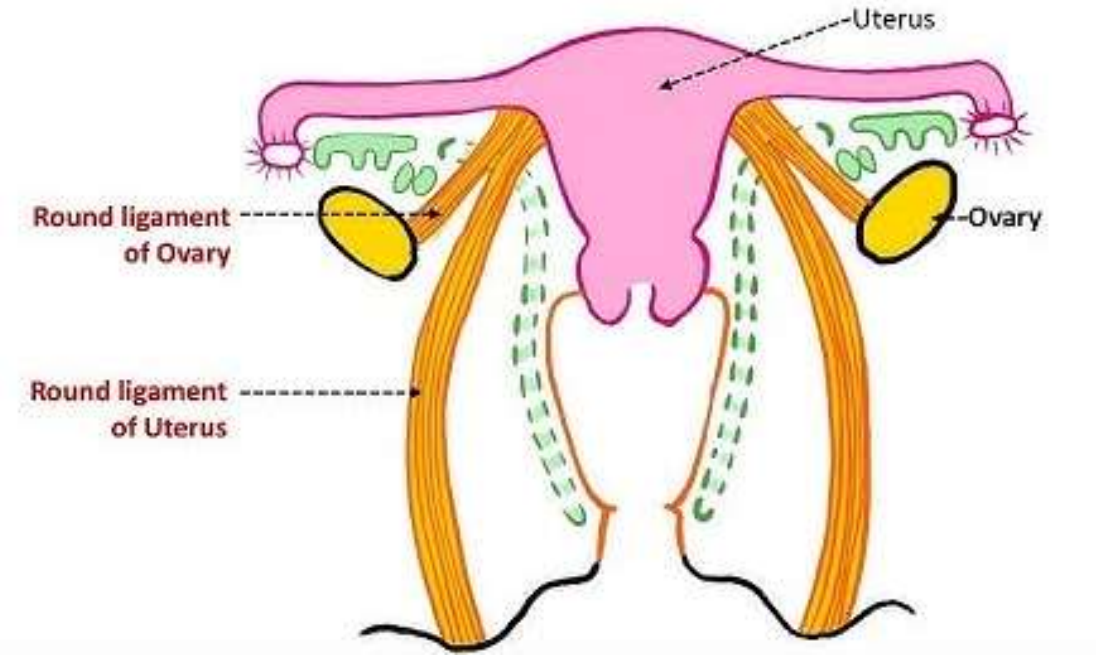
Reproduction Module-I

2nd Year MBBS(LGIS)

Development of Ovaries



Presenter: Prof. Dr. Ifra Saeed

Date: 00-00-25

First Ten Minutes

Prof. Umar's Model of Teaching Strategy

Self Directed Learning Assessment Program

Objectives :To cultivate critical thinking, analytical reasoning, and problem-solving competencies.

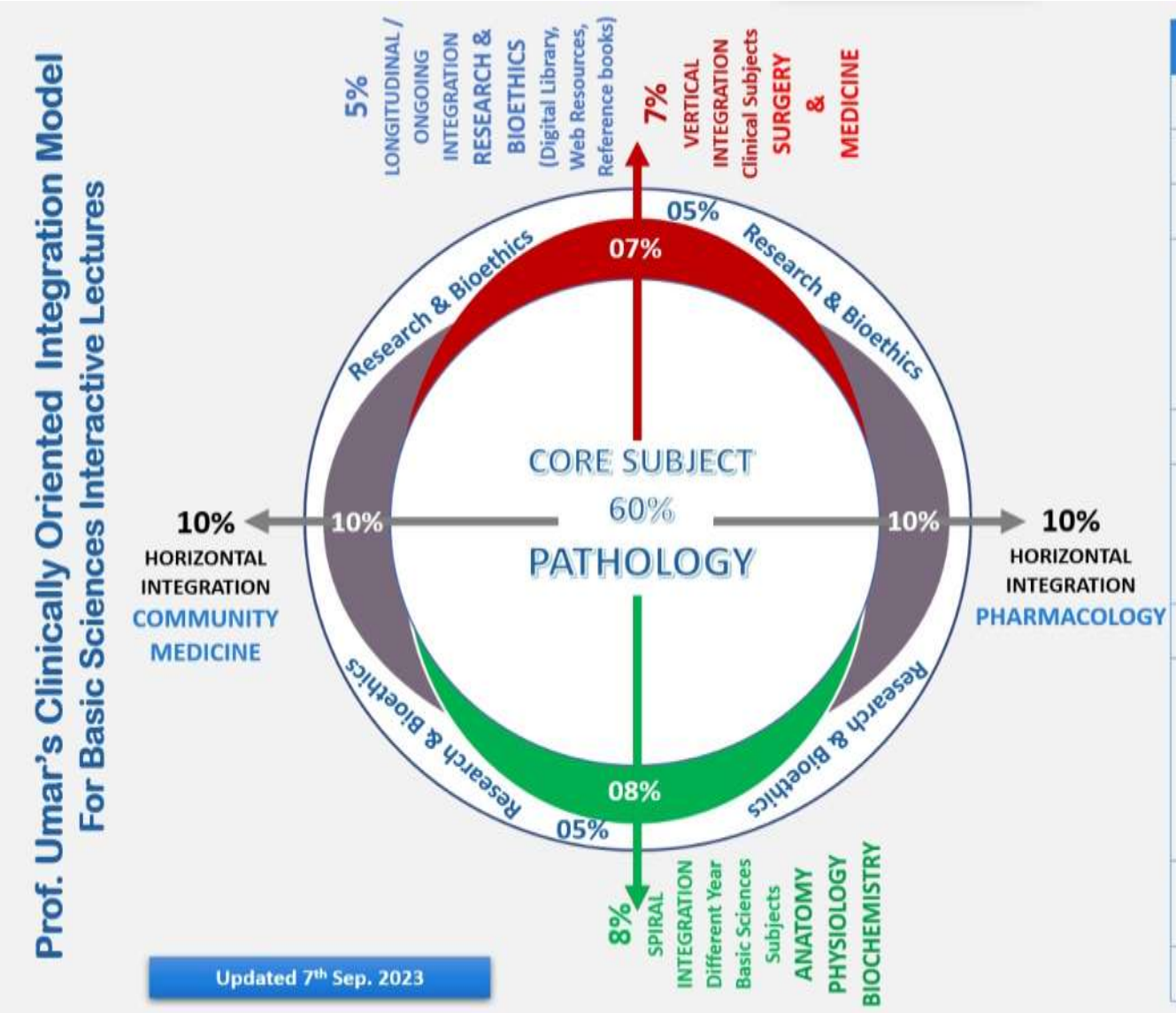
To instill a culture of self-directed learning, fostering lifelong learning habits and autonomy.

How to Assess?

- Ten randomly selected students will be evaluated within the **first 10 minutes of the lecture** through 10 multiple-choice questions (MCQs) based on the PowerPoint presentation shared on Students Official WhatsApp group, one day before the teaching session.
- The number of MCQs from the components of the lecture will follow the guidelines outlined in the **Prof. Umar model of Integrated Lecture**.

Component of LGIS	Core Knowledge	Horizontal Integration	Vertical Integration	Spiral Integration
No of MCQs	6–7	1-2	1	1

Professor Umar Model of Integrated Lecture



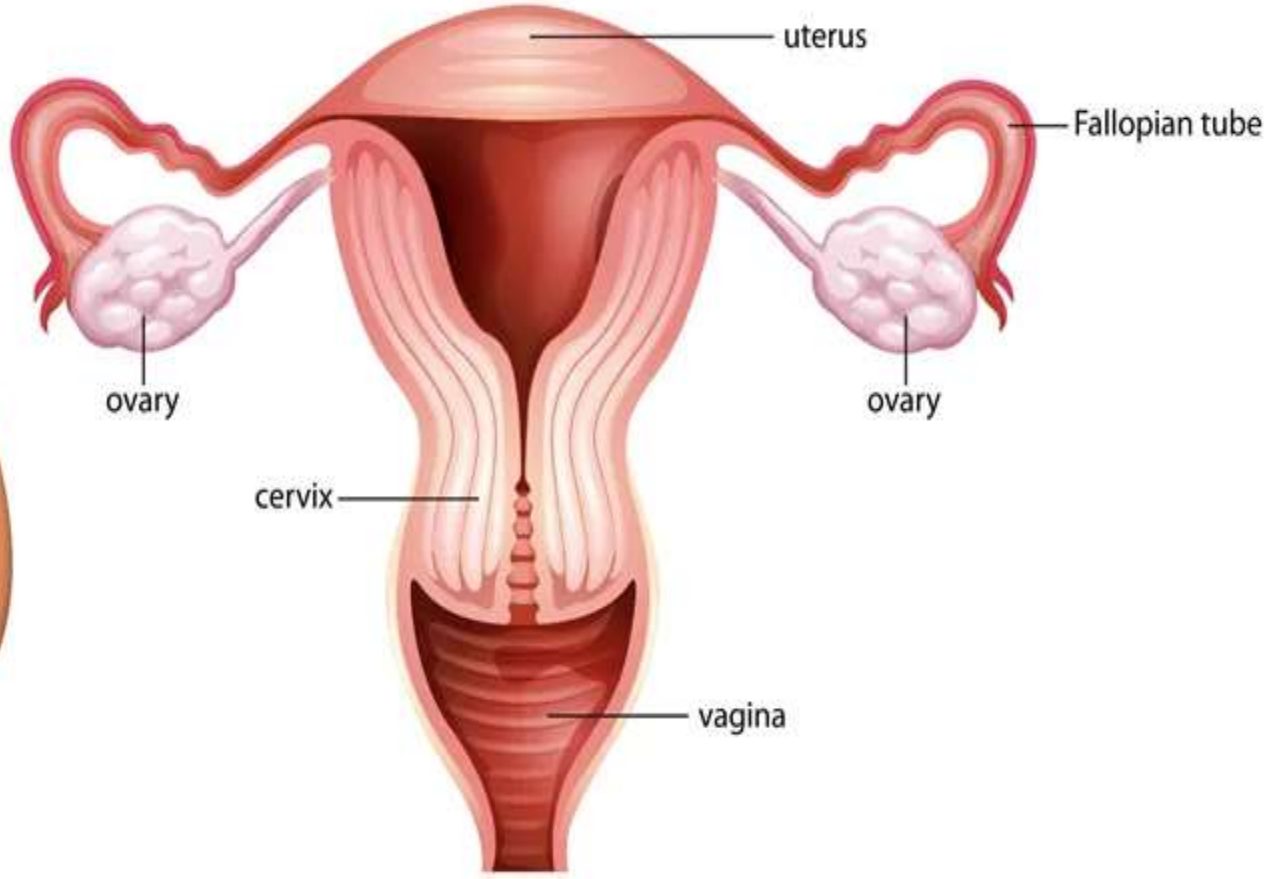
Model 3rd Year Pathology LGIS (≈30 slides)	
Core Subject – 60% (≈ 18-20 slides)	
Pathology (≈ 18-20 slides)	
Horizontal Integration – 20% (≈ 5-6 slides)	
Same Year Subjects	• Pharmacology (10%) (≈ 2-3 slides) • Community Medicine (10%) (≈ 2-3 slides)
Vertical Integration – 07% (≈ 2-3 slides)	
Clinical Subjects	• Medicine (3-5%) (≈ 1-2 slides) • Surgery (3-5%) (≈ 1-2 slides)
Spiral Integration – 08% (≈ 2-3 slides)	
Different Year Basic Sciences Subjects	• Anatomy (1-3%) (≈ 1-2 slides) • Physiology (1-3%) (≈ 1-2 slides) • Biochemistry (1-3%) (≈ 1-2 slides)
Longitudinal / Ongoing Integration – 05% (≈ 1-2 slides)	
Research & Bioethics (≈ 1-2 slides)	

Learning Objectives

At the end of the session, student will be able to

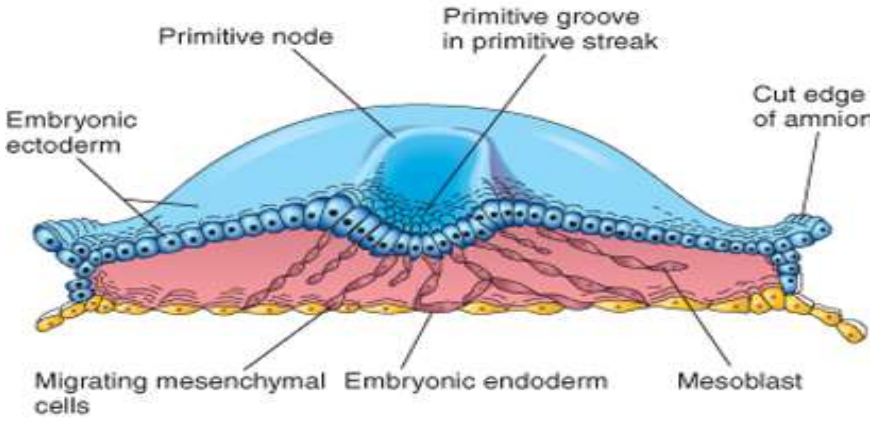
- Describe development of ovary
- Describe the descent of ovaries
- Discuss congenital abnormalities of ovaries
- Integrate physiological and biochemical aspects with development of ovaries
- Approach towards patient of POS in Family Medicine
- Correlate and build core knowledge on the basis of latest research

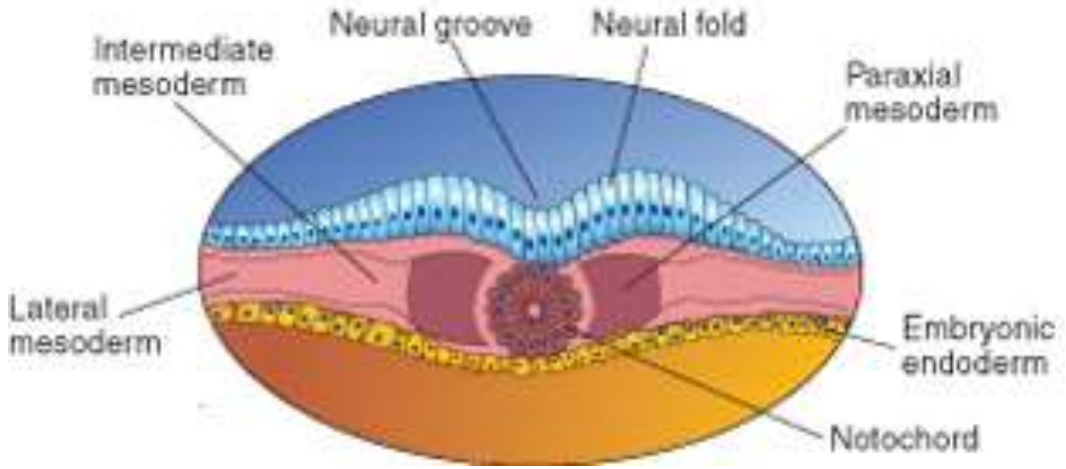
Female Reproductive System

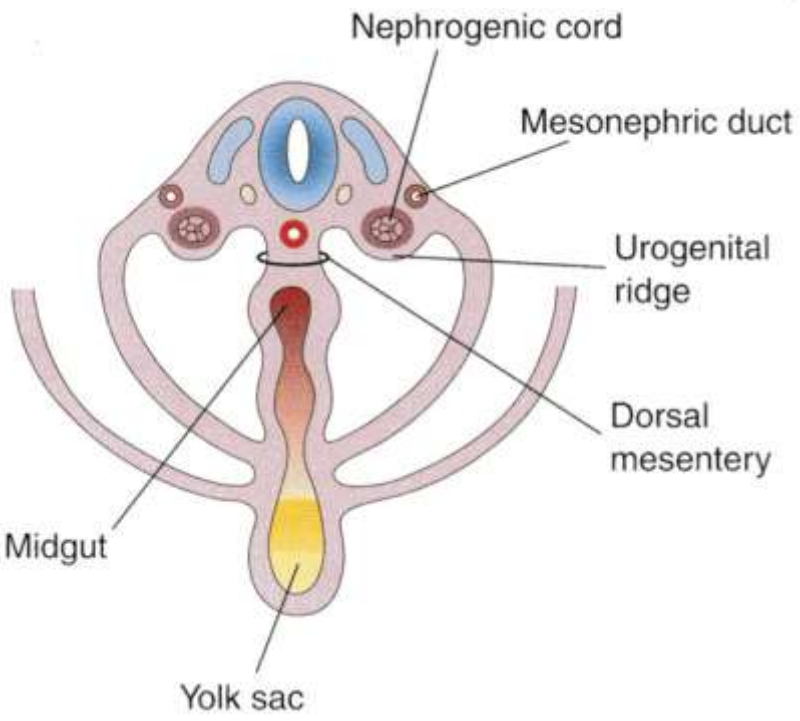


Core Concept

Gastrulation and Formation of Urogenital ridge







Core Concept

Introduction

- Sex of the embryo is determined at the time of fertilization, gonads do not acquire male/female morphological characteristics until seventh week of development

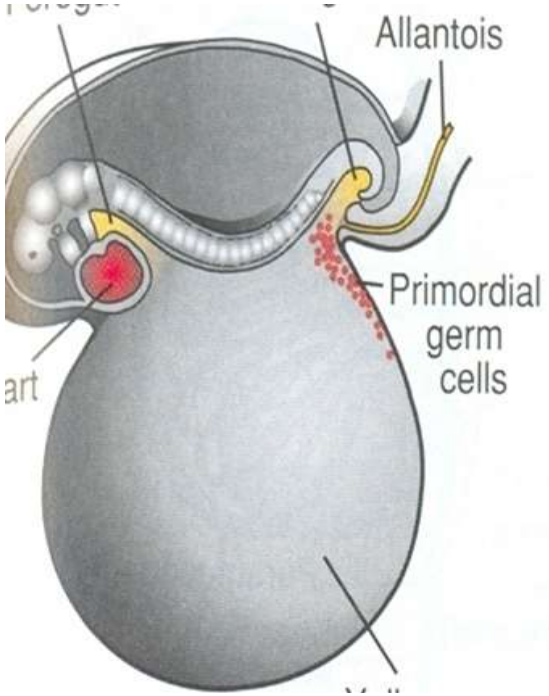
- Initially as a pair of longitudinal ridges

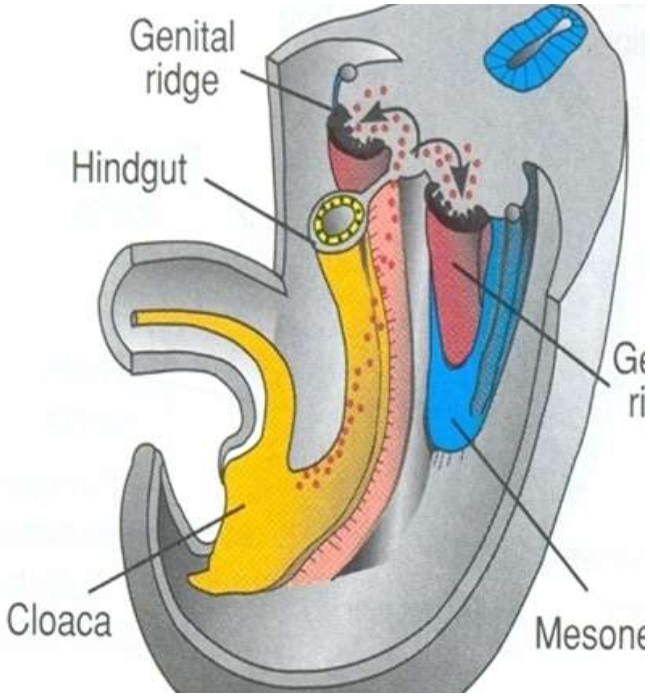
- Germ cells do not appear in these ridges until sixth week of development

Core Concept

Primordial Germ Cells

- Originate in Epiblast
- Migrate through primitive streak
- Reside in yolk sac by third week
- They migrate by ameboid movement along dorsal mesentery during fourth week
- Arrive at gonads during fifth week
- Invade gonads during sixth week
- If they fail to reach the ridges gonads never develop

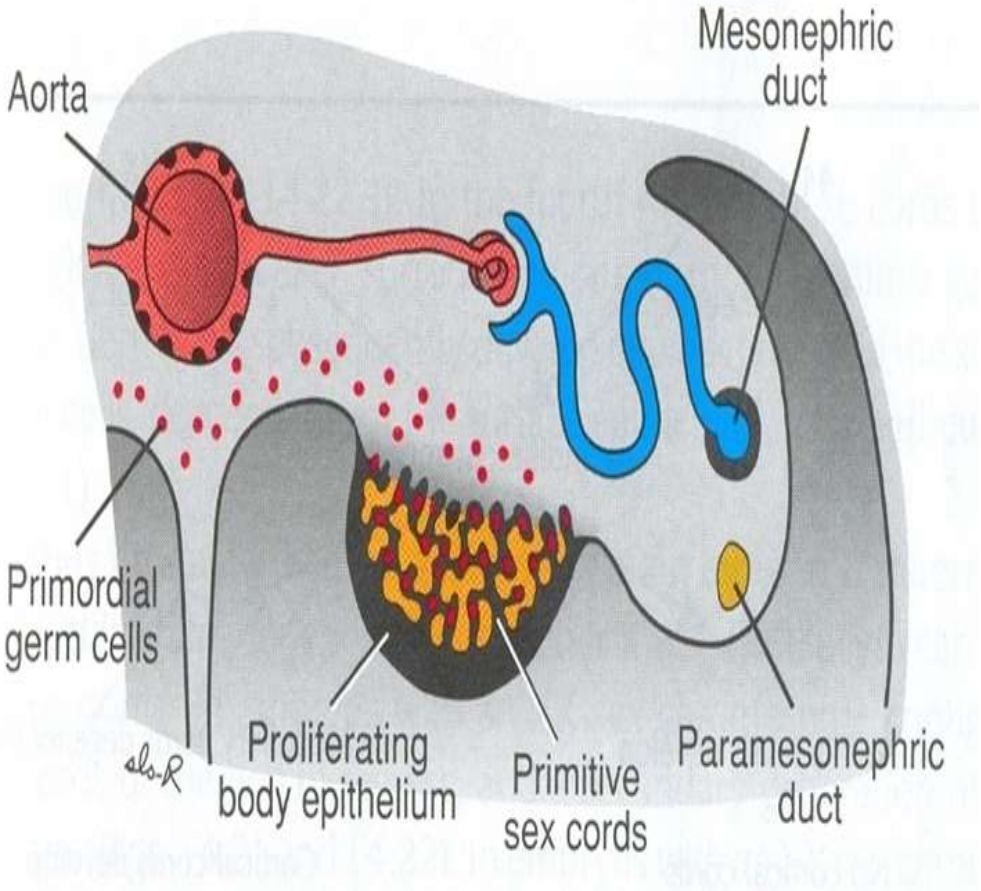




Core Concept

3 sources of Gonads

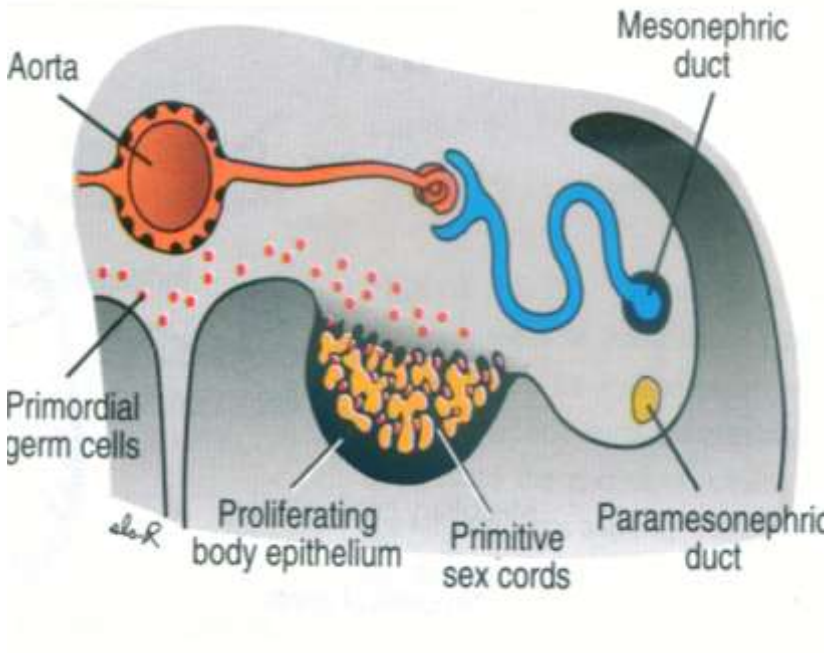
1. Mesodermal epithelium lining the urogenital ridge (posterior abdominal wall)
2. Underlying embryonic connective tissue
3. Primordial germ cell



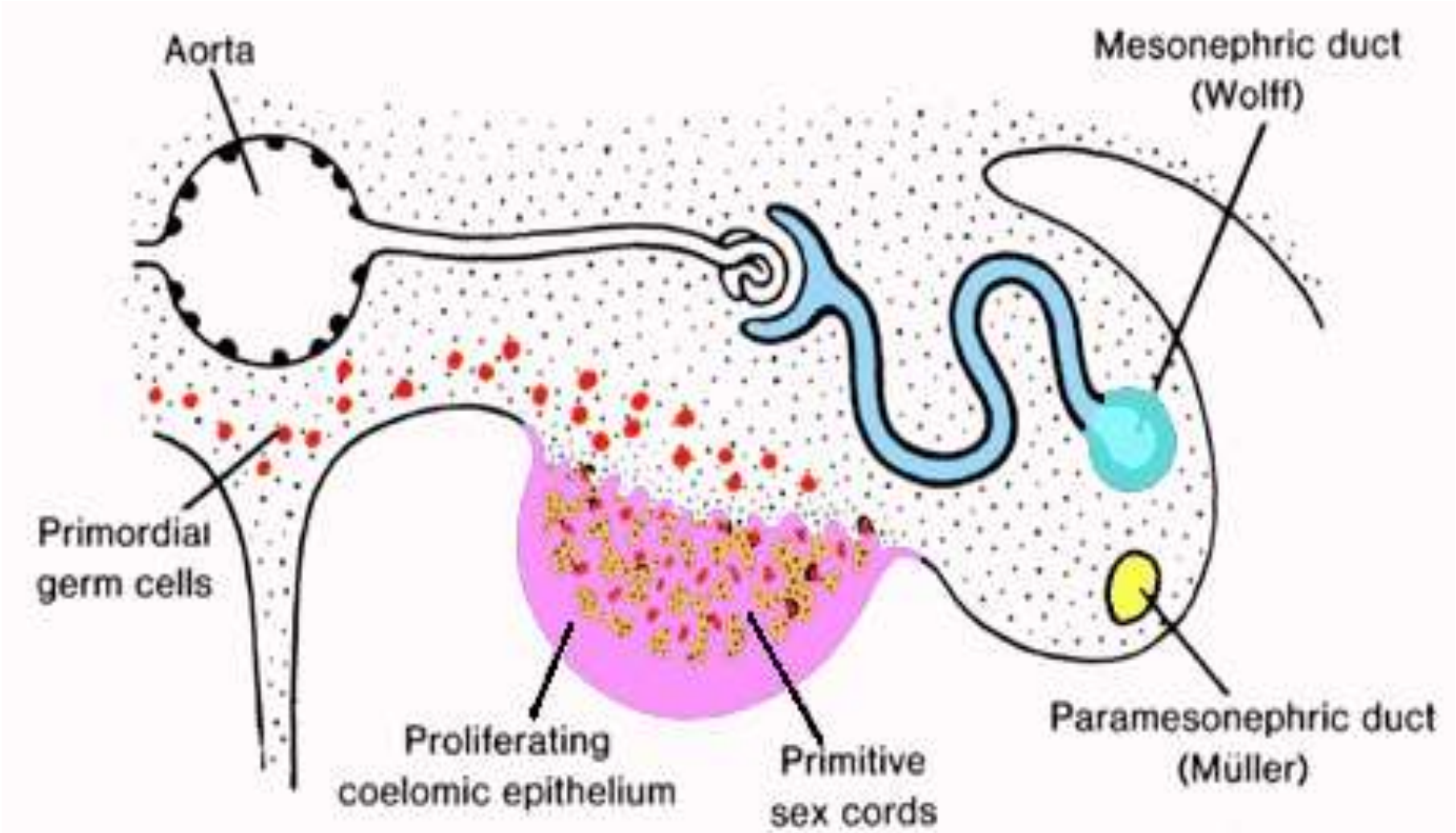
Core Concept

Indifferent stage of gonads

- Genital ridge is thus formed by proliferation of epithelium & underlying connective tissue
- Finger like epithelial cords develop known as primary sex cord
- Indifferent gonads now consists of an external cortex & internal medulla



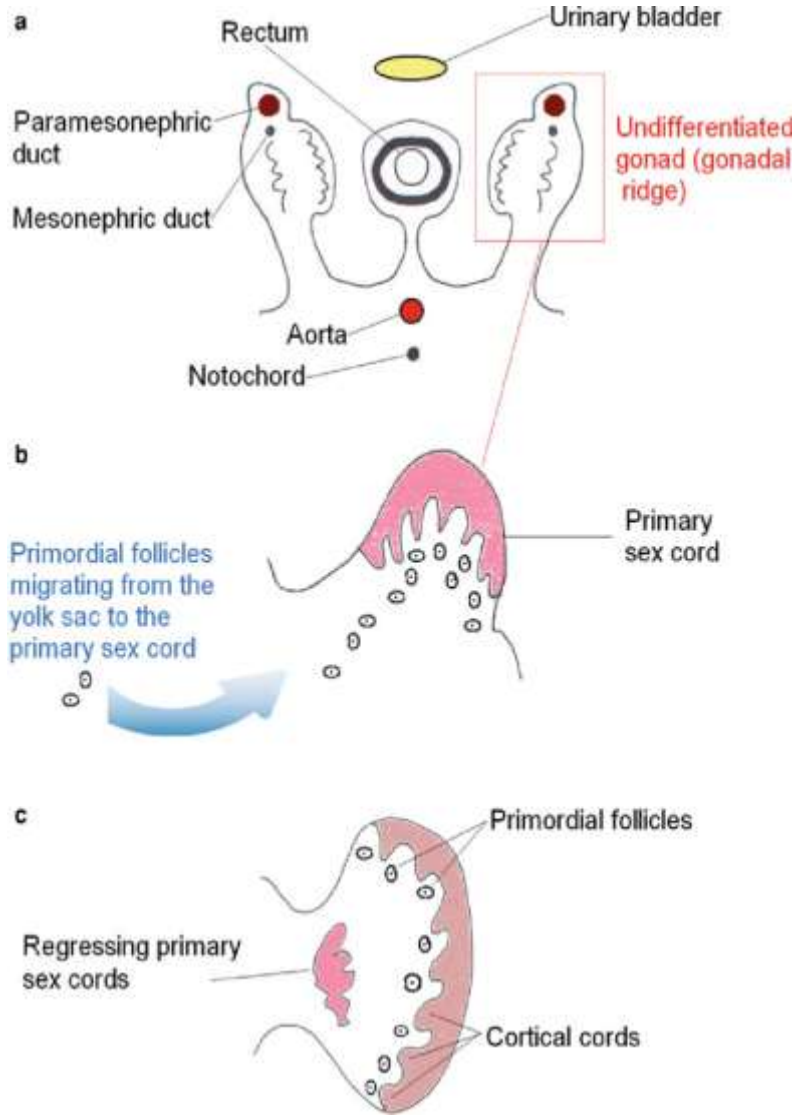
Core Concept



Core Concept

Development of ovary

- Gonadal development occurs slowly in female embryos.
- The X chromosomes bear genes for ovarian development, and an autosomal gene also appears to play a role in ovarian organogenesis.



Core Concept

Gonadal Cords

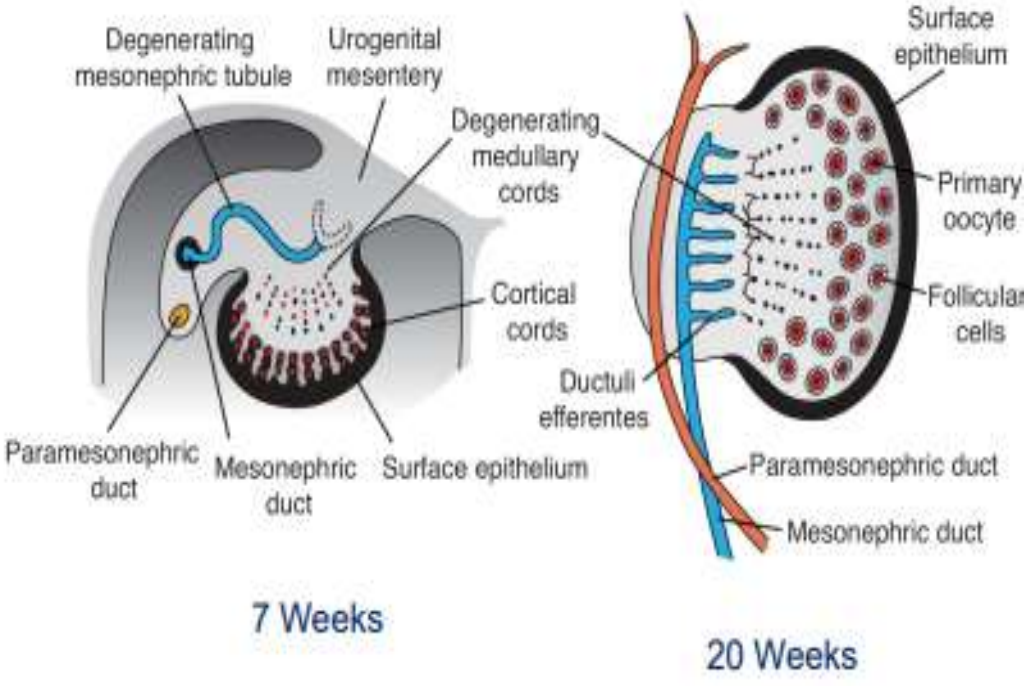
- The ovary is not identifiable histologically until approximately the 10th week.
- **Gonadal cords** do not become prominent, but they extend into the medulla and form a rudimentary **rete ovarii**.
- This structure and the gonadal cords normally degenerate and disappear

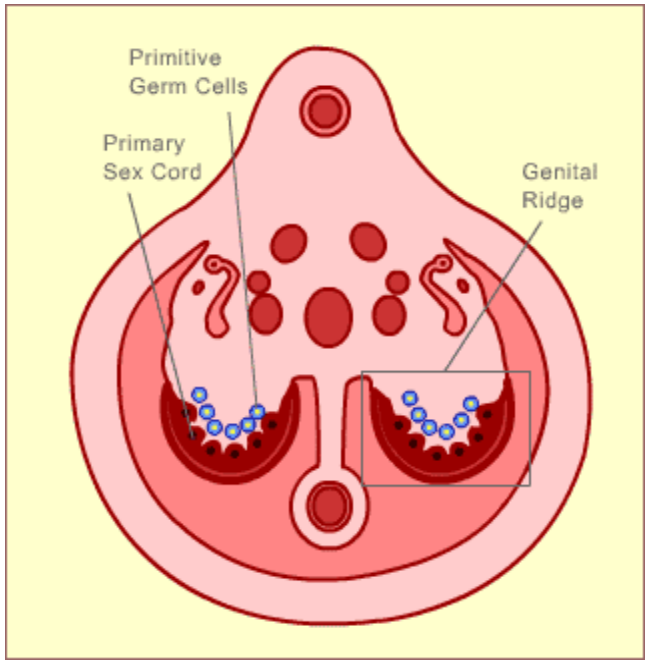
Core Concept

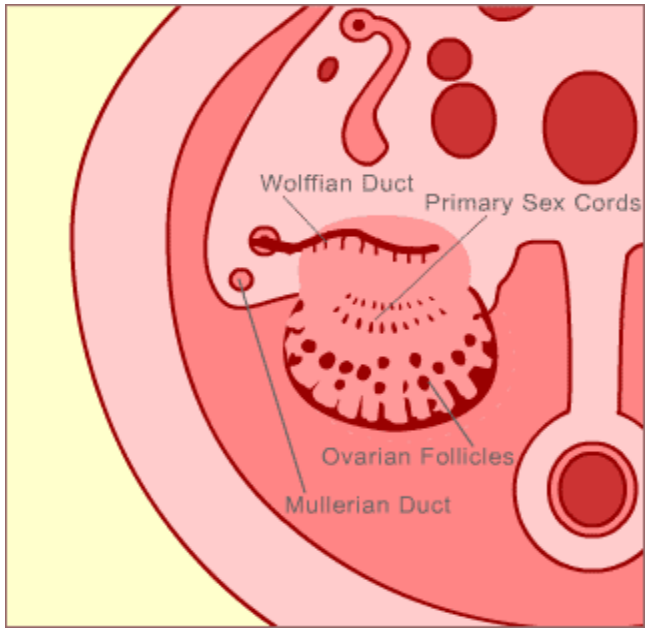
Cortical cords

extend from the surface epithelium of the developing ovary into the underlying mesenchyme during the early fetal period.

- This epithelium is derived from the mesothelium. As the cortical cords increase in size, **primordial germ cells** are incorporated in them.





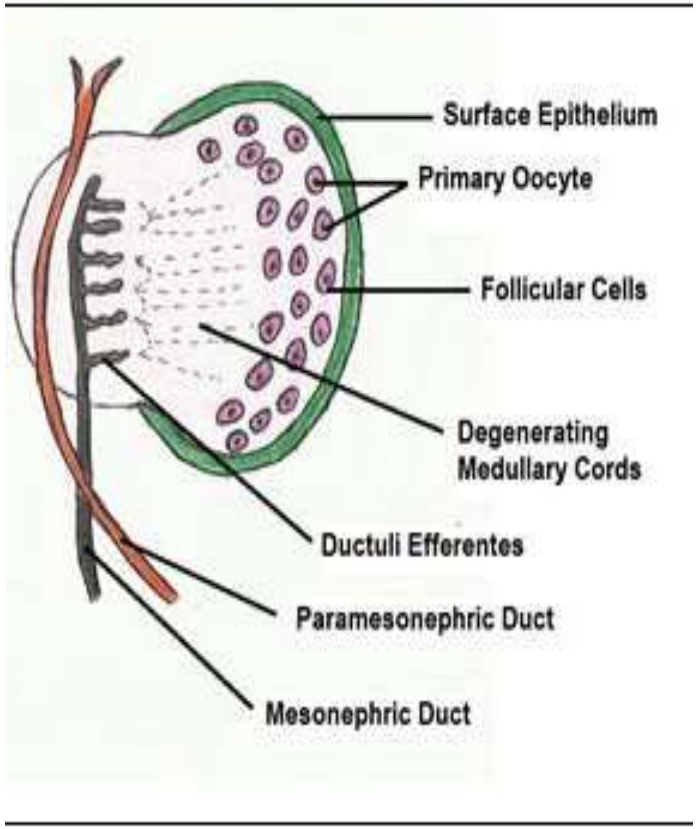


Core Concept

Primordial Follicles

At approximately 16 weeks, these cords begin to break up into isolated cell clusters-**primordial follicles-**

Primordial follicles consists of an oogonium, derived from a primordial germ cell, surrounded by a single layer of flattened follicular cells derived from the surface epithelium .



Core Concept

No oogonia form postnatally. Although many oogonia degenerate before birth, the two million or so that remain enlarge to become **primary oocytes** before birth.

After birth, the surface epithelium of the ovary flattens to a single layer of cells continuous with the mesothelium of the peritoneum at the hilum of the ovary.

Core Concept

Mesovarium

- The surface epithelium of the ovary was once called the germinal epithelium, which was inappropriate.

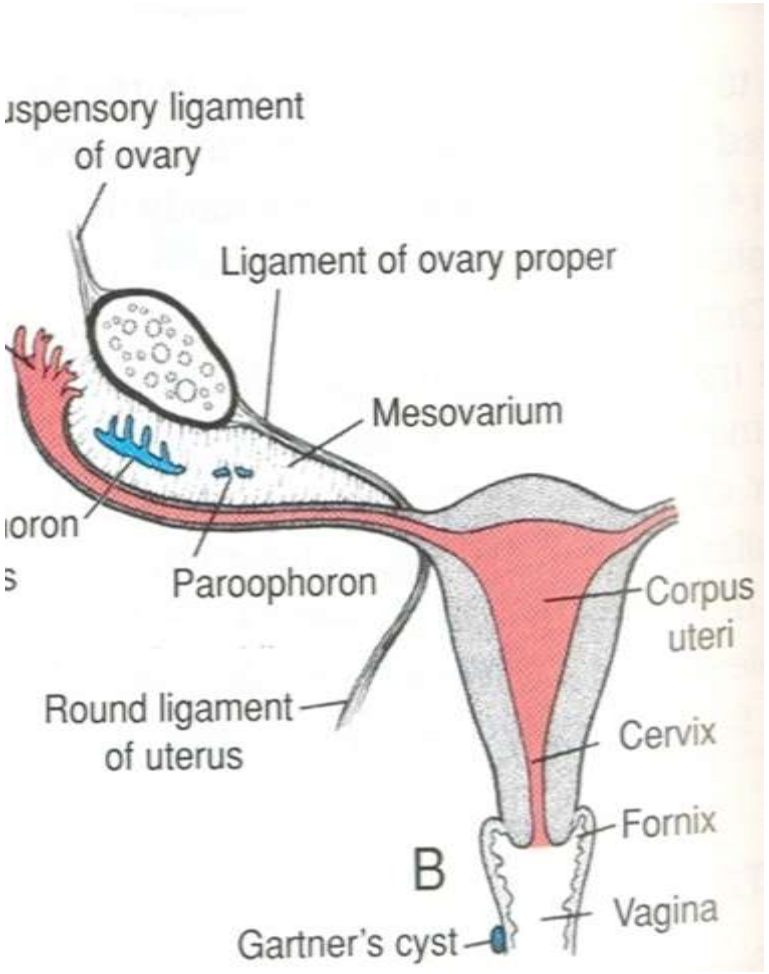
- The surface epithelium becomes separated from the follicles in the cortex by a thin fibrous capsule, the tunica albuginea.

- As the ovary separates from the regressing mesonephros, it is suspended by a mesentery- the **mesovarium**

Core Concept

Descent of ovaries

From the posterior abdominal wall to the pelvis; however, they do not pass from the pelvis and enter the inguinal canals.

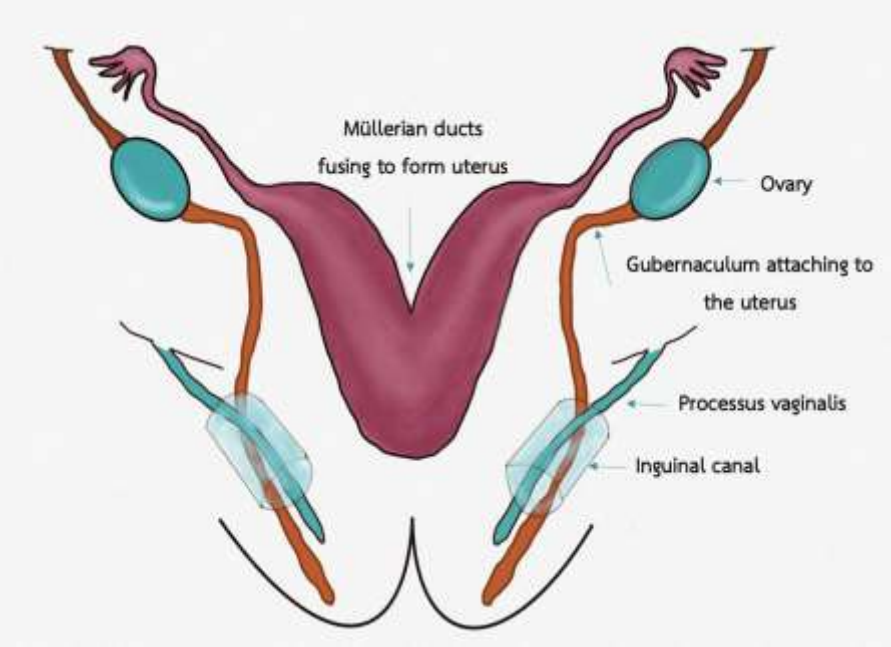


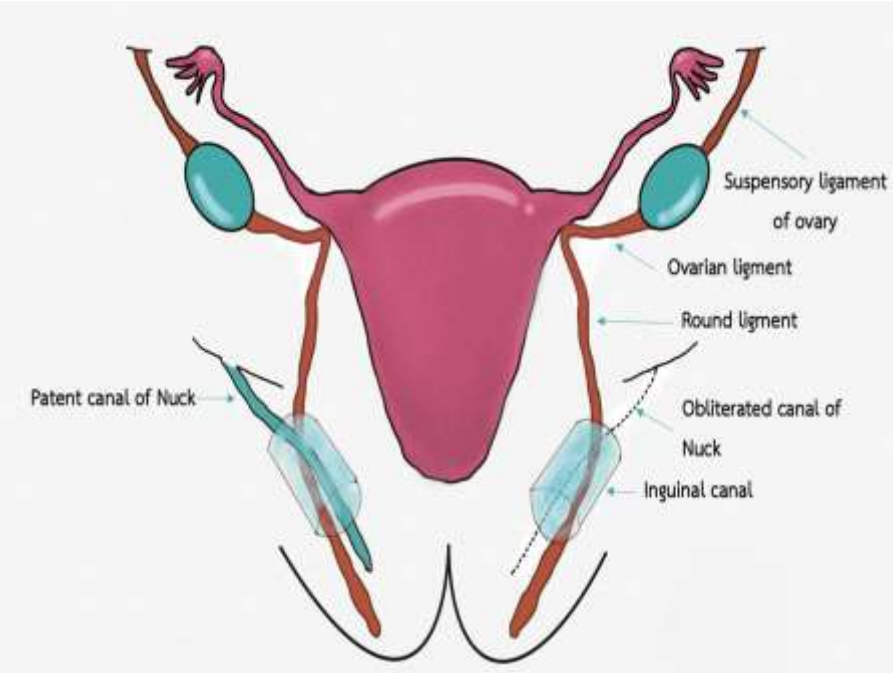
Core Concept

Gubernaculum

is also attached to the uterus near the attachment of the uterine tube.

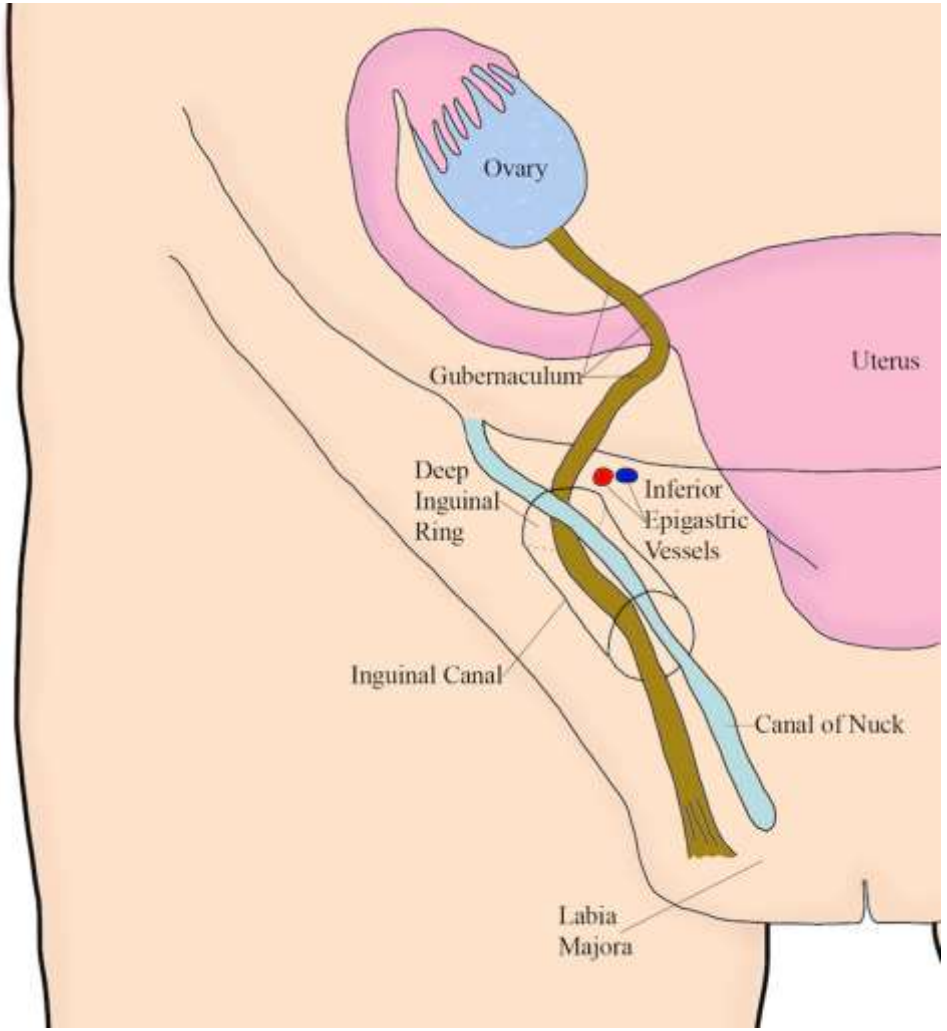
The cranial part of the gubernaculum becomes the **ovarian ligament,** and the caudal part forms the **round ligament of the uterus**





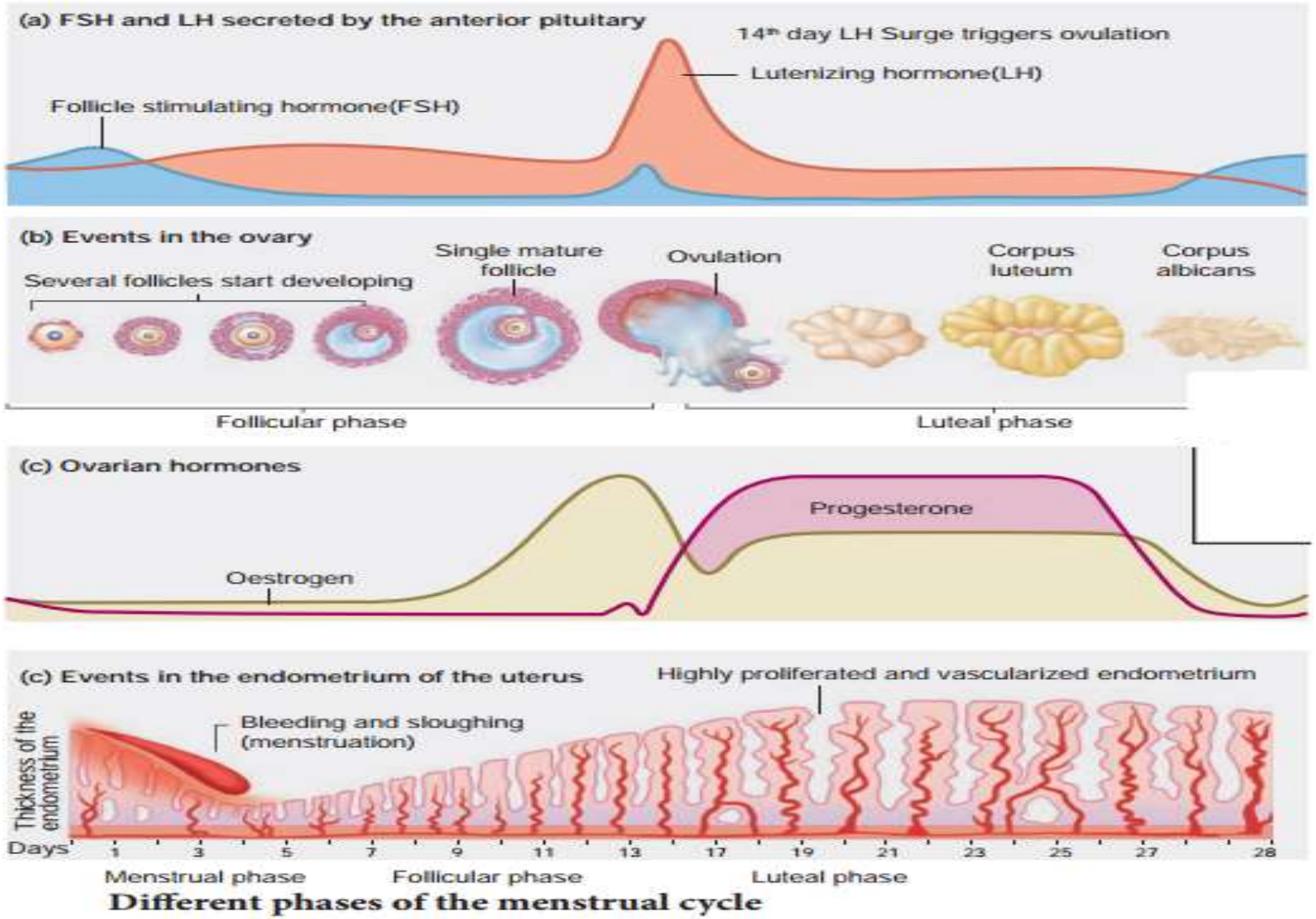
Canal of Nuck

- The round ligaments pass through the inguinal canals and terminate in the labia majora.
- The relatively small processus vaginalis in the female usually obliterates and disappears
- A processus vaginalis that persists after birth is called **canal of Nuck**.



Core Concept

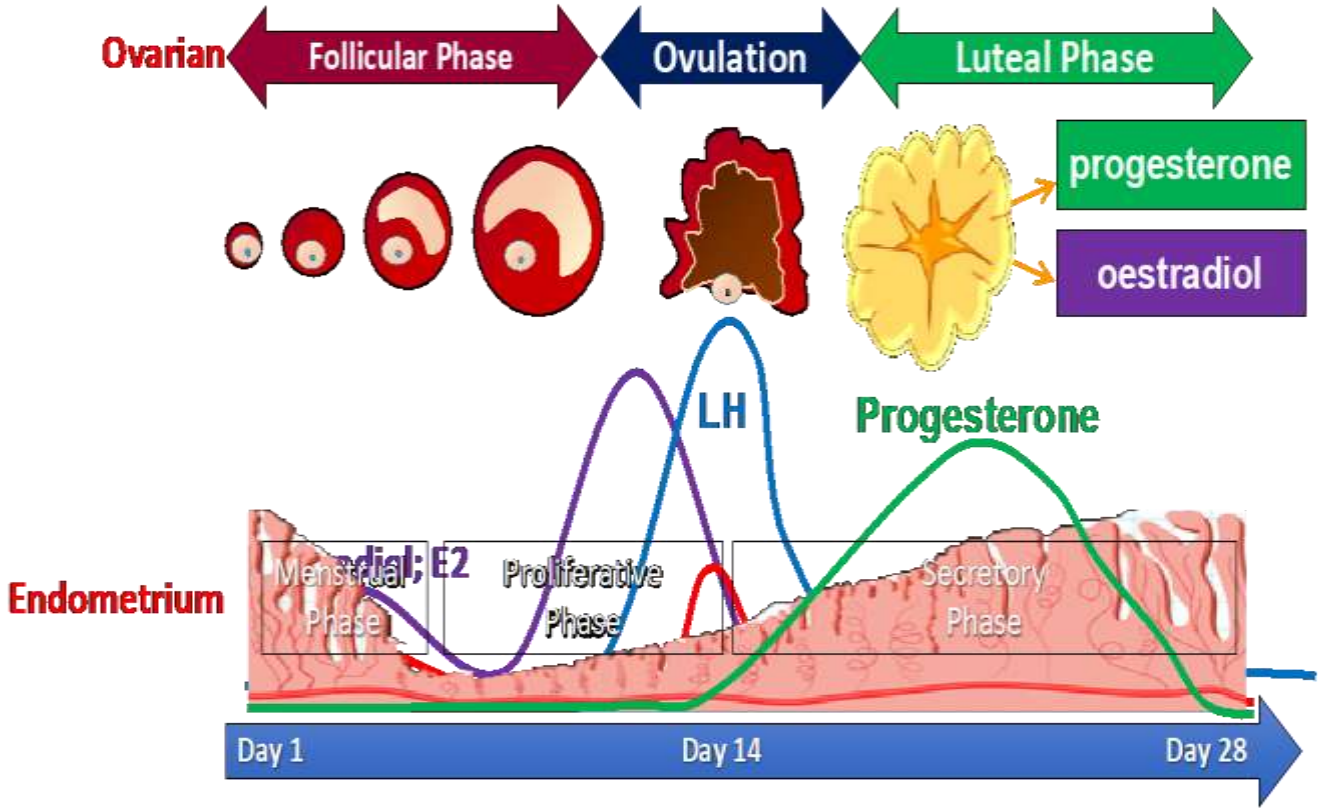
Physiological / Biochemical Aspects of ovaries

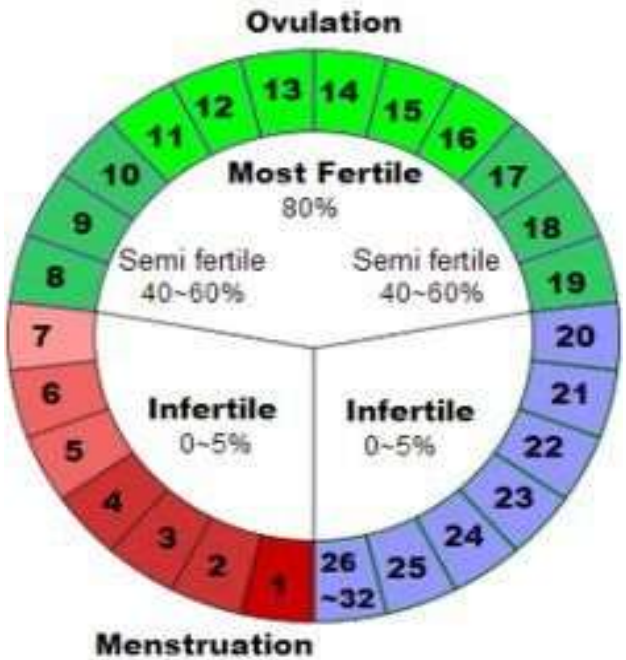


Different phases of the menstrual cycle

Horizontal Integration

Menstrual Cycle





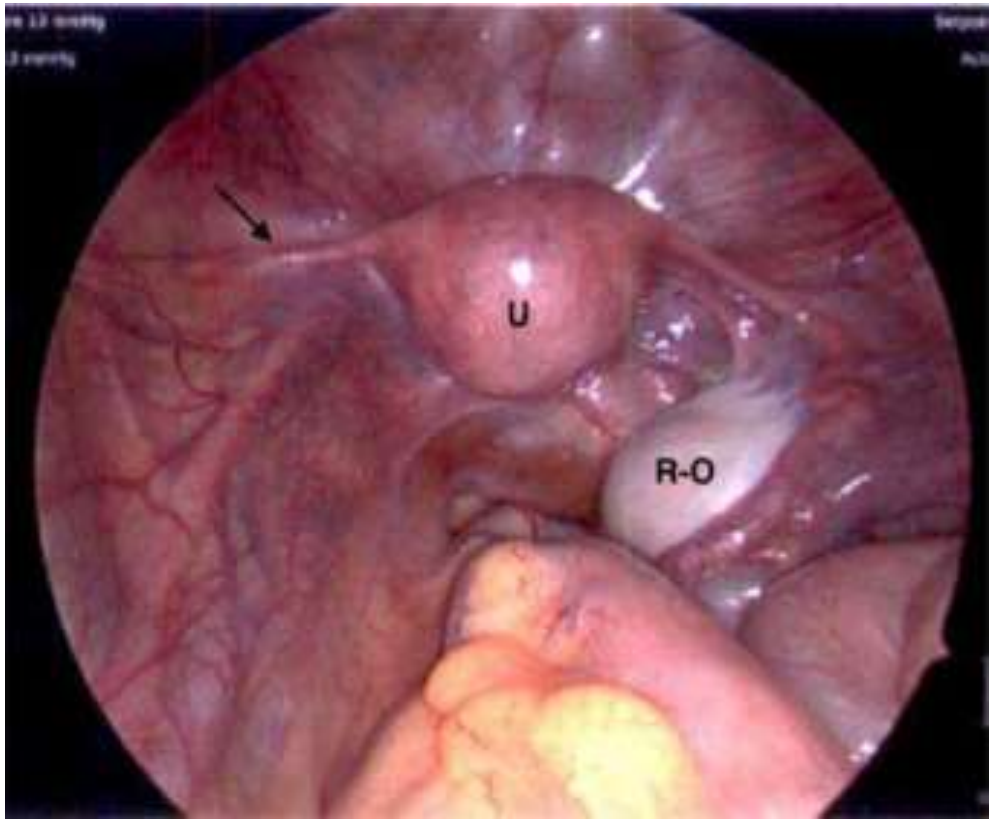
Horizontal Integration

Congenital anomalies of the ovary

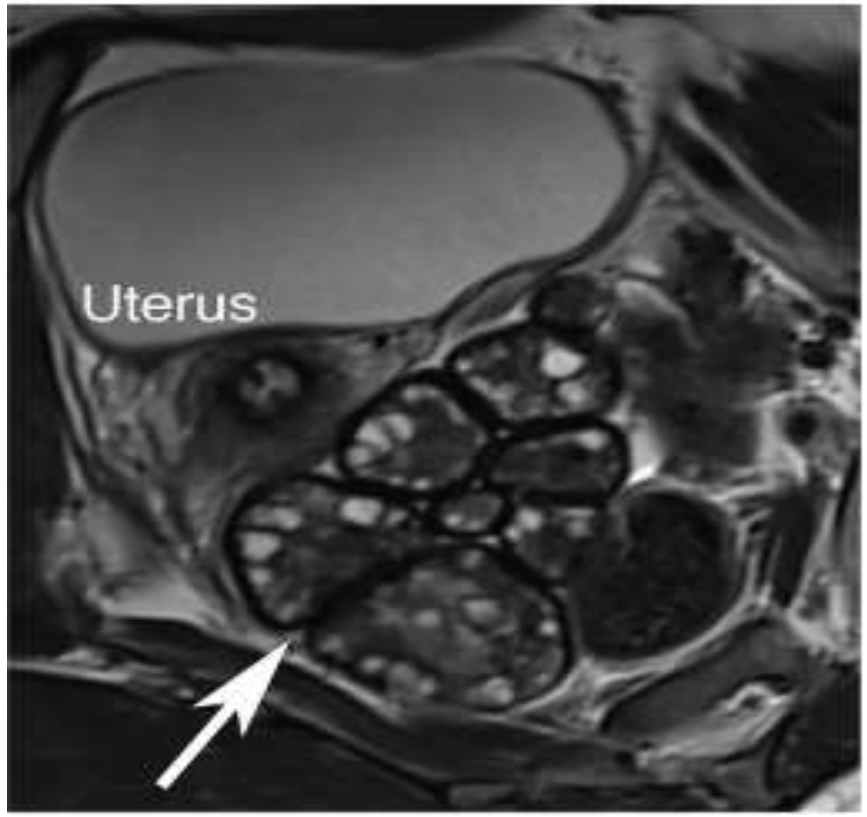
Congenital anomaly of the ovary includes

- absence,
- lobulated,
- accessory, and
- supernumerary ovaries .
- Congenital Ovarian cyst

Congenital Abnormalities of Ovary

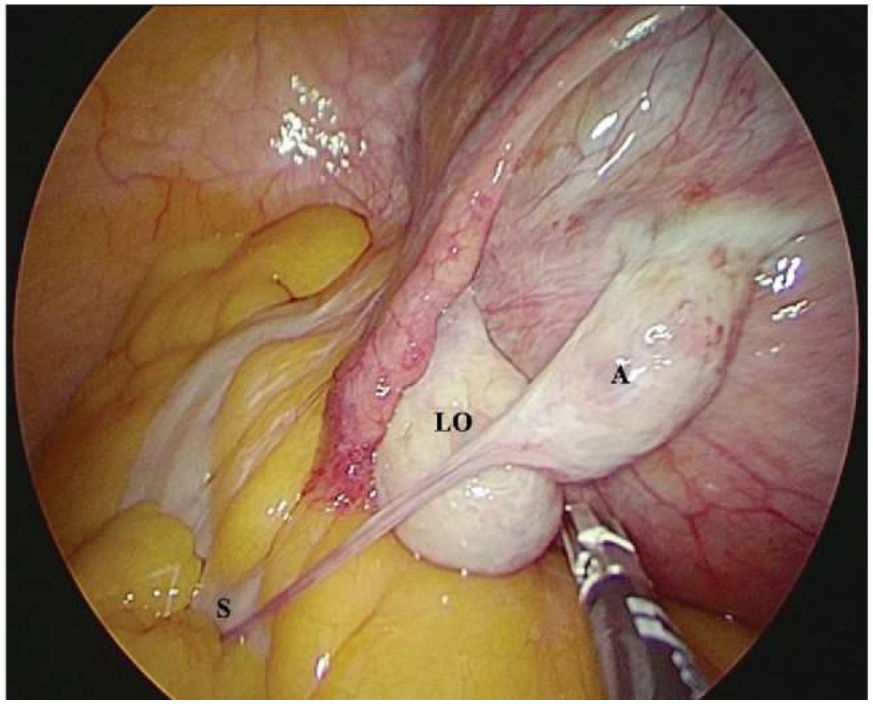


UNILATERAL AGENESIS OF OVARY

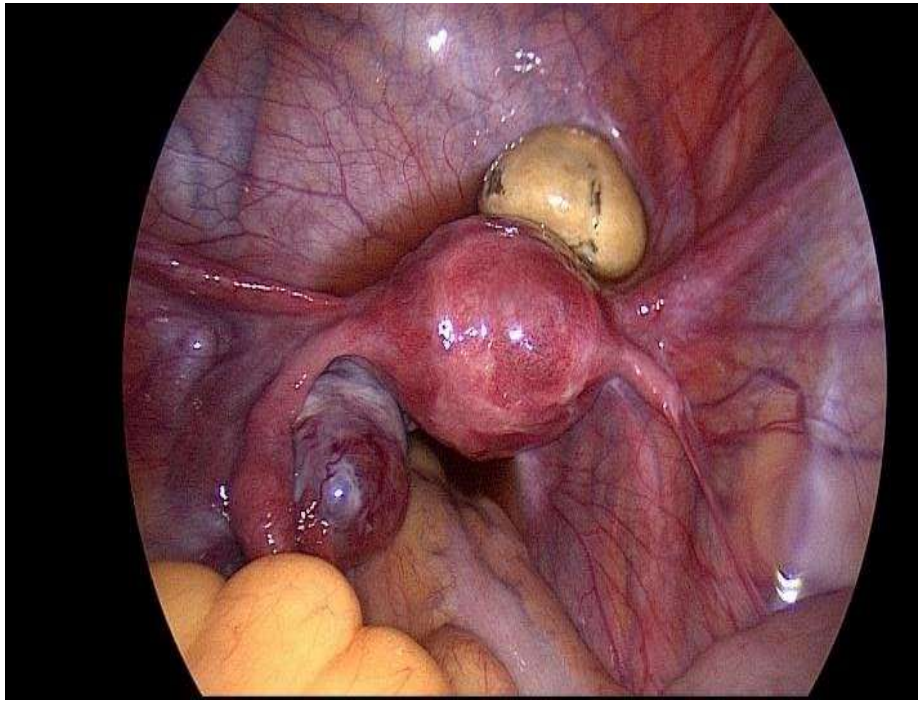


LOBULATED OVARY

Congenital Abnormalities of Ovary



ACCESSORY OVARY



ECTOPIC OVARY

Congenital Ovarian Cyst

Vertical Integration

Managing polycystic ovary syndrome in primary care

Singapore Med J 2018; 59(11): 567-571 doi: https://doi.org/10.11622/smedj.2018135

Polycystic ovary syndrome (PCOS) presents with a spectrum of conditions resulting from androgen excess, anovulation and metabolic syndrome.

May present with hirsutism, acne, menstrual irregularities, infertility, obesity, and psychiatric disorders such as anxiety and depression.

Management

Management of these patients should include **screening** for Type 2 diabetes mellitus, dyslipidaemia and hypertension.

- **Treatment** should be targeted to each patient's phenotype and personal expectations such as desire for pregnancy.
- **Psychological**
- **Diet and exercise**

- **The first-line therapy** for fertility and metabolic syndrome in PCOS is lifestyle modification with diet and exercise, followed by pharmacological therapy.

Commercial Surrogacy: Ethical Aspects

- Women may be regarded as a “way to conception” and children as mere products of conception
- Concerning children, some regard surrogacy as “selling babies” or human trafficking.
- Others consider it does not violate any of the children's rights, it cannot be regarded as a market of babies and that if the conditions of the surrogate arrangement are fulfilled at the end of the process, the best interest of the child is implicitly protected, since this was the manifested desired of both parties, a carrier who was always aware she was not going to be mother, and the IPs who are receiving their most desired child.Some consider these treatments to be exploitative to women.

- In fact, commercial surrogacy opens a door to illegal exploitation if not adequately ruled and monitored, especially in low-income countries. In many cases, third party organizations or people receive their compensation and little, if any, is given to the surrogate.
- It is also not uncommon that women are not aware of the risks of this procedure and do not have an opinion on the decision to become a carrier

- ***Reference:Brandão P, Garrido N. Commercial surrogacy: an overview. Revista Brasileira de Ginecologia e Obstetrícia. 2023 Mar 24;44:1141-58***.

Development of the human ovary: Fetal through pubertal ovarian morphology, folliculogenesis and expression of cellular differentiation markers

https://doi.org/10.1016/j.diff.2022.10.005

ABSTRACT:

A definition of normal human fetal and early postnatal ovarian development is critical to the ability to accurately diagnose the presence or absence of functional ovarian tissue in clinical specimens.

Normal fetal and postnatal ovarian tissue is defined by the presence of follicular structures and characteristic immunohistochemical staining patterns, including granulosa cells expressing Forkhead Box Protein L2 (FOXL2)

Learning Resources

- KLM Embryology Developing Human 11th Edition Clinically oriented embryology by Keith Moore, T. V. N. Persaud, Mark Torchia
- Langman's Medical Embryology 15th Edition

  by Dr. T.W. Sadler PhD
- Google scholar
- Google images