

Gynaecology

Marrow Edition 8

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Instructions

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APPLIED ANATOMY : INTRODUCTION AND UTERINE ARTERY

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Sex Differentiation & Lymphovascular Supply

00:01:18

SEX DIFFERENTIATION

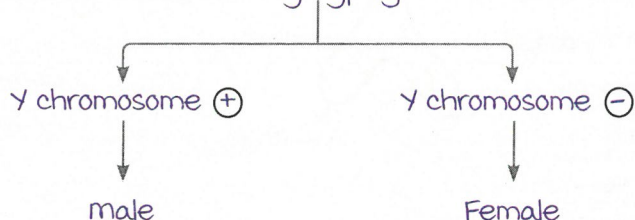
	Females	males
Karyotype	46(xx) / 44 + xx	46(xy) / 44 + xy
Barr body (No. of X chromosome - 1)	1	0
Internal genitalia	Fallopian tube - uterus - Cervix - Vagina	mnemonic : SEED - Seminal vesicle - Epididymus - Ejaculatory duct - vas deferens
External genitalia : Homologous organs : Organs with same embryological origin in males & females)		
	Females	males
	Labia majora	Scrotum
	Labia minora	Penile urethra
	Clitoris	Penis
	Bartholin glands/ Greater vestibular gland	Bulbourethral / Cowpers gland
	Paraurethral / Skene gland	Prostate

Sex determination :

m/c method : Assessment of external genitalia.

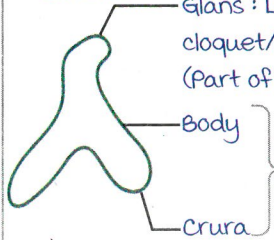
Drawback : Not applicable in ambiguous genitalia.

Best method : Karyotyping



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LYMPHOVASCULAR SUPPLY

	Blood Supply	Nerve Supply	Lymphatic Drainage
Ovary	Arterial drainage : Ovarian artery (Branch of abdominal aorta at L_4) Venous drainage : - Left ovarian vein $\rightarrow$ Renal vein. - Right ovarian vein $\rightarrow$ IVC.	T_{10}, T_{11} via Ovarian plexus ↓ Also supplies - Fallopian tube (Lateral). - Broad ligament.	Paraaortic lymph nodes
Fallopian tube	- medial $2/3^{rd}$: uterine artery. - Lateral $1/3^{rd}$: Ovarian artery.	T_{11}, T_{12}, L_1 Applied aspect : Pain in unruptured ectopic (d/t stretching of fallopian tube)	- major : Paraaortic lymph node (L.N.) - Intramural + Round ligament } Superficial inguinal lymph node (S.I.L.N.)
uterus	80% $\rightarrow$ uterine artery (Branch of anterior division of internal iliac artery) 20% $\rightarrow$ Anastomotic branch of ovarian artery	$T_{10} - L_1$ via Franken Hauser ganglion (Uterovaginal plexus)	- Cornua } S.I.L.N. - Round ligament } - Fundus : Paraaortic L.N. - Body : External + Internal iliac L.N.
Cervix	Descending cervical artery, Branch of uterine artery	$S_a - S_4$	mnemonic : HOPE Hypogastric L.N. (Internal iliac) Obturator L.N. Paracervical L.N. External iliac L.N.
Vagina	Vaginal artery : Branch of Internal iliac artery.	- upper vagina : $S_a - S_4$. - Lower vagina : Pudendal N.	- upper $2/3^{rd}$: HOPE - Lower $1/3^{rd}$: S.I.L.N
vulva	Internal pudendal artery mons pubis : External pudendal artery.	Pudendal nerve + Anterior superior part of : - Ilioinguinal nerve - Genito-femoral nerve Posterior-inferior part of : - Posterior cutaneous nerve of thigh - Pudendal nerve	- S.I.L.N $\rightarrow$ Deep I.L.N (Femoral) - Clitoris  - Glans : Lymph node of cloquet/ Rosenmuller LN (Part of deep inguinal LN) - Body } S.I.L.N $\rightarrow$ Deep I.L.N - Crura }

Note : vulva is AKA pudendum and is the external genitalia of females

Lining Epithelium, Embryological Derivatives, P/S Examination 00:14:50

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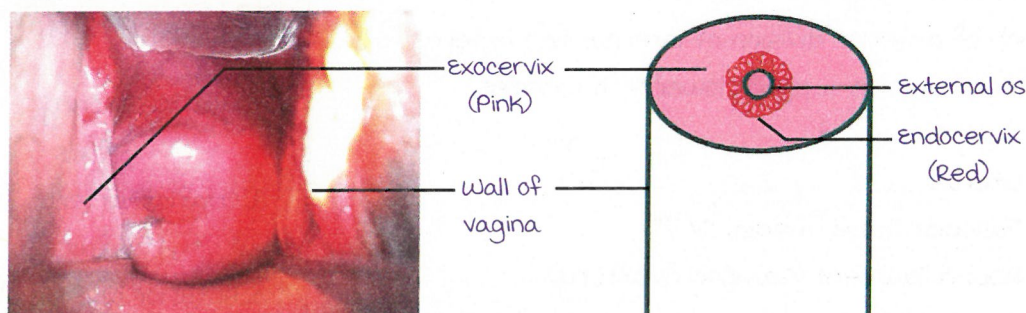
LINING EPITHELIUM OF FEMALE GENITALIA

Organ	Lining Epithelium	m/c Cancer
Ovary	Surface epithelium : Single layer of Cuboidal epithelium	Epithelial cell tumor
Fallopian tube	Ciliated columnar epithelium	Adenocarcinoma
uterus	Ciliated columnar epithelium (Onset of menstruation : Cilia lost)	Endometrial ca : Adenocarcinoma
Cervix	Endocervix → Columnar epithelium	Adenocarcinoma
	Exocervix → Stratified squamous epithelium	Squamous cell carcinoma (m/c)
Vagina	Non-keratinized stratified	Squamous cell carcinoma
Hymen	Non-keratinized stratified squamous epithelium	Squamous cell carcinoma
Bartholin gland	• Gland : Cuboidal epithelium.	Adenocarcinoma (m/c)
	• Duct : Transitional epithelium.	Transitional cell ca
	• Opening : Squamous epithelium.	Squamous cell carcinoma

EMBRYOLOGICAL DERIVATIVES

Ovary : Genital ridge
 Fallopian tube }
 uterus }
 Cervix } Mullerian duct / Paramesonephric duct } mesodermal origin
 upper vagina }
 Lower vagina : Sinovaginal bulbs of urogenital sinus } Endodermal origin
 Bartholin's gland : urogenital sinus }

PER SPECULUM EXAMINATION

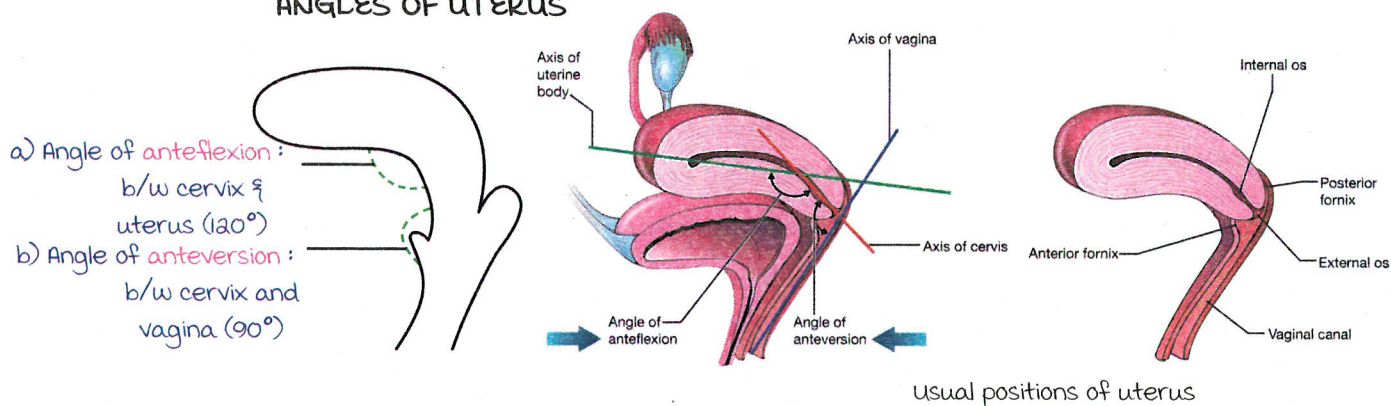


Structures visible on per speculum examination

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Angles of Uterus, Round Ligament & Uterine Artery

00:33:25

ANGLES OF UTERUS**Anteverted vs retroverted uterus :**

	Anteverted uterus	Retroverted uterus
Direction of uterine fundus	Towards pubic symphysis : 80 % : Anteverted Eg : Anteflexed uterus (+)	Towards sacral promontory : 20 % retroverted & retroflexed uterus (+)
PV examination		
Part easily felt	Fundus	Cervix
Difficult to palpate :	Cervix	Fundus
Part of cervix easily felt	Anterior lip	Posterior lip

Significance :

a. Prevent prolapse.

b. mechanical support of uterus

ROUND LIGAMENTAttachments : **cornua of uterus** & anterior $1/3^{\text{rd}}$ of labia majora.Function : Indirect support / 2° support (keeps uterus in anteverted position).Origin : **Gubernaculum**Blood supply : **Sampson's artery** (Branch of uterine artery).**UTERINE ARTERY**Branch of anterior division of internal iliac artery
(Posterior division supplies lower limb muscles).

Structures supplied :

1. uterus
2. Fallopian tube (medial $2/3^{\text{rd}}$)
3. Round ligament (Sampson's artery)
4. Cervix (Descending cervical branches)
5. ureter

Note : **Devascularization**
in PPH

1. uterine artery
↓ fails
2. Ovarian artery
↓ fails
3. Anterior division of
internal iliac artery

Vagina : Not supplied by uterine artery

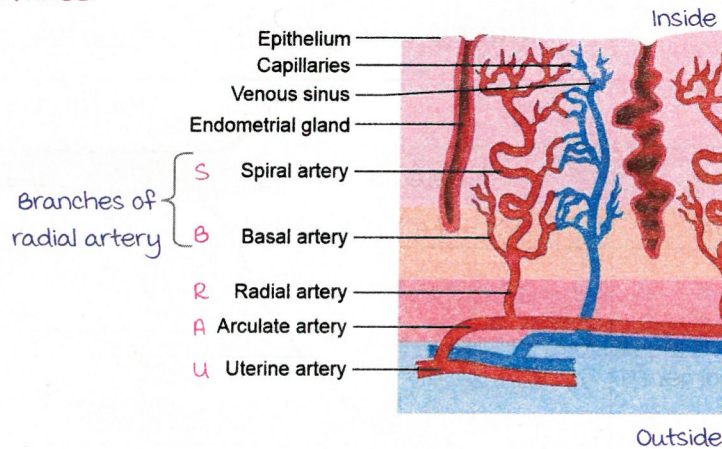
↓ hence

uterine artery embolization : vaginal blood supply intact

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Branches of uterine artery (Outside → Inside) :

mnemonic : **U ARBS**

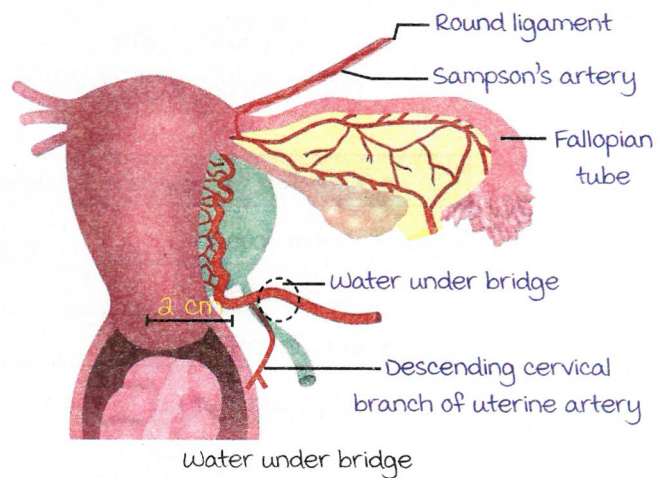


Note :
Spiral artery :
Responsible for menstrual blood.

Water under bridge :

- uterine artery directly crosses over ureter.
- 2 cm lateral to internal os.
- **m/c site of ureteric injury** during hysterectomy.

↓
Clamp applied as close to
the uterus as possible



----- Active space -----

APPLIED ANATOMY : FALLOPIAN TUBES, OVARY AND UTERUS

Fallopian Tube & Ovary

00:00:15

FALLOPIAN TUBE

Length : 10cm.

Parts of fallopian tube :

medial to lateral.

1. Interstitium :

- Intramural part (Inside uterus).
- **Narrowest** part.
- Anatomical sphincter : Circular muscle fibres (+).

2. Isthmus :

- 2nd narrowest part.
- Physiological sphincter : Product of conception moves → Isthmus (Narrow).
from ampulla (Widest)
- Site for female sterilization (Tubal ligation).

3. Ampulla :

- Widest & longest part.
- Site for → **Fertilization**
→ Ectopic pregnancy
- maximum mucosal folds, aka plicae.

4. Infundibulum :

- AKA fimbrial part of fallopian tube.

Note :

1. Adnexa : Ovary + fallopian tube

- Peg cells : + in lining of fallopian tube.

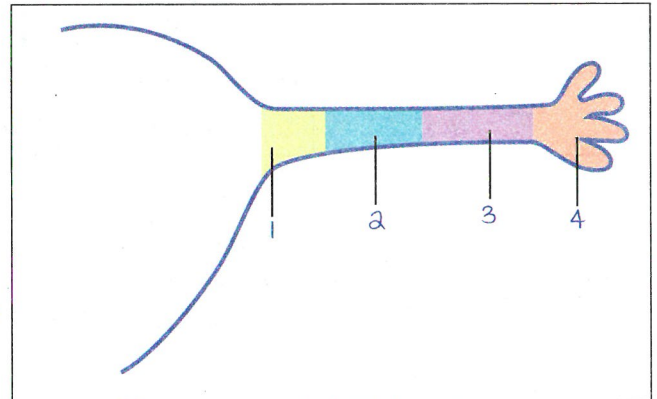
2. Genital TB :

- m/c affects fallopian tube (**Ampulla**).
- Can lead to b/l cornual block.

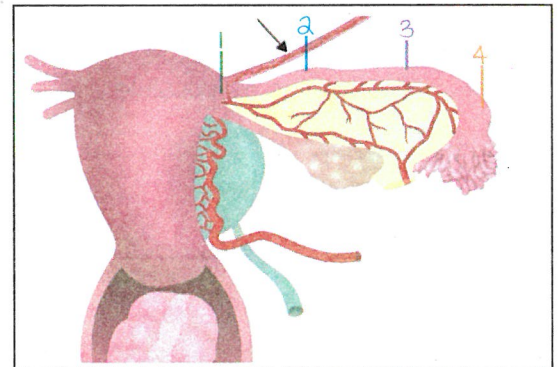
3. Gonococcal infection → leads to → Fimbrial block.

4. IOC for tubal patency : **HSG** (Hysterosalpingography).

5. Site for tubal ligation → Laparoscopic : Isthmus → Hysteroscopic (using Essure) : Interstitium.



Parts of fallopian tube



Parts of fallopian tube

OVARY

----- Active space -----

Present posteriorly

General Features :Size : $3 \times 2 \times 1$ cmVolume : 6-7 cc (≥ 10 cc : PCOS).

Location : Ovarian fossa of Waldeyer (Lateral pelvic wall).

Intrauterine life : Abdominal organ
 ↓
 With the help of gubernaculum

Descends into the pelvis

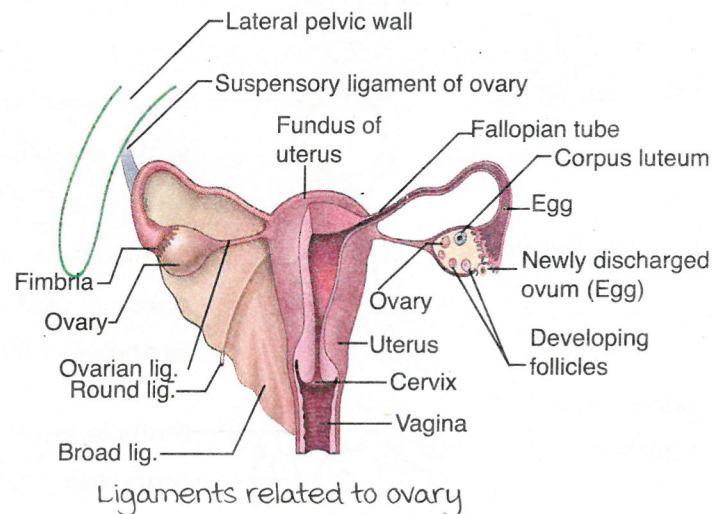
Applied aspect :

uterus : Prevents further descent of ovary.

Gubernaculum $\xrightarrow{\text{divided by uterus}}$ Ovarian ligament
 Round ligament.

Ligaments related to ovary :

1. Ovarian ligament : Attaches ovary to cornua of uterus.
2. Infundibulopelvic ligament :
 - AKA suspensory ligament of ovary.
 - Connects ovary to lateral pelvic wall.
 - Contains **ovarian vessels & nerves**.
 - Preserved during hysterectomy without oophorectomy.
3. mesovarium : Part of broad ligament near the ovary.

**Relations of ovary :**

Superior/anterior : External iliac artery.

Posterior : Ureter & internal iliac artery.

Lateral : Obturator nerve & infundibulopelvic ligament.

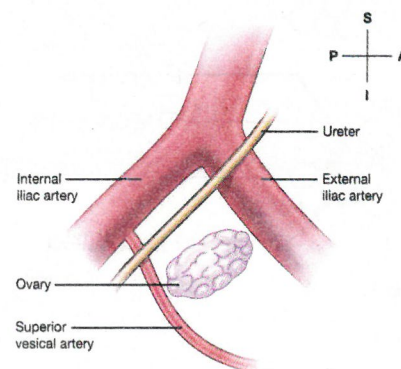
Applied aspect :

Large ovarian mass

↓
d/t pressure on obturator nerve

Pain along medial side of thigh

medial : Ovarian ligament.

**Histological Features :**

Surface epithelium : Single layer of cuboidal epithelium

Tunica albuginea : Below surface epithelium

----- Active space -----

Ovarian cortex : Contains follicles in various stages

Note :

Parts of broad ligament :

a. mesosalpinx : Close to fallopian tube.

b. mesovarium : Close to ovaries.

c. mesometrium : Close to uterus.

medulla :

Contains → Blood vessels
→ Hilar cells

Homologous to interstitial cells of testes.

Hilar cell tumor of ovary : Rare.

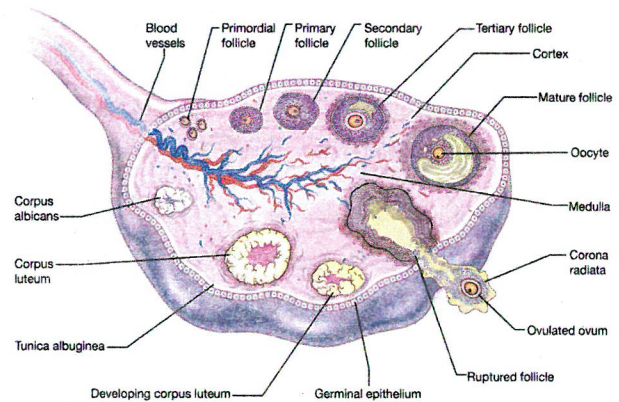
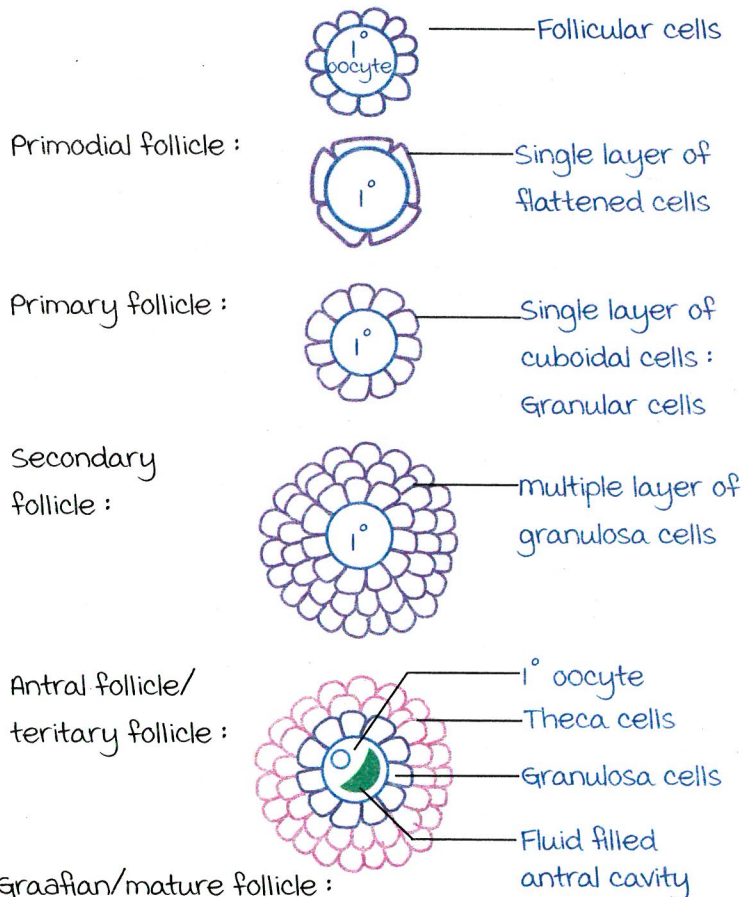
• Secretes androgens.

• masculinizing tumour of ovary.

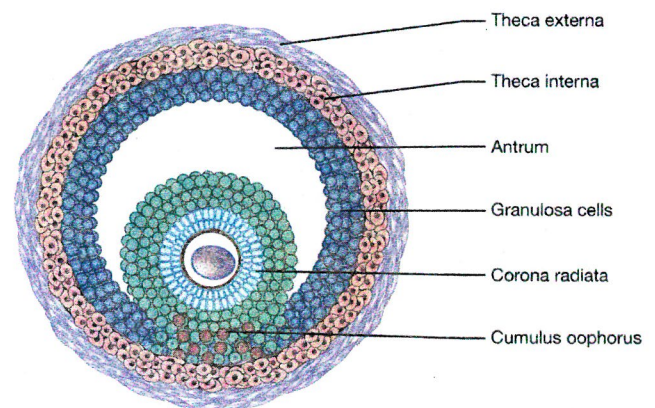
Folliculogenesis

00:18:45

Follicle : 1° oocyte surrounded by follicular cells of ovary.



Various follicles of ovary



Graafian follicle

- Ovoid/spherical shape.
- Size : 18-20mm (≥17mm).
- Cavity : Liquor folliculi/antral cavity.
- Cell layers surrounding 1° oocyte (outside to inside) :

- Theca externa.
- Theca interna.
- Granulosa cells.

- **Cumulus oophoricus.**

- AKA discus proligerus.
- Cells which project into the cavity.
- Separate 1° oocyte from the cavity.

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Uterus

00:26:45

General features :

Shape : Pear shaped.

Size : 3 x 2 x 1 inches

Weight ———> Non-pregnant : 60 - 80 g
 Pregnant : 1000 g (D/t hypertrophy >> hyperplasia)

Composition : Smooth muscle fibers

Applied aspect :

Progesterone (Smooth muscle relaxant) : used in the prevention of preterm labour

uterine cavity : Potential cavity (Anterior & posterior walls opposed to each other)

- Volume ———> Non-pregnant : 10 ml
 Pregnant : 5L

- Shape ———> Coronal : Triangular
 Sagittal : Slit-like

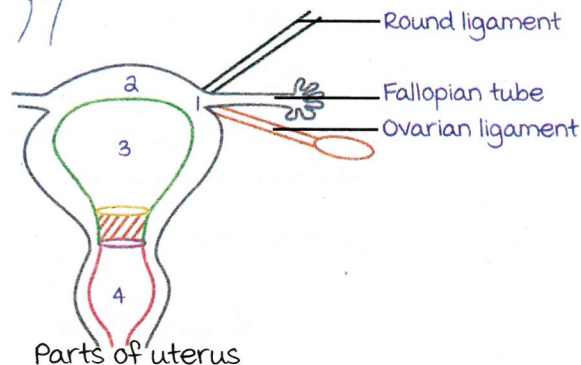
Position : Anteverted & anteflexed

IOC (To look inside uterus) : **Hysteroscopy**



PARTS OF UTERUS

1. Cornua/angle of uterus
2. Fundus (Dome shaped)
3. Body (corpus)
4. Cervix



Structure attached at cornua of uterus :

a. Anterior —> Posterior (mnemonic: **RTO**)

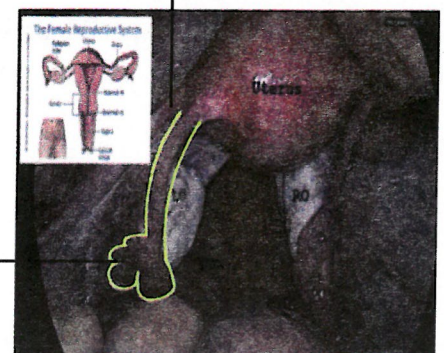
- **R**ound ligament
- **F**allopian tube
- **O**varian ligament

b. Superior —> Inferior

Fallopian tube

Round ligament Ovarian ligament

Round ligament



Laparoscopic view of uterus (Posterior)

----- Active space -----

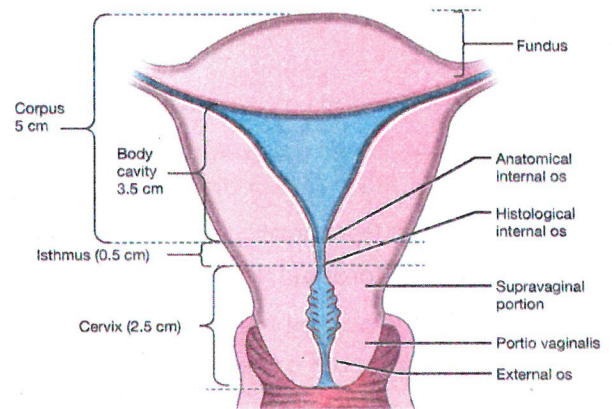
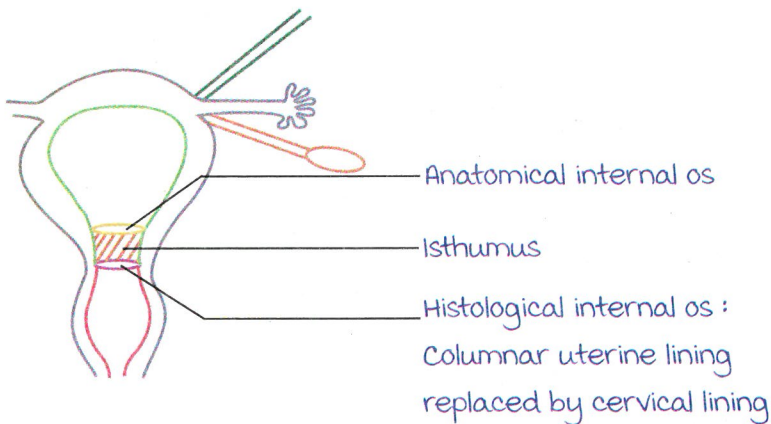
Note

- Cervical fibroid : Extrauterine fibroids.
- m/c cause of failure of female sterilization : Identification of wrong structure.

Cervix to Corpus ratio :

Stage	Cervix : Corpus ratio
Before puberty	2:1 (Cervix larger than uterus)
At puberty	1:2
Reproductive age	1:3 or 1:4
menopause	1:1 (d/t atrophy)

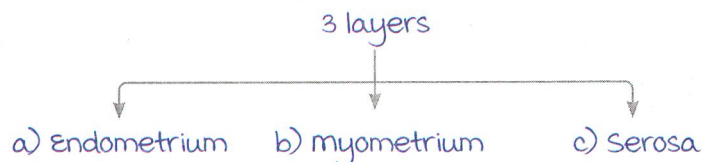
Isthmus :



Coronal section of uterus

- Lower part of uterus b/w anatomical & histological internal os.
- Length
 - Non-pregnant : 0.5 cm.
 - During pregnancy : Forms lower uterine segment (LUS) identified by loose fold of peritoneum
 - At term : 5 cm
 - At labour : 10 cm (5 cm + 5 cm cervix d/t effacement).

Body / Corpus :



Endometrium :

- 3 layers :
- 1. Zona compacta
 - 2. Zona spongiosa
 - 3. Zona basalis
- } Functional layers : Shed during menstruation.

Endometrial thickness during various phases :

----- Active space -----

Time of cycle	Endometrial thickness
Immediately after menstruation	1-2 mm
Early proliferative phase	5-7 mm
Late proliferative phase / preovulatory phase	Until 11 mm
Secretory phase	7-16 mm
Post menopausal females	< 4 mm

myometrium :

made of smooth muscle fibers.

middle layers : AKA **living ligature**.

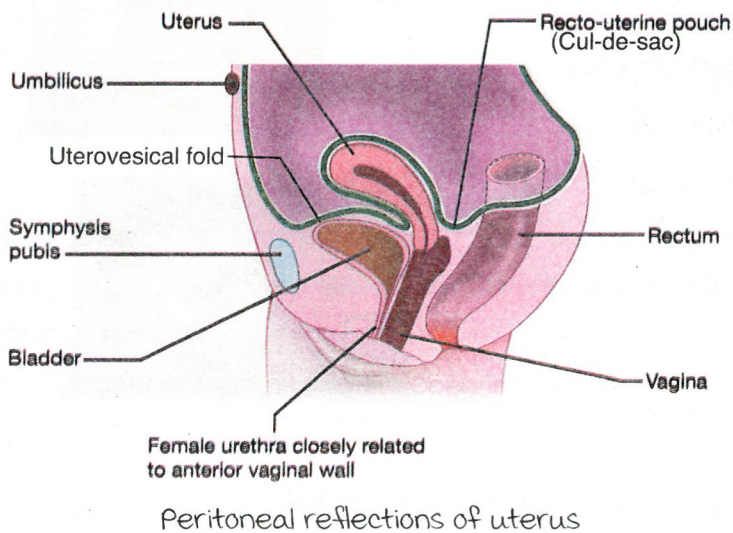
Peritoneal reflections :

utero-vesical fold : Peritoneum from bladder
reflected to uterus

At the level of isthmus (LUS)

Pouch of Douglas/cul-de-sac : Posterior peritoneal reflections b/w uterus & rectum

Applied aspect : **Culdocentesis** done for ruptured ectopic.



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APPLIED ANATOMY : CERVIX AND VAGINA

Cervix

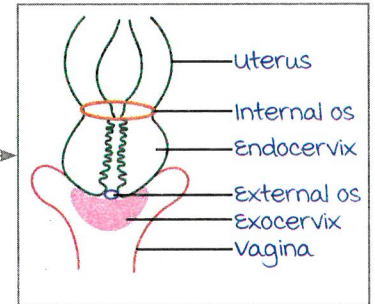
00:00:10

Composition :

- major : Collagen (Connective tissue).
- 10-15% : Smooth muscle fibers.

Applied aspect :

Effacement during labour : D/t breakdown of collagen + ↑ water content

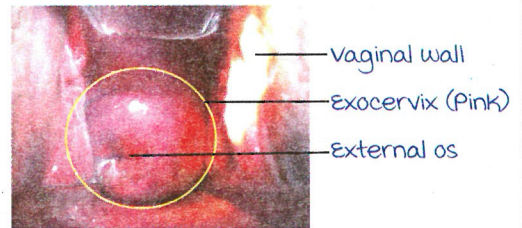


CERVIX

PER SPECULUM (P/S) FINDINGS

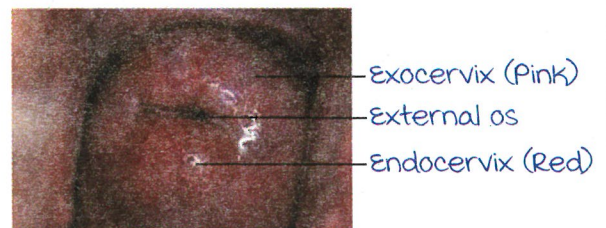
Endocervix :

- Part of cervix close to the uterus.
- Lining : Columnar epithelium.
- Aka supravaginal part of cervix.
- P/S : Appears red.



Exocervix :

- Part of cervix inside the vagina.
- Lining : Stratified squamous epithelium.
- Aka portio vaginalis.
- P/S : Appears pink.



Ectropion/Eversion :

- Red epithelium (Endocervix) (+) outside external os.
(Normally : Only pink epithelium(+))
- Physiological : m/c in pregnancy.
- c/o : Post coital bleeding.
- Biopsy : Not required.