. **Uncomplicated Breech**: No associated complications (except breech).
   2. **Complicated Breech**: Associated with conditions like **prematurity**, **twins**, **placenta previa**, or **contracted pelvis**.

4. Causes of Breech Presentation:

- **Prematurity** (most common cause).
- **Factors preventing version**:
    - Extended legs, twins, **oligohydramnios** (low amniotic fluid), **congenital uterine abnormalities**, or **short cord**.
- **Fetal abnormalities**: Hydrocephalus, trisomies, anencephaly.
- **Undue fetal mobility**: Hydramnios, **lax abdominal wall** in multiparae.

5. Diagnosis:

1. **Clinical**: Manual examination for buttocks/feet at the pelvic brim.
2. **Ultrasonography**: Confirms breech type, checks for abnormalities, fetal position, and placental location.

6. Breech Positions:

1. **Left Sacroanterior (LSA)** - Most common.
2. **Right Sacroanterior (RSA)**.
3. **Right Sacroposterior (RSP)**.
4. **Left Sacroposterior (LSP)**.

7. Mechanism of Labor in Breech Presentation:

1. **Sacro anterior Position**:
    - **Buttocks**: Descent, internal rotation, and delivery of hips, followed by trunk and lower limbs.
    - **Shoulders**: Engage and descend, internal rotation, delivery of posterior then anterior shoulder.
    - **Head**: Engagement, descent, internal rotation, and flexion for head delivery.
2. **Sacro posterior Position**:
    - Like sacroanterior but requires **more rotation** (3/8th of a circle) for the head to align.

8. **Dangers to the Baby in Breech Presentation:**

    1. **Intrapartum Fetal Death**: Particularly in preterm babies.
    2. **Brain and Skull Injuries**:
        - **Intracranial Hemorrhage**: Caused by compression and decompression of the unmolded head.
        - **Minute Hemorrhages**.
        - **Fractures of the Skull**.
    3. **Birth Asphyxia**: Due to:
        - **Cord compression** after delivery of the buttocks or when the head enters the pelvis.
        - **Premature breathing** attempts while the head is still inside.
        - **Delayed head delivery**.
        - **Cord prolapse**.
        - **Prolonged labor**.
    4. **Birth Injuries**: More common than in vertex presentations (7%).
        - **Hematomas** (e.g., over sternomastoid, thighs).
        - **Fractures** (e.g., femur, clavicle, humerus).
        - **Visceral Injuries** (e.g., rupture of liver, kidneys, lungs).
        - **Nerve Injuries** (e.g., medullary coning, spinal cord injury).
        - **Long-term Neurological Damage**.
    5. **Congenital Malformations**: Higher incidence compared to cephalic presentation (e.g., hip dislocation, hydrocephalus).

9. **Antenatal Management of Breech Presentation:**

Antenatal management of breech presentation includes the following steps:

1. **Identification of Complicating Factors**:

2. **Clinical Examination & Sonography**: Clinical examination and sonography help identify problems like fetal malformations, uterine abnormalities, and placental issues. Sonography is especially helpful for spotting fetal and uterine problems and locating the placenta.

3. **External Cephalic Version (ECV)**:

    - **Definition**: ECV is a procedure aimed at turning a breech baby to a cephalic (head-down) position. It is used when no contraindications are present.

    - **Benefits**:

        - Reduces the incidence of breech presentation at term.

        - Decreases the overall rate of breech delivery (both vaginal and cesarean).

        - Lowers the cesarean delivery rate by about 5%.

    - **Optimal Timing**: ECV is most effective when performed from 36 weeks **onward**, though earlier versions may have a higher chance of reversion.

    - **Success Factors for ECV**:

        - Complete Breech: Non-engaged breech with a Sacro anterior position.

        - Adequate Amniotic Fluid.

        - Non-obese Maternal Status.

    - **Causes of Failure**:

        - Extended Legs: If the legs are extended, the breech is harder to flex.

        - Scanty Liquor or a Large Baby.

        - Mechanical Factors: Obesity, increased tone of abdominal muscles, or an irritable uterus.

        - Uterine Malformations: Septate or bicornuate uterus.

        - Short Cord: Either relative or absolute.

    - **Dangers of ECV**:

        - Premature onset of labor.
        - Premature rupture of membranes.
        - Placental abruption and bleeding.
        - Cord entanglement or knot formation.
        - Increased chance of fetomaternal hemorrhage and amniotic fluid embolism.
    - **Post-ECV Monitoring**: Cardiotocography (CTG) should be performed before and after the procedure to monitor fetal well-being. Anti-D immunoglobulin should be given to Rh-negative mothers.

4. **Management if ECV Fails or is Contraindicated**:
    - **Continue Pregnancy with Regular Checkups**: Even if the breech presentation persists, spontaneous version may occur. If not, an assessment should be made based on factors such as maternal age, complicating factors, fetal size, and pelvic capacity.
    - **Pelvic Assessment**: Pelvic assessment is crucial, especially for primigravidas or women with a history of pelvic insufficiency.
    - **Diagnostic Imaging**: Sonography is the gold standard for evaluating the pelvic capacity and fetal position. CT or MRI may also be considered if needed, though X-ray pelvimetry is not recommended.
5. **Delivery Planning**:
    - **Elective Cesarean Section**: Often recommended in breech presentations due to the complications associated with vaginal breech delivery. Indications include:
        - **Large Fetus** (weight >3.5 kg).
        - **Small Fetus** (weight <1.5 kg).
        - **Hyperextension of the Head** (e.g., "stargazing" fetus).
        - **Footling Presentation** (increased risk of cord prolapse).
        - **Pelvic Contraction** or **Severe IUGR**.
        - **Other Obstetric or Medical Complications**.

- **Cesarean Section Rates**: Cesarean rates for breech presentations vary from **15% to 50%**, with **80% being elective**.
- **Preterm Breech**: Cesarean section is commonly performed for preterm breech babies, especially if the weight is below **1,500g**.

6. **Vaginal Breech Delivery**:
    - **Criteria for Vaginal Delivery**:
        - Fetal Weight: Between 1.5 kg and 3.5 kg.
        - Flexed Head.
        - Adequate Pelvis.
        - Absence of Complications: No medical or obstetric issues complicating the delivery.
        - Availability of Emergency Cesarean Section: Access to skilled anesthetists and neonatologists.
        - Experienced Obstetrician: The presence of an obstetrician experienced in vaginal breech delivery is essential.
        - Informed Consent: The mother must be informed about the risks involved.
    - **Preferred Position**: Frank breech is preferred for vaginal delivery.

Contraindications for External Cephalic Version (ECV):

- **Antepartum Hemorrhage**: Such as placenta previa or placental abruption due to the risk of placental separation.
- **Fetal Causes**:
    - Hyperextension of the head.
    - Large fetus (>3.5 kg).
    - Congenital abnormalities (major).
    - Fetal compromise (e.g., IUGR).
    - Dead fetus.

- Multiple Pregnancy.
- Ruptured Membranes: Especially with drainage of liquor.
- Congenital Malformation of the Uterus: Such as septate or bicornuate uterus.
- Abnormal Cardiotocography: Unfavorable CTG.
- Contracted Pelvis.
- Previous Cesarean Section: Risk of scar rupture.
- Obstetric Complications: Severe pre-eclampsia, obesity, elderly primigravida, bad obstetric history (BOH), oligohydramnios, Rh isoimmunization.

MANAGEMENT OF VAGINAL BREECH DELIVERY

First Stage of Labor:

- **Vaginal Examination**: Performed at labor onset for pelvic assessment and after membrane rupture to check for cord prolapse.
- **Intravenous Line**: Inserted with Ringer's solution; oral intake is avoided. Blood is sent for group and cross matching in case of CS.
- **Analgesia**: Adequate analgesia, preferably epidural, is given.
- **Monitoring**: Fetal status and labor progress are continuously monitored. Oxytocin may be used to augment labor.

Indications for Cesarean Section (CS):

1. Complications in labor.
2. Arrest in labor progress.
3. Nonreassuring fetal heart rate (FHR) or fetal distress.
4. Cord prolapse or presentation.

Second Stage of Labor: Methods of Vaginal Breech Delivery:

1. **Spontaneous Delivery**: Very little assistance needed; not preferred.
2. **Assisted Breech Delivery**: The fetus is delivered with assistance throughout. This is the preferred method.

3. **Breech Extraction**: Rarely done now due to trauma risks. It involves extracting part or all of the fetus manually.

Assisted Breech Delivery:

- **Required Equipment & Personnel**:
    - Anesthetist (for anesthesia administration).
    - Assistant (to push down the fundus during contractions).
    - Instruments for episiotomy.
    - Obstetric forceps for the aftercoming head, if necessary.
    - Resuscitation equipment for the baby.
    - Neonatologist for newborn care.

Principles of Assisted Breech Delivery:

1. Never rush.
2. Push from above, don't pull from below.
3. Always ensure the fetus is in a sacroanterior position (back anteriorly).
4. Adequate contractions and maternal effort should help maintain fetal head flexion and ensure safe descent.

Risks of Rushing or Pulling:

- Premature entrapment of the aftercoming head.
- Traction from below can increase head diameter at the pelvic inlet.
- Increased risk of nuchal arm displacement.

Steps for Assisted Breech Delivery:

1. **Positioning**: Place the patient in lithotomy position when the posterior buttock distends the perineum.
2. **Avoiding Aortocaval Compression**: Tilt the woman laterally (15°) with a wedge.

3. **Preparation**: Perform antiseptic cleaning and empty the bladder using a catheter.
4. **Anesthesia**: Administer a pudendal block or perineal infiltration if epidural isn't used.
5. **Episiotomy**: Make an episiotomy in primigravidae and selected multiparae to help with the delivery of breech with extended legs and minimize head compression.
    - Best done when the perineum is distended.
6. **Expulsive Effort**: Encourage the patient to bear down while the uterus aids in fetal head flexion and descent. Avoid touching the fetus until the buttocks are delivered and the trunk up to the umbilicus.
7. **After the Trunk is Delivered**:
    - Decompress the extended legs (in frank breech) by applying pressure on the knees to flex and abduct the thighs.
    - Mobilize the umbilical cord to one side of the sacrum to avoid cord compression.
    - If the back is posterior, rotate the trunk to bring the back anteriorly (sacroanterior).
    - Wrap the baby in a sterile towel to prevent slipping and to facilitate manipulation.

Delivery of the Arms:

- **Assistance Needed**: The assistant should place a hand over the fundus and apply steady pressure during contractions to prevent the arms from extending.
- **Arm Position**: The position of the arm should be noted. When flexed, the scapula's vertebral border aligns with the fetal spine, but when extended, there is winging of the scapula.
- **Arm Delivery**: Arms are delivered one at a time when one axilla is visible. Each elbow is hooked with a finger to assist in delivery, regardless of which arm is delivered first.
- **Positioning**: The baby should be held by the feet over a sterile towel while the arms are delivered.

Delivery of the Aftercoming Head:

This stage is crucial, and the time between delivery of the umbilicus and mouth should ideally be 5–10 minutes. Several methods are used to deliver the aftercoming head, each effective in skilled hands:

1. **Burns-Marshall Method**:
    - **Positioning**: The baby hangs by its own weight while the assistant applies downward and backward suprapubic pressure to promote head flexion.
    - **Procedure**: Once the nape of the neck is visible, the baby is held by the ankles and traction is applied, swinging the trunk upward and forward. The perineum is guarded to prevent tearing as the face and brow emerge. Mucus is cleared from the mouth and pharynx using a suction device, and the rest of the head is delivered by depressing the trunk.
2. **Forceps Delivery**:
    - **Use**: Forceps can be used routinely to control head delivery. They help maintain flexion, offer controlled traction, and allow for more effective mucus suction.
    - **Method**: The head is brought lower into the birth canal with suprapubic pressure, and forceps are introduced to guide the head along the arc of the birth canal. Delivery should be slow (over 1 minute) to avoid intracranial bleeding.
3. **Modified Mauriceau-Smellie-Veit Technique**:
    - **Positioning**: The baby is placed on the left forearm, with limbs hanging down. The middle and index fingers are placed on the baby's malar bones to maintain head flexion.
    - **Traction**: The right hand applies pressure on the baby's shoulders and suboccipital region while traction is exerted downward and backward. Suprapubic pressure is applied by an assistant to maintain flexion.
    - **Final Steps**: Once the nape of the neck is visible, the baby is moved upward and forward to release the face, brow, and finally the occiput.

Resuscitation of the Baby:

If the baby is asphyxiated during delivery, immediate resuscitation may be necessary.

Third Stage of Labor:

- The third stage typically proceeds without complications, and the placenta is usually expelled soon after the delivery of the head.
- **Prophylactic Treatment**: If ergometrine is to be administered for uterine contraction, it should be given intravenously once the head crowns.

Preterm Breech Delivery:

- **External Cephalic Version (ECV)** is not recommended for preterm breech presentations.
- **Caesarean Section (CS)** is commonly performed for preterm breech deliveries, especially when the fetal weight is less than 1,500 grams.
- The better outcomes for preterm breech deliveries are still debated, with the use of antenatal steroids and improved neonatal care playing a role in the outcomes alongside the method of delivery.

MANAGEMENT OF COMPLICATED BREECH DELIVERY

Challenges in Deciding Delivery Mode:

- Advanced labor can present difficulty in determining the ideal mode of delivery for breech presentations.
- If the breech is not visible at the perineum, **cesarean section (CS)** may be considered as the preferred option.
- **Simulated teaching** using mannequins and model pelvis with experienced trainers can improve skills for handling breech delivery complications.

1. Delay in Descent of the Breech

The breech can become arrested at various levels of the birth canal:

1. Arrested at the Outlet:

- **Causes**:
    - Large baby with extended legs (most common).
    - Weak uterine contractions.
    - Rigid perineum.
    - Outlet contraction.
- **Management**:
    - If the outlet is contracted or the baby is large, **CS** is the method of choice.
    - In the absence of these conditions, **liberal episiotomy** and **fundal pressure** with or without **groin traction** can be effective. This involves placing the index finger(s) in the groin fold to exert traction toward the trunk (avoiding traction on the femur).
    - However, such maneuvers are less commonly recommended in modern obstetrics.

2. Arrested at the Cavity:

- **Causes**:
    - Pelvic contraction.
    - Big baby.
    - Weak uterine contractions.
- **Management**:
    - **CS** is the preferred method for delivery if breech descent does not occur by the time the cervix is fully dilated (trial of breech).
    - If descent fails, **feto-pelvic disproportion** is likely, requiring **CS**.
- **Frank Breech Extraction (Pinard's Maneuver)**:

- In cases where breech decomposition is required, **Pinard's maneuver** (intrauterine manipulation) can be performed. This is usually possible if the membranes have ruptured recently.
- The technique involves placing fingers in the popliteal fossa, flexing the legs, and then extracting the breech by grasping the foot at the ankle.

Management of Extended Arms:

- **Causes**:
  - One or both arms may be fully extended alongside the head or behind the neck, usually due to improper delivery technique (e.g., pulling rather than pushing from above).
  - Arrest occurs when the trunk is delivered up to the costal margins, and the arms fail to emerge.
- **Diagnosis**:
  - Winged scapula and the absence of flexed arms in front of the chest are key indicators.
- **Management**:
  - Urgent delivery of the arms is required, with the posterior arm delivered first, followed by the anterior arm. Two main techniques can be used:

Classical Method:

- Requires intrauterine manipulation under general anesthesia.
- The posterior arm is delivered first by placing a hand along the sacrum and applying firm pressure to push the arm over the baby's face.
- The anterior arm is then delivered by introducing the hand anteriorly while depressing the baby's trunk towards the perineum.
-

2. Lovsett's Maneuver:

- **Preferred method** due to several advantages:
  - Wider applicability, minimal intrauterine manipulation, and no general anesthesia.

- It can be applied to all types of arm displacement.
- A single manipulation is usually effective.

- **Principles**:
  - The trunk is rotated while maintaining downward traction, bringing the posterior shoulder below the pubic arch.
  - The baby is then rotated in the opposite direction to deliver the anterior shoulder.

- **Procedure**:
  - The baby is grasped using a **femoropelvic grip**.
  - **Step 1**: Slightly lift the baby to cause lateral flexion. Rotate the trunk through 180° keeping the back anterior, and apply downward traction to bring the posterior arm below the pubic arch.
  - **Step 2**: Rotate the trunk in reverse to deliver the anterior shoulder.

- **Nuchal Displacement**:
  - If the arm is flexed at the elbow and lies behind the fetal head, rotate the trunk 180° to bring the trapped arm forward. If that fails, the arm can be forcibly extracted, although this may lead to a fracture.

3. Arrest of the Aftercoming Head

1. At the Brim:

- **Causes**:
  - Deflexed head.
  - Contracted pelvis.
  - Hydrocephalus.

- **Management**:
  - **Deflexed Head**: Complete delivery using **malar flexion** and **shoulder traction** with suprapubic pressure to rotate the head through the pelvic brim.

- **Contracted Pelvis / Hydrocephalus**: If the head is unable to descend, **perforation** of the head may be necessary.

2. In the Cavity:

- **Causes**:
  - Deflexed head.
  - Contracted pelvis.
- **Management**:
  - **Forceps** delivery is the best option for deflexed heads and contracted pelvises.
  - **Malar flexion** and **shoulder traction** may be useful in cases of deflexed head.

3. At the Outlet:

- **Causes**:
  - Rigid perineum.
  - Deflexed head.
- **Management**:
  - Perform **episiotomy** and use **forceps** or **malar flexion** and **shoulder traction** to assist in delivery.

Delivery of the Head Through an Incompletely Dilated Cervix:

- **Common Causes**:
  - Premature baby.
  - Macerated baby.
  - Footling breech.
  - Hasty delivery before full cervical dilation.
- **Management**:

- For a living baby, perform **malar flexion** and **shoulder traction** (shoe-horn method), while pushing the cervix up.
- If necessary, **Duhrssen's incisions** (2 and 10 o'clock) can be made on the cervix to aid dilation.
- For a dead baby, **perforation of the head** is preferred over waiting for full cervical dilation.

Occipitoposterior Position of the Head:

- **Common in spontaneous breech deliveries**.
- The fetal trunk and head are rotated to bring the head anterior.
- For rotation, use **malar flexion** and **shoulder traction**.
- In a **premature baby**, the **Prague method** (reverse malar flexion) or **forceps** may be used to complete delivery.

FACE PRESENTATION

Definition: Face presentation is when the baby's face is the first part to come out during labor, instead of the head being flexed as in a normal cephalic presentation. The baby's head is fully extended, with the chin (mentum) facing down.

Types of Face Presentation:

There are four positions based on the baby's chin and its relation to the mother's pelvic bones:

1. **Right Mentoposterior (RMP)**: Chin towards the right sacroiliac joint.
2. **Left Mentoposterior (LMP)**: Chin towards the left sacroiliac joint.
3. **Left Mentoanterior (LMA)**: Chin towards the left iliopubic eminence.
4. **Right Mentoanterior (RMA)**: Chin towards the right iliopubic eminence.

The most common position is **Left Mentoanterior (LMA)**.

Causes:

Maternal Factors:

- Multiple pregnancies.
- Abnormal uterine shape or size (contracted pelvis).
- Pelvic tumors.

Fetal Factors:

- Birth defects (e.g., anencephaly).
- Cord twisting around the neck.
- Increased muscle tone in the neck.

Labor Mechanism:

Mentoanterior (LMA/RMA):

- The baby's face engages in the pelvis and rotates anteriorly (towards the mother's front).
- The head is delivered in a sequence: face, brow, vertex, then occiput.
- This type of face presentation generally has a better outcome and can be delivered vaginally.

Mentoposterior (RMP/LMP):

- The chin faces the back (posterior), making delivery more difficult.
- Rotation of the chin to the front may happen in only 20-30% of cases.
- Often, these cases need caesarean section due to difficulty in the baby passing through the birth canal.

Diagnosis:

- Abdominal Exam: No visible bulging of the flanks due to the baby's spine.
- Vaginal Exam: The chin, mouth, and facial features are felt. Care is needed to avoid injury to the baby's eyes.
- Ultrasound: Used to confirm the diagnosis and check for any abnormalities.

Risks and Complications:

- Cord prolapses (umbilical cord coming out before the baby).
- Delayed labor and increased risk of cesarean delivery.

- Higher chance of perineal tearing due to the baby's face being larger than the vertex.
- Fetal risks include increased pressure on the neck and face, possibly leading to bruising and swelling after birth.

Management:

For Mentoanterior Position:

- **Vaginal Delivery**: If there are no complications, vaginal delivery is possible. An episiotomy (cut to widen the vaginal opening) may be needed.

For Mentoposterior Position:

- **Vaginal Delivery**: If the chin rotates to the front, vaginal delivery may be possible, sometimes with forceps.
- **Cesarean Section**: If rotation doesn't happen or the labor stalls, a cesarean section is usually recommended.

BROW PRESENTATION

Definition: Brow presentation is a rare type of cephalic presentation where the baby's brow (forehead) is the first part to come out during labor. The baby's head is positioned between full flexion (chin to chest) and full extension (face presentation), with the forehead as the presenting part.

Causes:

- Abnormal pelvic shape or size, and the baby being in an unstable position.
- The position often changes to a **vertex** (head down) or **face** presentation.

Diagnosis:

- **Abdominal Exam**: The head feels large and not engaged. The cephalic prominence (top of the head) and groove between the head and the back are less prominent than in face presentation.
- **Vaginal Exam**: The forehead can be palpated. The position is confirmed by identifying the supraorbital ridges and fontanel.
- **Ultrasound**: Confirms brow presentation and excludes any congenital malformations.

Mechanism of Labor:

- **Engagement**: The baby's brow engages through the oblique pelvic diameter. The engaging diameter is larger (mentovertical 14 cm), so normal vaginal delivery is difficult.
- **Labor Process**: If the baby is small and the pelvis is roomy, the brow may descend and rotate to the pubic symphysis. The baby will deliver in a similar way to a face presentation (brow followed by face).
- **Posterior Brow Position**: There is no natural mechanism for delivery, and this often leads to obstructed labor.

Management:

- **During Pregnancy**: If diagnosed, nothing is usually done unless there are contraindications for vaginal delivery (e.g., contracted pelvis, fetal malformations). Spontaneous correction to face or vertex may occur.
- **During Labor**:
    1. If spontaneous correction to vertex or face doesn't occur, **cesarean section** is the best option.
    2. **Manual correction** (changing the position to face) is rarely done nowadays.
    3. **Craniotomy** may be performed if labor becomes obstructed and the baby has died.

Course and Prognosis:

- **Persistent Brow Presentation** can lead to obstructed labor, which is a risk for **rupture of the uterus**, especially in women with multiple pregnancies (multipara).
- **Spontaneous Conversion**: In about 10% of cases, the brow may convert to a face or vertex presentation.

Molding:

- Prolonged labor can cause the baby's head to deform (overlapping bones) and a bulging forehead due to caput formation (swelling).

TRANSVERSE LIE

Definition:

- **Transverse Lie**: The fetus lies perpendicularly to the mother's spine.
- **Oblique Lie**: The fetus lies at an angle to the mother's spine, more common than transverse lie.
- Both are types of **shoulder presentations**, where the shoulder is typically the presenting part during labor.

Position:

- The **position** is determined by the direction of the fetus's back.
    1. **Dorsoanterior**: Most common (60%).
    2. **Dorsoposterior**: The back faces the mother's back.
    3. **Dorsosuperior** / **Dorsoinferior**: Rare positions.

Etiology (Causes):

1. Multiparity: Lax abdomen, poor uterine tone.
2. Prematurity: Fetal position is less stable.
3. Twins: Often in second twin.
4. Hydramnios
5. Contracted pelvis: Narrow pelvis.
6. Pelvic issues: Narrow pelvis, Tumors, or placenta problems.
7. Congenital uterine malformations.
8. Intrauterine fetal death.

Diagnosis:

Abdominal Examination:

- **Inspection**: Uterus appears broader, asymmetrical.
- **Palpation**:
    - Fundal height less than the expected for gestational age.

- **Lateral grip**: Feel both soft (breech) and hard (head) parts.
- **Pelvic grip**: Lower uterus may feel empty (may be occupied by the shoulder during labor).

- **Auscultation**:
  - Fetal heart sounds (FHS) lower in **dorso anterior** position.
  - FHS are higher and less distinct in **dorsoposterior** position.
- **Ultrasound** confirms the diagnosis.

Vaginal Examination:

 Pregnancy: Presenting part high up.

 Labor: Feel shoulder or prolapsed arm (with or without cord).

Labor Course:

 No natural birth mechanism in transverse lie; fetus can't pass through pelvis.

 Unfavorable outcomes (if untreated):

- Premature rupture of membranes, prolapsed arm/cord, obstructed labor, infection, dehydration, and uterine rupture.

 Favourable outcomes (rare):

- Spontaneous correction to a normal position (longitudinal lie).
- Spontaneous expulsion (more common in premature or small fetuses).

Management:

Before Labor:

- External Cephalic Version (ECV): Try after 35 weeks if safe.
- If ECV fails, caesarean section is preferred.

During Labor:

- Early labor: Try ECV if safe. If not, proceed with cesarean section.
- Late labor: Caesarean section is best if the baby is healthy.
  - Internal version (changing fetal position) is risky and rarely done.

UNSTABLE LIE

Definition:

- **Unstable Lie**: The fetus's position keeps changing after 36 weeks of pregnancy.

Causes:

1. **Grand multipara**: Multiple pregnancies, weak uterus.
2. **Hydramnios**: Too much amniotic fluid.
3. **Contracted pelvis**: Narrow pelvis.
4. **Placenta previa**: Placenta covers the cervix.
5. **Pelvic tumors**: Growths in the pelvis.

Risks:

- **Cord entanglement** or **prolapse** (cord slipping ahead of the baby) is a danger.
- Increased **perinatal death** risk.

Management:

1. **Check the fetal position** regularly during pregnancy.
2. **External Cephalic Version (ECV)**: Try to turn the baby to the right position (if safe).
3. **Hospitalize at 37 weeks** to monitor for complications like early water breaking or cord prolapse.
4. **Treatment**:
    - **Cesarean Section** is often needed, especially with complications like preeclampsia or placenta previa.
    - **Inducing labor**: Use **ECV**, **oxytocin**, and **amniotomy** to help labor progress and aim for a vaginal delivery.

COMPOUND PRESENTATION (Syn: Complex presentation)

Definition:

- Compound Presentation: When the baby is head-first (cephalic) but has a hand or foot beside the head or breech.

Common: Head with hand.
Rare: Head, hand, and foot.

Causes:

1. Prematurity.
2. Narrow pelvis.
3. Pelvic tumors.
4. Multiple pregnancies.
5. Macerated fetus.
6. Excess amniotic fluid (Hydramnios).
7. High head position with early rupture of membranes.

Diagnosis:

- Can be felt when the cervix is dilated and the limb is next to the head, especially after water breaks.
- Cord prolapse can happen in 10–15% of cases.

Management:

1. Cesarean Section: If there's a contracted pelvis, cord prolapse, or other complications.
2. Watch and Wait: In uncomplicated cases, monitor labor closely (preferably with fetal monitoring).
3. Do not reposition limbs early to avoid risks to the mother and baby.

CORD PROLAPSE

Cord Prolapse: Simplified

Definition:
Cord prolapse occurs when the umbilical cord slips ahead of or beside the baby's presenting part, which can lead to dangerous compression and loss of blood flow to the baby.

Types:

1. Occult Prolapse: The cord is beside the baby but not felt during an exam.
2. Cord Presentation: The cord is below the baby but still inside the amniotic sac.
3. Cord Prolapse: The cord is outside the cervix, in the vagina, or at the vulva after the water breaks.

Causes:

- Abnormal presentations (breech or transverse lie)
- Premature birth
- Small pelvis
- Multiple babies
- Excess amniotic fluid
- Placental problems (like placenta previa or long cord)
- Medical interventions (e.g., early membrane rupture)

Diagnosis:

- Occult prolapse is hard to diagnose without monitoring the baby's heart rate.
- Cord presentation is diagnosed by feeling the cord through the membranes.
- Cord prolapse is diagnosed by feeling the cord directly.

Prognosis:

- Fetal risk: Lack of oxygen to the baby (anoxia) due to cord compression, which is more dangerous in head-first babies or if the cervix is only partially dilated.
- Perinatal mortality: 15-50%, but quick delivery can lower the risk to 5-10%.
- Maternal risk: Mainly from emergency surgeries (C-sections), which carry risks like blood loss and infection.

Management:

1. **Prevention & Early Detection**:
    - Check for cord prolapse during early labor, especially with abnormal presentations, twins, or excess amniotic fluid.
    - If prolapse is suspected, prepare for a C-section.

2. **Cord Presentation**:
    - Avoid manually handling the cord. Instead, try to deliver quickly.
    - If vaginal delivery isn't possible, perform a C-section.
3. **For a Living Baby**:
    - C-section is the best option when the baby is mature and alive.
    - If the head is engaged, a forceps delivery may be possible.
    - For breech or transverse presentations, use breech extraction or internal version.
4. **First Aid**:
    - Stop oxytocin (if in use) to prevent contractions.
    - Give fluids and oxygen.
    - Bladder filling (using saline via a catheter) can lift the presenting part off the cord.
    - Place the mother in Sims' position to relieve pressure on the cord.
5. **For a Dead Baby**:
    - Let labor proceed naturally for spontaneous delivery.

PROLONGED LABOR

Definition of Prolonged Labor:

- Labor is considered prolonged if it lasts longer than 18 hours, combining both first and second stages.
- It can result from slow cervical dilation or poor descent of the baby.

Prolonged Latent Phase:

- The latent phase (before active labor) is considered prolonged if it lasts more than:
    - 20 hours in first-time mothers (primigravidae)
    - 14 hours in mothers who've given birth before (multipara).

- Causes: Unripe cervix, wrong baby position, small pelvis, early water breaking, labor induction.
- **Management**: Generally, wait and watch, provide rest and pain relief, and avoid unnecessary interventions like amniotomy.

Causes of Prolonged Labor:

1. **First Stage**:
    - **Power**: Weak or irregular contractions.
    - **Passage**: Small or abnormal pelvis.
    - **Passenger**: Baby's position (e.g., OP), size, or abnormalities.
2. **Second Stage**:
    - **Power**: Weak contractions or inability to push.
    - **Passage**: Small pelvis, resistance from pelvic muscles, or tumors.
    - **Passenger**: Baby's position or size.

Diagnosis of Prolonged Labor:

- **First Stage**: Prolonged if cervical dilation is <1 cm/hour in a first-time mom, or <1.5 cm/hour in a mom who's given birth before.
- **Second Stage**: Prolonged if no progress after 2 hours (nullipara) or 1 hour (multipara) without regional anaesthesia.
- **Use of a Partograph**: Tracks progress and alerts when intervention is needed.

Risks of Prolonged Labor:

- **Fetal Risks**: Reduced oxygen supply, infection, head trauma, or the need for delivery assistance.
- **Maternal Risks**: Stress, infection, bleeding, or tearing.

Management & Treatment:

- **Prevention**: Early detection using partographs, addressing risks like big baby or small pelvis.
- **During Labor**: Use oxytocin or amniotomy if contractions are weak; for secondary arrest, use caesarean if needed.

- **Second Stage**: If progress is slow, monitor and assist delivery using forceps, ventouse, or caesarean if necessary.

OBSTRUCTED LABOR

Definition:

- Obstructed labor occurs when, despite strong uterine contractions, the baby cannot move down the birth canal due to physical obstruction. This blockage can be caused by issues with the fetus or the birth canal.

Causes:

1. **Fault in the Passage (Birth Canal)**:
    - **Bony Obstruction**: Cephalopelvic disproportion (CPD), contracted pelvis.
    - **Soft Tissue Obstruction**: Cervical scarring, fibroids, ovarian tumors, or abnormal uterus.
2. **Fault in the Passenger (Baby)**:
    - **Malposition**: Transverse lie, brow presentation.
    - **Fetal Abnormalities**: Hydrocephalus, ascites, or conjoined twins.
    - **Other Issues**: Large baby, Occipito-posterior position, or compound presentations.

Effects on the mother:

- **Immediate**:
    - Exhaustion, dehydration, and metabolic acidosis.
    - Genital infections, especially after rupture of membranes.
    - Risk of uterine rupture, postpartum haemorrhage, and shock.
- **Remote**:
    - Fistulas (urinary or rectovaginal), vaginal scarring, or secondary amenorrhea due to hysterectomy.

Effects on the Fetus:

- **Asphyxia**: Reduced blood flow due to uterine contractions or cord issues.
- **Acidosis**: Fetal and maternal oxygen deprivation.
- **Intracranial Haemorrhage**: Caused by head compression during prolonged labor.
- **Infections**: Increased risk of neonatal sepsis.

Clinical Features:

- Similar to tonic uterine contractions, with stalled progress despite effective contractions.

Prevention:

- **Antenatal**: Detect potential causes like a large baby or abnormal fetal position.
- **Intranatal**: Monitor labor closely with a partograph, and intervene early if labor stalls for 2-4 hours despite strong contractions.

Treatment:

1. **Preliminary Care**:
    - Correct dehydration and acidosis with IV fluids (Ringer's solution).
    - Take blood samples for cross-matching and culture.
    - Administer antibiotics (e.g., ceftriaxone and metronidazole) to prevent infection.
2. **Obstetric Management**:
    - Exclude uterine rupture before proceeding with treatment.
    - If the baby is likely to be dead, consider destructive operations to relieve the obstruction.
    - **Vaginal Delivery**: Forceps can be used if the baby's head is low and delivery is not risky.
    - **Caesarean Section**: Best for early cases with a healthy fetus; late cases may lead to complications.
    - **Symphysiotomy**: An alternative in certain cases where cesarean is too risky.

DYSTOCIA CAUSED BY FETAL ANOMALIES

Macrosomia (Generalized Fetal Enlargement)

Definition:

- Macrosomia refers to a fetus that weighs more than 4 kg (approximately 8.8 pounds).

Causes:

- Hereditary factors: Family history and race.
- Maternal factors: Obesity, poorly controlled diabetes (both preexisting and gestational), and post maturity (birth after 42 weeks).
- Other factors: Multiparity (having many previous pregnancies), male fetus.

Diagnosis:

- **Suspected signs:**
    1. Disproportionate increase in uterine size.
    2. Clinically, the fetus feels larger than normal.
    3. Ultrasound measurements (BPD – biparietal diameter, HC – head circumference, FL – femur length, AC – abdominal circumference) are used to estimate fetal weight.

Fetal Hazards:

- Dystocia, Shoulder dystocia, Brachial plexus injury, Asphyxia, Birth trauma, Meconium aspiration & Perinatal morbidity and mortality.

Maternal Hazards:

- Soft tissue injuries, Postpartum hemorrhage (PPH), Puerperal sepsis & High maternal morbidity.

Management:

- **Induction of labor** early to reduce complications.
- **Elective Cesarean Section** for high-risk mothers (e.g., those with diabetes).

SHOULDER DYSTOCIA

Definition:
Shoulder dystocia is a condition during delivery where the baby's shoulder gets stuck behind the mother's pelvic bone (symphysis pubis or sacral promontory) after the head is delivered. This requires additional manoeuvres to help deliver the baby. It occurs in 0.2% to 1% of births.

Risk Factors:

- Previous shoulder dystocia
- Large baby (macrosomia > 4.5 kg)
- Diabetes
- Obesity (BMI > 30)
- Induced labor
- Prolonged labor stages
- Post maturity (late pregnancy)
- Multiparity (many pregnancies)
- Fetal anomalies (like anencephaly)
- Instrumental deliveries (especially ventouse)

Complications:

- **Fetal:** Asphyxia, nerve injuries (e.g., brachial plexus injury), fractures (humerus, clavicle), or trauma.
- **Maternal:** Postpartum hemorrhage (PPH), lacerations (vaginal, cervical), perineal tears, or uterine rupture.

Diagnosis:

- **Turtle Neck Sign**: The baby's head pulls back against the perineum.
- Failure of the shoulder to descend during delivery.
- **Fetal face plethoric** (flushed and swollen).

Management:

- **Maneuvers:**

- **McRoberts maneuver**: Maternal legs are bent sharply towards her abdomen, which helps open the pelvis.
- **Suprapubic Pressure**: Applied to help rotate the shoulder.
- **Wood's Maneuver**: Rotating the posterior shoulder using pressure.
- **Posterior Arm Extraction**: Delivering the baby's arm first to reduce shoulder width.
- **"All Fours" Position**: The mother moves to a hands-and-knees position to increase pelvic space.
- **Emergency Techniques:** If other methods fail, surgical interventions like cleidotomy (cutting the clavicle) or cesarean section (via Zavanelli maneuver) may be needed.

Hydrocephalus

Definition:
Hydrocephalus is the accumulation of cerebrospinal fluid (CSF) in the brain, leading to an enlarged head. This condition affects 1 in 2,000 deliveries.

Causes:
Often associated with congenital malformations, aneuploidy (chromosomal abnormalities), and neural tube defects.

Diagnosis:

- **Physical Exam:** Larger, softer head with increased circumference.
- **Ultrasound:** Enlarged ventricles and thin cerebral cortex.
- **During Labor:** The head feels "crackly" on palpation due to widened fontanels.

Prognosis:

- Poor, especially in severe cases, leading to stillbirth or death in the neonatal period. Surviving babies may have developmental delays.
- **Maternal Risk:** Possible obstructed labor if undiagnosed.

Management:

- **Decompression:** The baby's head can be decompressed by using a sharp needle or scissors to drain the excess CSF, making delivery easier.

- **Cesarean Delivery** may be performed if decompression fails.

Neural Tube Defects (NTD)

Definition:
NTDs like **anencephaly** and **spina bifida** result from incomplete development of the neural tube during pregnancy.

Anencephaly:

- Involves the absence of a major part of the brain and skull.
- Occurs in 1 in 1,000 births.
- Often detected early by elevated alpha-fetoprotein and ultrasound.

Diagnosis:

- **First Trimester:** Elevated alpha-fetoprotein (AFP) and sonography confirm the absence of the cranial vault.
- **Later in Pregnancy:** Often complicated by other issues like hydramnios (excess amniotic fluid).

Management:

- **Early Diagnosis:** Termination of pregnancy is advised if diagnosed early.
- **Late Diagnosis:** Often leads to obstructed labor, with possible shoulder dystocia.

Prevention:

- Folic acid supplementation starting a month before conception and continuing for the first 12 weeks reduces the risk by 85%.

Enlargement of Fetal Abdomen

Causes:

- **Ascites** (fluid buildup), **distended bladder**, kidney tumors, or **umbilical hernia** can cause abdominal enlargement sufficient to complicate delivery.

Diagnosis:

- **Ultrasound:** Identifies fluid buildup or abnormalities.

Management:

- **Decompression:** A needle can be used to puncture and relieve the pressure, facilitating easier delivery.

Monsters and Conjoined Twins

Monsters:
Rare developmental anomalies resulting from incomplete twinning that often cause surprise dystocia.

Conjoined Twins:

- Identified via ultrasound showing:
    - Continuous external skin contours,
    - Close spines,
    - Shared placenta.

Management:

- **Cesarean Section** is typically performed for the best chance of survival.
- **Destructive Operations:** In cases with non-viable fetuses, surgical separation may be needed.

COMPLICATIONS OF THE THIRD STAGE OF LABOR

Postpartum Hemorrhage (PPH) is heavy bleeding after childbirth, especially during the third stage of labor when the placenta is delivered. It can be life-threatening if not treated promptly.

Definition

- WHO Definition: PPH occurs if blood loss exceeds 500 mL after a vaginal birth.
- Clinical Definition: Any bleeding that affects the mother's health, causing symptoms like a fast pulse or low blood pressure, is PPH.

Normal Blood Loss

- Vaginal delivery: 500 mL
- Cesarean delivery: 1000 mL
- Cesarean hysterectomy: 1500 mL

Classifications of PPH

- Minor: <1L blood loss
- Major: >1L blood loss
- Severe: >2L blood loss

Types of PPH

1. **Primary PPH**: Happens within the first 24 hours after birth.
    - Third stage hemorrhage: Bleeding before the placenta is delivered.
    - True PPH: Bleeding after the placenta is delivered.
2. **Secondary PPH**: Bleeding that happens more than 24 hours after delivery, during the recovery period.

Complications in the Third Stage

- Retention of Placenta: The placenta doesn't come out as it should.
- Shock: Blood loss can cause the body to go into shock.
- Pulmonary Embolism: Air or amniotic fluid can block the lungs.
- Uterine Inversion: Rare, but serious, when the uterus turns inside out after the placenta is delivered.

Why It's Crucial

- The third stage of labor is critical for the mother, and unexpected bleeding can lead to severe problems if not managed quickly.

PRIMARY POSTPARTUM HEMORRHAGE

Primary Postpartum Hemorrhage (PPH) is heavy bleeding that happens within the first 24 hours after childbirth. It is mainly caused by four factors, known as the **Four Ts**:

Causes of Primary PPH

1. **Tone (Atonicity)**: The uterus doesn't contract properly after delivery, causing bleeding. This is the most common cause (80% of cases).
    - **Risk factors**: Multiple births, large baby, excess amniotic fluid, anemia, prolonged labor, anesthesia, or use of oxytocin during labor.
2. **Trauma**: Injury to the birth canal (cervix, vagina, perineum) during delivery, especially in surgical or assisted deliveries. In some cases, bleeding may be hidden inside the body.
3. **Retained Tissue**: Fragments of the placenta or blood clots left inside the uterus cause bleeding.
4. **Thrombin (Coagulopathy)**: Blood clotting problems, either from a disorder or medication, make it harder for blood to stop flowing.

Diagnosis and Symptoms

- **Visible Bleeding**: Most bleeding is easy to see, though in rare cases it can be hidden (e.g., hematomas).
- **Symptoms depend on the amount of blood lost**: A loss of about 20-25% of blood volume will show changes in pulse and blood pressure. Severe bleeding can cause shock or death.

Prevention

PPH cannot always be avoided, but its risk can be reduced:

- **Antenatal Care**: Ensure good health, monitor hemoglobin levels, and identify high-risk pregnancies (e.g., multiple births, previous PPH).
- **Intranatal Care**: Use active management during labor, give oxytocin after delivery to help the uterus contract, and check for trauma or missing placenta parts.

Management of Third Stage Bleeding (Postpartum Haemorrhage)

The aim is to **stop bleeding, empty the uterus, and ensure the uterus contracts properly**.

Steps in Management

Placental Site Bleeding:

1. **Massage the uterus**: Palpate and massage the uterus to make it firm. If bleeding continues, check for genital tract injury.
2. **Administer fluids and oxytocin**: Start IV fluids (Normal saline or Ringer's solution) with oxytocin (20 units in 1 L) at 60 drops/min. Prepare for blood transfusion if needed.
3. **Give medications**: Administer oxytocin (10 units IM) or methergine (0.2 mg IV) to help the uterus contract.
4. **Catheterize the bladder**: Empty the bladder to aid uterine contraction.
5. **Give antibiotics**: Ampicillin and metronidazole (2 g and 500 mg IV).

If the placenta hasn't separated, perform **manual removal** under anesthesia after resuscitating the patient if needed.

Traumatic Bleeding:

- **Examine the uterus and vaginal canal** under anesthesia to check for injuries. Stitch any bleeding areas.

Manual Removal of the Placenta:

1. **Anesthesia**: The procedure is usually done under general anesthesia. If urgent, use sedation.
2. **Positioning**: The patient is in lithotomy position, and the bladder is catheterized.
3. **Insert hand into the uterus**: One hand goes inside the uterus, the other holds the cord to guide the process.
4. **Apply pressure**: Press on the uterus from outside to help detach the placenta.
5. **Remove the placenta**: Once detached, pull on the cord to remove it and check the uterus for remaining tissue.
6. **Post-procedure care**: Give methergine to contract the uterus and check for any vaginal or cervical injuries.
7. **Ensure full removal**: Check the placenta and membranes to ensure nothing is left behind.

Difficulties & Complications:

- **Difficulties**:
    - Hour-glass contraction makes it hard to insert the hand.
    - Morbidly adherent placenta requires careful removal in pieces.
- **Complications**:
    - Bleeding from incomplete removal, Shock, Uterine injury, Infection, Uterine inversion & Blood clots or embolism.

MANAGEMENT OF TRUE POSTPARTUM HEMORRHAGE (PPH)

Principles:

- **Simultaneous Approach**: Focus on communication, resuscitation, monitoring, and arresting bleeding.
- **Key Action**: In major PPH (blood loss > 1000 mL or clinical shock), immediate measures are essential.

Immediate Measures:

1. **Call for Help**: Involve the obstetric registrar.
2. **Establish IV Access**: Two large-bore (14-gauge) IV cannulas.
3. **Positioning**: Keep patient flat and warm.
4. **Send Tests**: Full blood count, group/crossmatch, RFT, LFT, coagulation tests, and order 2 units of blood.
5. **Infuse Fluids**: Administer 2 liters of normal saline or plasma substitutes (e.g., Haemaccel).
6. **Oxygen**: Give 10-15 L/min via mask.
7. **Oxytocin**: Start 20 units in 1 L normal saline, at 60 drops per minute.
8. **Monitor**: A designated staff member monitors vital signs, fluid intake, urine output, and medications.

Management Based on Type of PPH:

1. Atonic PPH (Uterus fails to contract):

- **Step I**:
    - Massage uterus to firm it and expel clots.
    - Administer **Methergine** (0.2 mg IV).
    - Start oxytocin infusion (10 units in 500 mL saline at 40-60 drops/min).
    - Keep bladder empty with Foley catheter.
    - Examine placenta and membranes for missing parts.
- **Step II**:
    - **Explore the uterus** under general anesthesia.
    - Check cervix, vagina, and paraurethral region for injury.
    - If no improvement, administer **15-methyl PGF2α** (250 µg IM every 15 minutes, up to 2 mg), or **Misoprostol** (1000 µg rectally).
- **Step III**:
    - Perform **uterine massage and bimanual compression** (manual compression via vagina and abdomen).
- **Step IV**:
    - **Uterine Tamponade**: Either intrauterine gauze packing or balloon tamponade (Foley catheter or Bakri balloon inflated with saline).
- **Step V**:
    - **Surgical options** if bleeding continues:
        - B-Lynch compression suture (80% success rate).
        - Ligation of uterine arteries (75% success rate).
        - Angiographic embolization (90% success rate).
- **Step VI**:
    - **Hysterectomy**: Consider if all other methods fail, especially in parous women.

2. Traumatic PPH (Vaginal, cervical, or perineal injury):

- **Examine the perineum, vagina, and cervix** using good lighting and a speculum.
- **Repair any lacerations** under anesthesia with sutures.

Other Considerations:

- **Non-pneumatic antishock garment** can be used if transferring the patient.
- **Abdominal aorta compression** may provide temporary relief during transfer.
- **Document all interventions** (time of actions, drugs, fluids, etc.) to ensure proper records.

This simplified management approach ensures systematic action in controlling PPH and improves patient outcomes.

SECONDARY POSTPARTUM HEMORRHAGE (PPH)

Causes:

- **Timing**: Occurs between the 8th and 14th day after delivery.
- **Common Causes**:
    1. Retained cotyledon or membranes (most common cause).
    2. Infection and separation of slough over cervicovaginal lacerations.
    3. Endometritis and subinvolution of the placental site (delayed healing).
    4. Secondary hemorrhage after cesarean section (10-14 days) due to:
        - Separation of slough exposing bleeding vessels.
        - Granulation tissue formation.
    5. Withdrawal bleeding from estrogen therapy for lactation suppression.
    6. Rare causes: Chorionepithelioma, carcinoma of the cervix, placental polyp, infected fibroid, fibroid polyp, or puerperal uterine inversion.

Diagnosis:

- Characteristics of Bleeding: Bright red, varying amounts, sometimes brisk.

- Signs: Anemia, possible sepsis.
- Examination: Internal exam may show signs of sepsis, uterine subinvolution, and a patulous cervical os.
- Ultrasonography: Useful to detect retained placental bits in the uterine cavity.

Management

Principles:

1. Assess Blood Loss: Determine the amount and replace it (blood transfusion if needed).
2. Identify the Cause: Take appropriate action to rectify the underlying cause.

Supportive Therapy:

- Blood Transfusion: If necessary.
- Uterine Origin Bleeding: Administer Methergine 0.2 mg intramuscularly.
- Antibiotics: Routine use of clindamycin and metronidazole.

Treatment Approaches

1. Conservative Management:

- If the bleeding is mild and no obvious cause is identified, monitor for 24 hours in the hospital.

2. Active Treatment:

- **Retained Cotyledon/Membranes**:
    - Urgent uterine exploration under general anaesthesia is recommended.
    - Use ovum forceps to remove retained products.
    - Gentle curettage using a flushing curette to ensure complete removal.
    - Administer Methergine 0.2 mg intramuscularly to promote uterine contraction.
    - Send removed tissue for histological examination.
- **Infection/Sloughing Wound in the Cervicovaginal Canal**:

- Control bleeding with haemostatic sutures.

- **Secondary Haemorrhage After Caesarean Section**:
  - Laparotomy may be required.
  - Bleeding from the uterine wound can be controlled with haemostatic sutures.
  - In rare cases, ligation of the internal iliac artery or hysterectomy may be necessary.

RETAINED PLACENTA

Definition:

- Retained placenta is when the placenta is not expelled within **30 minutes** after the baby's birth.

Causes of Retained Placenta

1. **Poor Uterine Contractions**: Weak contractions prevent expulsion (e.g., in grand multiparas or overdistended uterus).
2. **Adherent Placenta**: Placenta stays attached to the uterus (due to uterine atony, prolonged labor, or uterine abnormalities).
3. **Morbidly Adherent Placenta**: Placenta sticks tightly to the uterus (can be partial or complete).
4. **Incarcerated Placenta**: Placenta trapped due to uterine contractions or premature removal attempts.

Diagnosis

- **Timing**: If the placenta isn't expelled within **30 minutes** after birth, it's diagnosed as retained.
- **Signs**: Placenta separation (cord lengthening, blood flow, uterine contraction) and manual examination confirm the type.

Risks of Retained Placenta

1. **Bleeding**: Heavy blood loss.
2. **Shock**: Due to blood loss or multiple abdominal manipulations.
3. **Infection**: Risk of puerperal sepsis.
4. **Future Risk**: Possibility of retained placenta in future pregnancies.

Management

1. **Watchful Expectancy**:
    - Observe for bleeding and placental separation for **30 minutes**.
    - Empty the bladder to help uterine contractions.
    - Manage bleeding if it occurs.
2. **Management of Retained Placenta**:
    - **Separated Placenta**: Use **controlled cord traction** to remove it.
    - **Unseparated Placenta**: **Manual removal** under general anesthesia.
    - **Complicated Cases**: If morbidly adherent, further surgery or uterine exploration may be needed.

MANAGEMENT OF UNFORESEEN COMPLICATIONS DURING MANUAL REMOVAL OF RETAINED PLACENTA

1. **Hour-glass Contraction**
    - **Cause**: A localized contraction of the uterus that traps the placenta. This may occur due to oxytocic use (like ergometrine) or premature attempts to remove the placenta.
    - **Diagnosis**: Identified during manual removal.
    - **Management**:
        - Relax the contraction by deepening anesthesia (use of halothane can help).

- Perform manual removal from **above downward** to minimize bleeding.

2. **Morbidly Adherent Placenta**
    - **Cause**: Placenta sticks tightly to the uterine wall, often diagnosed only during manual removal.
    - **Diagnosis**: Inability to separate the placenta from the uterine wall indicates placenta accreta.
    - **Management**:
        - If morbid adherence is suspected, it should be managed by a **senior obstetrician**.
        - Surgical intervention may be required if the placenta does not separate.

Management of Complicated Retained Placenta:

1. **Retained Placenta with Shock (but no hemorrhage)**:
    - **Action**: Treat the shock first. Once the condition stabilizes, proceed with manual removal of the placenta.
2. **Retained Placenta with Hemorrhage**:
    - **Action**: Follow the protocol for third-stage hemorrhage management (similar to managing major postpartum hemorrhage).
3. **Retained Placenta with Sepsis**:
    - **Action**:
        - Deliver the patient to a referral hospital after a few hours or days.
        - Take **intrauterine swabs** for culture and sensitivity, and start broad-spectrum antibiotics.
        - **Blood transfusion** may be required.
        - Once the patient is stable, arrange for manual removal, preferably by a **senior clinician**.

4. **Retained Placenta with Episiotomy Wound**:
    - **Action**:
        - Control bleeding from the episiotomy wound with **artery forceps**.
        - Make an early decision to perform **manual removal** of the placenta, followed by repair of the episiotomy wound.

PLACENTA ACCRETA (MORBID ADHERENT PLACENTA)

Definition: Placenta accreta is a rare condition where the placenta attaches too deeply into the uterine wall, without the normal separation layer. It occurs in about 1 in 550 pregnancies.

Risk Factors:

- Placenta previa (placenta covering the cervix)
- Previous C-sections
- Uterine surgeries (e.g., D&C, fibroid removal)
- Older maternal age and multiple pregnancies

The risk increases with more previous C-sections:

- 1 prior C-section: 11% risk
- 2 prior C-sections: 40% risk
- 4 or more prior C-sections: 67% risk

Diagnosis:

- Ultrasound: Shows abnormal placement or attachment of the placenta.
- Doppler & MRI: Helps identify blood flow problems or abnormal tissue.
- Elevated maternal αFP levels: Can indicate placenta accreta.
- Pathology: Confirms absence of normal separating tissue between placenta and uterus.

Risks:

- Heavy bleeding (hemorrhage)
- Shock from blood loss
- Infection
- Rarely, uterine inversion (turning inside out)

Management:

1. Partial Placenta Accreta:

- Remove as much placenta as possible.
- Use medications to help the uterus contract.
- If needed, sew up bleeding areas.
- If bleeding does not stop, a hysterectomy (removal of the uterus) may be necessary.

2. Total Placenta Accreta:

- Hysterectomy is usually needed, especially if the woman does not want more children.
- If fertility is desired, the placenta may be left in the uterus, with oxytocin to help it shrink over time, and antibiotics to prevent infection.
- Uterine artery embolization or methotrexate may be used to reduce bleeding.

3. Placenta Accreta Involving the Bladder:

- If the placenta grows into the bladder, avoid removing it. It may require hysterectomy with partial removal of the bladder.

UTERINE INVERSION

Uterine inversion is a rare but serious condition where the uterus turns inside out after delivery. It can happen during the third stage of labor and affects about 1 in 20,000 deliveries.

Types:

1. First Degree: The top of the uterus (fundus) dips but stays above the cervix.
2. Second Degree: The fundus passes through the cervix and enters the vagina.
3. Third Degree (Complete): The uterus turns completely inside out, and the inner lining and placenta may be visible outside.

Causes:

- Spontaneous (40%): Caused by weak uterine tissue or increased abdominal pressure (e.g., coughing or straining).
- Iatrogenic: Caused by improper management of labor, like:
    - Pulling the umbilical cord when the uterus is relaxed
    - Applying fundal pressure when the uterus isn't contracting
    - Improper removal of the placenta

Risk Factors:

- Overly large uterus (e.g., multiple pregnancies, large babies)
- Prolonged labor
- Placenta issues (placenta accreta)
- Uterine malformations

Dangers:

- Shock: Severe due to tension on nerves and pressure on ovaries.
- Heavy Bleeding (Hemorrhage) after placenta detachment.
- Pulmonary Embolism: Blood clots that travel to the lungs.
- Infection if untreated.
- Chronic Inversion if not corrected quickly.

Symptoms:

- Pain in the lower abdomen
- Shock (may range in severity)
- On exam:
    - Cupping or dimpling in the belly
    - In complete inversion, a reddish-purple mass may be visible outside the body.

Prevention:

- Avoid pulling the umbilical cord if the uterus is relaxed.
- Do not apply fundal pressure while the uterus is relaxed.
- Perform manual placenta removal properly.

Management:

Before Shock:

1. Call for help immediately.
2. **Manual Repositioning**: Push the uterus back into place using pressure, and support with your other hand on the belly.
3. Use **oxytocin** to make the uterus contract and remove the placenta only after it contracts.

After Shock:

1. **Treat Shock**: Give saline and blood transfusions.
2. **Hydrostatic Method**: Instill warm sterile fluid into the vagina to help replace the uterus back into place.
3. If manual methods do not work, surgery may be required.

INJURIES TO THE BIRTH CANAL

Maternal Injuries After Childbirth

Injuries during childbirth are common and can lead to serious complications. Early detection and proper treatment can help prevent long-term issues.

VULVAR LACERATIONS

- **Common Sites**: Skin at the back of the vulva and near the urethra.
- **Treatment**: Repair with sutures, especially if there's heavy bleeding.

PERINEAL INJURIES

- Minor injuries are common, but severe ones (third and fourth degree) happen due to poor management during labor.
- **Risk Factors**: Big baby, first-time birth, forceps delivery, previous scars, and fast labor.

Obstetric Anal Sphincter Injury Classification (RCOG–2007)

1. **First Degree**: Only the skin of the perineum is injured.
2. **Second Degree**: Injury to the perineal muscles, but not the anal sphincter.
3. **Third Degree**: Injury to the anal sphincter:
    - **3a**: Less than 50% of the external anal sphincter is torn.
    - **3b**: More than 50% of the external anal sphincter is torn.
    - **3c**: Both external and internal anal sphincters are torn.
4. **Fourth Degree**: Injury to the perineum, including the anal sphincters and the anal lining.

Prevention:

- Proper care during labor to protect the perineum from injury.

Management of Perineal Injuries:

1. **Immediate Repair**: Repair any recent tears right after the placenta is delivered to reduce infection.
2. **Delayed Repair**: If more than 24 hours have passed, delay repair and start antibiotics.

3. **Repair Steps**:
    - Clean the area, apply anesthesia, and stitch the rectal mucosa and muscles first.
    - Repair the anal sphincter muscles with figure-of-eight stitches.
    - Stitch the vaginal wall and perineal skin last.

Aftercare:

1. **Diet**: Start a light diet and use stool softeners like Lactulose.
2. **Antibiotics**: Give antibiotics to prevent infection.
3. **Exercises**: Pelvic floor exercises to aid recovery.
4. **Follow-up**: Check healing 6-12 weeks later. If incontinence continues, further tests may be needed.

Future Deliveries:

- Women who have had severe perineal injuries should deliver in a hospital.
- Vaginal delivery may be allowed with or without an episiotomy, but women with ongoing symptoms may need a cesarean section.

VAGINAL INJURIES

1. **Vaginal Tears**:
    - **Cause**: Often occur after assisted deliveries, leading to heavy bleeding.
    - **Treatment**:
        - Repair with stitches under anesthesia.
        - If bleeding is severe, use gauze soaked in glycerin and acriflavine, and remove after 24 hours.
        - In some cases, a procedure called arterial embolization may be needed to stop bleeding.
2. **Colporrhexis (Vaginal Vault Rupture)**:

- **Cause**: Can be primary (only the vaginal vault) or secondary (involves the cervix).
- **Treatment**:
  - Minor tears near the cervix are repaired vaginally.
  - Severe tears require surgery through the abdomen (laparotomy) along with emergency measures like stopping bleeding.

CERVICAL TEARS

Cervical Tears

1. **Minor Cervical Tears:**
   - Common during the first delivery and typically don't require treatment.
2. **Extensive Cervical Tears:**
   - Rare but can cause significant postpartum bleeding. The left lateral tear is the most common.
3. **Causes:**
   - Iatrogenic: Forceps delivery or breech extraction when the cervix is not fully dilated.
   - Rigid Cervix: Due to previous cervical surgery or conditions like carcinoma cervix.
   - Strong Contractions: Occur in rapid labor or with conditions like placenta previa.
   - Cervical Detachment: Can involve the whole circumference (annular) or just part of the cervix, leading to minimal bleeding that heals naturally.
4. **Diagnosis:**
   - If there's heavy bleeding after delivery with a firm uterus, check for cervical tears by examining the cervix.
5. **Dangers:**

- Early: Severe bleeding, hematomas, pelvic infections, and blood clots.
- Late: Issues like cervical incompetence or problems during pregnancy.

6. **Treatment:**
    - Deep Tears with Bleeding: Repair immediately after placenta delivery.
    - Procedure:
        - Perform under general anaesthesia.
        - Use a speculum, vaginal retractors, and forceps to expose the tear.
        - Suture the tear with vertical mattress stitches using chromic catgut or Vicryl.
        - Repair the entire tear, starting from the top and working down. If the tear is more severe, additional steps may be needed (e.g., for broad ligament hematomas).

PELVIC HEMATOMA

Definition:
A pelvic hematoma is a collection of blood in the pelvic area between the peritoneum and perineal skin.

Types:

1. **Infralevator Hematoma** (common)
2. **Supralevator Hematoma** (rare)

Infralevator Hematoma:

- **Cause**: Often due to improper stitching during repairs of vaginal or perineal tears, or rupture of blood vessels during delivery.
- **Symptoms**:
    - Severe pain in the perineal area.
    - Possible rectal pressure or trouble urinating if the hematoma extends.

- **Signs**:
    - Shock may be present.
    - Swelling in the vulva, which may be purple and tender.
- **Treatment**:
    - Small hematomas can be treated with cold compresses.
    - Larger ones require surgical exploration under anesthesia to remove blood clots and stop bleeding.
    - A drain may be placed for 24 hours, and antibiotics are given.

Supralevator Hematoma:

- **Cause**: Often due to cervical tears, rupture of the uterus, or spontaneous rupture of blood vessels.
- **Diagnosis**:
    - Shock and internal bleeding after delivery.
    - Swelling above the inguinal ligament or a boggy mass found on vaginal or rectal exam.
    - Ultrasound may be used to find the hematoma.
- **Treatment**:
    - Shock management and laparotomy to remove the clot and stop bleeding.
    - Care to avoid damaging other organs like the ureter.
    - If needed, arteries may be ligated to stop the bleeding.

RUPTURE OF THE UTERUS

Definition:
Uterine rupture is the tearing of all layers of the uterus after 28 weeks of pregnancy. It can happen due to injury, previous scars, or abnormal conditions like ectopic pregnancy.

Causes:

1. **Spontaneous**:
    - **During Pregnancy**: Rare and often due to previous uterine injury, multiple pregnancies, or birth defects.
    - **During Labor**: Caused by obstructed labor (blocking birth) or weak uterine walls, especially in women with many previous births.
2. **Scar Rupture**:
    - **After Cesarean or Surgery**: Previous cesarean sections or surgery make the uterus more prone to rupture, especially in later pregnancies or during labor.
3. **Iatrogenic (Traumatic)**:
    - Caused by medical procedures like the use of oxytocin, external versions, or forceps during delivery.

Types of Rupture:

- **Incomplete Rupture**: The peritoneum (outer layer) is intact, usually seen in lower segment scars or cervical tears.
- **Complete Rupture**: All layers of the uterus are torn, often in cases of obstructed labor or a weak uterus.

Diagnosis:

- **During Pregnancy**:
    - **Scar Rupture**: Abdominal pain, tenderness, and absence of fetal heart sounds.
    - **Spontaneous Rupture**: Sudden severe pain, fainting, and shock.
- **During Labor**:
    - **Scar Rupture**: Can happen slowly or suddenly with pain and bleeding.
    - **Obstructed Rupture**: Severe pain, dehydration, and fetal distress.
    - **Nonobstructive Rupture**: Sudden pain and relief, usually in women with many previous births.

Treatment:

1. **Resuscitation**: Stabilize the patient with fluids and medications.

2. **Surgery (Laparotomy)**:
    - **Hysterectomy**: Often needed, especially in cases of severe damage.
    - **Repair**: For clean scar ruptures or if the woman wants to keep her uterus for future pregnancies.
    - **Repair & Sterilization**: For scar ruptures if no future pregnancies are planned.

- **Broad Ligament Hematoma**: Drain the blood clot and stop any bleeding.

Prevention:

- Women at high risk (e.g., with a previous cesarean or multiple pregnancies) should deliver in a hospital.
- Avoid risky procedures and carefully manage labor, especially in women with prior uterine scars.

VISCERAL INJURIES IN OBSTETRICS

Bladder Injury

- **Causes**:
    - **Traumatic**: Caused by forceps delivery, cesarean section, or hysterectomy.
    - **Sloughing Fistula**: Due to prolonged labor pressure on the bladder.
- **Diagnosis**:
    - **Traumatic**: Urine leakage and blood-stained urine right after surgery.
    - **Sloughing Fistula**: Urine dribbling 5-7 days after delivery, with necrotic tissue.
- **Treatment**:
    - **Traumatic**: Immediate repair if possible. If not, use a catheter for 10-14 days. If it doesn't heal, repair after 3 months.
    - **Sloughing Fistula**: Use a catheter and repair after 3 months.

Rectal Injury

- **Cause**: Rare, caused by pressure on the rectum during labor, leading to fistulas.
- **Treatment**: Repair should be delayed for at least 3 months.

Urethral Injury

- **Cause**: Caused by forceps delivery or pubiotomy.
- **Treatment**: Same as bladder injury—either immediate repair or use a catheter and repair after 3 months.

INDUCTION OF LABOR

Definition:
Induction of labor (IOL) is the process of starting labor artificially, using methods like medication, surgery, or a combination of both, to help the woman give birth vaginally after the baby is considered capable of surviving outside the womb.

Indications for IOL:

- **Maternal Conditions**:
    - Pre-eclampsia, diabetes, high blood pressure
    - Chronic kidney disease, cholestasis
    - Post-term pregnancy (over 42 weeks)
- **Fetal Conditions**:
    - Slow growth (IUGR)
    - Rh incompatibility, fetal death, or birth defects
    - Premature rupture of membranes (PROM)

Elective IOL: Induction without a medical reason, done for convenience. It can risk preterm birth or cesarean delivery.

Contraindications for IOL:

- Cephalopelvic disproportion (baby too big)
- Abnormal baby positions (breech or transverse)

- Previous cesarean with a classical incision
- Certain placenta problems (e.g., placenta previa)
- Genital infections like herpes

Dangers of IOL:

- **Maternal**:
    - Longer labor, need for more pain relief
    - Higher chance of cesarean delivery
    - Psychological stress if induction fails
- **Fetal**:
    - Premature birth
    - Oxygen shortage due to slow labor

What to Check Before Induction:

- **For the mother**:
    - Confirm the reason for induction and that it's safe
    - Make sure the cervix is ready (Bishop score > 6 is ideal)
    - Check the pelvic size
    - Explain the risks and benefits to the mother
- **For the Baby**:
    - Confirm the baby's gestational age and lung maturity
    - Check fetal health, position, and size

Factors for Successful IOL:

- **Gestational Age**: Closer to full term increases success
- **Bishop Score**: A score of 6 or higher means a favorable cervix
- **Cervical Readiness**: More dilation helps
- **Maternal Factors**: Height, BMI, and weight matter

Methods for Cervical Ripening:

- **Medications**:
    - Prostaglandins (e.g., Dinoprostone, Misoprostol)
    - Oxytocin to start contractions
    - Mifepristone (progesterone blocker)
- **Non-medications**:
    - Stripping membranes (a manual method)
    - Artificial rupture of membranes (amniotomy)
    - Balloon catheter for dilation

Bishop Score:

A modified scoring system is used to assess cervical readiness for labor induction:

- **Cervix Dilatation**: 0-3 cm
- **Effacement**: 0-80%
- **Cervical Consistency**: Firm, medium, or soft
- **Position**: Posterior, midline, or anterior
- **Fetal Head Station**: -3 to +2

A **score > 6** indicates a favourable cervix for induction, while a score < 6 suggests an unfavorable cervix.

METHODS OF INDUCTION OF LABOR (IOL)

Induction of labor can be done using **medical**, **surgical**, or **combined** methods. The method chosen depends on the situation.

1. Medical Induction

This involves using medications to start labor:

- **Prostaglandins (PGE2 & PGE1)**:
    - **PGE2** (Dinoprostone): Used for **cervical ripening** (softening and opening the cervix).

- **PGE1** (Misoprostol): Used for both cervical ripening and starting contractions. It's more effective when used vaginally.
- Side effects can include uterine overstimulation and fetal heart problems.

- **Oxytocin**:
  - A hormone that causes the uterus to contract.
  - Most effective if the cervix is already ready for labor.
  - Side effects can include uterine overstimulation, but it wears off quickly when stopped.
- **Mifepristone**:
  - A medication that helps the cervix ripen by blocking progesterone.
  - Used for labor induction in some cases.

Surgical Induction Methods:

1. **Artificial Rupture of Membranes (ARM)**:
   - The doctor breaks the water (amniotic sac) to start labor.
   - It helps by stretching the cervix, releasing hormones, and reducing amniotic fluid.
   - Works best if the cervix is soft and partially open. Combining ARM with oxytocin speeds up labor.
   - **Benefits**: High success rate, allows checking the amniotic fluid, and helps with other procedures if needed.
   - **Limitations**: Not suitable for a closed cervix. It should be at least slightly dilated.
2. **Stripping the Membranes**:
   - The doctor separates the membranes from the cervix to trigger labor.

Benefits of ARM:

- Can lower blood pressure in conditions like pre-eclampsia.
- Helps with maternal discomfort in conditions like excess amniotic fluid.
- Helps control bleeding in cases like placental problems.

Risks of ARM:

- Once done, delivery is necessary.
- Small chance of umbilical cord problems, especially if the baby's head isn't in position.
- Risk of infection, injury to the placenta, cervix, or uterus.
- Rare risk of a serious complication called liquor amnii embolism.

Low Rupture of Membranes (LRM)

LRM is when a doctor breaks the membranes below the baby's presenting part to release some amniotic fluid.

- **When not to use**: It's avoided in cases of excess amniotic fluid (hydramnios) because too much fluid release can cause placental separation (abruption). In such cases, controlled ARM is preferred.

How it's done:

1. The patient empties her bladder and is positioned in lithotomy (legs up).
2. The doctor checks the fetal heart rate (FHR) and uses aseptic technique.
3. Two fingers are inserted into the vagina to reach the cervix, and the membranes are torn using a forceps or amnion hook.
4. The amniotic fluid drains out.
5. If the baby's head is not in position, an assistant may help prevent the cord from prolapsing.

After the procedure:

- Check the color of the fluid, cervix, baby's head position, and monitor for cord prolapse or abnormal FHR.
- A sterile pad is used, and antibiotics may be given.

Risks:

- **Cord prolapse**: If the baby's head is not engaged.
- **Too much fluid release**: Can cause placental problems.
- **Injury**: Risk to the cervix, baby, or blood vessels.
- **Infection**: Risk of amnionitis.

Stripping the Membranes

Stripping (or sweeping) the membranes involves manually separating the membranes from the cervix and lower uterine segment. This process helps release natural prostaglandins and stimulates the release of oxytocin from the mother's pituitary gland, which can start labor.

- **How it works**: By manually separating the membranes, it can help ripen the cervix and trigger labor, often done before artificial rupture of membranes (ARM).
- **When to use it**: It's a simple, safe method for inducing labor, especially if the cervix is favorable. It's often done to prepare the cervix for ARM.
- **Conditions for membrane stripping**:
    1. The baby's head must be well positioned against the cervix.
    2. The cervix must be dilated enough to allow the doctor's finger to be inserted.

Stripping is usually done as a first step to induce labor or make the cervix ready for further procedures like ARM.

Induction Methods:

Each method has its own limitations and risks, so the best choice depends on the individual case.

Mechanical Methods:

- **Dilators**: These help soften and open the cervix by releasing natural hormones.
    - **Hygroscopic Dilators**: Materials like seaweed (laminaria) or magnesium sulfate (lamicel) absorb water, swell, and help open the cervix.
    - These are as safe and effective as prostaglandins (PGE2) for ripening the cervix.
- **Balloon Catheter (Foley catheter)**: A balloon is inserted into the cervix and inflated to help it open, sometimes with saline added around the cervix for extra effect.

Combined Method:

A combination of medical and surgical methods is often used to make labor induction more effective and reduce the time between induction and delivery.

- **How it works**: Oxytocin infusion is given either before or after the membranes are ruptured, depending on the cervix's condition and the baby's head position.
    - If the baby's head is not engaged, it's better to use prostaglandin gel first or start oxytocin before rupturing the membranes (ARM).
- **Advantages of the combined method**:

1. More effective than using just one method.
2. Shortens the time from induction to delivery, which:
    - Reduces the risk of infection.
    - Decreases the time needed for monitoring.

Active Management of Labor (AMOL)

Active management of labor, introduced in 1968 by O'Driscoll and colleagues, focuses on closely monitoring and managing labor to ensure it progresses smoothly. It’s mainly used for first-time mothers (primigravida’s) with a singleton pregnancy, cephalic presentation, and clear amniotic fluid.

Key Components of Active Management:

1. **Antenatal Education**: Explaining the process and goals of AMOL before labor.
2. **Admission Criteria**: The woman is admitted once labor is confirmed (regular contractions and cervix changes).
3. **Continuous Monitoring**: One-on-one nursing care and partographic monitoring of labor.
4. **Amniotomy (ARM)**: Artificially breaking the water to confirm labor.
5. **Oxytocin Augmentation**: If the cervix dilates slower than 1 cm per hour, oxytocin is used to speed up labor.
6. **Labor Time Limit**: The goal is to deliver the baby within 12 hours of admission.
7. **Pain Relief**: Epidural analgesia can be used if needed.
8. **Fetal Monitoring**: Using intermittent listening or continuous electronic monitoring.
9. **Consultant Involvement**: A consultant obstetrician is actively involved in managing the labor.

Goals:

- Early detection of labor delays.
- Identify the cause of any delay.
- Initiate appropriate interventions.

Benefits:

- Provides close monitoring and timely interventions.
- Reduces the need for more invasive procedures.
- Lessens the need for pain relief and oxytocin.

Emotional Support:

- Having a supportive companion (partner or family) during labor can reduce anxiety, which in turn may shorten labor and reduce the need for pain relief and interventions.

Limitations:

- Only suitable for selected cases and centers with adequate staff and monitoring resources.
- Requires more staff involvement in both antenatal care and labor.

PARTOGRAPH

A partograph is a visual tool used to track key maternal and fetal data during labor, plotted over time on a single sheet of paper. It helps monitor the progress of labor and allows for early detection of any issues.

Components of a Partograph:

1. **Patient Information**: Identification details of the patient.
2. **Time**: Recorded at hourly intervals; labor starts at the time of admission for spontaneous labor and time of induction for induced labor.
3. **Fetal Heart Rate**: Checked every 30 minutes.
4. **Membrane Status and Amniotic Fluid**: Marked as "I" for intact membranes, "C" for clear fluid, and "M" for meconium-stained fluid.
5. **Cervical Dilatation and Descent of the Head**: Monitored to track labor progress.
6. **Uterine Contractions**: Recorded by shading squares for the duration and intensity of contractions.
7. **Medications and Fluids**: Documented as necessary.
8. **Vital Signs**: Blood pressure is recorded every 2 hours, pulse every 30 minutes.
9. **Oxytocin Use**: Doses and concentration recorded.
10. **Urine Analysis and Temperature**: Checked and recorded.

Cervicograph (Philpott & Castle, 1972):

- The **alert line** starts at 4 cm dilation and progresses at 1 cm per hour, ending at 10 cm.
- The **action line** is drawn 4 hours to the right of the alert line.

- In normal labor, cervical dilation should be on or to the left of the alert line. If it falls in **Zone 2**, further assessment is needed. If in **Zone 3**, the case should be reassessed by a senior obstetrician, who may decide whether to proceed with a cesarean section or augment labor with amniotomy and/or oxytocin.

Advantages of a Partograph:

1. **Efficient Record-Keeping**: All necessary information can be seen at a glance.
2. **Prevents Redundant Recording**: Labor events don't need to be repeated.
3. **Early Detection of Problems**: It helps identify any labor abnormalities early, allowing for timely interventions.
4. **Improves Communication**: Useful for handovers between medical teams.
5. **Reduces Complications**: The introduction of the partograph (WHO, 1994) has led to a reduction in prolonged labor, caesarean sections, and improvements in maternal and perinatal outcomes.

OPERATIVE OBSTETRICS

Obstetric Operations – Pre-Procedure Guidelines:

Obstetric surgeries, whether major or minor, require strict aseptic techniques to prevent infection. This includes careful precautions during vaginal exams, especially in late pregnancy or labor.

Pre-Operative Guidelines for Obstetric Surgery:

1. **Anesthesia**: General or local anesthesia is used, sometimes with sedation (e.g., intravenous diazepam).
2. **Positioning**: The patient lies on her back with legs raised (lithotomy position).
3. **Aseptic Precautions**:
    - The surgical team wears sterile clothing and performs handwashing.
    - The vulva, vagina, and cervix are cleaned with antiseptic solutions.
    - Sterile towels drape the perineum and legs.

4. **Bladder Emptying**: The patient should empty her bladder, or a catheter is used if she cannot.
5. **Vaginal Exam**: A vaginal exam is performed to assess the situation before the procedure.

These steps help ensure the procedure is safe and reduces the risk of infection.

DILATATION AND EVACUATION (D&E)

D&E is a surgical procedure to remove the products of conception from the uterus, typically done when there is an incomplete or inevitable abortion, or for medical termination of pregnancy (6-8 weeks). It can be performed in one or two stages.

One-Stage Operation

Indications:

- Incomplete abortion (most common)
- Inevitable abortion
- Medical termination of pregnancy (6–8 weeks)
- Hydatidiform mole expulsion

Procedure:

1. **Pre-procedure**: The patient is put under general anesthesia, and an internal exam is performed to assess the uterus and cervix.
2. **Cervical Dilation**: If the cervix isn't dilated enough, metal dilators are used to gradually widen it.
3. **Evacuation**: The products of conception are removed using ovum forceps. The uterus is then gently curetted using a flushing curette.
4. **Post-procedure Care**: The uterus is massaged to ensure contraction and minimize bleeding. A sterile pad is placed, and the patient is sent back to rest.

Post-abortion care includes:

- Emergency treatment for complications
- Family planning counseling

- Follow-up services

Two-Stage Operation

Indications:

- First trimester abortion
- Missed abortion (8–10 weeks)
- Hydatidiform mole with an unfavorable cervix

Procedure:

- **First Phase**: The cervix is gradually dilated using laminaria tents or misoprostol. This phase allows slow cervix dilation, and the tents are left in place for 12 hours.
- **Second Phase**: The cervix is dilated more rapidly, and the uterus is evacuated using ovum forceps.

Dangers of D&E:

Immediate Risks:

1. **Excessive bleeding**: Due to incomplete evacuation or uterine atony.
2. **Injury**: Cervical lacerations, uterine perforation.
3. **Shock**: From anesthesia, excessive blood loss, or cervical stimulation.
4. **Perforation**: Injury to nearby organs (blood vessels, bowel, bladder).
5. **Sepsis**: Endometritis, pelvic infections.
6. **Hematometra**: Blood accumulation in the uterus.
7. **Pregnancy continuation failure** (1%).

Late Risks:

1. **Pelvic infections**.
2. **Infertility**.
3. **Cervical incompetence**.
4. **Uterine scarring** (synechiae).
5. **Preterm labor** in future pregnancies.

6. **Ectopic pregnancy** risk.

The D&E procedure should be carefully performed by trained professionals to minimize risks and complications.

Management of Uterine Perforation

1. **Stop the Procedure**: Immediately halt the procedure that caused the perforation.
2. **Small Instrument Perforations (e.g., sound, small dilator)**:
    - Monitor the patient's pulse and blood pressure.
    - Give antibiotics to prevent infection.
3. **Large Instrument Perforations (e.g., large dilator, ovum forceps, suction cannula)**:
    - Use laparoscopy to check the damage and bleeding.
    - If needed, perform surgery (laparoscopy or laparotomy) to repair the injury.
4. **Cervical Tear with Hematoma or Uterine Artery Damage**:
    - Perform laparotomy to repair the damage, or in severe cases, a hysterectomy may be required.
5. **Perforation Before Complete Evacuation**:
    - If possible, evacuate the uterus under laparoscopy.
    - If surgery is needed, complete evacuation through the perforation or do an anterior hysterotomy. A hysterectomy may be done if needed.
6. **Simultaneous Care**:
    - Provide resuscitation and antibiotics to stabilize the patient and prevent infection.

The treatment depends on the severity of the perforation and the patient's condition. Immediate action is important to avoid complications.

SUCTION EVACUATION

Definition

Suction evacuation is a procedure to remove tissue from the uterus using a cannula connected to a suction machine.

Indications:

- Medical abortion (most common)
- Inevitable abortion
- Recent incomplete abortion
- Hydatidiform mole

Procedure:

1. **Preparation:**
    - The patient may receive sedation (diazepam) and a local anesthetic to numb the cervix.
    - Ensure the bladder is empty.
2. **Steps:**
    - **Examine the cervix and uterus**: Check the position and size of the cervix and uterus. An ultrasound may be done.
    - **Insert a speculum**: To expose the cervix.
    - **Dilate the cervix**: Use small dilators or medication (misoprostol) to open the cervix.
    - **Give Methergine**: An injection to reduce bleeding.
    - **Insert the suction cannula**: Attach the cannula to the suction machine and insert it into the uterus.
    - **Suction tissue**: Move the cannula in the uterus to remove the tissue. Suction stops when no more tissue is coming out.
    - **Check for leftovers**: Use a small curette to remove any remaining tissue.

3. **Final Steps:**
    - Confirm the uterus is empty, and minimal bleeding occurs. Place a sterile pad on the patient.

Complications:

- Uterine perforation (rare)
- Incomplete removal of tissue
- Infection
- Bleeding

Using a plastic cannula and ultrasound can help reduce risks.

MENSTRUAL REGULATION (ASPIRATION)

Definition
Menstrual regulation is a procedure to remove the contents of the uterus within 14 days after a missed period in a woman with a previously normal menstrual cycle. It is usually done to manage a suspected early pregnancy.

Procedure:

1. **Preparation:**
    - The procedure is done as an outpatient or office procedure under aseptic conditions.
    - In anxious patients, sedation or a paracervical block (numbing) may be used.
2. **Steps:**
    - **Insert a speculum**: To expose the cervix.
    - **Stabilize the cervix**: Use an Allis forceps to hold the cervix steady.
    - **Dilate the cervix**: Use a 4-5 mm dilator to open the cervix slightly.
    - **Insert the suction cannula**: A 5-6 mm suction cannula is connected to a 50 mL syringe.

- **Aspirate tissue**: The cannula is gently moved in and out to remove the uterine contents.

3. **Examine the tissue:**
    - The aspirated tissue is checked in a clear dish under a light. If placental tissue is present, it appears fluffy and feathery. This helps rule out failed abortion, molar pregnancy, or ectopic pregnancy.

Contraindications:

- Advanced pregnancy.
- Pelvic inflammation.

Risks:

- Continuation of pregnancy (0.5-2%).
- Ectopic pregnancy (if no chorionic villi are found, hCG levels and ultrasound should be checked).

This procedure is effective for early pregnancies, but close follow-up is necessary to ensure it is successful.

VACUUM ASPIRATION

Vacuum aspiration is a procedure used to terminate a pregnancy, usually up to 12 weeks. It can be done in a clinic with minimal cervical dilation. There are two types: **manual vacuum aspiration (MVA)** and **electric vacuum aspiration (EVA)**, both highly effective (98-100%).

Steps:

1. **Preparation:** The patient may receive local anesthesia or sedation.
2. **Procedure:**
    - A **Karman's cannula** (up to 12 mm) is inserted through the cervix into the uterus.
    - A syringe or electric vacuum creates **negative pressure** to remove the pregnancy tissue.
3. **Time & Trauma:** The procedure takes **5-15 minutes** and is **less traumatic** than other methods.

Complications:

- Risks include infection or bleeding, but complications are rare and usually less severe.

Overall, vacuum aspiration is a quick, safe, and effective method for early pregnancy termination.

HYSTEROTOMY

A **hysterotomy** is a surgical procedure to remove the products of conception from the uterus before viability (28 weeks), done by cutting through the anterior wall of the uterus. It is rarely used today for abortion but may be needed in certain situations.

Indications:

1. **Mid-trimester MTP** when other methods fail or are not suitable.
2. **Fibroids** obstructing evacuation in the lower uterine segment.
3. **Low-lying placenta** (placenta previa).
4. **Uterine anomalies** (e.g., uterine didelphys or septate uterus).
5. **Cervical cancer with pregnancy**.
6. **Previous caesarean sections**, especially with risk of placenta accreta.

Steps (Abdominal Hysterotomy):

1. **Preparation** is similar to other major surgeries with general or epidural anesthesia.
2. **Incision**: A low transverse or infraumbilical vertical incision is made to access the uterus.
3. **Uterus removal**: The uterus is pulled out of the incision and packed to avoid contamination.
4. **Uterine incision**: A vertical incision (5 cm) is made in the uterus to access the pregnancy.
5. **Evacuation**: The products of conception are gently removed and the cavity is cleaned.

6. **Closure**: The uterine incision is closed in three layers, with myometrial and peritoneal sutures.
7. **Post-procedure**: The abdominal wall is closed, and medication (Methergine) is given to prevent bleeding.

Complications:

- **Immediate risks**:
    - **Uterine bleeding**
    - **Peritonitis**
    - **Intestinal obstruction**
    - **Anesthetic hazards**
    - These can lead to increased morbidity and occasional death.
- **Remote risks**:
    - **Menstrual abnormalities** (e.g., menorrhagia or irregular periods)
    - **Scar endometriosis** (1%)
    - **Scar rupture** in future pregnancies, especially if sterilization is not performed.

This procedure carries both immediate and long-term risks, and is generally only performed in specific, high-risk cases.

EPISIOTOMY

An **episiotomy** is a surgical cut made in the perineum (area between the vagina and anus) during the second stage of labor to help with childbirth. It is a controlled incision that is typically done to prevent tearing.

Objectives of Episiotomy:

- **Enlarge the vaginal opening** to help with an easier and safer delivery, whether spontaneous or assisted.
- **Prevent overstretching and tearing** of the perineal muscles and fascia, reducing the strain on the baby's head during delivery.

Indications (when it's needed):

- **Elastic perineum**: In cases where there's difficulty in the baby's descent, especially in elderly first-time mothers.
- **Risk of perineal tear**: For example, with large babies, breech deliveries, or shoulder dystocia.
- **Operative deliveries**: During forceps or vacuum-assisted deliveries.
- **Previous perineal surgeries**: Such as pelvic floor repairs or reconstructions.

Timing of Episiotomy:

- Episiotomy is usually performed just before the baby's head crowns (3–4 cm visible), not too early (to avoid excessive bleeding) or too late (to prevent tearing).

Advantages:

- **Maternal**:
    - Easier to repair than accidental tears.
    - Reduces trauma to the pelvic floor muscles, potentially lowering the risk of prolapse or incontinence.
- **Fetal**:
    - Reduces the chance of brain injury, especially in premature babies or breech deliveries.

Types of Episiotomy:

1. **Mediolateral**: Cut goes diagonally from the center of the perineum outward (away from the anus).
2. **Median**: Cut goes straight from the center of the perineum towards the anus (risk of rectal injury if it extends).
3. **Lateral**: A cut made to the side of the perineum (not commonly used due to complications).
4. **'J' Shaped**: A combination of median and mediolateral incisions (rarely used).

Mediolateral vs. Median Episiotomy:

- **Mediolateral**:

- Pros: Safer for manipulative deliveries, less chance of rectal injury, easy to extend if needed.
- Cons: More bleeding, longer recovery, and slightly higher risk of wound disruption.

- **Median**:
  - Pros: Less blood loss, easier to repair, and faster healing.
  - Cons: Higher chance of rectal involvement if it extends and not suitable for all delivery types.

Steps of Mediolateral Episiotomy:

1. **Pre-procedure**: The perineum is cleaned and anesthetized with a local anesthetic.
2. **Incision**: A curved or straight scissors are used to make a diagonal cut from the center of the perineum. The incision is made during a contraction to ensure accuracy.
3. **Repair**: After delivery, the incision is repaired in three layers:
   - First, the vaginal mucosa is sutured.
   - Next, the perineal muscles are repaired.
   - Finally, the skin and subcutaneous tissue are stitched together.

Postoperative Care:

- **Dressing**: Clean the wound after urination or defecation, applying antiseptic ointment and powder.
- **Comfort**: Ice packs, painkillers (e.g., ibuprofen), or magnesium sulfate can be used for relief.
- **Stitch removal**: If non-absorbable sutures are used, they should be removed after 6 days.

Complications:

1. **Immediate**:
   - **Rectal injury** (especially in median episiotomy).
   - **Infection**: Pain, swelling, and fever are common signs.

- **Hematoma**: Blood clots forming under the skin.
- **Wound dehiscence** (wound opening), requiring further repair.
- **Injury to anal sphincter**: Leading to incontinence.
- **Rare: Necrotizing fasciitis** (severe infection in diabetic or immunocompromised patients).

2. **Remote**:
    - **Dyspareunia** (painful intercourse) due to scarring or improper repair.
    - **Perineal lacerations** in future deliveries.
    - **Scar endometriosis** (rare condition where endometrial tissue grows in the scar).

Episiotomy is performed selectively, depending on the patient's condition and the circumstances of the delivery. Proper repair and aftercare are key to preventing complications.

OPERATIVE VAGINAL DELIVERY

Operative Vaginal Delivery is when instruments are used to help deliver a baby through the vagina. This can include:

1. **Forceps**: Used to help pull the baby out.
2. **Ventouse (Vacuum)**: A suction cup used on the baby's head to assist delivery.
3. **Destructive operations**: Performed when the baby cannot be delivered alive, often due to size or abnormal position.

These methods are used when labor is difficult or the baby is in distress, with the goal of ensuring a safe delivery for both mother and baby.

FORCEPS

Forceps are surgical instruments used to assist in the delivery of a baby by helping to grasp and pull the fetal head during labor. They come in various types, with different designs and uses.

Types of Obstetric Forceps:

1. **Long-Curved Forceps:**
    - Heavy, around 37 cm long, and commonly used in India (Das's variety).
    - Suitable for smaller pelvises and babies.
    - The blades have two curves: the pelvic curve (to match the birth canal) and the cephalic curve (to grasp the fetal head).
2. **Short-Curved Forceps (Wrigley):**
    - Lighter than long-curved forceps.
    - Shorter length with marked cephalic and slight pelvic curves.
3. **Kielland's Forceps:**
    - Slight pelvic curve, used for correcting head position (asynclitism).
    - It lacks an axis-traction device and has a sliding lock.

Parts of Forceps:

- **Blades**: The two blades grip the fetal head. The blade design includes the **pelvic curve** (matches the birth canal) and the **cephalic curve** (fits the head).
- **Shank**: The part connecting the blade and lock, facilitating the locking mechanism.
- **Lock**: The mechanism that holds the two blades together.
- **Handle**: The part that the clinician holds to apply traction.

Types of Forceps Applications:

1. **Cephalic Application**: The ideal method, where the blades grip the fetal head's biparietal diameter (widest part).
2. **Pelvic Application**: The blades are applied to the pelvic walls, which should be avoided if the head is not in the correct position as it can cause compression of the baby's skull.

Forceps Usage:

- **Traction Force**: Typically, a force of 20 kg is required for first-time mothers and 13 kg for women who have given birth before.

- **Head Rotation**: Can be achieved using Kielland's forceps if needed.
- **Protective Cage**: It helps protect the baby's head during delivery, especially in cases of premature birth.
- **Breech Delivery**: Forceps may be used to control the delivery of the after-coming head in breech births.

Indications for Operative Vaginal Delivery (Forceps/Ventouse):

Maternal Reasons:

- Inadequate expulsive efforts or maternal exhaustion.
- Avoiding expulsive efforts in cases like cardiac or cerebrovascular diseases.
- Prolonged second stage of labor.

Fetal Reasons:

- Fetal distress, like non-reassuring heart rate or low birth weight.
- After-coming head of breech delivery.

Other Reasons:

- To speed up delivery in cases like severe preeclampsia or post-cesarean pregnancies.

Forceps Application Criteria:

- **Outlet Forceps**: The head is at or on the perineum.
- **Low Forceps**: The head is near the pelvic floor but not yet at the perineum.
- **Midforceps**: The head is engaged, but the station is above the pelvic floor.

Forceps are critical tools in ensuring a safe delivery, but they must be used correctly to minimize risks to both mother and baby.

Prerequisites for Operative Vaginal Delivery (Forceps or Vacuum)

Fetal Criteria:

1. **Head Engagement**: The fetal head should be engaged (most of the head should be inside the pelvis).
2. **Known Head Position**: The position of the fetal head must be clear.

Maternal Criteria:

1. **Fully Dilated Cervix**: The cervix must be 10 cm dilated.
2. **Ruptured Membranes**: The water (amniotic sac) should be broken.
3. **Adequate Pelvis**: The pelvis should be big enough for the baby to pass through.
4. **Empty Bladder**: The bladder must be emptied to avoid obstruction.
5. **Pain Relief**: The mother should have proper pain relief (e.g., epidural).

Other Criteria:

1. **Informed Consent**: The mother must understand and agree to the procedure.
2. **Experienced Doctor**: The procedure must be done by an experienced doctor.
3. **Aseptic Technique**: Clean and sterile practices must be used.
4. **Backup Plan**: A plan should be in place if the procedure fails (e.g., cesarean).
5. **Neonatologist Present**: A doctor should be available for the baby in case of problems.
6. **Willingness to Stop**: The team must be ready to stop the procedure if complications occur.

LOW FORCEPS OPERATION

Preparation:

- **Anesthesia**: Use local anesthesia (pudendal block and perineal injections).
- **Catheterization**: Empty the bladder.
- **Examination**: Check the cervix, membranes, fetal head position, and pelvic outlet.
- **Episiotomy**: Often done when the head is stretching the perineum.

Steps:

1. **Blade Application**:
    - **Left Blade**: Insert the left blade first, guided by the right hand, and position it on the side of the baby's head.
    - **Right Blade**: Insert the right blade similarly using the left hand.
2. **Locking Blades**:
    - Ensure the blades are positioned correctly and lock them into place. If they don't lock easily, reposition them.
3. **Traction**:
    - Apply gentle, steady traction during contractions, pulling the head towards the perineum.
    - Once the head crowns, change the direction of pull upwards and forwards.
4. **Remove Blades**:
    - After the head is delivered, remove the blades, starting with the right one.

After Delivery:

- Administer oxytocin or methergine and repair any tears or episiotomy.

OUTLET FORCEPS OPERATION

1. **Forceps Used**: Wrigley's forceps are used for the outlet forceps operation.
2. **Anesthesia**: Local anesthesia is administered through perineal and vulval infiltration with 1% lignocaine.
3. **Blade Introduction**: The blades are introduced in a manner similar to the low forceps operation, with the difference being that two fingers are used in the vagina to apply the left blade.
4. **Traction Application**: Traction is applied by holding the articulated forceps with fingers between the shanks and thumb on the under surface of the handles.

5. **Direction of Pull**: The pull is first straight horizontally, then upwards and forwards.

MIDFORCEPS OPERATION

Indication:

- Used after manual rotation of the head in occipitoposterior position.

Forceps:

- **Common**: Long-curved forceps (with or without axis-traction).
- **Kielland**: For experts.

Procedure:

1. **Anesthesia**: General anesthesia is preferred.
2. **Blade Introduction**:
    - **Without Axis-Traction**: Blades are introduced like in the low forceps operation. An assistant holds the left handle.
    - **With Axis-Traction**: For the left blade, hold the traction rod backward. For the right blade, hold the rod forward to avoid blocking blade locking.
3. **Traction**:
    - **Without Axis-Traction**: Pull downwards and backwards, then straight, and finally upwards and forwards.
    - **With Axis-Traction**: Attach the traction handle. Keep rods parallel to the shanks. Remove rods when the occiput is under the pubis.

DIFFICULTIES IN FORCEPS OPERATION

General Issues:

- Problems usually happen due to wrong assessment before delivery.
- **Low forceps operation** is generally straightforward.

During Blade Application:

- **Causes**:
    1. Cervix not fully dilated.
    2. Head not rotated or engaged.

Difficulty in Locking:

- **Causes**:
    1. Unrotated head.
    2. Blade not inserted deeply enough.
    3. Failure to push handle against the perineum.
    4. Cord or fetal parts inside the blades.

Difficulty in Traction (Failure to Deliver):

- **Causes**:
    1. Unrecognized occipitoposterior position.
    2. Incorrect head position.
    3. Wrong direction of pull.
    4. Mild pelvic narrowing.
    5. Constriction ring.

Slipping of the Blades:

- **Causes**:
    1. Blades not inserted deep enough.
    2. Wrong application in occipitoposterior position.

Forceps in Occipito-Sacral Position:

- **Application**: Same as occipitoanterior, ensuring blades are positioned equally on both sides of the head.
- **Traction**: Start horizontal, then change direction to upwards and forwards to deliver the occiput. Use downward movement to deliver the nose and chin.

Forceps in Face Presentation:

- **Indication**: For mentoanterior position only.
- **Application**: Same as occipitoanterior, but handles should be more forward to avoid neck injury.
- **Traction**: Similar to occipitoanterior, aiming to bring the chin below the symphysis pubis.

After-coming Head:

- Refer to the detailed method on page 444.

KIELLAND'S FORCEPS

- **Designed by**: Kielland (Norway) in 1916.
- **Advantages**:
    1. Useful for unrotated vertex or face presentation.
    2. Helps correct asynclitic heads with its sliding lock.
- **Blade Identification**:
    - Blades are held in front of the vulva; the concave curve should face the occiput's side.
    - The anterior blade is applied first.

Methods of Application:

1. **Classical (obsolete)**.
2. **Wandering** (most popular): The anterior blade is inserted and moved around the fetal face. The posterior blade is inserted with guidance from the right hand.
3. **Direct**: Less commonly used.

- **Indications**: Mostly for deep transverse arrest with asynclitism.
- **Technique**: Slight upward movement may help in rotation. Check position and apply traction.

Limitations:

- Requires skill; training is necessary before independent use.

Hazards:

- **Fetal**: Facial bruising, nerve palsy, skull fractures, hemorrhage.
- **Maternal**: Perineal tears, hemorrhage, infections.

Complications of Forceps Operation:

Maternal Complications:

- **Immediate**: Vaginal tears, cervical tears, postpartum hemorrhage, nerve injury, anesthetic issues, puerperal sepsis.
- **Remote**: Painful scars, backache, genital prolapse, incontinence.

Fetal Complications:

- **Immediate**: Asphyxia, facial bruising, hemorrhage, skull fractures, nerve injury.
- **Remote**: Cerebral palsy (rare).

Prophylactic Forceps (Elective):

- **Indications**: Eclampsia, heart disease, previous C-section, low birth weight, prolonged second stage of labor, etc.
- **Purpose**: Shortens the second stage of labor and reduces fetal pressure on the perineum.

Trial Forceps:

- **Purpose**: Attempt forceps delivery in suspected midpelvic contraction. If it fails, switch to C-section.
- **Conditions**: Maternal obesity, big baby, occipitoposterior position, etc.
- **Management**: If moderate traction works, proceed vaginally; if not, switch to C-section.

Failed Forceps:

- **Definition**: When forceps delivery does not progress, leading to C-section.
- **Common Causes**: Incomplete cervix dilation, unrotated occipitoposterior head, cephalopelvic disproportion, malpresentation, large baby, etc.
- **Prevention**: Careful case selection, skill, and judgment.
- **Management**: Assess mother and fetus, start Ringer's drip, arrange for C-section, and provide antibiotics.

VENTOUSE

Ventouse (Vacuum-Assisted Delivery)

Ventouse is a tool used to help deliver a baby by creating a vacuum between the cup and the fetal head. It pulls the head out during delivery, unlike forceps, which apply force to the base of the skull.

Components:

- **Suction Cup**: Made of soft silicone or plastic, these are used to grip the baby's scalp.
- **Vacuum Pump**: Creates the suction to hold the cup on the baby's head.
- **Sizes**: Four cup sizes are available (30 mm, 40 mm, 50 mm, and 60 mm).

When to Use Ventouse:

- It is used for the same reasons as forceps, but **not for**:
    - Non-head-first positions (like face or breech).
    - Premature babies (under 34 weeks).
    - Babies with bleeding disorders.
    - Very large babies (over 4 kg).

Advantages of Ventouse:

- **Less force**: It uses less pulling force than forceps, which means less trauma to the mother.

- **Comfortable for the mother**: It causes less pain and fewer injuries like vaginal tears.
- **Easier to learn**: It can be used by midwives with proper training.

Advantages of Forceps over Ventouse:

- **More effective in difficult cases**: Forceps work better when a stronger pull is needed or if delivery is urgent.
- **Faster**: It helps deliver the baby more quickly in cases of fetal distress.
- **Can be used in more situations**: Like face presentations or after-coming breech head.

How Ventouse is Used:

1. **Prepare**: Anesthesia (usually a local block) is given. The vacuum device is set up and tested.
2. **Place the Cup**: The largest cup is placed on the baby's head, aiming for the occiput (back of the head).
3. **Create Suction**: The vacuum is gradually increased to hold the cup in place.
4. **Traction**: The baby's head is pulled gently with the contractions. The vacuum is released after the head is out.

Risks and Complications:

For the Baby:

- **Scalp injuries**: Minor bruising or swelling (cephalhematoma).
- **Rarely**: Brain bleeding, retinal hemorrhage, or jaundice.

For the Mother:

- **Injury**: Rare, but can include vaginal or cervix tears if soft tissue is trapped in the cup.
- **Failure Rate**: Ventouse may fail more often than forceps, especially if used after forceps.

VERSION

Version Procedure (Simplified)

Version is a procedure to change the position of the baby inside the womb, making it head-down (cephalic version) or feet-down (podalic version).

Types of Versions:

1. **Spontaneous Version**: Happens naturally, especially after 32 weeks.
2. **External Version**: The doctor moves the baby from outside the mother's belly.
3. **Internal Version**: The doctor uses one hand inside the uterus and the other on the belly.
4. **Bipolar Version**: A combination of both external and internal methods.

EXTERNAL CEPHALIC VERSION (ECV)

This procedure turns a breech or sideways baby to the head-down position.

When It's Done:

- Mainly done after 36 weeks of pregnancy if the baby is breech or transverse (sideways).
- It can help avoid a cesarean section if successful.

Steps of ECV:

1. **Position**: The mother lies on her back, and the doctor checks the baby's position.
2. **Turning the Baby**: The doctor applies pressure to the baby's head and bottom to move it into the correct position.
3. **Monitoring**: The baby's heart rate is checked. If there are issues, the doctor watches for 30 minutes after the procedure.
4. **Follow-Up**: The mother is monitored, and if she's Rh-negative, she gets an anti-D shot.

Benefits:

- Reduces breech babies at term.
- Lowers cesarean section rates.
- Reduces risks for both mother and baby.

INTERNAL VERSION

Internal version is a procedure where the doctor helps deliver a baby by moving its feet into the birth canal. It's typically used for **transverse lie** (sideways babies) in **twin pregnancies** or certain emergency situations.

When it's done:

- Mostly for the **second baby in a twin pregnancy** if it's sideways.
- Can be used in **singleton pregnancies** if:
    1. The cervix is fully dilated.
    2. There's **cord prolapse** or the baby's head is too high to deliver normally.

Conditions for doing the procedure:

1. The cervix must be fully dilated.
2. There must be enough amniotic fluid.
3. The baby must be alive.

What should NOT be done:

- Should not be done in cases of **obstructed labor**.

How it's done:

1. The mother lies on her back with her legs up.
2. The doctor uses one hand to reach inside the uterus and grab a foot.
3. Once a foot is grabbed, the doctor pulls it down while gently pushing the baby's head up with the other hand.
4. The second leg is brought down, and the baby is delivered.

Risks:

- **For the mother**: Risks include placenta problems, uterine rupture, or other injuries.
- **For the baby**: Risks like lack of oxygen, cord issues, brain bleeding, or problems from breech delivery. This can result in **high mortality rates** (about 50%).

Bipolar Version (Old Method):

An older technique used to help deliver a baby in cases of **low-lying placenta** or other issues. It is rarely used today but can still be lifesaving in certain areas. It involves pushing the baby's head up while pulling a leg down to control bleeding.

DESTRUCTIVE OPERATIONS

Destructive Operations are procedures used to reduce the size of a fetus to make delivery easier. These are rarely needed today and are mostly preventable with good care. They are risky and should only be done by skilled professionals. However, they may still be necessary in certain emergencies.

Types of Destructive Operations:

1. **Craniotomy**: Crushing the skull to reduce the size.
2. **Evisceration**: Removing internal organs to make the fetus smaller.
3. **Decapitation**: Removing the head to make delivery easier.
4. **Cleidotomy**: Breaking the collarbones to help with delivery.

CRANIOTOMY

Craniotomy is a surgical procedure where a hole is made in the fetal head to remove brain matter, reducing the size of the head for easier delivery.

When It's Done:

- **Obstructed labor** with a dead baby.
- **Hydrocephalus** (enlarged head) in a living baby.
- **Interlocked twins' heads**.

Conditions Needed:

1. Fully dilated cervix.
2. Baby must be dead (unless hydrocephalus is present).

When Not to Do It:

- If the pelvis is too small (less than 7.5 cm).
- If the uterus has ruptured.

Steps:

1. **Preparation**: Done under general anesthesia with a vaginal exam.
2. **Perforation**: A tool is used to make a hole in the skull.
3. **Brain Evacuation**: Brain matter is removed to collapse the skull.
4. **Extraction**: The baby is removed using special tools.
5. **Completion**: After delivery, the uterus is checked for tears. Medication is given to control bleeding.

Forceps vs Craniotomy:

- **Forceps** are preferred if the head can be delivered with little force, but if it's too difficult or dangerous for the mother, craniotomy is safer.

DECAPITATION

Definition: Decapitation is a procedure where the fetal head is cut off from the body to help with delivery, usually when there are complications like shoulder presentation or twins with interlocked heads.

Indications:

1. **Shoulder presentation with a dead fetus**, where the neck can be easily reached.
2. **Interlocking heads of twins** during delivery.

Steps:

1. **Preparation:**
    - The procedure is done under general anesthesia.
    - Standard delivery preparation is followed.
2. **Procedure:**

- **Step 1:** If the hand isn't visible, bring it down. A gauze is tied to the fetal wrist, and the arm is pulled away to make the neck easier to access.
- **Step 2:** Two fingers are placed inside the vagina to find the neck.
- **Step 3:** A decapitation hook with a knife is inserted near the neck. It's rotated to cut the neck and the vertebrae.
- **Step 4:** Once the neck is cut, the soft tissues are also severed. The hook is removed carefully with guidance from the fingers.
- **Step 5:** The decapitated head is delivered. This can be done by:
  - Hooking the finger into the mouth.
  - Using a tool (vulsellum) to hold the neck and deliver the head.
  - Using forceps to pull the head out.
- **Step 6:** After delivery, check the uterus and vagina for any injuries.

EVISCERATION

- **What it is:** A procedure where parts of the fetus (like the organs) are removed through an opening in the chest or abdomen to reduce its size and make delivery easier.
- **When it's done:**
  1. **Shoulder presentation with a dead fetus** and the neck is hard to reach.
  2. **Fetal malformations**, like fluid buildup or a very large bladder.
- **If needed:** The spine might be cut to further reduce the size of the fetus.

CLEIDOTOMY

- **What it is:** A procedure where one or both of the fetal collarbones (clavicles) are cut to help deliver the baby when the shoulders are stuck.
- **When it's done:** Only in **dead fetuses** (not those with brain malformations) with **shoulder dystocia**.

Postoperative Care:

1. **Check for injuries:** The uterus and vagina are checked for tears.
2. **Catheter:** A catheter may be inserted to help with urination, especially after craniotomy, for a few days.
3. **Fluids:** IV fluids are given to prevent dehydration, and blood transfusions may be needed if there's heavy blood loss.
4. **Antibiotics:** Ceftriaxone is given to prevent infection.

Complications:

1. **Injury to the uterus or vagina.**
2. **Uterine rupture.**
3. **Heavy bleeding (postpartum hemorrhage).**
4. **Shock** from blood loss or dehydration.
5. **Infection** after childbirth.
6. **Failure of the uterus to shrink back.**
7. **Injury to nearby organs**, like the bladder or rectum, leading to fistulas.
8. **Prolonged illness** due to complications.

These operations are rare and are only done when the fetus is dead or in severe distress. Close monitoring is needed to avoid problems.

CESAREAN SECTION (CS)

Caesarean Section (C-Section)

Definition: A **C-section** is a surgical procedure where a baby is delivered through an incision in the abdomen and uterus instead of vaginally. It's usually done when vaginal delivery is unsafe for the mother or baby.

Types of C-Section:

1. **Primary C-Section:** The first C-section a woman has.
2. **Repeat C-Section:** A C-section in later pregnancies.

History: The term comes from an old Roman law, **lex Cesarea**, which allowed abdominal delivery if the mother was dying. It doesn't relate to Julius Caesar's birth.

Why the Rate is Rising: C-sections are becoming more common due to:

- More women having C-sections for the first time.
- Better safety (improved anesthesia, blood transfusions, antibiotics).
- More repeat C-sections.
- Fewer vaginal instrumental deliveries and breech births.

Why C-Sections Are Done:

Absolute Indications (When it's necessary):

- **Vaginal delivery is impossible** (e.g., placenta previa, small pelvis).
- **Previous C-section** with complications.

Relative Indications (Risks are too high for vaginal delivery):

- **Fetal distress** or abnormal heart rate.
- **Malpresentation** (breech, transverse lie).
- **Failure to progress** in labor.

Timing of C-Section:

1. **Elective (Planned) C-Section:**
    - Done at a set time, usually a week before the due date.
    - **Benefits:** Lower risk of labor complications, no pelvic floor damage.
    - **Risks:** Longer recovery time and risks in future pregnancies.
2. **Emergency C-Section:**
    - Done when an urgent issue occurs (e.g., fetal distress).
    - **Categories:**
        - **Category 1:** Immediate threat to life; needs delivery within 30 minutes.
        - **Category 2:** Serious but not life-threatening; needs delivery within 75 minutes.

- **Category 3:** No immediate danger, but needs early delivery.
- **Category 4:** Planned delivery to fit the mother's schedule.

Types of C-Section Surgery:

1. **Lower Segment Cesarean Section (LSCS):**
    - The most common method, with an incision in the lower part of the uterus.
2. **Classical Cesarean Section:**
    - Incision is made in the upper part of the uterus, rarely used today except in complex cases (e.g., fibroids, severe pelvic issues).

Risks and Benefits:

- **Benefits:** Lower risk of complications from vaginal birth, less chance of birth injuries.
- **Risks:** Longer recovery, higher chance of complications in future pregnancies.

C-sections are increasingly common because they are safer now, but they still come with risks that need careful consideration.

LOWER SEGMENT CESAREAN SECTION (LSCS)

Preoperative and Postoperative Care

Preoperative Preparation:

1. **Informed Consent:**
    - Obtain written permission from the patient for the procedure, anesthesia, and blood transfusion.
2. **Preparation:**
    - **Abdomen:** Scrub with soap and iodide lotion, hair may be clipped.
    - **Bladder:** Empty using a Foley catheter.
    - **Fetal Heart Sounds (FHS):** Check once more before surgery.
    - **Neonatologist:** Ensure one is available for immediate care of the baby.

- **Blood Crossmatch:** If excessive blood loss is anticipated (e.g., placenta previa, prior multiple C-sections).
- **Antibiotics:** Administer prophylactic IV antibiotics before the skin incision.

3. **IV Access:**
   - Place an IV cannula to administer fluids (e.g., Ringer's solution, 5% dextrose).
4. **Positioning:**
   - The patient is placed in the dorsal position. If needed, tilt 15° to the left to avoid venacaval compression.
5. **Anesthesia:**
   - May be spinal, epidural, or general anesthesia based on urgency and patient preference.
6. **Antiseptic:**
   - Apply 7.5% povidone-iodine or Savlon lotion on the abdomen and drape with sterile towels.
7. **Incision:**
   - Surgeon can choose either a vertical (infraumbilical or paramedian) or transverse (modified Pfannenstiel) skin incision.
8. **Packing:**
   - Use large swabs attached with tape to minimize spillage into the peritoneal cavity.

Surgical Procedure:

1. **Peritoneal Incision:**
   - Incision made in the peritoneum 1.25 cm below its attachment to the uterus.
2. **Uterine Incision:**
   - **Low Transverse Incision:** Most common; less blood loss, easier to repair, and lower risk of complications in future deliveries.

- **Other Uterine Incisions:** May include lower vertical, classical, or "J" incisions depending on circumstances (e.g., placenta previa).

3. **Delivery of the Baby:**
    - **Head Delivery:** Rupture membranes, suction out blood and amniotic fluid, and use fingers to carefully deliver the head.
    - **Trunk Delivery:** After delivery of the head, clear the mouth and nose, administer oxytocin for uterine contraction, and deliver the rest of the body.
4. **Placenta Removal:**
    - The placenta will typically separate spontaneously. Manual removal is avoided unless necessary.
5. **Uterine Suturing:**
    - The uterine incision is closed in layers using continuous sutures. Typically, two layers are used to minimize scar rupture risk in future pregnancies.
6. **Abdominal Closure:**
    - After checking the uterus for contraction, remove packing, and close the abdomen in layers.

Postoperative Care:

First 24 Hours (Day 0):

1. **Observation:**
    - Regularly monitor pulse, blood pressure, vaginal bleeding, and uterine tone.
2. **Fluid and Blood Transfusion:**
    - Continue IV fluids (e.g., saline or Ringer's lactate). Blood transfusion may be needed if there was significant blood loss (average loss is 0.5–1.0 L).
3. **Medications:**
    - Administer **oxytocin** or **methergine** for uterine contraction.
    - **Prophylactic antibiotics** to prevent infection (e.g., cephalosporins).

- Pain relief with **pethidine** (75–100 mg).

4. **Ambulation:**
    - Encourage the patient to move legs and breathe deeply to prevent thrombosis and pulmonary embolism.
5. **Baby Care:**
    - Put the baby to the breast 3-4 hours after the mother is stable.

Day 1:

1. **Oral Feeding:**
    - Offer plain water or tea. Monitor bowel sounds.

Day 2:

1. **Light Diet:**
    - Offer a light solid diet as tolerated.
2. **Bowel Care:**
    - Administer **lactulose** (3–4 teaspoons) if the patient hasn't had a bowel movement.

Day 5–6:

1. **Stitch Removal:**
    - Remove the skin stitches on **Day 5** (transverse) or **Day 6** (longitudinal).

Discharge:

1. **Postoperative Recovery:**
    - Discharge typically occurs after the stitches are removed and the patient is stable. This may be between **Day 3 and Day 7** depending on recovery progress.
2. **Postpartum Advice:**
    - Provide the usual advice for recovery and newborn care, similar to after vaginal delivery.

CLASSICAL CESAREAN SECTION

- **Incision Details**: A 15 cm (6 inches) abdominal incision is made, usually paramedian, and a 12.5 cm (5 inches) vertical incision is made on the uterus.
- **Procedure**: The membranes of the uterus are punctured to deliver the baby, usually through breech extraction. After the baby is delivered, medications like oxytocin or methergine are given, and the placenta is removed manually or by traction.

Comparison: Lower Segment vs. Classical C-Section

Aspect	Lower Segment	Classical
Blood Loss	Less	More
Wound Healing	Better (perfect apposition)	Imperfect (more hematoma)
Future Pregnancy Risk	Low (scar rupture 0.5-1.5%)	Higher (scar rupture 4-9%)
Technical Difficulty	Slightly difficult	Easier

Uterine Suture Technique:

1. **First Layer**: Continuous suture with chromic catgut (No. "0") excluding decidua.
2. **Second Layer**: Interrupted sutures (No. "1") to close superficial muscles.
3. **Third Layer**: Continuous suture for peritoneum and adjacent muscles.

Lower Segment Incision Types: Transverse vs. Vertical

Aspect	Transverse	Vertical
Bleeding	Less	More
Muscle Apposition	Better	Often imperfect
Wound Healing	Excellent	Less favorable

Complications:

- **Intraoperative**: Hemorrhage, uterine lacerations, bladder injury, and gastrointestinal injury.
- **Postoperative**: Postpartum hemorrhage, infections (like endomyometritis), deep vein thrombosis, and wound complications.
- **Fetal**: Prematurity, accidental injury, or distress.

Mortality:

- **Maternal**: 6 to 22 per 100,000 cases.
- **Fetal**: 5% to 10% mortality, mainly due to asphyxia or prematurity.

Cesarean Hysterectomy:

A cesarean followed by a hysterectomy is done if complications like severe bleeding, morbidly adherent placenta, or uterine rupture occur.

Preventing Unnecessary C-Sections:

- Techniques like external cephalic version, assisted vaginal delivery, and active labor management can help avoid unnecessary cesarean births.

SYMPHYSIOTOMY

Symphysiotomy Simplified

Symphysiotomy is a surgery that widens the pelvis by cutting the pubic joint, helping with difficult deliveries when the baby cannot pass through the birth canal. It's mainly used in countries with high rates of obstructed labor.

When is it done?

- **Obstructed labor** where a cesarean section is too risky.
- It's most useful when the pelvis is slightly too small (not severely contracted), the baby's head is facing down (vertex position), and the baby is still alive (heartbeat present).

How is it done?

- The surgeon cuts through the pubic joint in the center.
- The baby is then delivered either naturally or with the help of an **episiotomy**, **forceps**, or a **vacuum**.

Risks or Complications:

- **Pain** in the pubic area.
- **Incontinence** (difficulty controlling urine).
- Rarely, a **fistula** (hole between the bladder and vagina) can form.

Why use it?

- Symphysiotomy is used as an alternative to cesarean when it's safer and helps avoid future delivery problems by permanently enlarging the pelvis.

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Chapter 10: Abnormalities of the Puerperium

Puerperal pyrexia

1. **Definition:** Puerperal pyrexia is a fever of 100.4°F (38°C) or higher, measured on two occasions 24 hours apart, within the first 10 days after delivery.
2. **Causes**
    - Puerperal sepsis
    - Urinary tract infections (cystitis, pyelonephritis)
    - Mastitis
    - Breast abscess
    - Wound infections (cs or episiotomy),
    - Pulmonary infections (atelectasis, pneumonia),
    - Septic pelvic thrombophlebitis
    - Recrudescence of malaria or tuberculosis
    - Other conditions like pharyngitis and gastroenteritis.

Puerperal sepsis

1. **Definition**: An infection of the genital tract that arises as a complication of childbirth.
2. **Causes**
    - Endometritis
    - Endomyometritis

- Endoparametritis.

3. **The vaginal flora during late pregnancy and labor:**
   - Doderlein's bacillus
   - Candida albicans
   - Staphylococcus
   - Streptococcus
   - E. coli
   - Bacteroides
   - Clostridium welchii.
4. **Predisposing factors**
   1. **Vaginal flora**
      - Cervicovaginal damage during delivery
      - The placental site becoming an open wound
      - Blood clots at the placental site
   2. **Antepartum**
      - Malnutrition and Anemia
      - Preterm labor
      - Premature rupture of membranes
      - immunocompromised conditions (e.g., HIV)
      - Prolonged rupture of membranes (over 18 hours)
      - Diabetes.
   3. **Intrapartum**
      - Repeated vaginal examinations
      - Dehydration and ketoacidosis during labor
      - Traumatic vaginal delivery
      - Haemorrhage (antepartum or postpartum)
      - Retained placental tissue or membranes
      - Prolonged labor
      - Obstructed labor,
      - Cesarean delivery.
   4. **Microorganisms**
      - Aerobic bacteria like Group A and B Streptococcus, MRSA, E. coli, Klebsiella, Pseudomonas, Proteus, and Chlamydia.
      - Anaerobic bacteria such as Streptococcus, Peptococcus, Bacteroides (fragilis, bivius), Fusobacteria, Mobiluncus, and Clostridia.
   5. **Wound infection**
      - Placental site
      - Genital tract lacerations, or cesarean section wounds.
   6. **Pathology**

- Infections can occur in the perineum, vagina, cervix, or uterus. They may stay localized or spread. Blood clots and dead spaces in wounds increase the risk of infection, leading to redness, swelling, and pus-like discharge. Wounds may reopen if repaired before the infection is controlled. Risk factors include diabetes, obesity, and weakened immunity (e.g., HIV).

7. **Pathogenesis**

- Puerperal sepsis occurs when bacteria grow in areas like the uterus, cervical tears, or vaginal wounds. Dead tissue, blood clots, and surgical trauma help the infection spread, leading to conditions like metritis or cellulitis.
- Uterus: Endomyometritis is a uterine infection, more common after cesarean delivery. It's caused by bacteria and linked to risks like retained placenta, prolonged labor, and frequent exams. Dead tissue causes foul discharge, but severe cases are rare.

8. **Spread of infection**

- Pelvic cellulitis (parametritis) occurs when infection spreads to pelvic tissues, forming a mass that pushes the uterus to the opposite side.
- **Peritonitis**, common after cesarean infections, causes bowel distension and ileus due to uterine wound necrosis.
- **Salpingitis** can affect the fallopian tubes through direct, lymphatic, or peritoneal spread, sometimes leading to a rare pelvic abscess.
- **Septic pelvic thrombophlebitis** involves infected blood clots in pelvic veins, which may spread to vital organs like the lungs or kidneys.
- **Septicemia and shock** can result from severe infections, leading to complications like lung abscesses, meningitis, or multiorgan failure, with a 30% mortality rate.

9. **Clinical Features**

- **Local Infection (Wound Infection):**
  - **Mild:** Slight fever, malaise, headache, redness, swelling, and possible pus leading to wound disruption.
  - **Severe:** High fever with chills, rigor, and significant wound issues.
- **Uterine Infection:**

    - **Mild:** Fever (>100.4°F), rapid pulse, offensive and copious lochia, tender and subinvoluted uterus.
    - **Severe:** Acute onset with high fever, rapid pulse, breathlessness, abdominal pain, scanty odorless lochia, and tender, soft uterus. Wound infection may accompany.
- **Spreading Infection (Extrauterine Spread):**
    - Pelvic tenderness (pelvic peritonitis)
    - Fornix tenderness (parametritis)
    - Bulging mass in the pouch of Douglas (pelvic abscess).
- **Parametritis**
    - Onset: 7–10 days postpartum.
    - **Mild:** Constant pelvic pain, tenderness in the lower abdomen, and a tender mass shifting the uterus to the opposite side. Induration may extend along the uterosacral ligament, resolving in weeks.
    - **Severe (Suppuration):** High spiking fever, chills, intense pain, general deterioration, and a palpable fluctuant mass. Leukocytosis may be present.
- **Pelvic Peritonitis:**
    - Fever with increased pulse rate.
    - Lower abdominal pain, sometimes without muscle guarding.
    - Vaginal exam shows fornix tenderness and cervical movement pain.
    - Pus in the pouch of Douglas causes swinging fever, diarrhea, and a bulging mass felt through the posterior fornix.
- **General Peritonitis**
    - High fever and rapid pulse.
    - Vomiting and generalized abdominal pain.
    - The patient appears very ill and dehydrated.
    - Abdomen is tender, distended, with rebound tenderness.
- **Thrombophlebitis**
    - Symptoms resemble uterine infection or parametritis.
    - Prolonged swinging fever with chills and rigor.
    - Pyemia symptoms depend on affected organs.
    - Rare due to modern antibiotics.
- **Septicemia**
    - High fever with rigor and rapid pulse, even after temperature normalizes.
    - Positive blood culture.
    - Symptoms of metastatic infections (e.g., in lungs, meninges, or joints).
- **Septic Shock**

- Caused by bacterial toxins leading to poor circulation and tissue hypoperfusion.
- Symptoms include low blood pressure, reduced urine output, and respiratory distress.

10. **Investigation of puerperal pyrexia**

Goals:

1. Locate the infection.
2. Identify the organism.
3. Assess severity.

Steps:

1. History: Look for risk factors like anemia, prolonged labor, or membrane rupture.
2. Examination:
    - General and systemic check-up.
    - Abdominal and pelvic exams to identify infection and check uterine involution.
    - Examine legs for signs of thrombophlebitis.
3. Tests:
    - Swabs: Vaginal and cervical for bacterial culture and sensitivity.
    - Urine: Test for infection and sensitivity.
    - Blood tests:
        - White cell count and hemoglobin.
        - Platelets (for signs of septicemia or DIC).
        - Malaria test if relevant.
        - Blood culture for fever with chills.
    - Pelvic ultrasound: Detect retained products, abscess, or venous thrombosis.
    - Advanced imaging (CT/MRI): For unclear cases or vein thrombosis.
    - Chest X-ray: Check for lung issues or tuberculosis.
    - Renal tests: Blood urea and electrolytes to monitor kidney function if severe illness or surgery is expected.

11. **Prophylaxis for Puerperal Sepsis**

Puerperal sepsis is largely preventable with proper measures before, during, and after labor.

- **Antenatal Prophylaxis:**

- Improve nutrition to raise hemoglobin levels.
- Treat any infections (skin, throat, tonsils).

- **Intranatal Prophylaxis:**
  - Maintain full surgical asepsis during delivery.
  - Screen high-risk patients for Group B Streptococcus.
  - Use antibiotics prophylactically during cesarean delivery to reduce risks of infections (e.g., wound, endometritis, UTI).
- **Postpartum Prophylaxis:**
  - Follow aseptic precautions for at least 1 week until wounds heal.
  - Limit visitors.
  - Use sterilized sanitary pads.
  - Isolate infected mothers and babies.

12. **Treatment of Puerperal Sepsis**
    - **General Care:**
      - Isolation for patients with hemolytic Streptococcus to prevent spread.
      - Maintain hydration and nutrition with IV fluids.
      - Treat anemia with oral iron or blood transfusion if needed.
      - Use an indwelling catheter for urine retention and to monitor output.
      - Monitor and record vital signs, lochia, and fluid balance regularly.
    - **Antibiotic Therapy:**
      - Start gentamicin (2 mg/kg IV loading, then 1.5 mg/kg IV every 8 hours) and clindamycin (900 mg IV every 8 hours) while awaiting culture results.
      - Add metronidazole (500 mg IV every 8 hours) for anaerobic bacteria.
      - Continue antibiotics for 7–10 days or until infection resolves.
    - **Severe Sepsis:**
      - Use a combination of piperacillin-tazobactam or carbapenem with clindamycin for broad-spectrum coverage.
      - For MRSA, treat with vancomycin or teicoplanin.

13. **Surgical Treatment of Puerperal Sepsis**
    - **Perineal Wound:**
      - Remove stitches if infected to drain pus and reduce pain.
      - Clean with sitz baths and dress with antiseptic.
      - Perform secondary suturing after infection resolves.

- **Retained Uterine Products:**
  - Leave products ≤3 cm unless symptomatic.
  - Perform surgical evacuation after 24-hour antibiotic coverage to avoid Septicemia.
- **Pelvic Abscess:**
  - Drain via colpotomy under ultrasound guidance.
- **Wound Dehiscence:**
  - Clean wound twice daily, debride necrotic tissue, and resuture after infection control.
  - Use antibiotics guided by culture results.
- **Necrotizing Fasciitis:**
  - Rare but severe. Caused by Group A Streptococcus or polymicrobial infection.
- Treat with rehydration, wound debridement, and high-dose IV broad-spectrum antibiotics.
- **Severe Cases (e.g., Peritonitis):**
  - Manage primarily with fluids and antibiotics.
  - Perform laparotomy if unresponsive, for drainage or hysterectomy in cases of uterine rupture, abscesses, gangrene, or gas gangrene.
  - Remove ruptured tubo-ovarian abscesses.
- **Septic Pelvic Thrombophlebitis:**
  - Treat with IV heparin for 7–10 days.
- **Intensive Care Indications:**
  - For hypotension, oliguria, ARDS, thrombocytopenia, or septic shock. Manage with fluid resuscitation, antibiotics, circulatory support, and specific therapies like hemodialysis.

14. **Management of Bacteremic or Septic Shock**
    - **Fluid and Electrolyte Balance:**
      - Ensure proper hydration and monitor central venous pressure (CVP).
    - **Respiratory Support:**
      - Maintain adequate oxygenation (arterial PO_2) and normal carbon dioxide levels (PCO_2) through mechanical ventilation if needed.
    - **Circulatory Support:**
      - Use vasoactive drugs like dopamine or dobutamine to support blood pressure and improve circulation.
    - **Infection Control:**

- Administer intensive antibiotic therapy targeting the identified pathogens.
- Remove septic foci surgically if necessary (e.g., drainage of abscesses, debridement).

- **Specific Management:**
  - Perform hemodialysis in cases of renal failure.
  - Address other complications such as metabolic imbalances or organ dysfunction based on clinical presentation.

SUBINVOLUTION

1. **Definition:** refers to the impaired or delayed process of uterine involution after childbirth. The uterus, being the most affected organ, serves as a key indicator of subinvolution.
2. **Causes / Predisposing Factors**:
   - Grand multiparity
   - Overdistension (e.g., twins, hydramnios)
   - Maternal ill-health
   - Cesarean section
   - Uterine prolapse or retroversion
   - Uterine fibroids
3. **Aggravating Factors**:
   - Retained products of conception
   - Uterine infection (endometritis)
4. **Symptoms:**
   - May be asymptomatic.
   - Abnormal lochial discharge (excessive or prolonged)
   - Irregular or excessive uterine bleeding
   - Cramp-like pain or fever if there is retained tissue or infection.
5. **Signs:**
   - The uterus is larger than expected for the stage of puerperium.
   - It may feel boggy and softer.
   - Features contributing to subinvolution (e.g., retained products, infection) may be present.
6. **Management:**
   - **Management of Subinvolution**:

- The size of the uterus is not concerning unless there are symptoms like excessive bleeding, infection, or abnormal discharge.

- Treatment should focus on the underlying cause:
  - Antibiotics for infection (e.g., endometritis).
  - Exploration to remove retained products.
  - Pessary for uterine prolapse or retroversion.
  - Methergine is not recommended for routine use.

URINARY COMPLICATIONS IN PUERPERIUM

1. **Urinary Tract Infection (UTI):**
   - **Causes:**
     - Recurrence of previous cystitis or pyelitis.
     - Asymptomatic bacteriuria becoming overt.
     - First-time infection during puerperium due to:
       - Frequent catheterization during labor or early puerperium.
       - Urinary stasis from reduced bladder tone and delayed urination.
   - **Common Pathogens:** E. coli, Klebsiella, Proteus, S. aureus.
   - **Management:**

2. **Urinary Retention:**
   - **Causes:**
     - Bladder neck bruising or edema.
     - Reflex inhibition from perineal injury.
     - Discomfort with the postpartum position.
   - **Treatment:**
     - Use simple measures to initiate micturition.
     - If unsuccessful, insert an indwelling catheter for 48 hours to restore bladder tone.
     - Measure residual urine after catheter removal. If >100 mL, resume continuous drainage.
     - Administer urinary antiseptics for 5–7 days.
3. **Urinary Incontinence:**
   - **Types:**
     - Overflow incontinence: Often due to retention.

        - Stress incontinence: Manifests later in puerperium, triggered by stress.
        - True incontinence: Often caused by genitourinary fistulas, presenting soon after delivery or within a week.
    - **Diagnosis:**
        - Stress incontinence: Urine leakage during stress (e.g., coughing).
        - Fistula: Identify using Sims' speculum or three-swab test for tiny fistulas.
4. **Suppression of Urine:**
    - Defined as 24-hour urine output ≤400 ml.
    - Differentiate from retention and identify underlying causes for management.

BREAST COMPLICATIONS

Common Breast Complications in Puerperium:

- Breast engorgement.
- Cracked or retracted nipples, causing breastfeeding issues.
- Mastitis and breast abscess.
- Lactation failure.

Breast Engorgement

1. **Cause:** Occurs due to excessive venous and lymphatic congestion in the breasts, which blocks milk flow. Common in first-time mothers or those with inelastic breasts.
2. **Onset:** Typically starts on the 3rd or 4th postpartum day.
3. **Symptoms:** Pain and heaviness in both breasts, Malaise or mild fever & Painful breastfeeding.
4. **Prevention:**
    - Avoid prelacteal feeds.
    - Start early, frequent, and exclusive breastfeeding.
    - Ensure proper feeding position and latch.
5. **Treatment:**
    - Support breasts with a binder or bra.
    - Breastfeed frequently.
    - Manually express leftover milk.
    - Use analgesics for pain.
    - Use a breast pump gently in severe cases.

Cracked and Retracted Nipple

Cracked Nipple:

1. **Cause:**
    - Loss of surface epithelium or fissures on the nipple (tip or base).
    - Poor hygiene causing crust formation.
    - Retracted nipple or trauma from improper latch.
    - Infections with Candida albicans or S. aureus.
2. **Symptoms:**
    - Pain during feeding.
    - Risk of infection spreading to deeper tissues, leading to mastitis.
3. **Prevention:**
    - Maintain cleanliness during pregnancy and puerperium.
    - Clean nipples before and after feeding.
4. **Treatment:**
    - Correct latch to reduce pain and promote healing.
    - Apply purified lanolin with mother's milk 3-4 times daily.
    - If severe, use a breast pump and feed expressed milk.
    - For thrush, apply miconazole on the nipple and in the baby's mouth.
    - Persistent ulcers may require a biopsy to rule out malignancy.

Retracted and Flat Nipple:

5. **Features:**
    - Common in first-time mothers.
    - Usually acquired but does not prevent breastfeeding.
6. **Management:**
    - Manual milk expression can help initiate lactation.
    - Over time, the breast tissue softens, making breastfeeding easier.

Acute Mastitis

1. **Causes:** Common bacteria: S. aureus, S. epidermidis, Streptococcus viridans.
2. **Risk factors:** Poor nursing, fatigue, cracked nipples.
3. **Types:**
    - Cellulitis: Infection in breast tissue (milk ducts unaffected).
    - Mammary Adenitis: Infection through milk ducts (baby's nose/throat **source).**
4. **Non-Infective Mastitis:** Caused by milk stasis; resolves with feeding from the affected breast.

5. **Onset:** Typically, within 2–4 weeks postpartum, but can occur later.
6. **Symptoms:** Fever (102°F+), chills, severe pain, swelling, redness, malaise, headache, nausea, vomiting.
7. **Diagnosis:** Breast milk test: Leukocytes $>10^6$/mL, bacteria $>10^3$/ml.
8. **Complications:** Can lead to breast abscess.
9. **Prevention:** Hand washing, cleaning, and drying nipples before/after feeds.
10. **Treatment:**
    - Support breasts, stay hydrated.
    - Continue breastfeeding (start on the unaffected side).
    - Manually empty the infected breast.
    - Antibiotics: Dicloxacillin (500 mg every 6 hrs) or erythromycin (if allergic). Continue for 7 days.
    - Pain relief: Ibuprofen.
    - Maintain milk flow to prevent bacterial growth.

Breast Abscess

1. **Features:**
    - Flushed breast unresponsive to antibiotics.
    - Skin with brawny edema.
    - Marked tenderness and fluctuation.
    - Swinging temperature.
2. **Treatment:**
    - **Surgical Drainage:**
        - Deep radial incision near the areola to avoid duct damage.
        - Break loculi walls with finger exploration.
        - Loosely pack with gauze, replaced daily until healed.
    - Needle Aspiration: Ultrasound-guided, repeated if necessary.
    - Continue antibiotics based on pus culture.
    - **Breastfeeding:**
        - Feed from the unaffected breast.
        - Mechanically pump the infected breast every 2 hours.
        - Resume breastfeeding from the affected side after cellulitis resolves.
3. **Breast Pain Causes:**
    - Engorgement, infection (*C. albicans*), nipple trauma, mastitis, or let-down reflex.
4. **Pain Management:**
    - Correct nursing technique and breast care.

- Apply miconazole lotion/gel to nipples and baby's mouth 3 times daily for 2 weeks.

Lactation Failure (Inadequate Milk Production)

1. **Causes:**
    - Infrequent suckling.
    - Psychological factors: Depression, anxiety, or nursing apprehension.
    - Nipple issues: Poor development or painful lesions.
    - Hormonal factors:
        - Endogenous prolactin suppression (e.g., retained placental fragments).
        - Prolactin inhibition (caused by ergot, diuretics, or pyridoxine).
2. **Treatment:**
    - **Antenatal:**
        - Educate the mother on breastfeeding benefits.
        - Address nipple abnormalities and maintain breast hygiene.
    - **Puerperium:**
        - Encourage regular nursing and adequate fluid intake.
        - Treat painful lesions to avoid nursing phobia.
        - Medications to enhance milk production:
            - Metoclopramide: 10 mg thrice daily.
            - Intranasal oxytocin and Sulpiride (dopamine antagonist) stimulate prolactin secretion.

Puerperal Venous Thrombosis

1. Caused by **Virchow's triad**:
    - Vascular stasis (compression by gravid uterus).
    - Hypercoagulability (elevated clotting factors).
    - Endothelial trauma (injury to blood vessel lining).
2. **Types of Venous Thromboembolic Disease**:
    - Deep vein thrombosis (DVT) (e.g., iliofemoral).
    - Thrombophlebitis (superficial and deep veins).
    - Pulmonary embolism (PE).
3. **Risk Factors**:
    - High risk: Previous VTE, thrombophilia.
    - Intermediate risk: Heart disease, SLE, surgery (e.g., LSCS).
    - Low risk: Age >35, obesity, multiple pregnancies, immobility, dehydration, hyperemesis, and more.
4. **Pathophysiology**:

- Increased blood clotting factors during pregnancy.
- Venous stasis due to uterus compressing veins.
- Thrombophilias (inherited or acquired) can further increase risk.

Deep Vein Thrombosis (DVT):

5. **Symptoms**: Calf pain, leg swelling, and skin temperature rise.
6. **Diagnosis**:
    - Doppler ultrasound: Most accurate test (non compressibility of veins).
    - Venography: Reliable but rarely used in pregnancy.
    - MRI: Superior for pelvic, iliac, or femoral veins.
    - D-dimer test: Limited due to false positives during pregnancy.

Pelvic Thrombophlebitis:

7. Causes: Thrombosed veins at the placental site, often infected by anaerobic Streptococci or Bacteroides.
8. Signs: Persistent fever despite antibiotics.
9. Extra pelvic spread: Can lead to phlegmasia alba dolens (white leg), where swelling, pain, and coldness occur in the leg.

Phlegmasia Alba Dolens (Syn: White leg):

10. Features: Swollen, painful, white, and cold leg. Occurs in the second week of puerperium, often with fever, malaise, and constitutional symptoms.
11. Diagnosis: Confirmed by ultrasound, CT scan, or MRI.
12. Treatment: Heparin therapy to reduce symptoms and confirm diagnosis.

Prevention and Management of Venous Thromboembolism (VTE) in Pregnancy and Puerperium

13. Prevention:
    - Avoid trauma, sepsis, and anemia during pregnancy and labor.
    - Prevent dehydration during delivery.
    - Use compression stockings and intermittent pneumatic compression devices during surgery.
    - Encourage leg exercises and early ambulation after delivery.

14. **Risk Categories & Thromboprophylaxis**:
    1. Low Risk: No personal/family history of VTE, no significant genetic mutations.

- Management: Early mobilization and adequate hydration, no thromboprophylaxis needed.

2. High Risk: History of VTE or significant thrombophilia.
    - Management: Low-molecular-weight heparin (LMWH) prophylaxis during pregnancy and postpartum (6 weeks).
3. Intermediate Risk: 3+ risk factors (e.g., obesity, multiple pregnancies).
    - Management: LMWH prophylaxis for up to 7 days postpartum.

15. **Management of VTE**:
    - Bed Rest: Elevate feet above heart level.
    - Pain Relief: Use analgesics.
    - Antibiotics: Administer if infection is present.
    - Anticoagulants:
        - Heparin: 15,000 units IV, followed by 10,000 units every 4–6 hours for 7–10 days.
        - LMWH (Enoxaparin): 20 mg (for weight <50 kg) or 40 mg (for weight 50–90 kg) daily.
        - Warfarin: Oral anticoagulant with INR monitoring (2.0–3.0).
    - Mobility: Allow gentle movement by the first week, with high-quality stockings on the affected leg.
    - Inferior Vena Cava Filters: For recurrent pulmonary embolism or contraindicated anticoagulation.
    - Fibrinolytics: Streptokinase for rapid resolution of pulmonary embolism.
    - Venous Thrombectomy: For severe thrombosis or massive pulmonary embolism.

Pulmonary Embolism (PE)

1. Caused by deep venous thrombosis (DVT) in the legs or pelvis, but PE can occur without prior DVT symptoms (80–90%).
2. predisposing factors: venous thrombosis.
3. Clinical Features:
    - Tachypnoea (>20 breaths/min), dyspnea, pleuritic chest pain, cough, tachycardia (>100 bpm), haemoptysis, fever (>37°C).
    - Sudden collapse, acute chest pain, and air hunger in massive PE; death from shock and vagal inhibition.
4. **Diagnosis**
    - Chest X-ray: Shows diminished vascular markings in areas of infarction, diaphragm elevation, and pleural effusion.

- ECG: Tachycardia, right axis shift, ST changes, right bundle branch block.
- Arterial Blood Gas: Low oxygen saturation (<95% on room air).
- D-Dimer: A negative result can rule out PE.
- Doppler Ultrasound: Detects DVT, leading to anticoagulation therapy.
- V/Q Scan: Identifies reduced perfusion areas; high probability suggests PE.
- MRI/MRA: Preferred in pregnancy (no radiation risk), with 100% sensitivity and 95% specificity.
- Spiral CT Pulmonary Angiography (CTPA): Requires IV contrast, less precise in pregnant women.
- Pulmonary Angiography: Accurate but with higher risks (0.5% mortality, 3% complication rate).

5. **Management**:
   - Prophylaxis: As mentioned earlier for VTE.
   - Resuscitation:
     - Cardiac massage, oxygen therapy, and IV heparin (5,000 IU bolus) are initiated.
     - LMWH (enoxaparin 1 mg/kg SC twice daily) is used, with monitoring of antifactor Xa levels (0.6–1 U/mL).
     - Heparin is continued for 5–10 days, then switched to SC injections.
   - IV Fluid Support: Blood pressure management with dopamine or adrenalin if needed.
   - Treatment for Tachycardia: Use digitalis.
   - Surgical Treatment:
     - For recurrent PE, embolectomy or placement of inferior vena cava filters may be needed.
     - Filters are used if there is a contraindication to anticoagulation, or if anticoagulation fails, or in cases of heparin-induced thrombocytopenia.
6. **Contraindications for Heparin Therapy**:
   - Active bleeding (antenatal or postpartum), high hemorrhage risk (e.g., placenta previa), coagulopathy, thrombocytopenia.

Obstetric Palsies (Postpartum Traumatic Neuritis)

1. Foot drop is the most common form, usually appearing shortly after delivery.
2. Causes: stretching of the lumbosacral trunk, often due to a prolapsed disk between L5 and S1. Sacral rotation during labor can also contribute.
3. Symptoms: muscle weakness, wasting, and sensory loss in the areas supplied by the femoral nerve or lumbosacral plexus.
4. Management: Treating a prolapsed disk, with orthopaedist consultation.

5. **Rare Complications**: Paraplegia caused by epidural hematoma or abscess (arachnoiditis) after regional anaesthesia is extremely rare.

Puerperal Emergencies:

Complications during the puerperium can be categorized into:

1. **Immediate (right after delivery)**:
    - Postpartum hemorrhage
    - Shock (hypovolemic, endotoxic, idiopathic)
    - Postpartum eclampsia
    - Pulmonary embolism (liquor amnii or air)
    - Inversion of the uterus
2. **Early (within one week)**:
    - Acute retention of urine
    - Urinary tract infection
    - Puerperal sepsis
    - Breast engorgement
    - Mastitis and breast abscess
    - Pulmonary infection (atelectasis)
    - Anuria (from abruptio placentae, mismatched blood transfusion, or eclampsia)
3. **Delayed (after one week)**:
    - Secondary postpartum hemorrhage
    - Thromboembolic issues (pulmonary embolism, thrombophlebitis)
    - Psychosis
    - Postpartum cardiomyopathy
    - Postpartum hemolytic uremic syndrome

Psychiatric Disorders During Puerperium:

- Mental illness is common in the first 3 months after delivery, affecting 15-20% of women.
- Contributing factors: sleep deprivation, hormonal changes, and postpartum withdrawal.

1. **High-Risk Factors:**
    - Past psychiatric history
    - Family history of mental illness
    - Marital or social issues

- Young age, cesarean delivery, difficult labor, neonatal complications
- Unmet expectations

Types of Psychiatric Disorders:

1. **Puerperal Blues**:
   - A transient condition affecting 50% of women, occurring 4-5 days after delivery.
   - **Symptoms:** depression, anxiety, tearfulness, insomnia, and negative feelings toward the infant.
   - **Cause:** no specific abnormalities found, but altered neurotransmitter function may play a role.
   - **Treatment:** reassurance and psychological support.

2. **Postpartum Depression**:
   - Affects 10-20% of mothers, typically developing 4-6 months after delivery.
   - **Symptoms:** low energy, appetite loss, insomnia, irritability, and suicidal thoughts.
   - **Treatment:** early intervention with fluoxetine or paroxetine (safe for breastfeeding), oestrogen patch, and supportive measures. If no improvement, psychiatric consultation is needed.
   - **Prognosis**: generally good, but recurrence risk in future pregnancies is high (50-100%).

3. **Postpartum Psychosis (Schizophrenia)**:
   - Rare (0.14-0.26% of mothers), often in those with a history of psychosis.
   - **Onset:** sudden, usually within 4 days of delivery.
   - **Symptoms:** fear, restlessness, confusion, hallucinations, delusions, suicidal or infanticidal thoughts.
   - **Treatment:** urgent psychiatric consultation and hospitalization. Medications include chlorpromazine, estradiol, or lithium (contraindicated for breastfeeding). Electroconvulsive therapy may be considered.

Psychological Response to Perinatal Deaths:

- Perinatal deaths (fetal or neonatal) or complications like an unexpected hysterectomy or critically ill infants can cause grief for the mother and family.
- Common maternal symptoms: insomnia, fatigue, guilt, anger, and hostility.

Management:

- Offer emotional support, consolation, and sympathy.
- Encourage the parents to see, hold, or take photos of the baby.
- Discuss autopsy, follow-up visits, and plans for future pregnancies.

LOW BIRTH WEIGHT BABY

1. **Birth Weight and Prematurity**:
    - Birth weight < 2500g was historically used to define prematurity, but it doesn't account for gestational age.
    - Infants born at term or post-term can weigh < 2500g, and some premature babies can weigh more than 2500g, especially if the mother has diabetes.
2. **Gestational Age and Birth Weight**:
    - **Small for Gestational Age (SGA)**: Birth weight is less than the 10th percentile for the gestational age.
    - **Appropriate for Gestational Age (AGA)**: Birth weight lies between the 10th and 90th percentiles for the gestational age.
    - **Large for Gestational Age (LGA)**: Birth weight is above the 90th percentile for the gestational age.
3. **Low Birth Weight (LBW)**:
    - Defined as birth weight < 2500g, regardless of gestational age.
    - **Very Low Birth Weight (VLBW)**: Birth weight ≤ 1500g.
    - **Extremely Low Birth Weight (ELBW)**: Birth weight ≤ 1000g.
4. **Preterm Birth (PTB)**:
    - Defined as birth before 37 weeks of gestation, regardless of birth weight.
5. **Small for Gestational Age (SGA)**:
    - **70% of SGA infants**: They are constitutionally small but healthy (normal growth).
    - **30% of SGA infants**: They are growth restricted and have a higher risk of perinatal morbidity and mortality.
6. **Factors influencing LBW**
    - Factors influencing LBW include socioeconomic status, nutrition, intrauterine environment, ethnic background, and genetic factors.
7. **Importance of Birth Weight and Gestational Age**:

- These factors help predict neonatal risks and guide management, especially in different countries or populations.

PRETERM BABY (Syn. Prematurity, premature baby)

1. **Definition**
   - A preterm baby is born before 37 weeks of pregnancy.
   - Preterm babies usually weigh < 2500g, but some may weigh more than 2500g even before 37 weeks.
   - The weight of a preterm baby usually matches the average weight for their gestational age.
2. **Etiology**
   - Previous Preterm Birth or Miscarriage: Increases risk of preterm birth.
   - Pregnancy After ART: Fertility treatments can raise the risk of preterm birth.
   - Urinary Infections: UTIs or bacteria in the urine increase preterm birth risk.
   - Smoking: Smoking during pregnancy raises the risk of preterm birth.
   - Poor Socioeconomic and Nutritional Status: Lack of resources or poor nutrition increases risk.
   - Maternal Stress: High stress levels during pregnancy can lead to preterm birth.
3. **Manifestations of Prematurity**
   - Anatomical Features:
     - Weight is < 2500g, and length is usually < 44 cm.
     - The head and abdomen are relatively large, with soft skull bones and wide sutures.
     - Head circumference is larger than chest circumference.
     - Ears are soft and flat.
     - Eyes are closed.
     - Skin is thin, red, shiny, and covered in lanugo (fine hair) and vernix (protective coating).
     - Poor muscle tone, with no deep creases on the feet before 34 weeks.
     - Undescended testicles in males, exposed labia minora in females.
     - Nails do not reach the fingertips.

4. **Complications of a preterm neonate**
    - **Asphyxia:** Preterm babies are at risk of oxygen deprivation, which can cause bleeding in organs like the heart, lungs, and liver, and may lead to brain hemorrhage (IVH).
    - **Hypothermia**: Preterm babies have less fat and more surface area, making it hard for them to keep their body temperature stable.
    - **Pulmonary Issues** (23%): Preterm babies often face breathing problems, such as:
        - Pulmonary edema (fluid in the lungs)
        - Intra-alveolar hemorrhage (bleeding in the lungs)
        - Respiratory distress syndrome (RDS), which is a major cause of death in very premature babies.
        - Bronchopulmonary dysplasia (lung damage).
    - **Cerebral Hemorrhage**: Due to soft skull bones, fragile blood vessels, and low clotting ability, preterm babies are at risk of brain bleeds.
    - **Fetal Shock:** Shock can occur during or after birth, especially if resuscitation is not done properly.
    - **Hypoglycemia:** Low blood sugar is common in preterm babies due to low glycogen stores in the liver, poor feeding, or cold stress.
    - **Heart Failure**: Caused by asphyxia, which can lead to fluid in the lungs, affecting heart function and oxygen supply.
    - **Oliguria/Anuria**: Preterm babies' immature kidneys may struggle to manage water, salt, and waste, causing low urine output.
    - **Infections**: Preterm babies are more vulnerable to infections like pneumonia, meningitis, and necrotizing enterocolitis due to weaker immune systems.
    - **Jaundice**: Immature liver function leads to a buildup of bilirubin, causing yellowing of the skin (physiological jaundice).
    - **Patent Ductus Arteriosus (PDA):** A persistent open blood vessel between the heart and lungs can occur, especially in more premature babies.
    - **Dehydration and Acidemia**: Due to immature kidneys, preterm babies may face dehydration and imbalance in body acids.
    - **Anemia**: Lack of iron and bone marrow function, plus excessive breakdown of red blood cells, can lead to anemia.
    - **Apnea and SIDS**: Immaturity of the autonomic nervous system increases the risk of breathing problems, apnea, and sudden infant death syndrome (SIDS).

5. **Retinopathy of Prematurity (ROP)**
    - A condition that can cause blindness in premature babies, mostly due to too much oxygen given after birth. Other factors like extreme prematurity and lack of nutrients also contribute.
6. **Length of Stay**
    - Babies born very early (before 34 weeks) often stay longer in the hospital.
7. **Prognosis**
    - Survival chances depend on the baby's health, not just birth weight.
        - Babies >1500g have a 95% survival rate.
        - Babies 751-1000g have an 80% survival rate with care.
        - Babies <23 weeks have a >97% chance of dying.
    - Most deaths happen within 48 hours due to complications.
8. **Long-Term Prognosis**
    - Preterm babies may have problems like cerebral palsy, hearing loss, lung issues, poor growth, or ADHD.
9. **management of preterm neonates:**

- **Immediate Management After Birth:**
    - Clamping the cord quickly to prevent complications like hyperbilirubinemia.
    - Clear the air passage gently to remove mucus.
    - Oxygen via mask or nasal catheter, not exceeding 35%.
    - Keep the baby warm with a sterile towel (36.5–37.5°C).
    - Vitamin K injection to prevent bleeding.
- **Intensive Care Protocol:**
    - Preterm babies need special care due to organ immaturity. Care includes:
        - Thermal stability: Keep the room warm and maintain body temperature (36–36.5°C).
        - Humidity and oxygen therapy to avoid dehydration and provide adequate ventilation.
        - Prevent infection with proper hygiene and antibiotics if needed.
        - Nutritional support and monitoring growth.
- **Maintaining Temperature:**
    - Preterm babies are sensitive to temperature changes. Incubators or radiant warmers are used for ELBW (extremely low birth weight) babies.
    - Temperature should be closely monitored (36–36.5°C).

- **Fluid and Electrolyte Management:**
    - Increased fluid intake due to high water loss. IV fluids (50-70 mL/kg/day) are needed, and electrolyte levels must be monitored.
- **Respiratory Support:**
    - Oxygen support is required to treat initial cyanosis and help with breathing.
    - Babies may need mechanical ventilation, CPAP, or nasal cannulas. Surfactant therapy may be needed for breathing problems (like RDS).
    - Pulse oximeter monitors oxygen levels.
- **Hyperbilirubinemia:**
    - Bilirubin levels should be kept below 10 mg/dL. Phototherapy may be needed.
- **Infection Control:**
    - Antibiotics (e.g., Ampicillin) are given to prevent infections, especially after premature rupture of membranes.
- **Nutrition:**
    - Preterm babies often cannot suckle or swallow, so gavage feeding or parenteral nutrition is used.
    - Breast milk is preferred, as it promotes growth and reduces infection risk.
    - Calorie requirements are higher, with gradual increases in milk volume and calories.
- **Calorie & Fluid Management:**
    - Calorie needs start at 60 kcal/kg/day and increase gradually.
    - Fluids start at 80 mL/kg/day, increasing to 200 mL/kg/day.
- **Supplementation:**
    - Vitamin and mineral supplements (e.g., vitamins A, D, iron) are given after 2 weeks to support growth.
- **Nursing Care**:
    - Regular monitoring: Temperature and weight should be checked daily.
    - Parental involvement: Mothers should be involved in care and encouraged to express breast milk.
- **Signs of Progress:**
    - Pink skin colour.
    - Smooth and regular breathing.
    - Increasing strength, including movement and crying.
    - Gradual weight gain (after initial weight loss).

- **When to Discharge:**
    - Weight gain and good Vigor are required before discharge.
    - Baby should be able to suckle successfully.
- **Post-Discharge Care:**
    - Follow-up with public health nurses for home care.
    - Parental education on feeding, immunization, and baby care.
    - Regular check-ups for weight, hydration, and feeding progress.

FETAL GROWTH RESTRICTION (FGR)

Syn: Intrauterine Growth Restriction (IUGR), Chronic Placental Insufficiency

1. **Definition**
    - FGR (also called IUGR) is when a baby's birth weight is below the 10th percentile for their gestational age. This can happen at any stage: preterm, term, or post-term.
2. **SGA (Small for Gestational Age) and IUGR** are often confused but have differences:
    - **SGA:** Babies are small but healthy, grow at lower percentiles throughout pregnancy, and are not at increased risk.
    - **IUGR:** Babies have growth restrictions caused by pathological processes, with higher risks for perinatal mortality and morbidity.
3. **Normal Fetal Growth**
    - Fetal growth involves cell hyperplasia early on, followed by hypertrophy (increase in cell size). Most weight gain occurs after the 24th week.
4. **Types of FGR**
    - **Healthy small foetuses** (birth weight <10th percentile):
        - Normal fat and body proportions.
        - No increased risks, with an uncomplicated neonatal course.
5. **Pathologically restricted growth (True IUGR)**
    - **Symmetrical (Type I):** Affects fetus early in cellular hyperplasia, caused by structural/chromosomal abnormalities or infections.
    - **Asymmetrical (Type II):** Affects fetus later in hypertrophy phase, caused by maternal diseases affecting blood flow and nutrient transfer to the placenta.
6. **Etiology of FGR**

- **Maternal Factors**:
    - **Constitutional:** Small women or those with low BMI, no increased risk.
    - **Nutrition:** Lack of nutrients like glucose and amino acids.
    - **Diseases:** Anemia, hypertension, heart disease, renal disease, etc.
    - **Toxins:** Alcohol, smoking, drugs.
- **Fetal Factors:**
    - Structural anomalies (e.g., cardiovascular, renal).
    - Chromosomal abnormalities (e.g., trisomies, Turner syndrome).
    - Infections (e.g., TORCH, malaria).
    - Multiple pregnancy (mechanical hindrance to growth).
- **Placental Factors:**
    - Poor uterine blood flow, leading to chronic placental insufficiency.
    - Conditions like placenta previa, abruption, infarctions, etc.
- **Unknown Causes**:
    - About 40% of cases have no identifiable cause.

7. **Predictive Factors for FGR**
    - Risk factors (Obstetric, Medical).
    - Low first-trimester PAPP-A value.
    - Abnormal Doppler of uterine artery (notching).
    - Fetal echogenic bowel seen on ultrasound.

8. **Comparison of Symmetrical vs Asymmetrical IUGR:**

Feature	Symmetrical IUGR (20%)	Asymmetrical IUGR (80%)
Growth stage affected	Early in cell hyperplasia	Later in cell hypertrophy
Causes	Structural/chromosomal issues, infections	Maternal diseases affecting placental blood flow
Cell count/size	Fewer total cells, smaller organs	Normal cell count, smaller size
Head vs Abdomen Size	Proportional (head and abdomen both smaller)	Head larger than abdomen (due to sparing of brain growth)
Neonatal Outcome	Poor prognosis, complications	Generally good, normal outcome

9. **Pathophysiology of Fetal Growth Restriction (FGR)**

- **Reduced Nutrient Availability**: FGR occurs when the fetus doesn't get enough nutrients due to maternal or placental factors, or the fetus may fail to use available nutrients efficiently.
- **Brain & Organ Development**:
    - In **asymmetric FGR**, brain cells remain larger while other organs are smaller.
    - In **symmetric FGR**, both cell numbers and size are reduced in all organs.
- **Liver & Kidney Effects**: Reduced glycogen stores in the liver and decreased amniotic fluid (due to reduced renal and pulmonary contributions) are common.
- **Risk of Hypoxia & Acidosis**: FGR fetuses are at high risk for low oxygen levels and acidosis, which can lead to fetal death in severe cases.

10. **Diagnosis of FGR**
    - **Clinical Diagnosis**:
        1. **Palpation**: Checking fundal height, fetal mass, and amniotic fluid volume can give clues, but it's not very sensitive.
        2. **Symphysis Fundal Height (SFH)**: A lag of 3 cm or more indicates possible growth restriction, with 30–80% sensitivity.
        3. **Maternal Weight**: Little or no weight gain in the second half of pregnancy.
        4. **Abdominal Girth**: Stationary or falling measurements could indicate FGR.
    - **Biophysical Diagnosis**:
        1. **Ultrasound**: Key for diagnosing FGR and differentiating between symmetric or asymmetric types.
            - **HC/AC ratio**: In **asymmetric FGR**, the head circumference (HC) stays large while the abdominal circumference (AC) is smaller, resulting in a ratio greater than 1.0 before 32 weeks and lower than 1.0 after 34 weeks.
            - **AC measurement**: The most sensitive parameter for detecting FGR. Serial measurements improve accuracy.
            - **Femur Length (FL)**: In asymmetric FGR, FL is unaffected. A **FL/AC ratio** greater than 23.5 suggests FGR.
            - **Amniotic Fluid**: Reduced fluid volume (oligohydramnios) is common in asymmetric FGR. An amniotic fluid index (AFI) less than 5 cm indicates oligohydramnios.
        2. **Doppler Studies**:
            - **Umbilical Artery (UA)**: Decreased end-diastolic velocity (EDV) suggests placental vascular resistance and insufficient oxygen/nutrient exchange.

- **Uterine Artery (UA)**: A diastolic notch suggests incomplete placental invasion, a sign of preeclampsia risk.
- **Middle Cerebral Artery (MCA)**: Increased diastolic velocity, a brain-sparing effect, occurs in response to fetal hypoxia.
- **Ductus Venosus**: Abnormal Doppler patterns (e.g., absent or reversed EDV) are predictors of acidemia and stillbirth.

11. **Physical Features of FGR at Birth**
    - **Weight Deficit**: Babies may weigh 600g less than expected for their gestational age.
    - **Length**: Typically unaffected.
    - **Head Circumference**: Larger than the body in asymmetric FGR.
    - **Skin**: Dry, wrinkled, and less subcutaneous fat. The baby may have a "old-man" appearance.
    - **Other Features**: Thin umbilical cord, cartilaginous ear ridges, well-defined plantar creases, and alert, active behavior with normal reflexes.

12. **Complications of FGR**
    - **Fetal Complications**:
        - **Antenatal**: Chronic fetal distress, fetal death.
        - **Intranatal**: Hypoxia, acidosis.
        - **Post-birth**:
            - **Immediate**: Asphyxia, RDS, hypoglycemia, meconium aspiration, DIC, pulmonary hemorrhage, polycythemia, thrombocytopenia, NEC, IVH, electrolyte imbalances, multiorgan failure.
            - **Late**: Retarded growth, neurological and cognitive impairments, metabolic syndrome (obesity, hypertension, diabetes, CHD), reduced kidney function.
        - **Maternal Complications**:
            - **Underlying Diseases**: Preeclampsia, heart disease, and malnutrition can threaten maternal health. Risk of having another FGR baby is increased.

13. **Management of Fetal Growth Restriction (FGR)**

General Approach:

1. **Constitutionally Small Fetuses (70%)**: Typically healthy, no intervention needed.

2. **Symmetrically Growth Restricted Fetuses (15%)**: Investigate for anomalies, infections, or genetic issues. Focus on monitoring, as no effective therapy is available.
3. **Placental Insufficiency (10–15%)**: Monitor fetal well-being, some interventions may help improve placental blood flow.

General Management Strategies

1. **Bedrest**: Rest in left lateral position to improve placental blood flow.
2. **Nutrition**: Provide an additional 300 calories per day to address malnutrition.
3. **Treat Underlying Conditions**: Manage hypertension, preeclampsia, or diabetes.
4. **Avoid Harmful Substances**: Stop smoking, alcohol, and tobacco use.
5. **Oxygen Therapy**: Consider maternal oxygen supplementation for short-term benefits.
6. **Low-dose Aspirin**: Useful in some cases (e.g., history of thrombotic disease).
7. **Maternal Hyperalimentation**: Nutritional supplementation (e.g., amino acids) can help in malnutrition cases but not placental insufficiency.
8. **Volume Expansion**: Increases placental blood flow and may support fetal growth.

Antepartum Evaluation

1. **Ultrasound**: Repeat every 3–4 weeks to monitor fetal growth and amniotic fluid.
2. **Fetal Well-being**: Use kick counts, non-stress tests, biophysical profile, and amniotic fluid assessment.
3. **Doppler Ultrasound**: Check blood flow in the umbilical artery, uterine artery, middle cerebral artery, and ductus venosus.

Timing of Delivery

- **Factors**: Fetal abnormalities, gestational age, degree of FGR, maternal conditions, fetal surveillance results, NICU availability.
- **Delivery Decisions**:
    - **≥37 weeks**: Deliver.
    - **<37 weeks**:
        - **Uncomplicated Mild IUGR**: Continue pregnancy until at least 37 weeks.

- **Severe IUGR**: Deliver based on fetal surveillance. Administer corticosteroids if <34 weeks.
- **Additional Risk Factors**: Delivery at 34 weeks or earlier.
- **Preterm Delivery**: Administer antenatal corticosteroids and magnesium sulfate if <32 weeks.

Methods of Delivery

1. **Vaginal Delivery**:
    - If cervix is favorable, use oxytocin; if not, use prostaglandin E2 (PGE2) gel.
    - Continuous monitoring during labor due to high risk of fetal asphyxia.
2. **Cesarean Delivery**: May be needed in cases of fetal distress or unfavorable cervix.

Care During Delivery

- Ensure delivery in a facility with NICU and fetal monitoring capabilities.
- Be prepared for preterm delivery.

Immediate Care After Birth

1. **Pediatric Support**: A pediatrician should be present at delivery.
2. **NICU Care**: Admit the baby to NICU for monitoring and management of complications.
3. **Intensive Care Protocols**: Follow preterm infant protocols to prevent and treat complications like hypoglycaemia, respiratory distress, and infections.

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Chapter 11: Disease of the Fetus and the Newborn

Perinatal Asphyxia

1. **Definition:** Refers to a condition where a newborn has difficulty establishing normal breathing at birth, leading to a lack of proper oxygen exchange in the body.
2. **Causes:** Problems during pregnancy or childbirth and can lead to serious complications if not treated.
3. **Characteristics:**
    - Severe acidemia: A very low pH (below 7.0) in the blood from the umbilical cord.
    - Low Apgar score: A score of 0-3 for more than 5 minutes after birth.
    - Neurological problems: Symptoms like weak muscle tone, unconsciousness, or seizures in the first hours after birth.
    - Organ dysfunction: Problems with multiple organs in the body.
4. **Fetal Respiration and Lung Development**

    - **Fetal Breathing:** Fetal breathing starts around 11 weeks of pregnancy with small, rapid movements. These movements are more frequent during REM sleep. Breathing increases with more oxygen and decreases in low oxygen conditions.
    - **Lung Development**
        1. **4 weeks**: Lung bud forms.
        2. **8-16 weeks**: Airway and blood vessel development.
        3. **17-27 weeks**: Airway growth and development of blood vessels.
        4. **24-38 weeks**: Lung sacs form.
        5. **36 weeks and beyond**: Alveoli (air sacs) develop.

- Type II lung cells make **surfactant**, which helps the lungs expand after birth. Surfactant production increases with hormones like corticosteroids, especially in premature babies.
- **Starting Breathing at Birth**: The first breath is needed to clear the lung fluid and allow the lungs to expand. Chest compression during delivery helps remove some fluid. The first breath creates negative pressure, allowing normal breathing.

5. Causes of Perinatal Asphyxia:

1. **Intrauterine Hypoxia (Placental Insufficiency)**:
    - **Placental Problems**: Issues like premature separation, cord compression, or poor blood flow can reduce oxygen to the fetus.
    - **Maternal Health Issues**: Conditions like anemia, eclampsia, or hypotension can also limit oxygen supply to the fetus.
2. **Medication Effects**:
    - Certain drugs given to the mother during pregnancy or labor, such as morphine, pethidine, or anesthetics, can depress the baby's breathing centers, increasing the risk of asphyxia.
3. **Birth Trauma**:
    - Abnormal fetal positions (e.g., breech) or a long labor can lead to difficult deliveries, increasing the chance of asphyxia. Also, trauma during delivery can cause brain swelling and asphyxia.
4. **Postnatal Factors**:
    - After birth, issues like lung or heart problems, or brain injuries, can cause asphyxia in the newborn.

6. CLINICAL FEATURES

- **Cause, severity, and duration of oxygen lack** affect the clinical features of perinatal asphyxia.
- **Foetuses and newborns** are more resistant to asphyxia than adults.
- In response to oxygen deprivation, the **fetus redirects blood flow** to the **heart, brain, and adrenal glands** to protect these vital organs.

7. Apgar Score

- The **Apgar score**, developed by Dr. Virginia Apgar in 1953, helps assess a newborn's health right after birth. The **5-minute score** is the most important for predicting long-term neurological outcomes.
- If the **5-minute Apgar score** is low, the baby should be reassessed at **15 minutes**.

Apgar scoring is done at:

        - **1 minute**
        - **5 minutes**
        - **15 minutes**
    - **Apgar Scoring** is used to assess a newborn's condition at 1, 5, and 15 minutes after birth. It helps determine the severity of asphyxia and predict long-term neurological outcomes. The score is based on:
        - **Respiratory effort**
        - **Heart rate**
        - **Muscle tone**
        - **Reflex irritability**
        - **Skin colour**
    - **Apgar Scores:**
        - **0–2**: Severe depression
        - **3–4**: Moderate depression
        - **5–7**: Mild depression
        - **8–10**: Normal

    - An Apgar score of ≥4 at 10 minutes typically suggests a low risk of cerebral palsy (CP). However, 75% of CP cases have a normal Apgar score at birth, so it is not the only indicator of neurological damage.

8. **Normal Arterial Blood Gas Values for a Term Newborn:**
    - **PaO2:** 50–95 mm Hg
    - **PaCO2:** 35–45 mm Hg
    - **HCO3:** 24–26 mEq/L
    - **pH:** 7.35–7.45
9. **Clinical Sequelae of Birth Asphyxia:**
    - Signs of brain injury (HIE) include: hypoxia, seizures, apnea, respiratory failure, hypotension, NEC, thrombocytopenia, metabolic acidosis, and hypoglycemia.
    - Progression: hyperapnea → primary apnea → gasping → secondary apnea → bradycardia → shock → decreased cerebral blood flow → brain hemorrhage → HIE → death or disability if severe.
10. **Neonatal Diagnosis:**
    - **EEG:** Detects asphyxial injury severity and predicts long-term outcomes.
    - **CT:** Identifies cortical brain injury weeks after asphyxia.
    - **Ultrasound:** Preferred for detecting IVH and brain damage (basal ganglia, thalamus).
    - **MRI:** Shows areas of brain injury and cerebral edema, correlates with outcomes.

- **MRS:** Detects biochemical brain changes.
- **DWI & DTI:** Measure water diffusion in the brain, helping assess injury severity.

11. **Management of Perinatal Asphyxia**

Prophylactic Management:

1. Identify high-risk patients antenatally.
2. Monitor the fetus closely to detect distress early and ensure timely delivery.
3. Use electronic fetal monitoring and scalp blood pH assessment during labor.
4. Be cautious with anesthetic agents and sedatives during labor.
5. Ensure cooperation between obstetric and pediatric teams.
6. Avoid difficult or traumatic delivery.

Definitive Management (Resuscitation Based on Apgar Scores):

1. **Apgar Score 8-10 (Normal):**
    - Clear airways by suctioning.
    - Dry the baby and place under radiant heat.
    - Administer oxygen if necessary.
    - Reassess at 5 minutes. If normal, return to mother.
2. **Apgar Score 5-7 (Mild distress):**
    - Place under radiant heat and dry the baby.
    - Use a pulse oximeter and ensure proper head positioning.
    - Suction the airways and provide gentle stimulation.
    - Administer oxygen at 5 L/min using a bag and mask.
    - Consider CPAP if needed.
    - Continue support until the baby is breathing spontaneously and HR > 100 bpm. Reassess at 5 minutes.
3. **Apgar Score 3-4 (Moderate distress):**
    - Call for assistance if needed.
    - Start bag-mask ventilation with 100% oxygen at 5–8 L/min.
    - Apply positive pressure (25-30 cm H2O) for chest rise.
    - If ineffective, proceed with intubation and positive pressure ventilation (40-60 breaths/min).
    - Reassess every 15-30 seconds until the baby is breathing and HR > 100 bpm.
4. **Apgar Score 0-2 (Severe distress):**
    - If HR < 100 bpm, continue positive pressure ventilation.
    - Increase oxygen concentration to 100% if using an air-oxygen blend.

- If no improvement, perform intubation and start chest compressions if HR < 60 bpm.
- Administer epinephrine if needed for HR < 60 bpm.
- Perform meconium aspiration suctioning if necessary, with a suction pressure of 80-100 mm Hg.

Drugs for Resuscitation:

- **Epinephrine**: The drug of choice for a persistent heart rate (HR) < 60 bpm, even after ventilation and chest compression. It is crucial for improving circulation and heart function.
- **Other Drugs**: Additional medications may be required depending on the situation, as specified in the full resuscitation guidelines (e.g., for electrolyte imbalances or if the baby develops shock).

Meconium Aspiration Syndrome (MAS):

- **Procedure:**
  - **Endotracheal Intubation:** Performed to clear the airways if meconium is present in the newborn's lungs.
  - **Suctioning:** Use negative pressure of 80-100 mm Hg to remove meconium. This can be repeated if necessary to clear the airways completely.

12. **Resuscitation of the Newborn in the Delivery Room**

Equipment Needed for Neonatal Resuscitation

1. **Ventilatory Resuscitation:**
   - **Dry the Infant**: Place under a radiant heater to warm the baby.
   - **Position the Infant**: Keep the head in a midline position with slight neck extension.
   - **Suction**: Clear the mouth and oropharynx using a suction bulb.
   - **Assess the Infant**: Check the infant's respiratory effort (apnea or regular breathing) and heart rate.
   - **If the Infant is Breathing Regularly with HR > 100 bpm**: No further intervention is needed, but if the baby is cyanotic, provide oxygen (O2) supplementation.
   - **If HR < 100 bpm or Apnea/Irregular Respiration**: Begin bag and mask ventilation with 100% oxygen. Use a soft mask to seal around the mouth and nose.
   - **If No Improvement after 30-40 Seconds of Ventilation**: Proceed with intubation.

2. **Chest Compression**:
    - **Technique**: Compress the sternum about one-third of the chest diameter at a rate of 90 compressions per minute while ventilating the baby at 30 breaths per minute (3:1 ratio).
    - **Thumb Position**: Place the thumbs together over the lower third of the sternum and encircle the torso with the palms supporting the back.
    - **When to Discontinue**: Stop chest compressions when the heart rate is > 60 bpm.
3. **Medications:**
    - **Epinephrine**: Administer 0.1–0.3 mL/kg of a 1:10,000 dilution via IV or endotracheal route for persistent bradycardia. It can be repeated every 5 minutes.
    - **Sodium Bicarbonate**: For metabolic acidosis (pH < 7.2), give 1–2 mEq/kg IV (0.5 mEq/mL, 4.2% solution).
    - **Naloxone**: If the mother received pethidine or morphine within 3 hours of delivery, administer 0.1–0.2 mg/kg of naloxone via IV, IM, or endotracheal route to reverse the narcotic effect.
    - **Volume Expansion**: In cases of low blood pressure and poor tissue perfusion, administer normal saline, 5% albumin, or whole blood (10 mL/kg) IV.
    - **Dopamine Infusion**: Can be given for hypotension to support blood pressure.

13. **Prognosis of Perinatal Asphyxia:**
    - **Baby's Maturity**: Premature babies are at higher risk.
    - **Severity of Hypoxia/Acidosis**: A higher Apgar score and normal blood pH are better signs.
    - **Immediate Care**: Quick, competent medical treatment improves chances.

14. **Risk Factors for Neurological Sequelae:**
    - **Low Apgar Score:** A score of 0–3 at 20 minutes indicates severe asphyxia**.**
    - **Multiorgan Failure:** Issues like no urine output for 24 hours suggest worse outcomes.
    - **Severe Brain Damage:** Severe HIE or neonatal seizures increase the risk of long-term problems.

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15. **Complications of Perinatal Asphyxia**

Immediate Issues:

- **Heart**: Low blood pressure or heart failure.
- **Kidneys**: Kidney failure.
- **Liver**: Poor liver function.
- **Gut**: Necrotizing enterocolitis (severe bowel damage).
- **Lungs**: Persistent high blood pressure in the lungs.
- **Brain**: Swelling and seizures.

Long-Term Issues:

- **Growth Problems**: Slow mental and physical development.
- **Epilepsy**: 30% of babies with severe asphyxia may have seizures later.
- **Cognitive Issues**: Mild brain dysfunction affecting development.

RESPIRATORY DISTRESS IN THE NEWBORN

1. Respiratory distress in newborns can be caused by issues that affect breathing and oxygen exchange. These include:
   - Too much fluid in the lungs
   - Inability to clear lung fluid properly
   - Lack of surfactant (a substance that helps the lungs expand)
   - Reduced surface area for gas exchange
2. **Pulmonary Causes (Lung-related):**
   - Hyaline membrane disease (HMD) or respiratory distress syndrome (RDS)
   - Meconium aspiration (inhalation of meconium)
   - Clear fluid aspiration (inhalation of amniotic fluid)
   - Pulmonary hypoplasia (underdeveloped lungs)
   - Bronchopulmonary dysplasia (chronic lung disease)
   - Bronchopneumonia (lung infection)
   - Airway obstruction
   - Transient tachypnea of the newborn (temporary rapid breathing)
   - Pneumothorax (collapsed lung)
   - Pulmonary edema (fluid buildup in the lungs)
3. **Cardiovascular Causes (Heart-related):**
   - Congenital heart disease:
     - Aortic stenosis (narrowing of the aorta)
     - Coarctation of the aorta (constricted aorta)
     - Cyanotic heart defects like:

        - Transposition of the great vessels
        - Tetralogy of Fallot
        - Patent ductus arteriosus (PDA)
        - Ventricular septal defect (VSD)
    - Heart failure
    - Persistent pulmonary hypertension of the newborn **(PPHN)** (high blood pressure in lung vessels)
4. **Non-Cardiopulmonary Causes (Other factors):**
    - Metabolic acidosis (imbalanced body chemistry)
    - Hypo- or hyperthermia (abnormal body temperature)
    - Hypoglycemia (low blood sugar)
    - Asphyxia (lack of oxygen)
    - Drug effects (e.g., Pethidine)
    - Birth trauma
    - Intracranial injury (brain injury)

IDIOPATHIC RESPIRATORY DISTRESS SYNDROME Syn: Hyaline Membrane Disease, Respiratory Distress Syndrome (RDS)

1. **Respiratory Distress Syndrome (RDS)** is a condition in newborns where they struggle to breathe due to low oxygen levels and cyanosis (blue skin). It requires oxygen support to maintain healthy oxygen levels.

2. **Causes of RDS**
    1. **Lack of surfactant**: Surfactant keeps the lungs open for breathing.
    2. **Premature birth**: Babies born early may not have enough surfactant.
    3. **Corticosteroids and fetal stress**: These can help produce more surfactant.
    4. **Diabetes**: This can delay surfactant production.

3. **Symptoms:** Symptoms appear 4–6 hours after birth and include:
        1. Fast breathing (more than 60 breaths per minute)
        2. Nasal flaring
        3. Chest retraction
        4. Grunting sounds
        5. Blue skin (cyanosis)

- **X-rays** show a “ground glass” pattern, indicating lung collapse.

4. **Tests**
   - **Blood tests** can check for infections and low calcium or blood sugar.
   - **Echocardiography** may be done to rule out heart problems.

5. **Treatment**
   - **Corticosteroids** given to the mother before delivery can help the baby’s lungs mature and produce surfactant.
   - Oxygen and other support may be needed if the baby’s breathing becomes severe.

6. **Prevention**
   - Administering corticosteroids before birth, especially if the baby is at risk of premature delivery.
   - Monitoring and managing conditions like maternal diabetes can reduce the risk.

7. **Risk Reduction**
   - Factors that decrease the risk of RDS include vaginal delivery, corticosteroid treatment, and female babies.

8. **Treatment of RDS:**
   1. **Main Goals**:
      - Prevent low oxygen and acidosis (too much acid).
      - Maintain proper fluid and electrolyte levels.
      - Keep lungs open and avoid fluid buildup.
      - Avoid lung damage and infections.
   2. **Initial Care**:
      - **The baby is placed in a warm incubator with high humidity in a NICU.**
      - **The airways are cleaned regularly using suction.**
   3. **Oxygen Therapy**:
      - **Give humidified oxygen at 35-40% under positive pressure.**
      - **If oxygen levels stay low, use CPAP to help with breathing**.
   4. **Correct Imbalances**:
      - Treat low blood volume and anemia.
      - Correct any electrolyte imbalances.
      - Prevent infection.
   5. **Monitoring**:
      - Regularly check oxygen and carbon dioxide levels in the blood.

- Avoid too much oxygen to prevent lung damage and eye disease.

6. **Surfactant Therapy**:
   - Surfactant is given directly into the lungs to help them work better.
   - This treatment improves survival and reduces lung problems.
   - Rare side effect: pulmonary bleeding (lung bleeding).
7. **Mechanical Ventilation**:
   - Used if oxygen levels are too low or the baby is not breathing well.
   - Intermittent ventilation is preferred.
   - Avoid very low carbon dioxide levels.
8. **Fluid and Nutrition**:
   - Feed the baby through the stomach if possible.
   - If feeding is risky, give glucose through an IV.
9. **Antibiotics**:
   - Start antibiotics to prevent or treat infections.

9. Complications:

- **Immediate problems**: Infection, air leaks, or persistent heart issues.
- **Long-term problems**: Lung damage, eye disease, brain issues, or infections.

MECONIUM ASPIRATION SYNDROME (MAS)

1. **Definition**
   - MAS happens when a newborn inhales meconium (the first stool) into their lungs, usually in term or post-term babies who are small for their age.
2. **Causes**:
   - It's caused by lack of oxygen in the womb, leading the baby to pass meconium before or during birth.
3. **Symptoms**:
   - Fast breathing
   - Nasal flaring
   - Chest retractions (chest pulls in when breathing)
   - Blue skin (cyanosis)
   - Symptoms show up in about 5–10% of babies.
4. **Diagnosis**:
   - Meconium is found in the baby's airways.
   - X-ray shows lung issues like collapsed lungs or patchy infiltrations.
5. **Treatment**:

- Monitor and care during birth.
- Amnioinfusion (injecting fluid) can reduce risk of meconium inhalation.
- Keep the baby warm and minimize handling.
- Treat any blood sugar or calcium issues.
- Suction the airways to remove meconium.
- Provide oxygen and treat any infections with antibiotics.
- In severe cases, use surfactant therapy or inhaled nitric oxide.
- Mechanical ventilation may be needed if oxygen is too low.

6. **Complications**:
   - Problems like lung air leaks, high lung pressure, and long-term lung diseases.
   - Risk of neurodevelopmental delays (e.g., cerebral palsy).

JAUNDICE OF THE NEWBORN

1. **Jaundice in Newborns:**
   - Cause: Jaundice is the yellowing of the skin and eyes caused by too much bilirubin in the blood, with levels above 7 mg/dL being abnormal, and >15 mg/dL being severe.

2. **Bilirubin Production and Processing**:
   1. Red blood cells break down into hemoglobin, which forms biliverdin, iron, and carbon monoxide.
   2. Biliverdin is converted into unconjugated bilirubin (UCB).
   3. UCB travels to the liver, where it becomes conjugated bilirubin (CB) through an enzyme called UDPG-T.
   4. CB is water-soluble and excreted in stool.
   5. If CB is broken down in the intestines, it turns back into UCB and can be reabsorbed into the liver.
   6. Certain substances, like sulfonamides and fatty acids, can increase bilirubin levels by displacing it from albumin.
   7. Phenobarbital helps speed up the process of converting UCB into CB.

3. **Toxicity**:
   - Unconjugated bilirubin (UCB) is toxic and can cause brain damage.

- Conjugated bilirubin (CB) is safe and easier to remove from the body.

4. Causes of Neonatal Jaundice

1. Physiological Jaundice

- **When**: Appears on the 2nd-3rd day, resolves by day 7–10.
- **Bilirubin Levels**:
  - Term: 6–8 mg/dL on day 3.
  - Preterm: 12–15 mg/dL in the first week.
- **Causes**:
  - More red blood cells that break down faster.
  - The liver doesn't process bilirubin well at first.
  - Slower digestion, leading to more bilirubin reabsorption.
  - The liver has a hard time removing bilirubin.
- **Treatment**: No treatment needed in most cases. Feed the baby frequently, and in severe cases, use phototherapy or exchange transfusion.

3. **Pathological (Non-Physiological) Jaundice**:

Excessive Red Blood Cell Breakdown:

- **Causes**:
  - Blood group incompatibility (e.g., Rh, ABO).
  - Enzyme deficiencies (e.g., G6PD).
  - Infections (e.g., sepsis, toxoplasma).
  - Birth injuries (e.g., cephalhematoma, brain bleeds).

- **Defective Bilirubin Conjugation**:

  - **Causes**:
    - Genetic conditions (e.g., Crigler-Najjar, Gilbert syndrome).
    - Premature infants with immature liver function.

- **Breast Milk Jaundice**:
  - **Cause**: Breast milk contains a substance that slows bilirubin breakdown.
  - **When**: Starts around day 7, peaks by day 14.

- **Treatment**: Usually no treatment needed, but if bilirubin is high, stop breastfeeding temporarily.

- **Metabolic & Endocrine Disorders**:
  - **Causes**:
    - **Galactosemia** (enzyme deficiency, liver issues, jaundice).
    - **Hypothyroidism** (increases bilirubin levels).
- **Increased Bilirubin Reabsorption**:
  - **Causes**: Blockages in the intestines (e.g., duodenal atresia) or less feeding.
- **Substances Affecting Bilirubin Binding**:
  - **Causes**: Drugs like aspirin, sulphonamides, or conditions like acidosis or infections.

- **Miscellaneous Causes**:
  - **Conditions**: Blocked bile ducts, polycythaemia (too many red blood cells), thalassemia, or asphyxia.

HYPERBILIRUBINEMIA OF THE NEWBORN

1. **Definition**:
   - Hyperbilirubinemia occurs when the bilirubin (unconjugated) level exceeds 12 mg/dL in a term infant, leading to yellowing of the face and chest.
2. **Causes of Unconjugated Hyperbilirubinemia**:
   - Haemolytic Disease: Rh incompatibility (common), ABO incompatibility (rare)
   - Other Causes: Spherocytosis, prematurity, G6PD deficiency, sepsis, drugs, breast milk jaundice, cephalhematoma, hemoglobinopathies, diabetes, hypothyroidism, etc.
3. **Causes of Conjugated Hyperbilirubinemia**:
   - Liver-related: Neonatal hepatitis, bacterial infection, TORCH infections
   - Genetic or Developmental Disorders: Trisomy 21, 18, galactosemia, cystic fibrosis, biliary atresia, etc.
4. **Diagnosis**:

- Clinical:
    - Jaundice: Indicated by yellowing of skin (above 5 mg/dL bilirubin).
    - Cephalocaudal Progression: Jaundice starts from the face and moves down the body.
    - Neurologic Signs: Lethargy, poor feeding, vomiting, hypotonia, seizures.
- Laboratory Tests:
    - Blood Groups: ABO, Rh, and antibody screen of the mother.
    - Direct Coombs' Test: Detects alloimmunization.
    - Bilirubin Levels: Total, conjugated, and unconjugated.
    - Complete Blood Count (CBC): To check for anemia (low Hb), hemolysis (high reticulocytes), or infection (WBC, CRP).
    - Serum Albumin: Assesses the need for albumin infusion.
    - Other Tests: Urine for reducing substances (e.g., galactosemia), infection cultures, G6PD screening, liver function tests.
- **Radiology/Ultrasonography**: To check for issues like obstruction, hemorrhage, or tumors.

5. The **Dermal Icterus Zones** and their corresponding **Serum Bilirubin Levels** in a term infant (Kramer-1969) are as follows:
    - **Zone 1**: Bilirubin level 5 mg/dL
        - Slight yellowing of the face and upper chest.
    - **Zone 2**: Bilirubin level 10 mg/dL
        - Yellowing extends to the chest and abdomen.
    - **Zone 3**: Bilirubin level 12 mg/dL
        - Yellowing reaches the thighs and lower parts of the body.
    - **Zone 4**: Bilirubin level 15 mg/dL
        - The yellowing spreads to the arms, legs, and possibly the palms/soles.
    - **Zone 5**: Bilirubin level > 15 mg/dL
        - Severe jaundice with extensive yellowing over the entire body, including the palms and soles.

6. **Complications**:
    - Kernicterus: A severe brain damage caused by high bilirubin levels, which can be fatal if not treated promptly.

KERNICTERUS

Kernicterus - Simplified Overview

1. **Definition**: Kernicterus is a serious brain condition caused by the accumulation of unconjugated bilirubin in the brain, leading to neuronal damage.
2. **Commonly affected areas** include the basal ganglia, cranial nerve nuclei, hippocampus, brainstem nuclei, and spinal cords anterior horn cells.
3. **Critical Bilirubin Level**:
    - For a term infant, kernicterus typically occurs when bilirubin levels exceed 20 mg/dL (340 µmol/L).
    - If bilirubin is below 20 mg/dL, the risk of bilirubin encephalopathy is low.
4. **Risk Factors**:
    - Pre-existing conditions like hypoxia, acidosis, hypoglycemia, sepsis, and prematurity can make the brain more vulnerable to bilirubin toxicity, even at lower bilirubin levels.
    - Conjugated bilirubin does not cause kernicterus.
5. **Clinical Features**:
    - Early Signs: Lethargy, hypotonia, poor feeding, and loss of neonatal reflexes.
    - Progressive Symptoms: Hypertonia, severe illness, respiratory distress, opisthotonos (arching of the body), hyperpyrexia (high fever), convulsions, and enlarged liver and spleen.
    - Chronic Effects: Survivors may experience mental retardation and choreoathetoid cerebral palsy (a movement disorder).
6. **Prevention and Management**:
    - Regular monitoring of serum bilirubin levels in susceptible infants.
    - Phototherapy and exchange transfusion are used to reduce bilirubin levels.
    - The use of barbiturates and phototherapy can improve outcomes.
7. **Management of Jaundice in the Newborn - Simplified Overview**

1. **Phototherapy**:
    - Used for **moderate jaundice** (bilirubin >12 mg/dL).
    - **Not** a reliable guide by skin color; bilirubin levels must be checked.
    - **Discontinued** when bilirubin is <13 mg/dL in term infants and <11 mg/dL in preterm infants.
    - **Blue lamps** (420–480 nm wavelength) are most effective.

- **Double phototherapy** (overhead + below light or fiberoptic blanket) is twice as effective as single.
- **Mechanism**: Converts bilirubin to a less toxic form that can be excreted.
- **Hydration**: Maintain hydration, with frequent breast milk or IV/nasogastric feeding.
- **Complications**: Watery diarrhea, skin rashes, dehydration, bronze baby syndrome, low calcium, retinal damage.
- **Contraindications**: Not used in direct hyperbilirubinemia due to liver disease or obstructive jaundice.

2. **Phenobarbital Therapy**:
   - Stimulates liver enzymes to increase bilirubin conjugation and excretion.
   - **Dosage**: 10 mg/kg on day 1, followed by 5–8 mg/kg/day for the next 4 days.
   - **Prophylactic Use**: Can be given to the mother (90 mg/day for 2 weeks before delivery) to prevent jaundice in the baby.
   - Also used for **Crigler-Najjar syndrome type II**.
3. **Metalloporphyrins (Sn MP, Zn MP)**:
   - Inhibit **heme oxygenase**, reducing bilirubin production.
   - **Tin and zinc metalloporphyrins** are used for this purpose.
4. **Exchange Transfusion**:
   - Used in **severe cases** to prevent kernicterus.
   - **Double-volume exchange** replaces 85% of the red blood cells and lowers bilirubin by 50%.
5. **Oral Agar**:
   - Increases the effectiveness and shortens the duration of phototherapy by **decreasing enterohepatic circulation**.
6. **Indications for Exchange Transfusion in Newborns**
   1. Bilirubin Increase: Bilirubin rises >1 mg/dL/hour despite phototherapy.
   2. Bilirubin Rise with Normal Hemoglobin: Bilirubin increases >0.5 mg/dL/hour when hemoglobin is 11-13 g/dL.
   3. Anemia and Heart Failure: Used to treat worsening anemia and congestive heart failure.
   4. High Bilirubin Levels: Bilirubin >12 mg/dL in the first 24 hours or >20 mg/dL later.
   5. Low Hemoglobin and High Bilirubin: Cord hemoglobin < 11 g/dL and bilirubin > 5 mg/dL.
   6. Worsening Anemia: When anemia continues to get worse.
   7. Failure of Phototherapy: When phototherapy cannot lower bilirubin to safe levels.

7. **Procedure**:
    - Blood is typed and crossmatched in nonimmune hyperbilirubinemia.
    - Typically, double-volume exchange is done (160 mL/kg if the newborn's blood volume is 80 mL/kg).
8. **Complications**:
    - Air embolism, thrombosis, hypervolemia, respiratory distress syndrome (RDS)
    - Hypothermia, acidosis, infection, hyperkalemia
    - Hypocalcemia, hypoglycemia, cardiac arrhythmias
    - Thrombocytopenia, coagulopathies, necrotizing enterocolitis.

HEMOLYTIC DISEASE OF THE NEWBORN

1. **Cause**: Hemolysis of fetal red blood cells (RBCs) due to maternal antibodies.
2. **Symptoms**: Decreased hematocrit, increased reticulocyte count, and high bilirubin levels.
3. **Common Causes**:
    - **A. Immune Hemolysis**:
        - Rh incompatibility, ABO incompatibility, Other blood group incompatibilities (e.g., C, E, Kell, Duffy)
        - Maternal diseases (e.g., lupus), drugs
    - **B. Inherited RBC Disorders**:
        - RBC membrane defects (e.g., spherocytosis, elliptocytosis)
        - G6PD deficiency
        - Hemoglobinopathies (e.g., thalassemia)
        - Metabolic disorders (e.g., galactosemia)
    - **C. Acquired Hemolysis**:
        - Infections (bacterial, viral, parasitic like rubella, syphilis)
        - DIC (Disseminated Intravascular Coagulation)
        - Acute transfusion hemolysis
        - Vitamin E deficiency
        - Drugs (e.g., Vitamin K, nitrofurantoin)
4. **Management**:
    - Treat the underlying disorder.
    - Transfusion (simple or exchange transfusion).
    - Provide nutritional support (iron, folate, Vitamin E).

ABO GROUP INCOMPATIBILITY

1. **Principle**:
    - Mother's Blood Group: O (naturally has anti-A and anti-B antibodies, mostly IgM).
    - Fetal Blood Group: If the baby has blood group A or B (from the father), maternal antibodies (mainly IgG) can cross the placenta and cause hemolysis.
2. **Incidence**:
    - **ABO incompatibility occurs in 15% of babies, but only <1% experience hemolysis.**
    - **Direct Coombs' test is positive in 3-4% of cases.**
3. **Key Points**:
    - Unlike Rh incompatibility, the first baby can be affected (50% chance).
    - No progressive severe issues in successive pregnancies, as no "boosting" of antibodies occurs during pregnancy.
    - Jaundice appears within 24 hours but is usually mild.
4. **Diagnosis**:
    - Baby’s blood group is A or B, while the mother is group O.
    - Direct Coombs’ test is usually negative.
    - Microspherocytes on blood smear and increased reticulocyte count are characteristic.
    - Increased osmotic fragility of RBCs.
5. **Management**:
    - No treatment needed in most cases.
    - Maintain adequate hydration and prevent sepsis.
    - Phototherapy may be required in 10% of cases.
    - Exchange transfusion is extremely rare.
6. **Prognosis**:
    - Excellent overall prognosis.

BLEEDING DISORDERS IN THE NEWBORN

1. **Overview**: Bleeding disorders in neonates involve spontaneous internal or external bleeding, often due to decreased clotting factor activity and platelet function. Causes can vary.
2. **Causes:**
    1. **Abnormalities of Clotting Factors**:

    - Vitamin K deficiency (affects clotting factors II, VII, IX, X). Most common between day 2 and day 5, especially in preterm or breastfed babies.
    - Drug-related issues: Medications like phenytoin, warfarin, and salicylates taken by the mother during pregnancy can affect vitamin K function.
2. **Disseminated Intravascular Coagulation (DIC)**:
    - Caused by infection, anoxia, shock, or necrotizing enterocolitis (NEC).
3. **Platelet Problems**: Qualitative issues (thrombasthenia) or quantitative issues (thrombocytopenia, low platelet count).
4. **Inherited Coagulation Abnormalities**:
    - Hemophilia A (Factor VIII deficiency)
    - Hemophilia B (Christmas disease - Factor IX deficiency)
    - Von Willebrand Disease (VWD) (decreased von Willebrand factor).
5. **Trauma**: Obstetric trauma (e.g., cephalhematoma, visceral injury, umbilical cord rupture).
6. **Other Causes**: Liver dysfunction, Vitamin K deficiency, especially in breastfed babies.

3. Diagnosis

1. **History & Clinical Examination**:
    - Look for signs of spontaneous bleeding or bruising.
2. **Laboratory Tests**:
    - **Complete Blood Count (CBC)**: Check for low platelets (below 20,000–30,000/mm^3).
    - **Prothrombin Time (PT)** and **Partial Thromboplastin Time (PTT)** to assess clotting.
    - **Fibrinogen** and **D-Dimer** tests (raised in DIC).
    - Specific assays for conditions like **Von Willebrand disease**.

4. Treatment:

- **Vitamin K1** (Aquamephyton): 1 mg IV or IM. May be repeated weekly for vitamin K deficiency.
- **Fresh Frozen Plasma (FFP)**: 10 mL/kg IV to replace clotting factors immediately.
- **Platelet Concentrate**: Given to raise platelet count from 50,000/mm^3 to 100,000/mm^3.
- **Fresh Whole Blood**: **10 mL/kg**, may be repeated.
- **Clotting Factor Concentrates**: Given for specific deficiencies (e.g., **Factor VIII, IX**, or **VWD**).

- **Treat Underlying Problems**: Manage conditions like **sepsis** or **DIC**.

5. **Management of Cord Bleeding:**
   - **Slipping Ligature**: Religate the cord if the ligature slips.
   - **Bleeding after Cord Separation**:
     - Apply pressure or ligature to stop bleeding.
     - Transfuse blood, if necessary, even for small blood loss, as it can be life-threatening.

ANEMIA IN THE NEWBORN

1. **Normal Hemoglobin Levels:**
   - For infants born after 34 weeks gestation, normal central venous hemoglobin levels are 14–20 g/dL, with an average of 17 g/dL.
   - Anemia is defined as a central venous hemoglobin level of <13 g/dL.
2. **Causes of Anemia:**
   - **Physiologic Anemia of Infancy**:
     - Shorter lifespan of red blood cells (RBCs) and decreased erythropoietin production.
   - **Haemorrhagic Anemia** (due to blood loss):
     - **Obstetric causes**: Abruptio placenta, placenta previa, traumatic rupture of the umbilical cord, difficult delivery, twin-twin transfusion, caesarean section complications, ruptured vasa previa, fetomaternal bleed, Anemia of prematurity, and hereditary RBC disorders.
     - **Neonatal causes**: Caput succedaneum, cephalhematoma, intracranial haemorrhage, visceral hemorrhage (e.g., spleen, kidneys), DIC, thrombocytopenia, and hemorrhage from vitamin K deficiency.
   - **Hemolytic Anemia**: Destruction of RBCs (e.g., Rh incompatibility, infections, inherited RBC disorders).
   - **Hypoplastic Anemia** (underproduction of RBCs): Congenital hypoplastic anemia, leukemia, and infections like rubella or syphilis.
3. **Diagnosis:**
   - **History**: Family history of bleeding, maternal medications (e.g., phenytoin, warfarin).
   - **Clinical Examination**: Look for jaundice, splenomegaly, or skin bruises.

- **Laboratory Tests**: Complete blood count (CBC), RBC indices, blood smear, reticulocyte count, Kleihauer-Betke test, coagulation profile, TORCH study, and ultrasound of abdomen and head.

4. **Treatment:**
   - **General Management**:
     - Treatment of the underlying disorder, along with blood transfusions, exchange transfusion, and nutritional support.
   - **Specific Treatments**:
     - **Blood transfusion**: For hemorrhagic anemia (hematocrit < 35%).
     - **Exchange transfusion**: For hemolytic or hemorrhagic anemia with raised central venous pressure (CVP) or Rh incompatibility.
     - **Oral Iron**: 2–4 mg of elemental iron/kg, folic acid (50 mcg/day), and vitamin E (25 IU/day) for longer periods.
     - **Recombinant human erythropoietin (rh-EPO)**: For anemia of prematurity.
     - Treatment of specific conditions, such as coagulopathy or immune thrombocytopenia.

SEIZURES IN NEWBOR

1. **Overview:** A seizure in a newborn is an abnormal neurological event causing changes in behavior, motor function, or autonomic function.
2. **Causes of Seizures in Newborns:**
   - **Perinatal Asphyxia**: Hypoxic-ischemic encephalopathy (HIE), intracranial hemorrhage (e.g., subarachnoid, intraventricular).
   - **Metabolic Disturbances**: Hypoglycemia, hypocalcemia, hypercalcemia, hyponatremia, hypomagnesemia.
   - **Neuroinfections**: Group B Streptococcus, E. coli, TORCH infections (e.g., rubella, toxoplasmosis), tetanus.
   - **Genetic and Developmental Causes**: Pyridoxine dependency, inborn errors of metabolism, cerebral malformations, neonatal epileptic syndromes, chromosomal syndromes.
   - **Traumatic and Iatrogenic Causes**: Traumatic delivery (e.g., forceps use), narcotic withdrawal, drug toxicity (e.g., theophylline).
   - **Others**: High fever, CNS infections, or unknown causes.
3. **Risk Factors:** Prematurity, low birth weight (<2.5 kg), maternal age ≥40 years, and traumatic delivery.

4. **Diagnosis:**
    1. **History**: Information about delivery, birth weight, gestational age, maternal drug use, family history, and possible inborn errors of metabolism.
    2. **Clinical Examination**: Observation of signs like jaundice, abnormal movements, or lethargy.
    3. **Laboratory Tests**: Complete blood count, blood, urine, and CSF cultures, serum biochemical tests (glucose, ammonia, calcium, magnesium, electrolytes), blood gas levels (for acidosis or hypoxia).
    4. **Imaging Studies**:
        - Ultrasound/CT scan: Detects brain hemorrhage or malformations.
        - MRI: For congenital abnormalities (e.g., lissencephaly, HIE).
        - EEG: Helps diagnose and predict the outcome of seizures.
5. **Treatment:**
    - **Control Seizures**:
        - Phenobarbital (20 mg/kg IV) is the first-line treatment. A maintenance dose of 3-4 mg/kg/day is given orally or IV for at least 2 weeks.
        - In resistant cases, phenytoin (15–20 mg/kg IV) or fosphenytoin may be used.
    - **Treat the Underlying Cause**:
        - Hypoglycemia: IV glucose (2 mL/kg of 10% glucose), with ongoing infusion at 6–8 mg/kg/min.
        - Hypomagnesemia: IV magnesium sulfate (0.4–0.8 mg/kg).
        - Infection: Appropriate antibiotics after a full septic work-up.
        - Hypocalcemia: IV calcium gluconate (2 mL/kg of 10% solution).
        - Pyridoxine deficiency: IV pyridoxine (100 mg).
        - For intracranial tension: IV mannitol (0.5–1 mL/kg of 20% solution).

BIRTH INJURIES OF THE NEWBORN

1. **Definition:**
    - Birth injuries refer to physical impairments or damage to the newborn's body that occur due to adverse factors during labor and delivery.
    - Injuries may range in severity, from mild trauma to life-threatening conditions, and can contribute to neonatal death, stillbirths, or long-term morbidities.

2. High-Risk Factors for Birth Injuries

Several factors during pregnancy, labor, and delivery increase the likelihood of birth injuries:

1. Prolonged or obstructed labor
2. Fetal macrosomia (large baby)
3. Cephalopelvic disproportion (mismatch between the baby's head size and the mother's pelvic size)
4. Very low birth weight infants
5. Abnormal presentation (e.g., breech)
6. Instrumental delivery (use of forceps or vacuum extraction)
7. Difficult labor
8. Shoulder dystocia (shoulder of the baby gets stuck during delivery)
9. Inadequate maternal pelvis
10. Oligohydramnios (low amniotic fluid)
11. Fetal anomalies
12. Precipitate labor (very rapid labor)
13. Manipulative delivery (assisted by techniques such as intra-pelvic version)

3. Types of Birth Injuries and Affected Organs

Birth injuries can involve several organ systems and can range from minor injuries to life-threatening conditions:

1. **Soft Tissue Injuries**
    - **Skin:** Lacerations, abrasions, fat necrosis, petechiae
    - **Muscles:** Damage to the sternocleidomastoid muscle (e.g., in torticollis)
    - **Nerves:**
        - **Facial nerve** (can cause facial palsy)
        - **Brachial plexus injury** (e.g., Erb's palsy C5, C6; Klumpke's palsy C7, C8, T1)
        - **Spinal cord**
        - **Phrenic nerve** (C3, C4, or C5)
        - **Horner's syndrome**
        - **Recurrent laryngeal nerve**
    - **Eyes:** Hemorrhages in the subconjunctival, vitreous, or retina
2. **Visceral Injuries**
    - Rupture of internal organs like the **liver**, **adrenal glands**, and **spleen**
    - Testicular injury
3. **Scalp Injuries**

    - Lacerations, abscesses, hemorrhages, and **caput succedaneum** (swelling of the soft tissues of the head from pressure during delivery)
4. **Dislocations**
    - **Hip**, **shoulder**, and **cervical vertebrae** dislocations
5. **Skull Injuries**
    - **Cephalhematoma** (accumulation of blood between the baby's skull and periosteum)
    - **Subgaleal hematoma** (bleeding in the space between the scalp and the skull)
    - **Fractures** of the skull and **nasal bones**
6. **Intracranial Injuries**
    - Hemorrhages such as **intraventricular**, **subdural**, or **subarachnoid hemorrhages**
7. **Bone Fractures**
    - **Mandible**, **clavicle**, **humerus**, **femur**, and **skull fractures**

INJURIES TO THE HEAD

1. **Definition:** Cephalhematoma is a collection of blood between the pericranium (the membrane covering the skull) and the skull bone (subperiosteal) that commonly affects the parietal bone. It is usually unilateral (on one side of the head).
2. **Cause:** The condition results from the rupture of small emissary veins in the skull, often due to forceps delivery or difficult labor. It can also occur following normal vaginal delivery.
3. **Onset:** It does not appear at birth but begins to develop 12-24 hours post-delivery.
4. **Characteristics:**
    - The swelling is soft, fluctuant, and incompressible.
    - It is limited by the skull's suture lines, as the pericranium is fixed to the margins of the bone.
    - In some cases, there may be an underlying skull fracture.
    - Over time, a hard, sharp edge may form due to the blood organizing and clotting.
5. **Complications:**
    - If large, cephalhematoma may lead to hyperbilirubinemia (high bilirubin levels), requiring possible blood transfusion.

- In rare cases, infection or suppuration may occur.

6. **Treatment:**
    - Most cases resolve naturally within 6-8 weeks with no active treatment required.
    - If neurological symptoms (e.g., lethargy, seizures) are present, a CT scan should be performed to rule out complications like a skull fracture or intracranial haemorrhage.
    - In some cases, treatment for Anemia or hyperbilirubinemia might be needed.

2. Scalp Injuries Minor injuries to the scalp can occur during delivery, especially with the use of forceps, during cesarean section, or from the placement of scalp electrodes. These injuries may include:

- **Types of injuries:**
    - **Abrasion:** Minor damage from forceps during delivery.
    - **Incised wound:** Cuts or lacerations made during cesarean delivery or other procedures.
- **Management:**
    - Small wounds usually require basic care, such as cleaning with an antiseptic solution (e.g., 2% mercurochrome).
    - If there is brisk haemorrhage from an incised wound, **stitches** may be necessary.

3. Skull Fractures: Fractures of the skull, particularly the **vault** (upper part of the skull), can occur during difficult deliveries, including with forceps or in cases of cephalopelvic disproportion (when the baby's head is too large for the mother's pelvis). Skull fractures may be:

- **Linear fracture:** A simple crack in the skull that usually does not cause significant problems and may not cause any symptoms.
- **Depressed fracture:** A more severe fracture where part of the skull is pushed inward, which may cause pressure on the brain.

Causes:

- Difficult forceps delivery, especially if the blades are not applied correctly.
- Pressure from the sacral promontory of the pelvic bones, which can create a depressed fracture even during a spontaneous delivery.

Complications:

- Cephalhematoma or haemorrhage (e.g., extradural, or subdural haemorrhage) may occur alongside a skull fracture.
- Brain contusions (bruising) can also be associated with skull fractures.

Treatment:

- **Linear fractures** are usually asymptomatic and require no intervention.
- **Depressed fractures** may cause neurological symptoms due to pressure on the brain. In these cases:
    - Conservative management is often sufficient if there are no symptoms.
    - If neurological symptoms occur, further imaging (e.g., X-ray or CT scan) is needed.
    - Neurosurgical intervention may be required to elevate the depressed bone or remove a hematoma or contusions.

INTRACRANIAL HEMORRHAGE (ICH)

1. **Types of Intracranial Hemorrhage (ICH):**
    1. Traumatic
    2. Anoxic
    3. Primary Haemorrhagic Disease
2. **Types of Haemorrhage Locations:**
    - External to the brain: Epidural, subdural, subarachnoid.
    - In the brain tissue (parenchyma): Cerebrum or cerebellum.
    - Into the ventricles: From the germinal matrix or choroid plexus.
3. **Common Hemorrhages:**
    1. Subdural Hemorrhage (SDH): Most common (70%).
    2. Subarachnoid Hemorrhage (SAH): 20%.
    3. Intracerebral Hemorrhage: 20%.
    4. Intraventricular Hemorrhage (IVH): Common in preterm infants.
4. **Types of Traumatic Hemorrhages:**
    - Epidural Hemorrhage: Rare in newborns; caused by skull fractures.
    - Subdural Hemorrhage (SDH): Caused by skull fractures, ruptured veins, or excessive birth trauma (forceps, breech delivery).
    - Subarachnoid Hemorrhage (SAH): Caused by small vessel rupture during birth trauma or asphyxia. Symptoms may appear late (1 week).
5. **Anoxic Causes:**

- Intracerebral Hemorrhage: Caused by venous thrombosis or stasis, typically after perinatal hypoxic-ischemic events.
- Intraventricular Hemorrhage (IVH) / Germinal Matrix Hemorrhage (GMH): Caused by trauma or asphyxia in full-term infants, ischemia in preterm infants.

6. **Clinical Features:**
   - Traumatic Hemorrhage: Symptoms like respiratory depression, seizures, irritability, vomiting, and bulging fontanel.
   - Anoxic Hemorrhage: Symptoms like seizures, irritability, lethargy, and a full fontanel.
7. **Diagnosis:**
   - Neuroimaging: Cranial ultrasonography (CUS), CT scans, MRI.
   - Risk Factors for IVH/GMH: Prematurity, birth asphyxia, resuscitation, neonatal seizures.
8. **Prevention:**
   - **Antenatal Care**: Avoidance of preterm labor, steroids for preterm infants, and cesarean delivery if needed.
   - **Postnatal Care**: Prevent birth asphyxia and correct blood pressure fluctuations.
9. **Investigations:**
   - Ultrasonography: For IVH detection.
   - CT scan/MRI: To assess brain injury.
   - CSF: Elevated RBCs, WBCs, and protein levels.
10. **Management:**
    - Supportive Care: Maintain normal circulatory volume and electrolytes.
    - Medications: Anticonvulsants (Phenobarbitone, Phenytoin) for seizures.
    - Subdural Hematoma: Surgical interventions (tap or open evacuation) may be needed.
    - Follow-up: Serial cranial ultrasound to monitor for complications like hydrocephalus.

OTHER INJURIES

1. **Skin and Subcutaneous Tissue Injuries:**
   1. **Bruises & Lacerations:**
      - Caused by forceps, mainly on the face (treated with 1% mercurochrome lotion).
      - Edema and congestion occur on buttocks (breech) or eyelids, lips, nose (face presentation) – no treatment needed.
   2. **Scalpel cuts/lacerations (during cesarean section):**

- Common on buttocks, scalp, or thigh; small cuts heal naturally, larger ones need stitches (7-0 nylon).
- Healing is usually quick.

2. **Muscle Injuries:**
    1. **Sternocleidomastoid (SCM) Injury (Congenital Torticollis):**
        - Causes a mass in the SCM and tilting of the head toward the affected side.
        - Treated with stretching exercises; heals in 3-4 months; surgery if no recovery after 6 months of therapy.
    2. **Sternomastoid Hematoma:**
        - Appears 7–10 days after birth due to muscle and blood vessel rupture, common after difficult breech delivery.
        - Treated conservatively with stretching exercises; heals in 3-4 months.
    3. **Subcutaneous Tissue Necrosis:**
        - Causes hard nodules under the skin, usually from pressure; heals on its own over weeks with no treatment required.

3. **Nerve Injuries:**
    1. **Facial Palsy (Peripheral):**
        - Caused by forceps pressure or birth trauma.
        - Symptoms: inability to close the eye, asymmetry of the mouth.
        - Treatment: Protect the eye with synthetic tears, usually recovers within weeks.
    2. **Brachial Palsy (Damage to Brachial Plexus):**
        - Caused by excessive neck traction during delivery.
        - Erb's Palsy: Affects C5-C6 roots, causing "Waiter's Tip" position (adducted arm, extended elbow, flexed wrist).
        - Klumpke's Palsy: Affects C8-T1 roots, causes a claw-like hand and arm paralysis.
        - Treatment: Physical therapy, passive movements; surgery if recovery doesn't occur within months.
    3. **Phrenic Nerve Injury (C3-C5):**
        - Affects diaphragm function, causing respiratory distress, cyanosis, and tachypnoea.
        - Treatment: Supportive care (CPAP or mechanical ventilation); recovery in 1-3 months.
4. **Fractures:**

1. **Skull Fractures: Not detailed here.**
2. **Spinal Fractures:**
    - Occurs during difficult delivery, often leading to immediate death due to medullary compression.
3. **Long Bone Fractures:**
    - Common in breech delivery (humerus, clavicle, femur).
    - Fractures are often greenstick but heal quickly with callus formation; deformities are rare.
    - Treatment: Immobilization and possible casting, healing within 2-4 weeks.

5. **Dislocations:**
    - Common dislocations: shoulder, hip, jaw, cervical vertebrae.
    - Confirmation via radiology/ultrasonography; orthopedic intervention may be required.

6. **Visceral Injuries:**
    1. **Organ Injuries (Liver, Kidneys, Adrenals, Lungs):**
        - Usually caused by breech delivery.
        - Can result in severe or minor internal bleeding.
        - Treatment focuses on correcting hypovolemia, anemia, and coagulation issues; surgery if needed for organ damage.

PERINATAL INFECTIONS

1. Infections are a significant cause of neonatal death, especially in developing countries, due to the immaturity of the neonate's immune system. Preterm infants are especially at risk for perinatal infections. Survivors of sepsis often experience severe neurological and lung damage.
2. **Risk Factors for Neonatal Infection:**
    - Rupture of membranes for more than 18 hours.
    - Maternal intrapartum fever (>100.4°F).
    - Low birth weight (<2,500 g).
    - Chorioamnionitis (infection of the amniotic sac).
    - Male gender.
    - Group B Streptococcus (GBS) infection in the mother.
    - Prematurity (<37 weeks).

- Repeated vaginal examinations during labor.
- Invasive monitoring procedures.

3. **Mode of Infection:**
   - **Antenatal (Transplacental)**:
     - Infections like rubella, cytomegalovirus, herpes, HIV, chickenpox, hepatitis B, syphilis, toxoplasmosis, and tuberculosis can be transmitted from mother to fetus.
     - **Amnionitis**: Infections can spread if the membranes rupture prematurely, affecting the neonate through aspiration or ingestion of infected amniotic fluid.
   - **Intranatal**:
     - **Aspiration** of infected amniotic fluid or meconium during labor.
     - Infections as the fetus passes through the birth canal (e.g., **ophthalmia neonatorum** or **oral thrush** from Candida).
     - **Improper asepsis** during umbilical cord care.
   - **Postnatal** (Nosocomial infections):
     - Transmission through human contact (infected mother, relatives, or healthcare staff).
     - Cross-infection from other infants in the nursery.
     - Infection via feeding, bathing, clothing, airborne exposure, or environments like the NICU.
4. **Clinical Presentation of Early-Onset Neonatal Sepsis:**
   - Symptoms appear within 24 hours of birth (90% of cases).
   - Common symptoms: Tachypnea, grunting, lethargy, hypotension, cyanosis, jaundice, vomiting, diarrhea, and Respiratory Distress Syndrome (RDS).
   - Less common symptoms: Disseminated Intravascular Coagulation (DIC), meningitis, and Persistent Pulmonary Hypertension (PPHN).
   - Temperature abnormalities: Hypothermia in preterm infants, hyperthermia in term infants.
5. **Common Pathogens:**
   - Group B Streptococcus (GBS), Staphylococcus aureus, E. coli, Klebsiella, Haemophilus, Enterobacter, Bacteroides fragilis, Citrobacter, Pseudomonas, Candida (fungus), and anaerobes.
   - Transmission occurs during the intrapartum period, with the neonate colonized by pathogens in the genital tract. Common sites of colonization include skin, nasopharynx, oropharynx, conjunctiva, and the umbilical cord.
6. **Diagnosis:**
   - **Laboratory tests**: Complete blood count (CBC), platelet count, blood and urine cultures, and acute phase reactants.

    - Elevated WBC (>40,000) or low WBC (<5,000) with neutropenia are typical findings.
    - **C-reactive protein (CRP)** levels are elevated in infection and decrease with recovery.
- **Imaging studies** (if necessary): Chest X-ray and renal ultrasound, based on symptoms.

7. **Prevention:**
    - Group B Streptococcus (GBS) prophylaxis can significantly reduce early-onset sepsis (EOS).
    - Penicillin is the drug of choice for GBS prophylaxis, but alternatives like ampicillin, cefazolin, or vancomycin can also be used.
8. **Treatment:**
    - **Broad-spectrum antibiotics**:
        - Ampicillin (150 mg/kg every 12 hours) and Gentamicin (3–4 mg/kg every 24 hours).
        - For severe cases, cefotaxime or ceftazidime may also be added.
    - **Supportive care**:
        - Mechanical ventilation for RDS.
        - Dopamine for hypotension.
        - Anticonvulsants for seizures.
        - Sodium bicarbonate for metabolic acidosis.
    - **Immunotherapy**:
        - IV immunoglobulin (IVIG), monoclonal antibodies, and granulocyte colony-stimulating factor (GM-CSF) can be used as adjuncts to antibiotics to help boost the immune response.
9. **COMMON SITES OF INFECTION:**
    - Trivial but may be serious: (i) Eyes—ophthalmia neonatorum; (ii) Skin; (iii) Umbilicus; (iv) Oral thrush. Severe systemic: (i) Respiratory tract; (ii) Septicemia; (iii) Meningitis; (iv) Intra-abdominal infection.

OPHTHALMIA NEONATORUM (CONJUNCTIVITIS)

1. **Definition:**
   Ophthalmia neonatorum is an eye infection in newborns that occurs within the first month of life.
2. **Causes:**
    1. **Bacterial:**
        - Chlamydia trachomatis (most common)

- Gonococcus (rare but serious)
- Staphylococcus and Pseudomonas

2. **Chemical:** Silver nitrate used in some hospitals can cause irritation.
3. **Viral:** Herpes simplex virus (HSV)

3. Mode of Infection:

- The infection is typically passed during **delivery** through contact with contaminated vaginal fluids.
- It can also occur from direct contamination from other body areas or due to chemicals.

4. Symptoms:

- Watery to purulent (pus-filled) eye discharge
- Sticky or swollen eyelids
- Severe cases may involve the cornea, causing further complications.

5. Prevention:

- Treat any vaginal discharge during pregnancy.
- Ensure sterile conditions during birth.
- Clean and dry the baby's eyes immediately after birth.

6. Tests:

- Gram stain and culture: To identify bacteria.
- Giemsa stain: For chlamydia.
- Viral culture: For herpes.

7. Treatment:

1. **Prophylaxis (Prevention after birth):**
   - **1% silver nitrate** or **0.5% erythromycin ointment** or **2.5% povidone iodine** drops are applied to the eyes within an hour of birth.
2. **Specific Treatment:**
   - **Gonococcal infection**: Eye irrigation with sterile saline and **antibiotics** (e.g., **ceftriaxone**).
   - **Chlamydia infection**: **Oral erythromycin** for 14 days (topical treatment alone is not enough).
   - **Herpes simplex**: **Acyclovir** (oral and topical) and **isolation**.

SKIN INFECTIONS

1. **Causes:**

- **Bacterial**: Mainly *Staphylococcus aureus*, also Gram-positive, Gram-negative, and anaerobic bacteria.
- **Common sites**: Face, axilla, groin, scalp, and periumbilical area.
- **Transmission**: Occurs during birth from vaginal flora or environmental contamination.

2. **Types of Skin Infections:**
   - **Pustulosis**: Often caused by *S. aureus*. Can become severe and lead to septicemia.
   - **Cellulitis**: Skin infection at traumatized sites (e.g., venipuncture, scalp electrodes).
3. **Treatment:**
   - **Mild pustulosis**: Topical mupirocin and oral antibiotics (amoxicillin or cephalexin).
   - **Severe pustulosis**: IV antibiotics like nafcillin or oxacillin. For MRSA, use vancomycin.
   - **Cellulitis**: Local antibiotic ointment (bacitracin). For severe cases, use systemic antibiotics (oxacillin/nafcillin + gentamicin).
4. **Epidemic outbreaks**: In hospitals (e.g., NICU), outbreaks of *S. aureus* require strict infection control and surveillance.

UMBILICAL SEPSIS (OMPHALITIS)

1. **Causes**: Both Gram-positive and Gram-negative bacteria, rare *Clostridium tetani*.
2. **Symptoms**:
   - Discharge from the umbilical cord (serous or purulent).
   - Red, swollen periumbilical skin.
   - Systemic signs: Fever, jaundice, toxemia.
3. **Spread of infection**:
   - Periumbilical cellulitis.
   - Thrombophlebitis, liver infection (hepatitis or abscess).
   - Peritonitis, necrotizing fasciitis.
4. **Prevention**: Proper antiseptic care from the moment the umbilical cord is cut until it heals.
5. **Treatment**:

- **Antibiotics**: Nafcillin + gentamicin or oxacillin/piperacillin-tazobactam.
- **Wound care**: Clean with antiseptic and apply a sterile dressing.
- **Investigations**: CBC, blood culture, umbilical swab culture.

TETANUS NEONATORUM

1. **Cause**: Clostridium tetani, enters via the umbilical cord.
2. **Symptoms**:
   - Inability to suck, trismus (jaw stiffness), body rigidity, convulsions, fever.
3. **Prevention**:
   - Immunize the mother with tetanus toxoid during pregnancy.
   - If no immunization, give antitetanic serum (1,500 IU) to the baby after birth.
4. **Treatment**:
   - Isolate the baby in an infectious disease unit.
   - Administer tetanus immune globulin (6,000 IU) and anti-tetanus serum (50,000–100,000 units).
   - Antibiotics: Penicillin in high doses.
   - Sedation: Chlorpromazine or phenobarbitone.
   - Ventilation: Endotracheal intubation may be needed.

NECROTIZING ENTEROCOLITIS (NEC)

1. **Definition:**
   NEC is a life-threatening condition where there is ischemic and inflammatory necrosis (death) of the immature intestine, commonly seen in premature infants.
2. **Risk Factors:**
   - Premature infants
   - Perinatal asphyxia (lack of oxygen at birth)
   - Hypotension (low blood pressure)
   - Polycythemia (increased red blood cells)
   - Umbilical cord catheter-related thromboembolism

- Septicemia (bacterial infection), especially from *E. coli*, *Klebsiella*, *Pseudomonas*
- Exchange transfusion (blood transfusion)
- Congenital heart disease

3. **Pathophysiology:**
   - Ischemia (lack of blood flow) and/or toxic damage to the gut lining, often in the ileocecal region.
   - Bacterial growth and gas formation follow the damage, leading to necrosis (tissue death) of the gut wall.
   - This may result in gangrene, perforation, and peritonitis (infection in the abdominal cavity).
4. **Diagnosis:**
   - **Systemic Signs:**
     - Respiratory distress, lethargy
     - Feeding intolerance
     - Hypertension (high blood pressure)
     - Acidosis (excess acid in blood)
     - Oliguria (low urine output)
     - Bleeding tendency
   - **Abdominal Signs:**
     - Abdominal distension (swelling)
     - Tenderness
     - Bloody stools
     - Vomiting
   - **Imaging:**
     - **X-ray**: Abdominal gas patterns, dilated loops of bowel, or absent bowel gas with pneumoperitoneum (gas in the abdomen).
     - **Ultrasound**: Can show gas bubbles in the liver, portal veins, and signs of bowel necrosis or perforation.
   - **Lab Signs**:
     - Thrombocytopenia (low platelet count)
     - Metabolic acidosis
     - Hyponatremia (low sodium levels)
5. **Prevention:**
   - Human milk (breastfeeding) can help prevent NEC.
   - Probiotics and nutrients promote the growth of beneficial gut bacteria.
   - Avoid prolonged use of antibiotics, which may disturb the balance of gut bacteria.

6. **Treatment:**
    1. **Respiratory Support:**
        - Supplemental oxygen and possibly mechanical ventilation.
    2. **Cardiovascular Support:**
        - Maintain circulatory volume, blood pressure, and tissue perfusion.
        - Monitor arterial blood gases and electrolytes.
    3. **Nutrition:**
        - Stop oral feeding and use nasogastric suction.
        - Provide **total parenteral nutrition** (IV feeding).
    4. **Medical Management:**
        - **Antibiotics**: Vancomycin, piperacillin/tazobactam, gentamicin, metronidazole.
        - **Laboratory Monitoring**: Check blood gases, glucose, platelet count, acid-base balance, and conduct septic workup.
    5. **Surgical Intervention:**
        - **Bowel resection** (surgical removal of the dead intestine) if perforation occurs.

MUCOCUTANEOUS CANDIDIASIS - Oral Thrush in Infants

1. **Definition:**
   Oral thrush is a fungal infection of the mouth caused by *Candida albicans*. It is common in bottle-fed infants and occurs due to contamination from feeding bottles, teats, nurse's hands, or mother's nipple.

2. **Symptoms:**

- **White patches**: Milky, elevated spots on the buccal mucosa and tongue that resemble curd and cannot be easily wiped off.
- **Feeding difficulty**: The infant may refuse to feed due to pain.
- **Progression**: In rare cases, the infection can spread to the gastrointestinal or respiratory tract, leading to more severe symptoms.
- **Appearance**: The typical patches are visible in the mouth; attempting to remove them leaves a raw, oozing surface.
- **Tongue spots**: Diagnostic spots on the edges of the tongue, which are not removed by suckling.

3. **Diagnosis:**

- Visual examination: Characteristic white, curd-like patches.
- Differentiation: The milk curd on the tongue can be easily wiped away, unlike thrush lesions.

4. Prevention:

- **Maternal fungal infections** (e.g., vaginal candidiasis) should be treated before delivery.
- **Proper cleaning** of feeding bottles, teats, and other utensils after each use.

5. Treatment:

1. **Local treatment:**
    - **Nystatin oral suspension** (100,000 U/mL): Apply 1 mL to each side of the mouth, 4 times a day for 2–3 weeks.
    - **Gentian violet** (1% solution) can be used but is rarely recommended now due to side effects.
2. **Systemic treatment:**
    - **Fluconazole**: Used for chronic or severe mucocutaneous candidiasis.
3. **For chronic thrush**:
    - Investigate **immunodeficiency** in cases that are resistant to treatment.
4. **Breast ductal candidiasis** in mothers:
    - Both mother and infant should be treated simultaneously to avoid cross-infection.
5. **Diaper candidiasis** (candidal dermatitis):
    - Use topical treatments such as **2% nystatin ointment**, **2% miconazole ointment**, or **1% clotrimazole cream**.
    - Treat any **intestinal colonization** with oral nystatin.

CONGENITAL MALFORMATIONS AND PRENATAL DIAGNOSIS

1. Etiology of Congenital Malformations:

1. **Genetics:**
    - Congenital defects may be inherited through genes in the ovum or sperm.
    - These defects can be due to **single gene disorders** (autosomal or X-linked, dominant, or recessive).

2. **Environmental Factors:**
    - Teratogens (substances that cause malformations) affect the fetus based on the **dose**, **gestational age at exposure**, and the **fetal/maternal immune response**.
    - **Critical period**: The period between **day 31 to day 71** from the first day of the last menstrual period (LMP) is critical for organ development.
3. **Maternal Age and Parity:**
    - **Advancing maternal age** increases the risk of conditions like **Down's syndrome (1 in 100 births at age 40)**.
    - **Increasing parity** (having more children) is associated with higher malformation risks, except for anencephaly or spina bifida, which are more common in first births.
4. **Drugs:**
    - Certain drugs, such as **warfarin**, **lithium**, **phenytoin**, and **antifolic acid drugs**, can cause malformations in the fetus. Their effects on the growing fetus are unpredictable and may vary based on timing.
5. **Infections:**
    - Maternal infections in the **first trimester** (like **rubella**, **cytomegalovirus**, and **toxoplasmosis**) can lead to fetal malformations.
6. **Irradiation:**
    - **Radiation exposure**, especially in the **early embryonic phase**, can cause mutations, leading to recessive gene mutations in offspring. While ionizing radiation is generally considered safe below **10 rads**, its use should be minimized, especially during the **first trimester**.
7. **Maternal Health:**
    - Conditions like **malnutrition**, **uncontrolled diabetes**, and **epilepsy** increase the likelihood of fetal malformations.

3. Multifactorial Causes:

- Most congenital malformations are likely the result of complex interactions between **genetic predisposition** and **environmental factors**, which are not always clearly understood. These malformations can affect a single organ or be sex-specific.

4. Prenatal Diagnosis and Fetal Therapy:

- Early detection and monitoring through **prenatal diagnosis** (e.g., ultrasound, amniocentesis, genetic testing) allow for better management of these conditions.

- **Fetal therapy** may be offered in certain cases to treat or manage conditions diagnosed before birth.

DOWN'S SYNDROME (TRISOMY 21)

1. **Overview:**
   - **Trisomy 21** is the most common autosomal chromosomal disorder.
   - It occurs when there is an additional **chromosome 21** (47 chromosomes instead of the usual 46).
   - **95%** of cases are due to trisomy 21, where an entire additional chromosome 21 is present. Rare cases may involve the addition of only a part of chromosome 21.
2. **Features and Complications:**
   1. **Physical Traits:**
      - **Craniofacial abnormalities:**
        - Small ears
        - **Brachycephaly** (flat back of the head)
        - **Upward slanting eyes** with **epicanthic folds**
        - **Short upper lip**, **small mouth**, **macroglossia** (enlarged tongue)
        - Resemblance to the Mongolian race in facial features
      - **Hands:** Short, broad hands, sometimes with a **single palmar crease** (30% of cases).
   2. **Health Issues:**
      - **Congenital heart disease** (50%) such as **VSD (ventricular septal defect)**.
      - Other conditions: **Omphalocele**, **cataracts**, **esophageal atresia**, **duodenal atresia**, and **imperforate anus**.
      - **Hypotonia** (low muscle tone) may cause:
        - Breathing difficulties
        - Poor swallowing and aspiration (risk of choking)
      - **Joint hyperextensibility** (overly flexible joints).
      - Reduced life expectancy.
      - Increased risk of **leukemia** in adulthood.
      - **Male infertility** is common.
      - **Females** may experience delayed puberty but can be fertile.

3. **Diagnosis:**
   - **Chromosomal analysis** (karyotype) is used to confirm the diagnosis, typically through bone marrow aspiration or leukocyte culture.
4. **Genetic Aspects:**
   - **1% recurrence risk** for trisomy 21 in future pregnancies.
   - **Higher recurrence risk** in cases of chromosomal **translocation** (a segment of one chromosome moves to another chromosome).
     - In cases of translocation, there is a **30% chance of recurrence**.
   - **Translocation** is more likely in younger mothers.
5. **Management:**
   - **Genetic counseling** is recommended for families considering future pregnancies.
   - **Amniocentesis** for prenatal diagnosis can identify the condition by karyotyping the fetus's cells. If a chromosomal abnormality is detected, **therapeutic termination** may be considered.

CONGENITAL MALFORMATIONS IN NEWBORN AND THE SURGICAL EMERGENCIES

Congenital malformations are birth defects that can cause serious issues in newborns, requiring prompt diagnosis and often surgical intervention. Below are key congenital malformations and their management.

IMPERFORATE ANUS

1. **Types:**
   - **High imperforate anus:** The rectum ends above the puborectalis sling, and may be associated with a **rectourinary fistula** in males or **rectovaginal fistula** in females.
   - **Low imperforate anus:** The rectum passes through the puborectalis sling and may or may not have a perineal fistula.
2. **Diagnosis:**
   - **Clinical signs:** No meconium passage, no anal opening, inability to pass a rectal thermometer or lubricated finger.
   - **Radiography:** An **invertogram** is used to assess the extent of atresia (baby is held in an inverted position with a coin over the anal pit).

- **Imaging:** X-ray or ultrasound of the lumbosacral spine and urinary tract is done to check for other abnormalities.

3. **Management:**
    - **Simple membranous obstruction**: A **cruciate incision** (perineal anoplasty) is made if there is bulging over the anal pit.
    - **High imperforate anus**: A **colostomy** is performed initially, followed by a **pull-through operation** later.

ESOPHAGEAL ATRESIA

1. **Definition:** The esophagus ends blindly, usually about 12 cm from the mouth.
2. **Association:** Often occurs with **tracheoesophageal fistula (TEF)**, in 85% of cases.
3. **Symptoms:**
    - Excessive salivation, increasing respiratory distress, and coughing/cyanosis when feeding.
    - Distal TEF causes gastric reflux into the trachea, leading to pneumonitis or pneumonia.
4. **Diagnosis:**
    - Failure to pass a nasogastric tube through the esophagus.
    - Radiographic confirmation after insertion of a radiopaque catheter.
5. **Management:**
    - Withhold fluids by mouth to avoid aspiration.
    - Frequent suctioning to clear airway secretions.
    - Position the baby upright (45°) to prevent reflux.
    - Administer broad-spectrum antibiotics.
    - Surgical intervention: Gastrostomy tube placement, followed by ligation of the fistula and esophageal anastomosis via thoracotomy or thoracoscopy.

MECONIUM ILEUS

1. **Cause:** This is often a manifestation of **cystic fibrosis** (CF), where **meconium** in the intestine becomes thickened and obstructs the lower ileum.
2. **Symptoms:** Clinical signs of **small gut obstruction**.
3. **Diagnosis:**

- Sweat test: CF patients have high sodium content in sweat.
- Immunoreactive trypsinogen (IRT): A high value may indicate cystic fibrosis, prompting further testing for CF gene mutations.
- Radiography: A straight abdominal X-ray shows inspissated meconium with a granular appearance.

4. **Management:**
    - Contrast enema (Meglumine diatrizoate) is diagnostic and therapeutic.
    - Surgical options:
        1. Resection and anastomosis of the affected gut.
        2. Pancreatic enzyme and vitamin supplementation post-surgery.
        3. Surgical techniques: Open, laparoscopic, or transanal approaches, including methods like staged repair with colostomy, one-stage pull-through, or delayed repair after the infant gains weight.
5. **Prenatal Diagnosis:** Possible through chorionic villus sampling and DNA probes.

OTHER SURGICAL EMERGENCIES

In addition to the above conditions, other congenital malformations in newborns may require urgent surgical intervention:

- **Exomphalos (Omphalocele):** A defect in the abdominal wall where abdominal organs protrude into the umbilical cord.
- **Diaphragmatic hernia:** A hole in the diaphragm that allows abdominal organs to move into the chest, affecting lung development.

EXOMPHALOS (OMPHALOCELE) AND RELATED CONDITIONS

Exomphalos is a congenital condition where the abdominal contents, often the small intestine, herniate through a defect in the abdominal wall at the base of the umbilical cord. The anterior abdominal wall is incomplete, and the herniated contents are covered by a protective membrane.

1. **Associated Anomalies:**
    - About 30-40% of infants with omphalocele have associated congenital anomalies, including chromosomal abnormalities, congenital diaphragmatic hernia (CDH), and cardiac defects.
2. **Anatomic Features:**
    - Unlike gastroschisis, where the organs are exposed, omphalocele's contents are enclosed in a membrane.
    - The umbilical cord vessels course over the sac and extend to the apex of the hernia.
3. **Management:**
    - Prevention of rupture: Efforts should be made to protect the sac from rupture, and Cesarean delivery may help avoid this risk.
    - Sterile dressing: A moist saline dressing should be applied to protect the sac.
    - Surgical closure: If the defect is less than 5 cm, the sac may be repaired in a single surgery. Larger defects may require a staged approach for closure.
    - Prenatal diagnosis: Ultrasound can detect exomphalos before birth.

CONGENITAL DIAPHRAGMATIC HERNIA (CDH)

1. **Definition:** CDH occurs when abdominal contents herniate into the thoracic cavity through a defect in the diaphragm, typically through the foramen of Bochdalek (on the left side).
2. **Incidence:** CDH is most commonly on the left side (95% of cases).
3. **Associated Conditions:** CDH may be associated with trisomies (e.g., trisomy 13, trisomy 18) and Turner syndrome (45,XO).
4. **Symptoms:**
    - Acute respiratory distress with cyanosis (which may improve by holding the baby upright).
    - Unequal thoracic movements, absent breath sounds on the affected side, and a scaphoid abdomen (sunken stomach).
    - In left-sided CDH, the apical impulse shifts to the right side, and heart sounds are better heard on the right chest.
5. **Diagnosis:**

- X-ray chest reveals the characteristic gas shadow of the small bowel in the thorax, with a mediastinal shift to the unaffected side.
- Prenatal diagnosis can be made with ultrasound.

6. **Management:**
   - Supportive care: Intubation and positive pressure ventilation (PPV) are essential immediately after birth.
   - Surfactant therapy: Helps manage pulmonary insufficiency.
   - Nasogastric tube insertion: Helps to decompress the bowel and prevent further gaseous distension.
   - Oxygen therapy: Provide positive pressure oxygen with a low concentration to manage hypoxia.
   - Extracorporeal Membrane Oxygenation (ECMO): For severe pulmonary hypoplasia or respiratory failure.
   - Sildenafil: May reduce pulmonary hypertension (PPHN) in neonates.
   - Surgical repair: Involves reducing the herniated organs and closing the diaphragmatic defect. Surgery may be delayed until pulmonary function improves.
   - Intrauterine fetal surgery: In some cases, surgery during pregnancy may be performed to prevent pulmonary hypoplasia.

DUODENAL ATRESIA

1. **Definition:** Duodenal atresia is a condition where the duodenum is completely obstructed, usually occurring below the ampulla of Vater. It may be confused with duodenal stenosis, which is a narrowing rather than a complete blockage.
2. **Associated Conditions:**
   - Hydramnios (excess amniotic fluid) and IUGR (Intrauterine Growth Restriction).
   - Down's syndrome (Trisomy 21) is associated with 33% of cases.
   - Around 70% of affected infants have additional malformations, including cardiac and gastrointestinal defects.
3. **Symptoms:**
   - Vomiting: Often profuse and bile-stained.
   - Distended upper abdomen.
   - After passing meconium (usually white), no further stools are passed.
4. **Diagnosis:**
   - X-ray or ultrasound of the abdomen in the upright position shows the characteristic "double bubble" appearance, where air is seen in the

stomach and the proximal duodenum, but the small bowel and large bowel are devoid of air.
    - Prenatal diagnosis can be made with ultrasound.
5. **Management:**
    - Withhold oral fluids: To avoid aspiration and further complications.
    - Parenteral nutrition: Fluid and electrolyte replacement through IV.
    - Surgery: Prompt corrective surgery is needed, with the most common procedure being duodenojejunostomy, where the duodenum is reconnected to the jejunum.

NONIMMUNE FETAL HYDROPS (NIFH)

1. **Nonimmune fetal hydrops (NIFH)** refers to the accumulation of extracellular fluid in fetal tissues and serous cavities, occurring in conditions other than **Rh incompatibility**. It is characterized by the following features:
    - Increased skin thickness (greater than 5 mm), caused by generalized subcutaneous edema.
    - Placental enlargement.
    - Pericardial effusion, pleural effusion, and/or ascites.

2. **Causes of Nonimmune Fetal Hydrops:**
    1. **Chromosomal Abnormalities** (10%):
        - Trisomies (13, 18, 21), Turner syndrome, Triploidy, Aneuploidy
    2. **Congenital Cardiac Lesions**:
        - Congenital heart block, Supraventricular tachycardia
        - Structural cardiac abnormalities (e.g., hypoplastic left heart)
    3. **Congenital Abnormalities**:
        - Diaphragmatic hernia, Renal abnormalities, Cystic hygroma
    4. **Hematological Disorders**:
        - Beta-thalassemia, Glucose-6-phosphate dehydrogenase (G6PD) deficiency, Leukemia
    5. **Infections** (8%):
        - Parvovirus, Rubella, Toxoplasmosis, Syphilis, Cytomegalovirus (CMV), Hepatitis
    6. **Placental and Umbilical Cord Pathology**:

- Twin-to-twin transfusion, Chorioangioma, Umbilical vein thrombosis, TRAP (Twin Reverse Arterial Perfusion)

7. **Idiopathic Causes** (20%): No identified underlying cause.
8. **Maternal Diseases** (5%):
   - Uncontrolled diabetes, Severe Anemia, Thyrotoxicosis
9. **Miscellaneous Causes** (10%):
   - CNS malformations, Skeletal abnormalities, Lysosomal disorders

3. Pathology of Nonimmune Fetal Hydrops:

The pathology in NIFH depends on the underlying cause. However, the **ultimate pathology** involves: Severe anemia, Hypoproteinemia (decreased colloid osmotic pressure), Asphyxia, Increased capillary permeability & Heart failure

These factors contribute to the accumulation of fluid in the fetus's tissues and serous cavities, leading to the clinical manifestations of hydrops.

4. Investigations for Nonimmune Fetal Hydrops:

1. **Maternal Blood Tests**:
   - Complete blood count (CBC), ABO and Rh group, red cell antibody titers
   - Hemoglobin electrophoresis to screen for hemoglobinopathies like thalassemia or sickle cell disease
   - VDRL for syphilis, Kleihauer-Betke test for fetal-maternal hemorrhage, glucose tolerance test for diabetes, and tests for G-6 PD deficiency.
   - Serological tests for infections (e.g., CMV, rubella, toxoplasmosis).
2. **Ultrasound**:
   - Detailed scan to assess fetal anatomy, including echocardiography to evaluate structural cardiac lesions.
   - Doppler flow studies to check for fetal anemia or other vascular abnormalities.
   - Regular follow-up imaging for disease progression and evaluation of complications like pleural effusions.
3. **Amniocentesis**:
   - Chromosomal analysis and biochemical or enzyme testing (e.g., testing for infections or enzymatic deficiencies).
4. **Cordocentesis**:

- For obtaining fetal blood to study chromosomal disorders, single-gene disorders, enzymes, plasma proteins, blood gases, and antibodies.
- Hemoglobin electrophoresis, PCR, and DNA studies can also be conducted on fetal blood samples.

5. **Neonatal Investigations**:
   - Chromosomal studies, placental examination, and autopsy (if stillbirth occurs) are essential for final diagnosis.

5. Management of Nonimmune Fetal Hydrops:

Management is dependent on the underlying cause and the severity of the condition. Potential approaches include:

1. **Termination of Pregnancy**:
   - This may be considered, especially if there is a poor prognosis due to chromosomal abnormalities or structural malformations.
2. **Transplacental Therapy for Fetal Dysrhythmias**:
   - Digoxin can be administered orally to the mother for fetal dysrhythmias like supraventricular tachycardia.
3. **Direct Fetal Therapy**:
   - Fetal transfusion may be performed via umbilical vein or peritoneal cavity to treat fetal anemia.
   - Drainage of pleural, pericardial, or ascitic fluid under ultrasound guidance to reduce fluid buildup.
4. **Obstetric Management**:
   - Intrauterine paracentesis or thoracocentesis prior to delivery may be performed to ease delivery and assist neonatal resuscitation.
   - The decision for Caesarean section depends on obstetric reasons and the clinical status of the fetus.
   - Antenatal corticosteroid therapy may be given to promote fetal lung development if preterm delivery is anticipated.
   - Intensive neonatal care, including ventilator support, is necessary for neonates.

For **pregnant** and **lactating mothers**, the Recommended Dietary Allowance (RDA) in India, based on guidelines by the **Indian Council of Medical Research (ICMR)**, is adjusted to support the increased nutritional needs for fetal growth, milk production, and maternal health. Here are the approximate RDA values:

Pregnant Women

Nutrient	RDA
Energy	+350 kcal/day (Total ~2250-2500 kcal/day)
Protein	+23 g/day (Total ~78 g/day)
Fat	~20-30% of total energy
Iron	~35 mg/day
Calcium	~1200 mg/day
Vitamin C	~60 mg/day
Vitamin A	~800 µg/day (Retinol)
Thiamine (B1)	~1.2 mg/day
Riboflavin (B2)	~1.4 mg/day
Niacin (B3)	~18 mg/day
Folate (B9)	~500 µg/day
Vitamin B12	~1.2 µg/day
Zinc	~12 mg/day
Fiber	~30 g/day

Lactating Mothers

Nutrient	RDA
Energy	+600 kcal/day (Total ~2500-2700 kcal/day)
Protein	+19 g/day in the first 6 months (Total ~74 g/day) +13 g/day after 6 months (Total ~68 g/day)
Fat	~25-30% of total energy
Iron	~21 mg/day
Calcium	~1200 mg/day
Vitamin C	~80 mg/day
Vitamin A	~950 µg/day (Retinol)
Thiamine (B1)	~1.4 mg/day
Riboflavin (B2)	~1.6 mg/day
Niacin (B3)	~17 mg/day
Folate (B9)	~300 µg/day
Vitamin B12	~1.5 µg/day
Zinc	~12 mg/day
Fiber	~30 g/day

These values represent typical recommendations for healthy individuals. Adjustments may be needed based on specific health conditions, activity levels, or multiple pregnancies. Always consult with a healthcare professional for tailored guidance.

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Chapter 12: OBG Instruments

Instrument	Purpose	Indications	Parts	Measurements
Simpson's Forceps	Used to assist in the delivery of the baby during labor, especially in difficult deliveries	Prolonged labor, fetal distress, malposition	Handles, blades, lock, shank	Length: 40 cm; Width of blade: 5 cm
Vacuum Extractor	To assist in the delivery of a baby when labor is not progressing	Prolonged labor, fetal distress, maternal exhaustion	Cup, handle, vacuum pump, release valve	Cup diameter: 7-9 cm, Length: 30 cm
Episiotomy Scissors	To make an incision in the perineum during delivery to prevent tearing	Preventing perineal tears, facilitating delivery	Blades, handle, joint	Length: 17-19 cm
Amniotic Hook	To rupture the amniotic sac during labor for inducing or accelerating labor	Induction of labor, artificial rupture of membranes	Hook, handle	Length: 20-25 cm
Cord Clamp	To clamp the umbilical cord after delivery of the baby	After birth, to prevent bleeding	Clamping arms, ratchet, lock	Length: 6-8 cm

Uterine Curette	To scrape the uterine lining (e.g., after a miscarriage)	Post-abortion, retained products of conception, uterine hemorrhage	Handle, blade	Length: 22-25 cm, Blade diameter: 2-3 mm
Foetal Stethoscope	To listen to the fetal heart sounds during labor	To monitor fetal heart rate	Chest piece, tubing, ear pieces	Chest piece diameter: 4-5 cm
Dressing Forceps	To grasp and hold tissues or objects during procedures	Handling tissues, dressings during deliveries	Tips, grooves, handle	Length: 16-18 cm
Cesarean Section Scissors	To make incisions during Cesarean delivery	Cesarean section surgery	Blades, handle, joint	Length: 24-26 cm
Foley's Catheter	To drain the bladder during labor or after delivery	Urinary retention, Cesarean section, labor preparation	Balloon, catheter tube, drainage port	Length: 40-45 cm; Balloon volume: 5-30 ml

This version omits the diagrams and includes only the essential details.

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Chapter 13: OBG Drugs

1. Drugs for Induction and Augmentation of Labor

Drug	Purpose	Indications	Route	Dose of Administration
Oxytocin	Stimulates uterine contractions	Induction or augmentation of labor	IV/IM	IV: 1-2 mU/min, increase by 1-2 mU every 30-60 mins; IM: 10 units after delivery
Misoprostol	Induces uterine contractions or softens cervix	Induction of labor, post-abortion care	Oral/Vaginal	Oral: 25 mcg every 4-6 hours; Vaginal: 25 mcg every 4-6 hours
Dinoprostone	Softens cervix and induces contractions	Cervical ripening, labor induction	Vaginal	10 mg vaginal insert every 6 hours (max 3 doses)

2. Drugs for Postpartum Hemorrhage (PPH)

Drug	Purpose	Indications	Route	Dose of Administration
Ergometrine	Constricts blood vessels to reduce bleeding	Postpartum hemorrhage, uterine atony	IM/IV	IM/IV: 0.2 mg every 2-4 hours (max 5 doses)
Carboprost	Causes uterine contraction and reduces bleeding	Postpartum hemorrhage	IM	250 mcg every 15-90 minutes (max 8 doses)
Misoprostol	Stimulates uterine contraction	Postpartum hemorrhage	Oral/Sublingual	600 mcg orally or sublingually after delivery

3. Drugs for Management of Preterm Labor

Drug	Purpose	Indications	Route	Dose of Administration
Tocolytics (e.g., Nifedipine, Terbutaline)	Relax the uterus to prevent premature labor	Preterm labor, uterine hyperactivity	Oral/Subcutaneous/IV	Nifedipine: Oral 10-20 mg every 4-6 hours; Terbutaline: 0.25 mg SC every 20 minutes for up to 3 doses
Magnesium Sulfate	Prevents seizures and relaxes the uterus	Preterm labor, eclampsia prevention	IV/IM	IV: 4-6 g loading dose over 20-30 minutes, followed by 1-2 g/hour maintenance

4. Drugs for Managing Pregnancy-Related Conditions

Drug	Purpose	Indications	Route	Dose of Administration
Iron Supplements (Ferrous Sulfate)	Treats or prevents iron deficiency anemia	Anemia in pregnancy	Oral	100-200 mg daily (elemental iron)
Folic Acid	Prevents neural tube defects in the fetus	Pre-conception, first trimester of pregnancy	Oral	400 mcg daily (preconception); 600 mcg during pregnancy
Calcium Carbonate	Prevents or treats calcium deficiency	Pregnancy-induced hypertension, osteoporosis	Oral	1-2 grams daily
Magnesium Sulfate	Prevents preterm birth and seizures in eclampsia	Preterm labor, eclampsia, preeclampsia	IV/IM	IV: 4-6 g loading dose followed by 1-2 g/hour maintenance

5. Drugs for Infections

Drug	Purpose	Indications	Route	Dose of Administration
Amoxicillin	Antibiotic for bacterial infections	Urinary tract infections, chorioamnionitis	Oral/IV	Oral: 250-500 mg every 8 hours; IV: 500-1000 mg every 6 hours
Metronidazole	Treats bacterial vaginosis, pelvic inflammatory disease	Vaginal infections, post-operative prophylaxis	Oral/Vaginal/IV	Oral: 500 mg every 8 hours for 7 days; IV: 500-1000 mg every 8 hours
Cephalosporins (e.g., Ceftriaxone)	Antibiotic for infections during pregnancy	UTI, infections during labor	IV/IM	IV/IM: 1-2 g every 12-24 hours

6. Drugs for Management of Gestational Diabetes

Drug	Purpose	Indications	Route	Dose of Administration
Insulin	Lowers blood sugar levels	Gestational diabetes mellitus (GDM)	Subcutaneous	Dose adjusted based on blood glucose levels
Metformin	Used to control blood sugar levels	Gestational diabetes	Oral	500 mg once or twice daily, adjust as needed

7. Drugs for Hormonal Therapy

Drug	Purpose	Indications	Route	Dose of Administration
Progesterone	Supports pregnancy, prevents preterm birth	Threatened miscarriage, preterm labor	Oral/IM/Vaginal	Oral: 200-400 mg daily; IM/Vaginal: 100-200 mg daily
Clomiphene Citrate	Stimulates ovulation	Ovulation induction in infertility	Oral	50-100 mg daily for 5 days (starting on day 2-5 of the cycle)
Estradiol	Estrogen therapy for menopausal symptoms	Menopausal hormone therapy	Oral/Transdermal	Oral: 1-2 mg daily; Transdermal: 0.025-0.05 mg daily

8. Drugs for Pain Management

Drug	Purpose	Indications	Route	Dose of Administration
Pethidine	Analgesic for labor pain	Pain relief during labor and delivery	IM/SC	50-100 mg every 4 hours, max 400 mg/day
Epidural Anesthesia (e.g., Bupivacaine)	Provides regional anesthesia for labor or C-section	Pain relief during labor or surgery	Epidural/Spinal	0.125-0.25% solution; dose varies based on the procedure

These doses and routes are general guidelines and should be adjusted based on patient conditions and doctor's recommendations.