



Madhya Pradesh

Nursing Officer

Madhya Pradesh Employees Selection Board (MPESB)

Volume - 4



INDEX

S No.	Chapter Title	Page No.
1	Obstetrics & Gynecology	1
2	Community Health Nursing	77
3	Child Health Nursing	220

1

CHAPTER

Obstetrics & Gynecology

Introduction to Obstetrics & Gynecology

Term	Definition
Obstetrics	Branch of medical science dealing with pregnancy, childbirth, and puerperium , including care of the mother and newborn.
Gynecology	Branch of medical science concerned with diseases and disorders of the female reproductive system (excluding pregnancy).

Key Differences

Feature	Obstetrics	Gynecology
Focus	Pregnancy, labour, postpartum	Non-pregnant reproductive health
Patient Type	Pregnant woman	All females
Setting	Labour room, maternity ward	OPD, OT
Nursing Role	Antenatal, intranatal, postnatal care	Pre/postoperative, preventive, counseling

Role of Nurse in OBG

1. Antenatal (Before Delivery)

- ✓ Assess pregnancy status & fetal growth
- ✓ Provide health education (nutrition, hygiene, exercise)
- ✓ Detect risk factors early (anemia, PIH, GDM)
- ✓ Prepare for safe delivery

2. Intranatal (During Labour)

- ✓ Monitor progress of labour (partograph use)
- ✓ Maintain asepsis in labour room
- ✓ Assist in normal delivery & obstetric emergencies
- ✓ Provide emotional support & pain relief

3. Postnatal (After Delivery)

- ✓ Assess involution, lochia, lactation
- ✓ Prevent & manage PPH, infection
- ✓ Support breastfeeding & newborn care
- ✓ Educate about family planning & postnatal hygiene

4. Gynecological Nursing

- ✓ Assist in gynecologic examinations and minor procedures
- ✓ Provide pre- and post-operative care
- ✓ Counsel on menstrual hygiene, contraception, infertility
- ✓ Prevent cervical and breast cancer through screening

Important Terms

Term	Meaning
Gravida (G)	Number of times a woman has been pregnant (including current).
Para (P)	Number of pregnancies reaching ≥ 20 weeks gestation (regardless of outcome).
Abortus (A)	Pregnancy loss before 20 weeks or < 500 g fetal weight.

Primigravida	First pregnancy.
Multigravida	More than one pregnancy.
Nullipara	Never given birth to a viable infant.
Primipara	Given birth once (≥ 20 weeks).
Grand multipara	≥ 5 viable births.

Key Signs of Pregnancy

Type	Examples
Presumptive (Subjective)	Amenorrhea, Nausea, Breast tenderness, Fatigue, Urinary frequency
Probable (Objective)	Chadwick's sign (bluish cervix), Goodell's sign (soft cervix), Hegar's sign (soft uterine isthmus), Positive pregnancy test
Positive (Diagnostic)	Fetal heart sounds, USG visualization, Palpable fetal movements by examiner

History & Founders

Title	Name
Father of Modern Gynecology	James Marion Sims
Indian Father of Gynecology	Dr. B. N. Purandare
Father of Modern Obstetrics	William Smellie
Pioneer of Antiseptic Obstetrics	Ignaz Semmelweis
Discoverer of PAP Smear	Dr. George Papanicolaou

Common Instruments in OBG Nursing

Instrument	Use
Cusco's Speculum	Vaginal inspection
Sims' Speculum	Posterior vaginal wall retraction
Uterine Sound	Measuring uterine cavity length
Hegar's Dilator	Cervical dilatation
Vulsellum Forceps	Holding cervix
Episiotomy Scissors	Perineal incision during delivery
Cord Clamp	Clamp umbilical cord
Partograph	Monitor progress of labour

Nursing Booster Points (Exam Focus)

- Most common obstetric procedure in India → **Episiotomy (2nd degree)**
- Most sensitive female organ → **Clitoris**
- Short female urethra → ↑ risk of **UTI (E. coli)**
- Screening test for cervical cancer → **PAP Smear**
- HPV vaccine prevents **Cervical Cancer**
- MC site of Breast Cancer → **Upper Outer Quadrant**
- Normal uterus → **Anteverted + Anteflexed**
- Normal placenta type in humans → **Discoid, Deciduate, Hemochorial**

Anatomy and Physiology of the Female Reproductive System

The female reproductive system plays a vital role in the continuation of the human race.

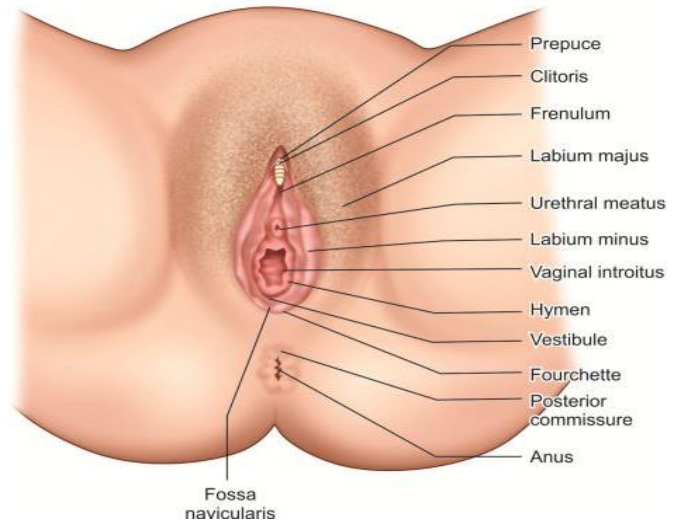
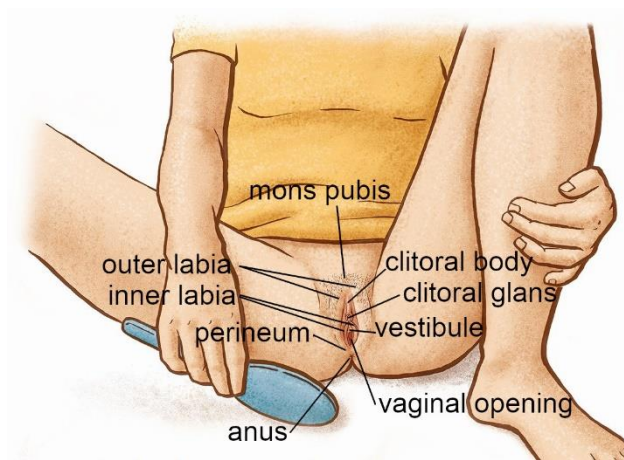
It includes organs responsible for ovum production, fertilization, fetal growth, childbirth, and lactation.

This system is under the control of the hypothalamic–pituitary–ovarian axis, which regulates hormonal balance and reproductive functions.

The major components of the system are:

1. External genitalia (vulva or pudendum)
2. Internal genitalia (vagina, uterus, fallopian tubes, ovaries)
3. Supportive ligaments and pelvic muscles

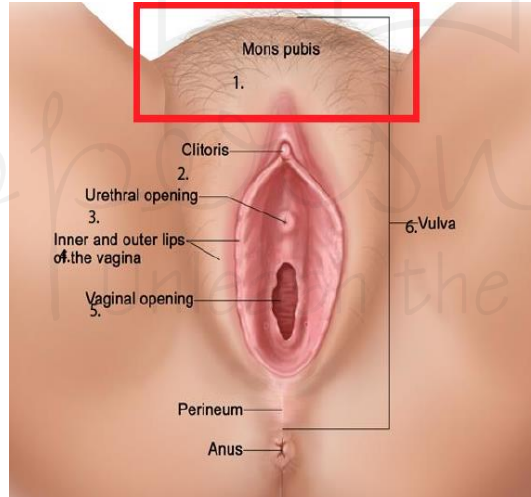
External Genitalia (Vulva / Pudendum)



- The external genital organs are located outside the pelvic cavity and are covered by skin.
- They develop from the ectoderm and mainly serve to protect the internal reproductive organs and provide sexual pleasure.

Parts of External Genitalia

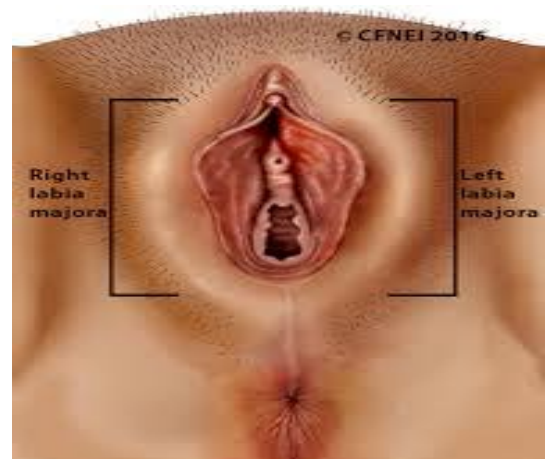
1. Mons Pubis



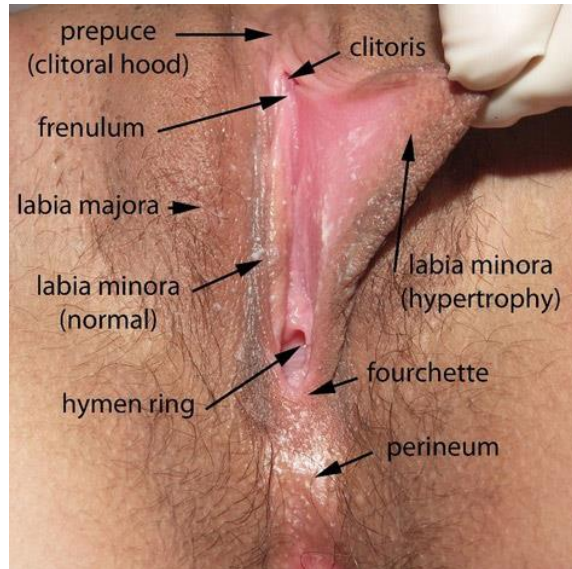
- The mons pubis is a rounded fatty prominence situated over the pubic bone.
- It becomes covered with hair after puberty and acts as a cushion during sexual intercourse.

2. Labia Majora

- These are two large folds of skin extending downward from the mons pubis.
- They contain sweat and sebaceous glands and are homologous to the male scrotum.
- Their function is to protect the underlying structures of the vulva.



3. Labia Minora



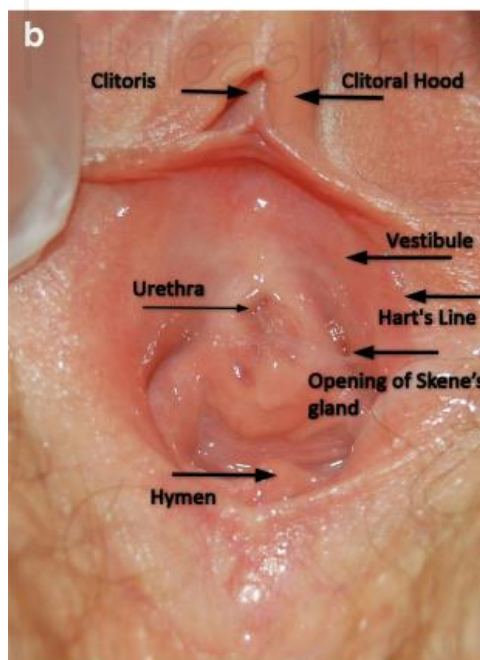
- Situated inside the labia majora, these are two smaller folds of delicate tissue that meet posteriorly to form the fourchette.
- They have no hair and are rich in sebaceous glands, providing lubrication and protection to the vestibule.

4. Clitoris

- The clitoris is a small, erectile, and highly sensitive organ located at the anterior junction of the labia minora.
- It measures about 2.5 cm in length and contains numerous nerve endings, making it the most sensitive part of the female genitalia.
- It is homologous to the glans penis in males and functions solely for sexual stimulation.



5. Vestibule



- The vestibule is the space between the labia minora.
- It contains the openings of the urethra, vagina, and ducts of the Bartholin's and Skene's glands.

6. Bartholin's Glands

- These are two small glands situated on each side of the vaginal opening.
- They secrete an alkaline mucus that lubricates the vaginal orifice during sexual intercourse.
- Blockage of the duct can lead to the formation of a Bartholin cyst, which may require surgical drainage.

7. Skene's Glands

- These are also known as paraurethral glands and are located near the urethral opening.
- They secrete a whitish fluid during sexual arousal and are homologous to the male prostate gland.

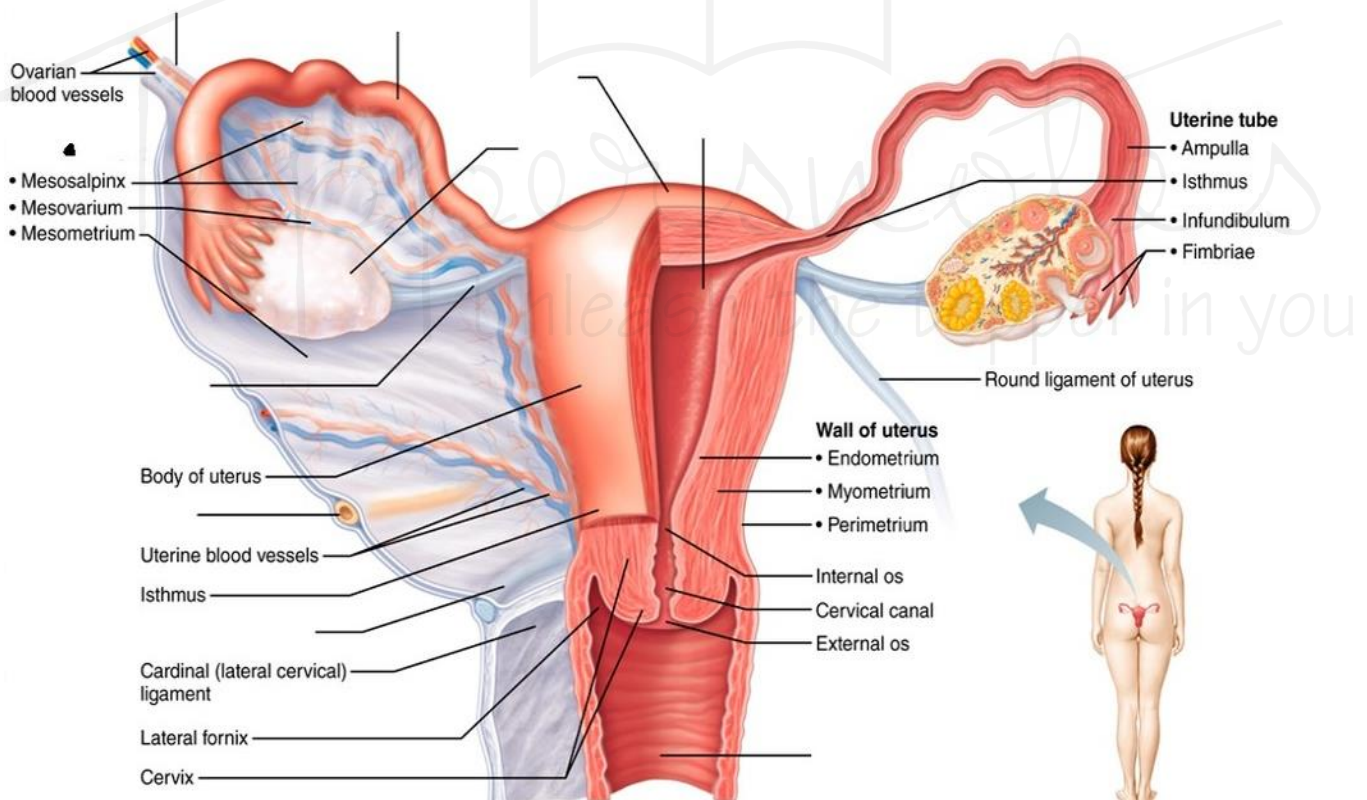
8. Perineum

- The perineum is the area between the vaginal opening and the anus.
- It supports the pelvic organs and is often incised during childbirth in a procedure known as episiotomy to prevent uncontrolled tearing.

Homologous Organs in Male and Female

Female Organ	Male Equivalent	Main Function
Clitoris	Glans penis	Sexual stimulation
Labia majora	Scrotum	Protection
Labia minora	Penile urethra	Protection and lubrication
Bartholin's gland	Cowper's gland	Secretes mucus during intercourse
Skene's gland	Prostate gland	Secretes lubricating fluid

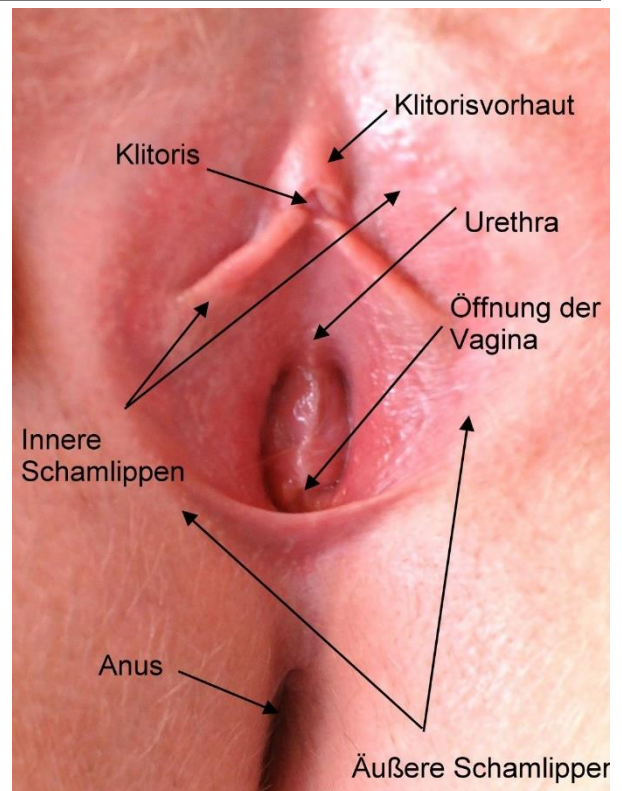
Internal Genitalia



- The internal reproductive organs are situated within the pelvic cavity and consist of the vagina, uterus, fallopian tubes, and ovaries.
- These organs are responsible for receiving the male gametes, fertilization, fetal nourishment, and childbirth.

A. Vagina

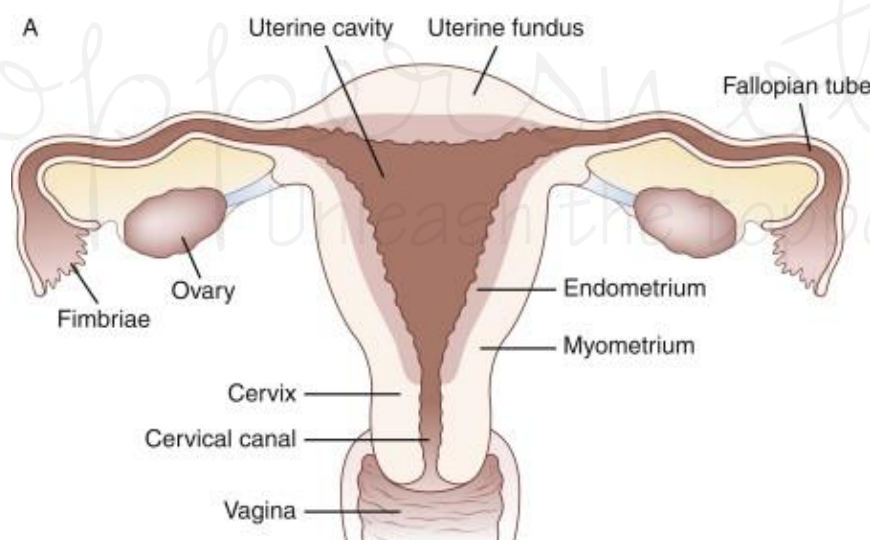
- The vagina is a fibro-muscular canal that connects the cervix of the uterus to the vulva.
- It measures approximately 7.5 cm anteriorly and 9 cm posteriorly.
- The vaginal wall is composed of mucous, muscular, and adventitial layers.
- Its lining is made of non-keratinized stratified squamous epithelium, which allows for stretching during childbirth.
- The vaginal environment is acidic (pH 3.5–4.7), maintained by the action of *Lactobacillus acidophilus*, which converts glycogen into lactic acid, preventing infections.
- The vagina serves three major functions: it acts as a canal for menstruation, a receptacle during sexual intercourse, and a birth canal during labor.
- The blood supply comes mainly from the vaginal artery, a branch of the internal iliac artery.
- The lower third of the vagina is innervated by the pudendal nerve, making it sensitive to pain.



Common Disorders:

- Vaginitis caused by *Candida albicans* (curdy discharge) or *Trichomonas vaginalis* (frothy green discharge)
- Fistulas such as vesicovaginal and rectovaginal fistula resulting from obstetric trauma

B. Uterus



- The uterus is a hollow, muscular, pear-shaped organ located in the pelvis between the bladder and the rectum.
- It measures about 7.5 × 5 × 2.5 cm in non-pregnant women and weighs around 50–80 g.

The uterus is divided into four parts:

1. Fundus – the upper rounded portion above the openings of the fallopian tubes.
2. Body (Corpus) – the main portion where the fetus develops.
3. Isthmus – a narrow segment between the body and cervix, forming the lower uterine segment in pregnancy.
4. Cervix – the lower 2.5 cm portion projecting into the vagina.

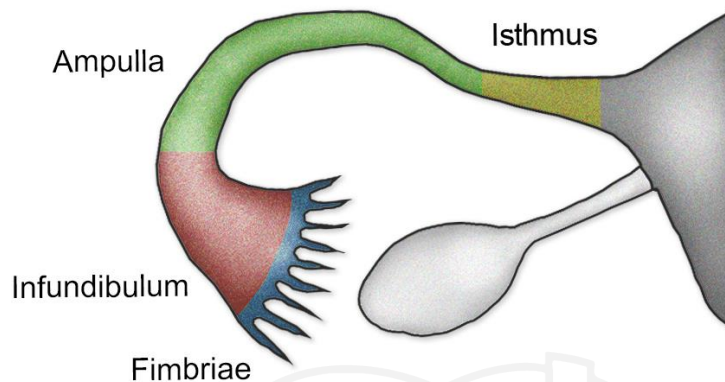
The wall of the uterus has three layers:

- Perimetrium (outer serous coat)
- Myometrium (middle muscular coat responsible for uterine contractions)
- Endometrium (inner mucosal lining that undergoes cyclic changes during menstruation)
- The normal uterus lies in an anteverted and anteflexed position.
- It receives its main blood supply from the uterine artery, a branch of the internal iliac artery.

Clinical Importance:

- Retroversion of the uterus can cause infertility or prolapse.
- Cervical incompetence can lead to recurrent second-trimester abortions.

C. Fallopian Tubes (Oviducts)



- Each fallopian tube is about 10–12 cm long and extends from the uterus to the ovary.
- It is lined by ciliated columnar epithelium that helps in the transport of the ovum.

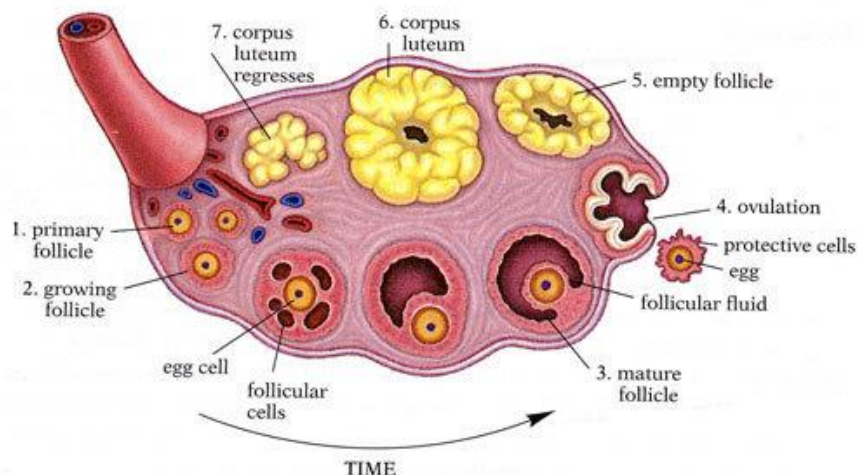
The tube is divided into five parts:

1. Fimbriae – finger-like projections that catch the ovum after ovulation.
2. Infundibulum – funnel-shaped portion near the ovary.
3. Ampulla – the widest and longest portion; site of fertilization.
4. Isthmus – narrow, thick-walled part joining the uterus.
5. Interstitial (intramural) – portion that passes through the uterine wall.

Clinical Points:

- The ampulla is the most common site of ectopic pregnancy.
- Tubectomy for sterilization is usually performed at the isthmus.
- Salpingitis (infection of the tube) can lead to infertility.

D. Ovaries



- The ovaries are the female gonads that produce ova and hormones such as estrogen and progesterone.

- They are almond-shaped structures located on either side of the uterus in the ovarian fossae.
- Each ovary measures about $3 \times 2 \times 1$ cm and weighs 5–8 g.
- The ovary has an outer cortex containing follicles at various stages of development and an inner medulla containing blood vessels and nerves.
- The surface is covered by a layer of cuboidal germinal epithelium.

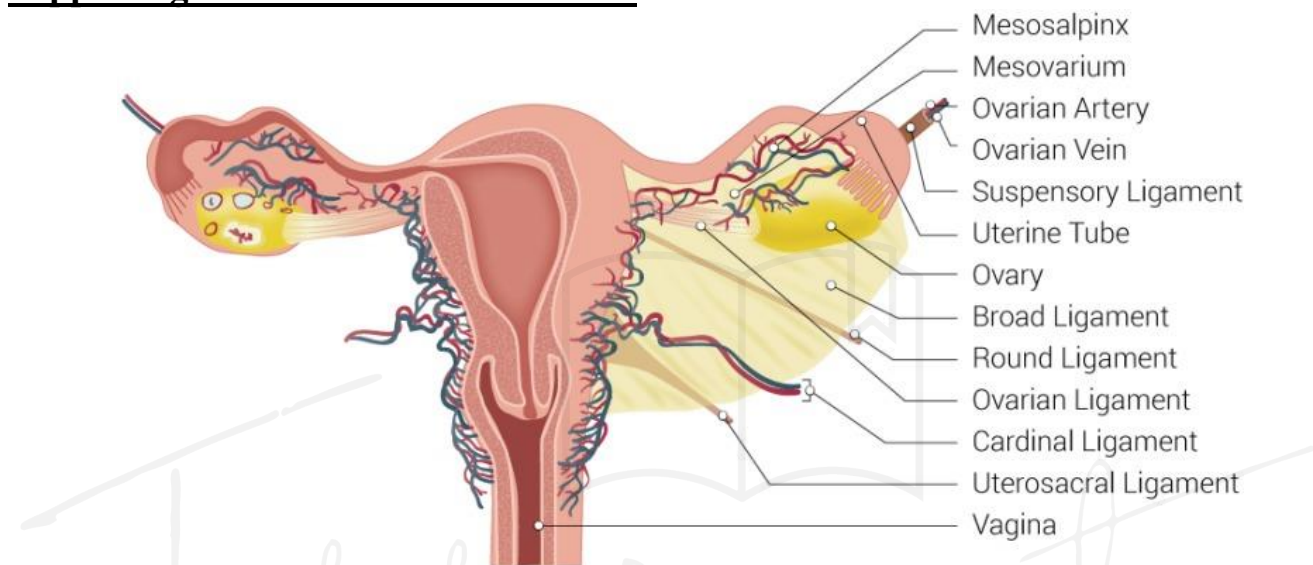
Functions of the Ovary:

1. Production and release of mature ova (oogenesis).
2. Secretion of hormones — estrogen, progesterone, inhibin, and relaxin.

Clinical Importance:

- Polycystic Ovary Syndrome (PCOS) – hormonal imbalance leading to infertility.
- Ovarian torsion – twisting of the ovary causing severe pain.
- Ovarian cancer – highly fatal gynecological malignancy.

Supporting Structures and Pelvic Floor



- The uterus and vagina are supported by ligaments and pelvic muscles that maintain their position and prevent prolapse.
 - ✓ Broad ligament: a double fold of peritoneum extending from the sides of the uterus to the lateral pelvic wall. It contains the fallopian tubes, ovaries, and associated blood vessels.
 - ✓ Round ligament: extends from the uterine cornu to the labia majora through the inguinal canal; it helps maintain the anteverted position of the uterus.
 - ✓ Uterosacral ligament: connects the cervix to the sacrum and prevents uterine prolapse.
 - ✓ Cardinal (Mackenrodt's) ligament: provides lateral support to the uterus.
 - ✓ Pelvic floor muscles: mainly formed by the levator ani group (pubococcygeus, iliococcygeus, puborectalis); they support the pelvic organs and help maintain continence.

Blood Supply and Nerve Supply

- Arterial supply: Uterine, vaginal, and ovarian arteries (branches of internal iliac and aorta).
- Venous drainage: Through the internal iliac veins.
- Lymphatic drainage: Internal and external iliac and para-aortic nodes.
- Nerve supply: Sympathetic and parasympathetic fibers from the pelvic plexus and pudendal nerve.

Clinical Correlations

- The short female urethra (approximately 4 cm) increases susceptibility to urinary tract infection.
- Cervical cancer is the most common gynecological malignancy in India; screening by PAP smear is essential.
- Episiotomy (a surgical incision of the perineum) is commonly performed to facilitate childbirth.

- Prolapse may occur due to weakness of pelvic floor muscles, commonly after multiple vaginal deliveries.
- Retroverted uterus can cause backache and infertility in some women.

Nursing Responsibilities

1. Educate women regarding menstrual and genital hygiene.
2. Provide pre- and post-procedure care during gynecological examinations.
3. Encourage regular PAP smears and HPV vaccination.
4. Maintain privacy and emotional support during pelvic assessments.
5. Report abnormal findings such as discharge, bleeding, or pain.
6. Assist in minor gynecological procedures and surgeries.
7. Promote pelvic floor exercises (Kegel's) to prevent prolapse.

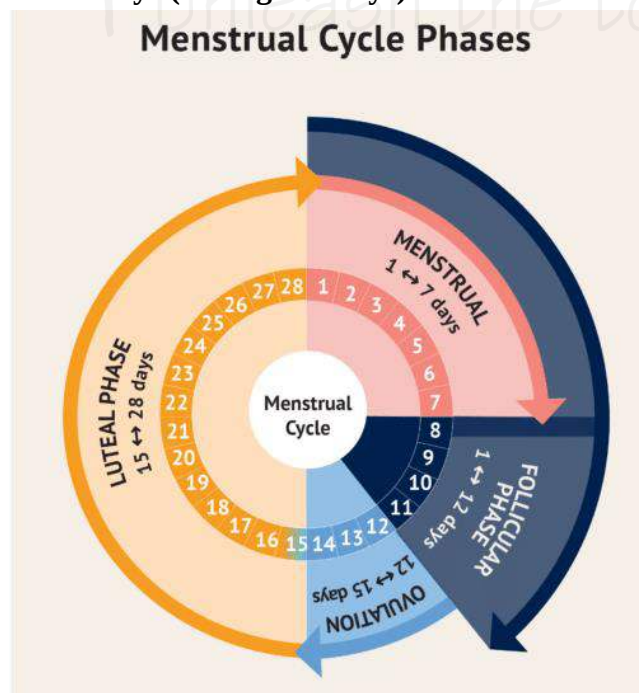
Nursing Booster Points

- The clitoris is the most sensitive part of the female genitalia.
- The normal position of the uterus is anteverted and anteflexed.
- The ampulla is the site of fertilization.
- Estrogen causes endometrial proliferation; progesterone maintains pregnancy.
- The uterine artery arises from the internal iliac artery.
- The transformation zone of the cervix is the common site for cervical cancer.
- Broad ligament is the site for broad-ligament fibroids.

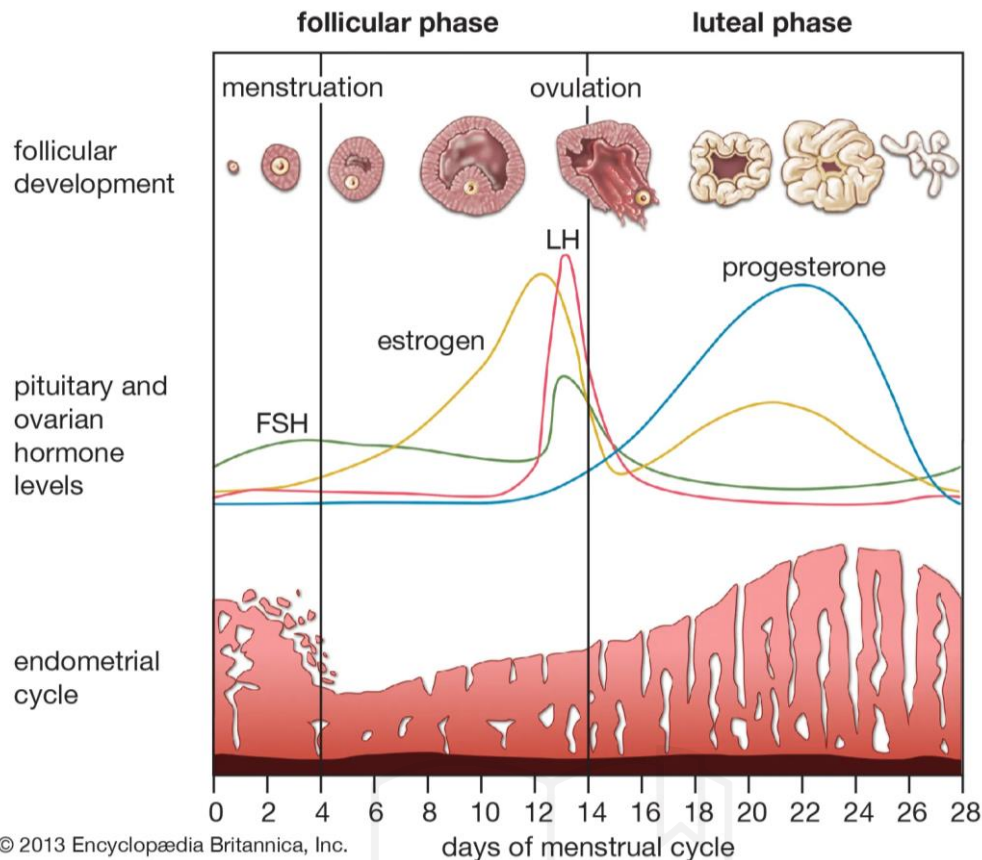
Organ	Main Function	Important Clinical Note
Vagina	Coitus, menstruation, childbirth	Candidiasis, vaginitis
Uterus	Fetal growth and menstruation	Cervical incompetence, cancer
Fallopian Tube	Ovum transport and fertilization	Ectopic pregnancy
Ovary	Ovum and hormone production	PCOS, ovarian cancer

Menstrual, Ovarian & Hormonal Cycles

- The menstrual cycle is a **monthly physiological process** that prepares a woman's body for pregnancy.
- It involves cyclic changes in **ovaries, uterus, and hormones** controlled by the hypothalamus and pituitary gland.
- Normal cycle duration: **21–35 days (average 28 days)**.



Phases of Menstrual Cycle



1. Menstrual Phase (Day 1–5)

- ✓ Shedding of the endometrial lining.
- ✓ Hormones: Estrogen and progesterone levels fall.
- ✓ Blood loss: 30–80 ml is normal.

2. Proliferative (Follicular) Phase (Day 6–14)

- ✓ Regeneration of endometrial tissue.
- ✓ Follicle-stimulating hormone (FSH) promotes follicle growth.
- ✓ Estrogen level rises → stimulates endometrial proliferation.

3. Ovulatory Phase (Around Day 14)

- ✓ Triggered by **LH surge** from the pituitary.
- ✓ Ovum released from mature Graafian follicle.
- ✓ Cervical mucus becomes thin and stretchable (Spinnbarkeit).
- ✓ Body temperature slightly rises (0.3–0.5°C).

4. Secretory (Luteal) Phase (Day 15–28)

- ✓ Corpus luteum secretes progesterone.
- ✓ Endometrium thickens and becomes vascular for implantation.
- ✓ If fertilization doesn't occur → corpus luteum degenerates → menstruation begins again.

Hormonal Regulation (Hypothalamo–Pituitary–Ovarian Axis)

1. **Hypothalamus** secretes GnRH in pulses.
2. GnRH stimulates anterior pituitary to release FSH and LH.
3. FSH promotes follicle maturation and estrogen production.
4. LH triggers ovulation and corpus luteum formation.
5. Estrogen proliferates endometrium; Progesterone maintains it.
6. Feedback mechanism:
 - ✓ **Positive Feedback** – Estrogen surge → LH surge → Ovulation.
 - ✓ **Negative Feedback** – Progesterone inhibits further GnRH release.

Puberty and Menopause

- **Puberty:**
 - ✓ Begins between 10–13 years.
 - ✓ Controlled by activation of hypothalamo-pituitary-ovarian axis.
 - ✓ Development of secondary sexual characters (breast, pubic hair, menstruation).
- **Menarche:**
 - ✓ First menstrual cycle; occurs around 12–13 years of age.
- **Menopause:**
 - ✓ Permanent cessation of menstruation for 12 months.
 - ✓ Occurs around 45–55 years.
 - ✓ Marked by ↓ Estrogen and ↑ FSH/LH.
 - ✓ Symptoms: Hot flashes, mood swings, vaginal dryness, osteoporosis.

Common Menstrual Disorders

1. **Amenorrhea** – Absence of menstruation (primary or secondary).
2. **Dysmenorrhea** – Painful menstruation due to uterine contractions.
3. **Menorrhagia** – Excessive or prolonged bleeding.
4. **Oligomenorrhea** – Infrequent cycles (>35 days).
5. **Polymenorrhea** – Too frequent cycles (<21 days).
6. **Premenstrual Syndrome (PMS)** – Emotional and physical symptoms before menses.

Nursing Interventions

- Educate about **menstrual hygiene and cycle tracking**.
- Encourage **balanced diet, rest, and hydration**.
- Use **warm compress or analgesics** for dysmenorrhea.
- Assess for **anemia, stress, or endocrine causes**.
- Provide **counseling for PMS and menopausal symptoms**.

Hormone & Cycle Correlation Table

Day	Dominant Hormone	Key Event
1–5	↓ Estrogen & Progesterone	Menstrual bleeding
6–13	↑ FSH → Follicle growth	Endometrium rebuilds
14	LH Surge	Ovulation
15–25	↑ Progesterone	Secretory changes
26–28	↓ Hormones	Prepares for menstruation

Nursing Booster Points

- Ovulation occurs **14 days before next menstruation**.
- Basal body temperature **rises after ovulation** due to progesterone.
- Cervical mucus becomes **watery and stretchable** at ovulation.
- Fertile period: **Day 10–17** of a 28-day cycle.
Cycle Phases: “Men Please Ovulate Soon” → Menstrual → Proliferative → Ovulatory → Secretory.
Hormone Order: “FLow High Every Period” → FSH → LH → Estrogen → Progesterone.

Nursing Booster Points

- **LH surge** causes ovulation (Day 14).
- **Progesterone** maintains endometrium after ovulation.
- **Estrogen** proliferates endometrial lining.
- **Cycle length** = 21–35 days (normal).
- **Basal temperature rise** = Indicates ovulation.

-
1. Ovulation occurs due to: → **LH surge**
 2. Hormone responsible for proliferative phase: → **Estrogen**
 3. Best indicator of ovulation: → **Basal body temperature rise**
 4. Normal menstrual cycle length: → **21–35 days**

Reproductive Hormones & Endocrine Control

- Female reproductive hormones regulate **ovulation, menstruation, pregnancy, and lactation.**
- Main controlling axis: **Hypothalamus → Pituitary → Ovaries → Target organs (Uterus, Breast).**
- Any imbalance causes menstrual irregularities, infertility, or pregnancy complications.

Major Reproductive Hormones

A. Human Chorionic Gonadotropin (hCG)

- ✓ **Source:** Syncytiotrophoblast of placenta.
- ✓ **Function:**
 - Maintains corpus luteum in early pregnancy.
 - Stimulates progesterone and estrogen production.
- ✓ **Detection:** Appears 8–9 days after fertilization (basis of pregnancy tests).
- ✓ **Clinical Notes:**
 - ↑ in molar pregnancy, multiple pregnancy, choriocarcinoma.
 - ↓ in ectopic or missed abortion.
- ✓ **Nursing Point:** Positive urine test = confirm pregnancy; interpret with LMP date.

B. Progesterone

- ✓ **Source:** Corpus luteum (first trimester), placenta (after 12 weeks).
- ✓ **Functions:**
 1. Maintains endometrium for implantation.
 2. Relaxes uterine muscles to prevent preterm contractions.
 3. Thickens cervical mucus (protective plug).
 4. Prepares breast lobules for lactation.
 5. Raises basal body temperature post-ovulation.
- ✓ **Deficiency:** Abortion or preterm labour.
- ✓ **Nickname:** Hormone of Pregnancy.
- ✓ **Nursing Role:** Administer prescribed progesterone support in threatened abortion.

C. Estrogen

- ✓ **Source:** Ovarian follicles (non-pregnant), placenta (pregnancy).
- ✓ **Types:**
 - Estradiol (E₂) – reproductive age
 - Estrone (E₁) – menopause
 - Estriol (E₃) – pregnancy marker
- ✓ **Functions:**
 - Promotes secondary sexual characters.
 - Stimulates endometrial proliferation (follicular phase).
 - Increases uterine blood flow and myometrial growth.
 - Aids cervical mucus secretion (thin, watery).
 - Improves bone mass and HDL (“heart-protective”).
- ✓ **Clinical Notes:**
 - ↓ Estrogen → osteoporosis, menopausal symptoms.
 - Estriol used as a marker of fetal well-being.
- ✓ **Nursing Role:** Teach women about dietary calcium, estrogen therapy safety.

D. Human Placental Lactogen (hPL / hCS)

- ✓ **Source:** Syncytiotrophoblast of placenta.
- ✓ **Functions:**
 - Alters maternal metabolism to supply glucose to fetus.
 - Promotes lipolysis (mobilizes fat for maternal energy).
 - Prepares breast for lactation.
- ✓ **Clinical Significance:**
 - Causes physiological insulin resistance → gestational diabetes risk.
 - Low levels → placental insufficiency.
- ✓ **Nursing Point:** Monitor blood sugar during pregnancy; educate on diet control.

E. Relaxin

- ✓ **Source:** Corpus luteum and placenta.
- ✓ **Functions:**
 1. Relaxes pelvic ligaments and pubic symphysis.
 2. Softens cervix for labour.
 3. Promotes uterine growth and endometrial receptivity.
- ✓ **Clinical Note:** High near term; helps facilitate normal delivery.
- ✓ **Mnemonic:** “RELAX – Relaxes pelvis, Endometrium support, Labour aid, Aids sperm transport, eXtra vasodilation.”

F. Prolactin

- ✓ **Source:** Anterior pituitary gland.
- ✓ **Functions:**
 - Stimulates milk secretion (lactogenesis).
 - Inhibits ovulation during lactation (natural contraception).
- ✓ **Controlled by:** Dopamine (inhibits release).
- ✓ **Nursing Point:** Encourage early breastfeeding → increases prolactin naturally.

G. Oxytocin

- ✓ **Source:** Synthesized in hypothalamus, released by posterior pituitary.
- ✓ **Functions:**
 - Stimulates uterine contractions during labour.
 - Causes milk ejection (let-down reflex).
 - Enhances maternal bonding and relaxation.
- ✓ **Clinical Uses:**
 - Induce labour or control postpartum hemorrhage (PPH).
- ✓ **Nursing Role:** Monitor uterine tone, FHR, and bleeding during oxytocin infusion.

H. Inhibin

- ✓ **Source:** Granulosa cells (ovary).
- ✓ **Function:** Selectively inhibits **FSH** release from pituitary.
- ✓ **Nursing Tip:** Measured for ovarian reserve testing in infertility cases.

Placental Hormones

Hormone	Source	Major Function	Clinical Importance
hCG	Placenta	Maintains corpus luteum	Pregnancy test
hPL	Placenta	Anti-insulin effect, fetal nutrition	↑ in GDM
Progesterone	CL → Placenta	Maintains pregnancy	Deficiency → abortion
Estrogen (E ₃)	Placenta	Uterine & breast growth	Marker for fetal health
Relaxin	CL & Placenta	Relaxes pelvis, cervix	Labour facilitation
Prolactin	Pituitary	Milk production	↑ in lactation
Oxytocin	Post. pituitary	Uterine contraction, milk ejection	Induction, PPH control

Other Endocrine Changes in Pregnancy

a. Thyroid Hormones:

- ✓ ↑ Total T₃/T₄ (due to high TBG); free T₃/T₄ normal.
- ✓ Slight hypermetabolic state → ↑ basal metabolic rate.

b. Cortisol:

- ✓ ↑ due to placental CRH → supports fetal lung maturity.

c. Insulin:

- ✓ Insulin resistance due to hPL → ensures glucose supply to fetus.
- ✓ May cause **gestational diabetes**.

d. Aldosterone:

- ✓ ↑ Sodium & water retention → expands blood volume.

Nursing Responsibilities:

- ✓ Monitor thyroid & blood sugar in high-risk mothers.
- ✓ **Educate** on balanced diet, rest, and early antenatal screening.

Clinical Applications of Hormones

1. Oral Contraceptives (OCPs):

- ✓ Contain estrogen + progesterone → suppress ovulation.
- ✓ Take daily for 21 days; 7-day pill-free interval.
- ✓ Nursing role: Educate on correct timing and missed-dose management.

2. Progesterone Therapy:

- ✓ Used in threatened abortion, preterm prevention, and infertility.

3. Estrogen Replacement Therapy (ERT):

- ✓ Used in menopause → relieves hot flashes, prevents osteoporosis.
- ✓ Nursing note: Watch for DVT, hypertension, and breast tenderness.

4. Oxytocin Infusion:

- ✓ Used for induction and to prevent PPH.
- ✓ Nurse must **monitor uterine contractions, fetal heart rate, and BP** continuously.

Hormone Comparison (Summary Table)

Feature	Estrogen	Progesterone
Nickname	Hormone of Femininity	Hormone of Pregnancy
Endometrium	Proliferation	Secretion & maintenance
Uterus	Increases excitability	Relaxes myometrium
Breast	Ductal growth	Lobulo-alveolar growth
Temperature	No change	Raises BBT
Clinical Use	OCP, HRT	OCP, luteal support

Nursing Responsibilities in Hormonal Therapy

- Verify medication orders carefully.
- Administer drugs at prescribed times.
- Observe for side effects (nausea, headache, weight gain).
- Educate patient about compliance and follow-up tests.
- Record menstrual pattern and symptom changes.
- Report any abnormal bleeding or pain.

Mnemonics for Quick Revision

Progesterone Functions – “PREGNANCY”

P – Prevents contractions

R – Regulates endometrium

E – Enhances breast growth

-
- G – Gingival changes
 - N – Neuroprotective
 - A – Antagonizes estrogen
 - N – Normalizes endometrium
 - C – Contraceptive role
 - Y – Yields immunosuppression

Oxytocin Functions – “LOVE BABY”

- L – Labour contractions
- O – Onset of milk ejection
- V – Vasodilation
- E – Emotional bonding
- B – Bonding mother–infant
- A – Aids sperm transport
- B – Behavioural calming
- Y – Yields positive feedback

Nursing Booster Points

- **First hormone of pregnancy:** hCG
- **Hormone maintaining pregnancy:** Progesterone
- **Gestational diabetes cause:** hPL
- **Fetal well-being marker:** Estriol (E_3)
- **Labour hormone:** Oxytocin
- **Pelvic relaxation hormone:** Relaxin
- **Milk secretion vs ejection:** Prolactin → secretion, Oxytocin → ejection

Sample MCQs

1. The hormone responsible for maintaining pregnancy is: → **Progesterone**
2. Which hormone causes gestational insulin resistance? → **hPL**
3. The hormone detected in pregnancy test is: → **hCG**
4. Milk ejection is controlled by: → **Oxytocin**
5. Fetal well-being is best assessed by: → **Estriol (E_3)**

Fertilization, Implantation & Embryonic Development

- **Fertilization** = Fusion of male (sperm) and female (ovum) gametes to form a diploid **zygote** ($2n = 46$).
- **Implantation** = Embedding of the developing blastocyst into the uterine endometrium.
- These processes initiate **pregnancy** and determine **early embryonic and placental development**.

Gametogenesis (Formation of Gametes)

A. Spermatogenesis

- ✓ Site → Seminiferous tubules of testes.
- ✓ Controlled by FSH (Sertoli cells) & LH (Leydig cells → testosterone).
- ✓ Duration \approx 64 days.
- ✓ Each spermatogonium ($2n$) → 4 spermatozoa (n).

B. Oogenesis

- ✓ Site → Ovarian follicles.
- ✓ Begins before birth → arrested in Prophase I until puberty.
- ✓ Each oogonium ($2n$) → 1 ovum (n) + 3 polar bodies.
- ✓ Ovulation releases the secondary oocyte (arrested in Metaphase II → completes meiosis after fertilization).

Process of Fertilization

1. **Site:** Ampullary–isthmic junction of the fallopian tube.
2. **Timing:** Within 12–24 hours after ovulation.
3. **Steps:**
 - ✓ **Capacitation:** Functional maturation of sperm inside the female tract.
 - ✓ **Acrosomal reaction:** Sperm enzymes (hyaluronidase, acrosin) digest zona pellucida.
 - ✓ **Fusion:** Sperm membrane binds oolemma; nuclei fuse → zygote formed.
 - ✓ **Cortical reaction:** Zona hardens → prevents polyspermy.
4. **Result:** Diploid zygote (46 chromosomes) restores species number.

Zygote Cleavage & Early Embryo

- **20–30 h:** 2-cell stage.
- **40–50 h:** 4-cell stage.
- **~3 days:** 8-cell morula enters uterus.
- **~5 days:** Blastocyst (> 64 cells) forms → inner cell mass + trophoblast.
- **~6–7 days:** Zona hatching → blastocyst ready for implantation.

Implantation

- **Occurs:** ~Day 7 post-fertilization (in decidua basalis).
- **Mechanism:**
 1. **Attachment:** Trophoblast contacts endometrium.
 2. **Invasion:** Trophoblast → cyto- & syncytiotrophoblast layers.
 3. **Nutrition:** Lacunae form → uteroplacental circulation begins (Day 10–12).
- **Sign:** Minor implantation bleeding (Hartman's sign).
- **Nursing Note:** Spotting ~1 week after ovulation may mimic light menses.

Formation of Germ Layers (3rd Week)

Layer	Major Derivatives
Ectoderm	Skin, nervous system, sense organs
Mesoderm	Muscles, bones, blood, connective tissue, urogenital organs
Endoderm	GIT, respiratory tract, liver, pancreas, thyroid

Mnemonic → “**EME**” = **Ectoderm** → **Mind + Skin** | **Mesoderm** → **Muscle** | **Endoderm** → **Organs inside.**”

Embryonic & Fetal Milestones

Week 1–2: Fertilization → Implantation.

Week 3: Gastrulation → 3 germ layers form.

Week 4: Neural tube forms (critical for folic acid).

Week 5–6: Heart beats → first organ functioning.

Week 8: Organogenesis complete; called “embryo → fetus.”

Week 10–12: Heartbeat detectable (Doppler); external genitalia differentiate.

Week 16–20: Quickening (fetal movements); lanugo & vernix appear.

Week 24: Surfactant production begins (lung viability threshold).

Week 28–32: Fat deposition & eye opening.

Week 36–40: Full term maturity; L:S ratio ≥ 2:1.

Fetal Circulation (Important Concept)

- Oxygenated blood → from **placenta via umbilical vein**.
- **Ductus venosus** → bypasses liver → joins IVC.
- **Foramen ovale** → right to left atrial shunt.
- **Ductus arteriosus** → pulmonary artery → aorta (shunts away from lungs).
- Deoxygenated blood → returns via 2 umbilical arteries → placenta.
After birth: all shunts close → normal postnatal circulation established.

Nursing Role in Early Pregnancy Care

1. Educate on timing of conception and fertile period.
2. Encourage folic acid 400 µg/day to prevent neural tube defects.
3. Explain implantation bleeding vs menstrual bleeding.
4. Reinforce importance of avoiding radiation and teratogenic drugs.
5. Support antenatal registration and early USG for dating.

Spermatogenesis vs Oogenesis

Feature	Spermatogenesis	Oogenesis
Site	Testes (seminiferous tubules)	Ovarian follicles
Duration	~64 days	Birth → menopause
Gametes / cell	4 sperm	1 ovum + 3 polar bodies
Start	Puberty	Fetal life
Arrest	None	Prophase I & Metaphase II
Output	Millions daily	One ovum per cycle

Clinical Correlation :

- **Ectopic pregnancy:** Implantation outside uterus (usually ampulla).
- **Molar pregnancy:** Abnormal trophoblast growth → ↑ hCG markedly.
- **Neural tube defects:** due to folate deficiency or early teratogen exposure.
- **Early pregnancy loss:** often chromosomal abnormality or hormonal defect.

Nursing Responsibilities:

- Recognize symptoms of ectopic (pain, spotting).
- Reinforce antenatal supplements (folic acid, iron).
- Provide emotional support after pregnancy loss.

Mnemonics for Revision

- **Fertilization steps:** “C-A-F-C” → Capacitation, Acrosome reaction, Fusion, Cortical reaction.
- **Fetal shunts:** “V-O-A” → Ductus Venosus, Foramen Ovale, Ductus Arteriosus.
- **Three germ layers:** “E-M-E” → Ectoderm, Mesoderm, Endoderm.

Nursing Booster Points

- **Site of fertilization:** Ampulla of fallopian tube.
- **Implantation site:** Decidua basalis of uterus.
- **First functioning fetal organ:** Heart (3rd week).
- **First detectable hormone:** hCG (8–9 days).
- **Fetal viability:** > 24 weeks (≥ 500 g with NICU care).
- **First fetal movement:** Quickening (16–20 weeks).
- **Folic acid prevents:** Neural tube defects.
Site of fertilization → **Ampulla of fallopian tube**
Implantation occurs on → **Decidua basalis**
First functioning organ → **Heart (21 days)**
Main fetal shunt bypassing lungs → **Ductus arteriosus**
Hormone for implantation maintenance → **Progesterone**

Placenta, Umbilical Cord & Amniotic Fluid

- The **placenta, umbilical cord, and amniotic fluid** are vital structures that support **fetal growth, development, and protection** during pregnancy.
- Collectively, they are called the **fetomaternal unit**.

Placenta



- The **placenta** is a **temporary, discoid organ** formed by the fusion of **chorionic villi (fetal part)** and **decidua basalis (maternal part)**.
- It connects **mother and fetus**, allowing nutrient and gas exchange.

Formation

1. Begins at **implantation (~7 days after fertilization)**.
2. Fully developed by **12–14 weeks of gestation**.
3. **Chorionic villi** invade decidua basalis → form **cotyledons** (15–20 lobes).
4. Placenta enlarges until ~36 weeks.

Shape: Circular, discoid (~15–20 cm diameter, 500 g weight).

➤ **Surfaces:**

- ✓ **Fetal side:** Smooth, shiny (amnion-covered), umbilical cord attached centrally.
- ✓ **Maternal side:** Rough, red, lobulated (cotyledons).

Placental Circulation (Fetomaternal Exchange)

Fetal Blood Flow:

Umbilical arteries (2) → chorionic villi → umbilical vein → fetus.

Maternal Blood Flow:

Spiral arteries → intervillous spaces → uterine veins → maternal circulation.

No direct mixing of maternal and fetal blood occurs (exchange via diffusion).

Functions of the Placenta

A. Respiratory

- ✓ Acts as the **lungs** of the fetus.
- ✓ O₂ diffuses from mother → fetus; CO₂ diffuses back.

B. Nutritive

- ✓ Transfers glucose, amino acids, vitamins, minerals to fetus.

C. Excretory

- ✓ Removes fetal waste products (urea, uric acid, creatinine).

D. Endocrine (Hormonal)

Produces several hormones essential for pregnancy maintenance:

- ✓ **hCG** – Maintains corpus luteum.
- ✓ **hPL** – Alters maternal metabolism.
- ✓ **Estrogen** – Uterine growth.
- ✓ **Progesterone** – Maintains endometrium.
- ✓ **Relaxin** – Softens cervix.