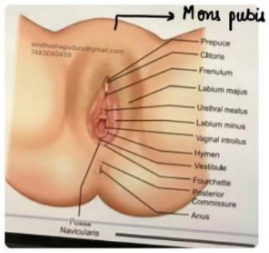
Anatomy

EXTERNAL GENITALIA 1:21

Parts

- External genitalia = vulva
- Mons pubis - pad of fat
- Labio majora - Has hair follicles
  - Labia majora of both sides fuse to form posterior commissure



- Labia minora - Inner to labia majora
  - Both sides fuse to form fourchette

- Introitus - vaginal opening
- Urethra
- Clitoris - covered by labia minora — Above - prepuce; Below - frenulum

- Vestibule
  - Area b/w clitoris above
    - Labia minora on either side
    - Fourchette below
  - Has 4 openings -
    a) Urethra
    b) Vaginal opening
    c) Bartholin glands
    d) Bulbourethral glands

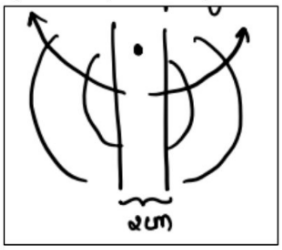
VESTIBULE 3:42

- Triangular space bounded anteriorly by clitoris, posteriorly by fourchette and either side by labia minora

- 4 openings –
  (1) Urethral opening
  (2) Vaginal orifice opening
  (3) Bartholin's duct on either side (5 & 7 o'clock)
  (4) Ducts of Paraurethral glands, also known as the Skene's ducts on the posterior surface of urethra.

LYMPHATIC DRAINAGE OF VULVA *4:11*

- 1st sentinel LN – superficial inguinal LN → Deep inguinal LN → Pelvis LN
- Only clitoris drains directly into deep inguinal LN (LN of cloquet)
- Middle 2 cm can drain bilaterally into right & left superficial inguinal LN. So, when there is cancer in this region B/L superficial inguinal LN s/b removed.



- The lymphatics hardly cross the labiocrucial fold.

BARTHOLIN'S GLANDS *5:40*

- Also called greater vestibular gland
- They are in pair; they are compound racemose glands
- Lined by columnar epithelium
- Lies in superficial perineal pouch posterior to vestibule
- It is homologous to bulbourethral gland in males present in deep perineal pouch
- Bartholin duct – Lined by transitional epithelium
  - At opening, it is stratified squamous epithelium
  - Opens into an opening b/w labia minora & hymen at junction of upper 2/3rd & lower 1/3rd
- Function – To secrete alkaline mucus for lubrication during intercourse

BARTHOLIN CYST *7:08*

- It is a postero lateral cyst

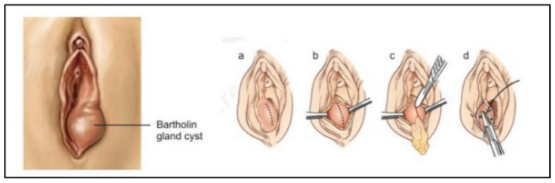
- They are non-tender, fluctuant, mobile swellings inner to labia majora at junction of upper 2/3rd & lower 1/3rd
- When Bartholin's cyst is infected → it becomes Bartholin's abscess. (M/C organism – E.coli > Gonococci). It is tender, fluctuant & mobile.
- Rx – Incision & drainage (I & D)
- Rx of Bartholin cyst – Initially, I & D

  ↓ If > 3 times recurrence

  Marsupialisation is done

  (Cyst walls are sutured to skin itself)

  & Keep it open



Bartholin cyst Marsupialisation

- Biopsy of cyst wall is done to r/o cancers if:
  a) Age > 40 yrs
  b) Solid / fixed mars
  c) Post – menopausal

INTERNAL GENITALIA *9:31*

UTERUS *9:35*

Parts

1. Cornu – part where fallopian tube meets the uterus
2. Fundus – part of uterus above the line joining both cornu
3. Body proper – part below the line
4. Isthmus – lies b/w Anatomical & Histological os
5. Anatomical internal os – part where endometrial canal becomes endocervical canal
6. Histological internal os – where endometrial lining changes to endocervical lining

CERVIX *10:50*

a) Supravaginal cervix – above the vagina
b) Vagina / portio vaginalis – below the vagina, pointing inside the vagina

Fornix

- Gap b/w cervix & vagina. 4 fornices present – 1 anterior, 1 posterior & 2 lateral
- Posterior fornix is the deepest

LAYERS OF UTERUS *11:16*

1. Endometrium – inner layer
   a) Stratum basale – regenerates endometrium every month
   b) Stratum functionalis – sheds off every month → menstruation

2. Myometrium – Middle part
   a) Inner circular layer
   b) Middle criss – cross layer → arranged to include spiral arteries, which get compressed by these fibers to prevent post partum bleeding → So, also called Pinnards living ligature
   c) Outer longitudinal layer

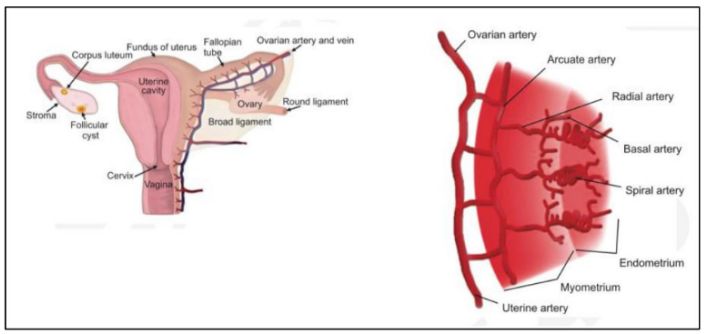
3. Serosa – Outer most layer

Adnexa – Fallopian tube & ovary are together called so.

BLOOD SUPPLY TO UTERUS *13:12*

- By uterine artery & ovarian artery
- Uterine artery – branch of anterior division of internal iliac artery
  ↓
  Further divides into –
  a) Arcuate artery } Supplies myometrium
  b) Radial artery }
  c) Basal artery }
  d) Spiral artery } Supplies endometrium

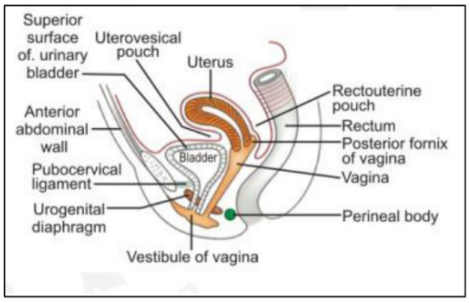
- Ovarian artery – direct branch of abdominal aorta



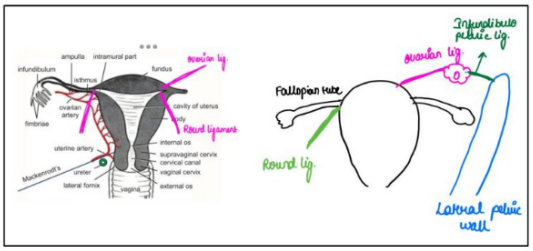
RELATIONSHIPS OF UTERUS

14:03

- Anteriorly - Uterovesical pouch
  Posteriorly - Rectouterine pouch



- At cornu
  Anteriorly - Round ligament
  Middle - Fallopian tube
  Posterior - Ovarian ligament → holds ovaries
  ↓
  Attached to lateral pelvic wall ⊂ the help of infundibulopelvic ligament
  (Suspensory ligament of ovary)



Uterus	Weight	Length	Capacity
Nulliparous	50-70 gm	6-8 cm	10ml
Multiparous	80 gm	10 cm	
Pregnant uterus at term	1 kg	35 cm	5000 ml

- After pregnancy, hypertrophy ↓, but not hyperplasia.
- (n) Uterocervical length = 14cm ~ 7 inches

Position of uterus

1. Anteversion – Angle b/w axis of cervix & vagina (normal) = 90° [Maintained by round ligament]
2. Anteflexion – Angle b/w uterine axis & cervical axis (normal) = 125°

Lymphatic drainage of uterus

- Obturator, internal & external iliac nodes
- Only round ligament & cornu drain into superficial inguinal LN

Nerve supply of uterus

- Uterus is innervated by fibers of uterovaginal plexus, also known as Frankenhauser ganglion
- Root value – T_{10} – L_1
- Level of block for epidural analgesia – T_{10}
- Level of block for spinal anesthesia for LSCS – T_4

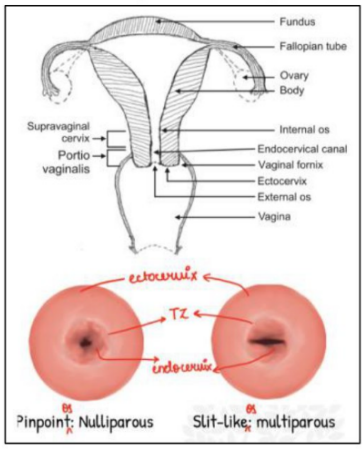
CERVIX *18:52*

1. Portio Vaginalis – part of cervix present in vagina
2. Portio supravaginalis – part of cervix present in uterine cavity

- It is 3cm is non-pregnant state
  4 cm is pregnant state
- Cervical incompetence – Size of C_x < 2.5cm
- Uterus: Cervix Ratio – Prepuberty – 1:2
  Puberty – 2:1
  At Reproductive age – 3:1
  At menopause – 1:1

- Endocervix – Part of cervix in portio vaginalis – lined by simple columnar epithelium
- Ectocervix – Part of cervix in portio vaginalis – lined by stratified squamous epithelium
- Transformation zone – extends from new squamocolumnar junction to old squamocolumnar junction. It is a dynamic zone. There is metaplasia of columnar to squamous epithelium. It is estrogen dependent (comes out during high estrogen state)
  - 1st site of HPV infection
  - 1st site of Ca cervix

- Blood supply of cervix – Descending cervical artery

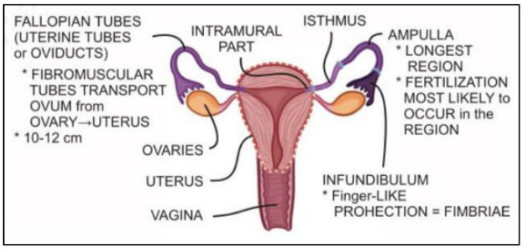


- Nerve supply
  a) Sympathetic – Hypogastric nerve
  b) Parasympathetic – pelvic & vagus nerves

- Lymphatic drainage
  1. Internal iliac LN
  2. Hypogastric LN
  3. Obturator LN
  4. Paracervical & Parametrial LN
  5. External iliac LN

FALLOPIAN TUBE

24:10



- 10-12 cm length
- Part that goes into uterus - Intramural part - 1.25 cm - narrowest
  ↓
  Isthmus - 2.5 cm - site of tubectomy
  ↓
  Fertilisation occurs ← Ampulla (5cm) - Longest & widest region
  ↓
  Infundibulum (1.25 cm)
  ↓
  Fimbriae (finger - lite projections)

- Layers of FT
  1. Lining of epithelium - ciliated columnar epithelium. It has
     a) Partly ciliated cells
     b) Non-ciliated secretory cells
     c) Peg cells
  2. Mucosa
     a) Many long & thin branching folds
     b) Runs longitudinally
     c) More folds - near ampulla
  3. Muscularis layer
  4. Serosa

Blood supply

- Medial 2/3rd - uterine artery
- Lateral 1/3rd - ovarian artery

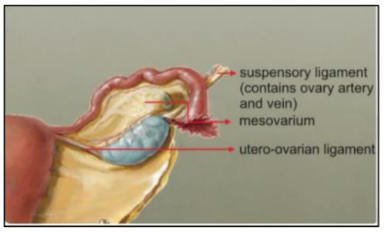
- Lymphatic drainage - Para aortic LN

- Nerve supply – T_{10} – T_{12}

OVARY 26:25

- Normally, it is pinkish white
- Completely white / oyster shell ovary → in PCOS
- It is held to the uterus by ovarian ligament
- Held to lateral pelvic wall by infundibulopelvic / suspensory ligament
- Ovary measure – 5x3x3 cm

- Ovary originally arises at the genital ridge at T_{10}
  ↓
  Brought down by Gubernaculum into ovarian fossa



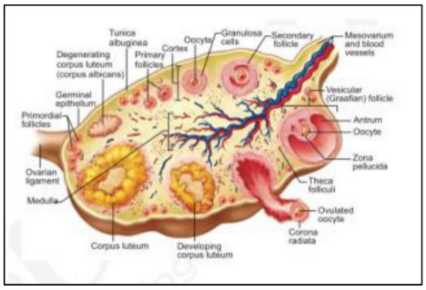
- At birth, gubernaculum becomes round ligament anteriorly & ovarian ligament posteriorly.

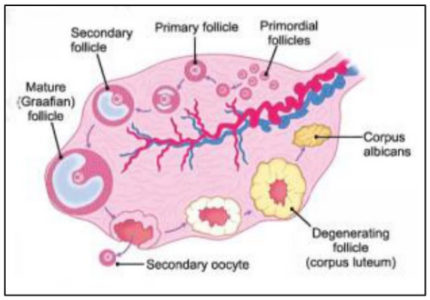
- Ovarian volume

  Ovarian Volume in:
  - Premenarchal women: 3ml
  - Menstruating women: 9.8ml. if it is more than 10ml, it is indicative of PCOS.
  - Postmenopausal: 5.8ml

Ovary

Outer cortex	Inner medulla
Contains all stages of follicles	Has fibromuscular tissue & blood vessels. It enters through hilum





- **Blood supply** – Ovarian artery ↴
  Branch of Abd. Aorta at L_2 level
- Venous drainage – ovarian vein

Lt side	Rt side
↓	↓
Drains into Lt Renal vein	drains into IVC

- Nerve supply – Ovarian plexus
- Lymphatic drainage – Para – aortic LN

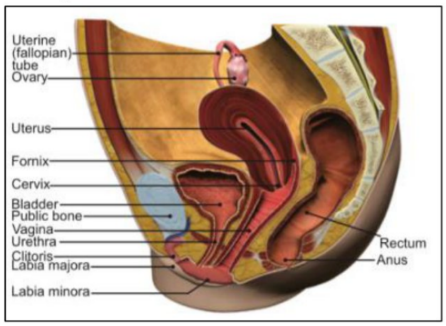
VAGINA

28:44

- Vagina makes an angle of 45–55° c Horizontal
- Anterior wall – 7cm
  Posterior wall – 9cm
- Fornices – Anterior
  Posterior – deepest (Pouch of douglas lies deep)
  2 lateral fornices

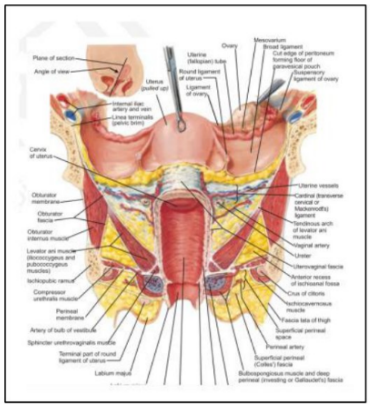
Relations

1. Anteriorly
   - Upper 2/3rd of vagina – Bladder
   - Lower 1/3rd of vagina – Urethra



2. Posteriorly
   - Upper 1/3rd – Pouch of Douglas
   - Middle 1/3rd – Rectum
   - Lower 1/3rd – Perineal body

3. Laterally –
   - Mackenrodt ligament
   - Levator ani muscle
   - Bulbo cavernous muscle
   - Vestibular bulb
   - Bartholin gland



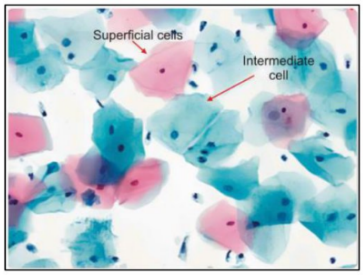
Cervicovaginal junction – 'Water under the bridge'

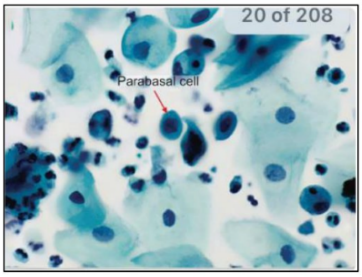
- Uterine artery above
- Mackenrodt ligament between
- Ureter below
- M/c site of ureteric injury
- Wartheim's Hysterectomy has highest risk of ureteric injury

- Vaginal epithelium at birth – Transitional
- Vaginal epithelium In adults – Non – Keratinising stratified squamous epithelium

3 Kinds of cells

Superficial cells	Intermediate cells	Parabasal cells	Basal cells
• Under estrogen influence • Pink polygonal • ↑ Granular cytoplasm • Small nucleus	• Under influence of progesterone • Blue polygonal	• Round to oval • Blue colour • N:C = 1:2 • No hormonal predominance	• Round to oval • N:C = 2:1 • No hormonal predominance





- Maturation index
  - For hormonal study, smear is taken from lateral fornix of vagina
  - P/I/S cells ratio →
    a) Before puberty & after menopause – 100/0/0
    b) Before ovulation – 0/30/70
    c) After ovulation – 0/60/40

- Vaginal PH
  - Lactobacilli convert glycogen into lactic acid under influence of estrogen
    a) Prepuberty - alkaline (no estrogen)
    b) At birth to 2 weeks - 4.5 - 5.5 (Maternal estrogen)
    c) At puberty - shift from alkaline to acidic PH
    d) Reproductive - 4.5 - 5.5
    e) Menopausal - > 7
    f) Pregnancy - 3.5 - 5.5 (most acidic)
    g) Menstruation - <7

Blood supply

1. Internal pudendal artery
2. Middle rectal artery
3. Vaginal artery

Lymphatic drainage

Upper 2/3rd - same as cervix

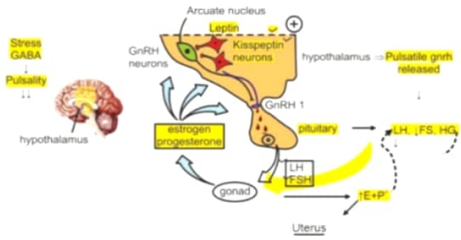
Lower 1/3rd - superficial inguinal LN

- Vaginal has no mucus secreting glands
- It has no serosal covering except for the arc covered by cul - de - sac posteriorly.

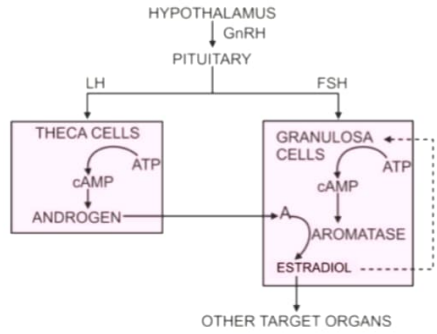
BASIC PRINCIPAL

Reproductive Physiology

- **HPO uterine axis:**
  - **It controls:**
    A. Endocrinal cycle
    B. Ovarian cycle
    C. Uterine cycle
  - These cycles work hand in hand for menstruation to occur.
  - Pulsatile GnRH is released from arcuate nucleus of hypothalamus which acts on pituitary to release FSH and LH.
  - LH and FSH acts on ovary to release estrogen and progesterone.
  - Leptin and Kisspeptin increase the pulsatile release of GnRH.
  - Stress and GABA decrease pulsality.
  - Estrogen in high levels cause positive feedback to LH and negative feedback to FSH.
  - Progesterone in low levels causes positive feedback on FSH.
  - Progesterone in high levels causes negative feedback on LH.



- 2 cell 2 gonadotropin theory:



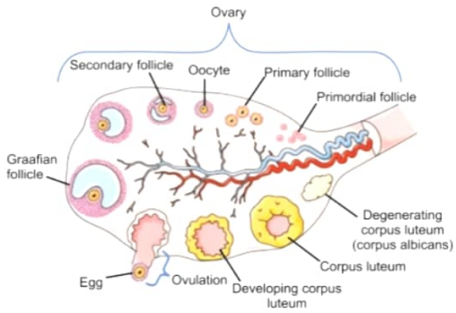
- **There are 4 types of estrogen:**
  - E_1: Estrone – Menopause
  - E_2: Estradiol – reproductive
  - E_3: Estriol – pregnancy specific
  - E_4: Estetrol – pregnancy specific
- Potency: $E_2 > E_1 > E_3$
- In fat cells, androgen gets converted to estrone: Peripheral aromatization.
- 2 cell 1 gonadotropin theory:
  - If FSH acts on granulosa cells: Testosterone gets converted into estrogen.
  - If LH acts on granulosa cells: Testosterone gets converted into progesterone.

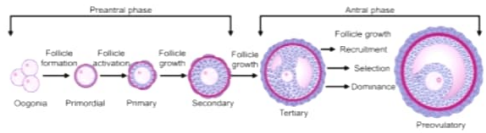
FOLLICULOGENESIS 10:21

- Development of primordial follicle to graffian follicle takes 84 days.

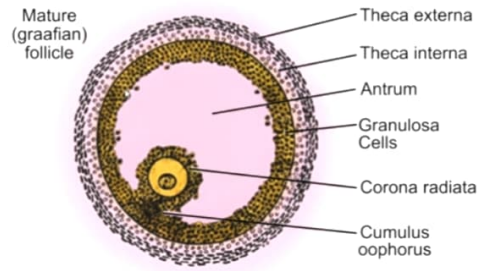
Active Space

BASIC PRINCIPAL

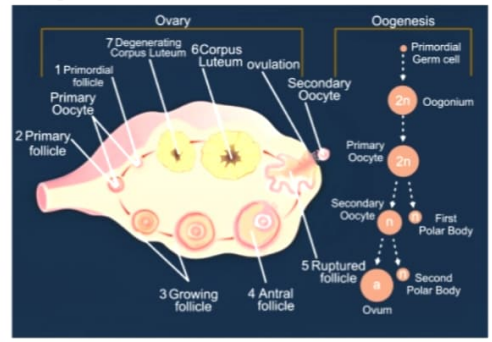




- **Primordial follicle**: primary oocyte covered by single layer of granulosa cell.
- **Primary follicle**: primary oocyte covered by cuboidal granulosa cells.
- **Secondary follicle**: primary oocyte covered by inner granulosa cell and outer theca cells.
- Secondary follicle → Antral follicle/Tertiary follicle → Dominant follicle/Preovulatory follicle.
- Development form primordial follicle (0.02-0.05mm) to antral follicle is Gonadotrophin independent.
- Conversion of antral follicle (2-9mm) into dominant follicle is Gonadotrophin (FSH) dependent.
- **Good ovarian reserve**: 5-8 antral follicles on Transvaginal ultrasonography done on day 2.



Oogenesis-



- Primary oocyte is arrested in prophase of meiosis I. LH helps primary oocyte resume meiosis at the time of ovulation.
- Secondary oocyte is arrested in metaphase of meiosis II.

OVARIAN CYCLE 22:33

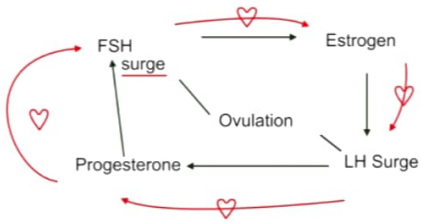
I. Follicular phase: Growth of follicle
II. Ovulation phase: Oocyte pushed out.
III. Luteal phase: Growth and development of corpus luteum.

- Recruitment of antral follicle on Day 2-3.
- Day 5-8: Selection of a dominant follicle depending on follicle which has maximum FSH receptors.

Active Space

BASIC PRINCIPAL

- Hence, OCP are given from Day 1-2 to downregulate FSH → No dominant follicle selected → No ovulation.
- FSH stimulates the granulosa cells to secrete estrogen and inhibin B.
- When Estrogen levels are 200 pg/ml lasting for 48-50 hours → Stimulate LH surge → Ovulation causing release of secondary oocyte and 1st polar body.
- LH surge onset → Ovulation: It takes 36 hours
- LH surge peak → Ovulation: It takes 10-12 hours
- Both LH surge and FSH surge are present at the time of ovulation.



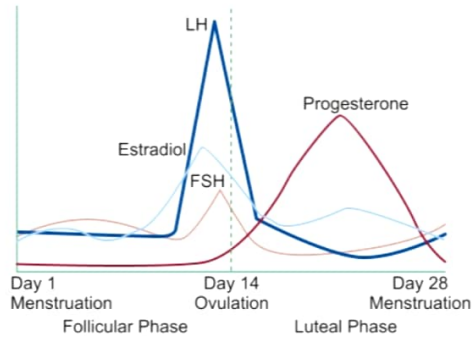
- **For ovulation to take place, following factors are required:**
  I. **Endocrinal:**
    - LH Surge: resumption of meiosis I
    - FSH surge: Increased plasmin → Lysis of ovarian wall.
  II. Stretching factor
  III. Contraction in the theca externa and ovular stroma due to increased prostaglandin secretion.

- **Luteal Phase:**
  - Corpus luteum is yellow in color due to lipid deposition and carotene pigmentation.
  - Life span of corpus luteum if not pregnant: 14 days
  - Life span of corpus luteum if pregnant: 10 weeks

- **Hormones secreted by corpus luteum:**
  1. Progesterone
  2. Estrogen
  3. Relaxin
  4. Inhibin A

- Maximum activity of corpus luteum is on Day 8 after fertilization (day 22). Maximum progesterone is also seen on this day.

- **D22 progesterone**
  - >5ng/ml: anovulation
  - >25ng/ml: pregnancy
  - <5ng/ml: anovulation



- **Estrogen has 2 peaks:**
  - At time of ovulation
  - Day 22

- Progesterone has single peak on Day22.

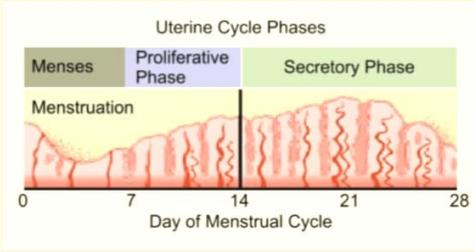
Active Space

BASIC PRINCIPAL

- Second half is constant.

UTERINE CYCLE 36:44

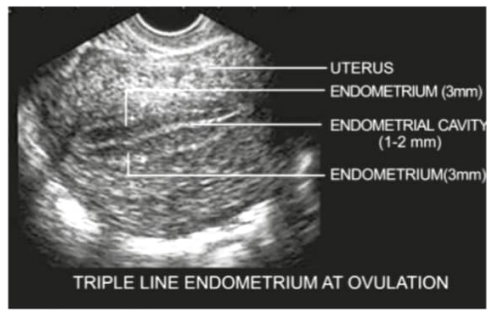
- It coincides with ovarian cycle.
- It has:
  1. Menstrual phase
  2. Proliferative phase
  3. Secretory phase



- Estrogen helps in the growth on endometrium.
- Progesterone is anti to estrogen receptors on endometrium. It is antimitotic. Long term progesterone causes atrophy of endometrium. Progesterone is dominant-pathy which overpowers action of estrogen.
  Hence, COCP can be given in heavy menstrual bleeding → Endometrial thinning

- **Endometrial changes due to progesterone:**
  - **Day 16**: First change is subnucleus vacuolation due to glycogen accumulation. (Post ovulation)
  - **Day 18**: vacuoles move towards the lumen of the glands
  - **Day 20**: Corkscrew appearance of glands.
  - **Day 22**: Maximal stroma edema due to VEGF and mitoses seen.
  - **Day 24**: Perivascular filling
  - **Day 26**: lymphocytic infiltration

- **Endometrial thickness:**
  - Immediately after menstruation = 0.5 mm
  - Proliferative phase = 4 to 8 mm
  - Periovulatory phase = 6-10 mm
  - Secretory phase = 7 to 14 mm
  - At implantation = 8 to 10 mm



- **In anovulatory cycles**: unopposed estrogen causes prolonged amenorrhea followed by heavy menstrual bleeding.
  Initially, there is overgrowth of endometrium. At a point when spiral arteries cannot support the growth of endometrium, it sheds leading to heavy menstrual bleeding.
- **Primary spasmodic dysmenorrhea**: pain during 1st day of menstruation only for 1st 6 hrs due to progesterone withdrawal. Progesterone normally suppresses prostaglandin's production till menstruation.
  Treatment: 1st with NSAIDS → DOC: OCP
- **Secondary spasmodic dysmenorrhea**: Pain will be prior to menstruation. Treatment: treat underlying cause.

- **Functions of FSH**:
  1. Rescues follicles from apoptosis
  2. Stimulates proliferation granulation cell

Active Space

BASIC PRINCIPAL

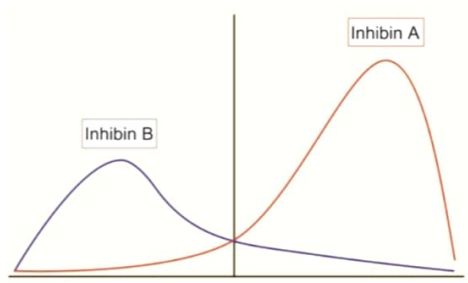
3. Helps in full maturation of follicle
4. Stimulates plasminogen activator for ovulation.

- **LH function:**
  1. Androgen production from theca cells.
  2. Luteinisation of granulosa cells to secrete progesterone
  3. Stimulates meiosis resumption
  4. Helps in physical act of ovulation
  5. Formation and maintenance of corpus luteum

- **Inhibin**:
  - Inhibin B is the form of inhibin predominantly secreted by granulosa cells in follicular phase of the cycle. It is under control of FSH.
  - Inhibin B recaches a peak in mid-follicular phase and then decreases in the late follicular phase to reach a nadir in mid-luteal phase.

- Inhibin A is mainly active in luteal phase and its release is under the control of LH.
  Levels of inhibin A rise in late follicular phase to reach a peak at mid-luteal phase.

- **Inhibin during pregnancy:**
  - Placenta produces mainly inhibin A- the levels of inhibin A are high during pregnancy at 8 weeks of gestation, third trimester, and at term.
  - Maternal levels of inhibin B are very low during pregnancy.



- **Activin**:
  - It is derived from granulosa cells and released by pituitary in early follicular phase.
  - In the granulosa of the early follicular phase, activin augments FSH activities, FSH receptor expression, aromatization, inhibit activin production, and LH receptor expression.
  - In the theca, activin suppresses androgen production, allowing the emergence of an estrogen microenvironment.

- **Role of AMH (Anti-Mullerian Hormone)**
  - It is secreted from granulosa cells of small follicles.
  - AMH inhibits initial recruitment of primordial follicles into the pool of growing
  - It also decreases responsiveness of follicles to FSH.
  - AMH plays an important role for monofollicular development and ovulation.
  - It is a best marker for ovarian reserve.

- The probable mechanisms for monofollicular development and ovulation:

Active Space

BASIC PRINCIPAL

- All the primordial follicles that reach the preantral stage, produce AMH.
- AMH inhibits further growth of primordial follicles by decreasing the responsiveness of follicles to FSH.
- The growth of dominant follicle is uninhibited as the dominant follicle has maximum number of FSH receptors, and it produces less AMH

- **Functions of estrogen:**
  - Helps in formation of secondary sexual characteristic.
  - Helps in growth of uterus, growth of endometrium.
  - Cervical mucus changes: thin, copious → Spinnbarkeit – can be stretched between fingers. Ferning positive.
  - Closure of epiphysis, prevents osteoclast.
  - It increases HDL cholesterol and decreases LDL cholesterol. It increases triglycerides.
  - It causes hypercoagulable state.
  - It causes high karyopyknotic index: total number of superficial cells/total number of vaginal epithelial cells.
  - **Estrogen**:
    - Inhibits GnRH and FSH.
    - Low levels inhibit LH
    - High levels cause LH surge.

- **Progesterone**:
  - Relaxes uterus
  - Maintains pregnancy
  - Intermediate cells: Low karyopyknotic index.
  - Cervical mucus changes:
    - Thick, scanty
    - Breaks on stretching (tack)
    - Ferning absent

  - Decreased HDL, decreased Triglycerides, increased LDL
  - Breast: Glandular, alveolar development.
  - Thermogenic: post ovulation increases temperature by 0.5°C.

  - **Progesterone**:
    - Low concentration: positive feedback on LH and FSH
    - High concentration: negative feedback on LH and FSH; And on GnRH.

Active Space


1

2

3

4

5

6

Abnormal Uterine Bleeding

Normal parameters of Menstrual Cycle:

- Clinically menstrual cycle ranges from 21-35 days

Clinical dimensions of menstruation and menstrual cycle	Descriptive terms	Normal limits (5^{th} to 95^{th} percentiles)
Frequency of menses (days)	Frequent Normal Infrequent	<24 24-38 (acc. To FIGO) >38
Regularity of menses (cycle to cycle variation over 12 months; in days)	Absent Regular Irregular	- Variation ± 2 to 20 days Variation greater than 20 days
Duration of flow (days)	Prolonged Normal Shortened	>8.0 4.5-8.0 <4.5
Volume of monthly blood loss (ml)	Heavy Normal Light	>80 50-80 <5

- Polymenorrhoea - ↑ frequency of cycles at regular interval of menstrual cycles within 21 days
- Oligomenorrhoea - regular interval of menstrual cycles beyond 35 days
- Heavy menstrual bleeding - bleeding for >8 days (or) >80ml
- Hypomenorrhoea - Bleeding < 2 days (or) < 20ml
- Intermenstrual bleeding - Bleeding b/w cycles
- Post coital bleeding - Bleeding after intercourse

ABNORMAL UTERINE BLEEDING *1:58*

- Bleeding from uterus corpus that is abnormal in:
  a. Regularity
  b. Volume
  c. Frequency
  d. Duration and
  e. Occurs in the absence of pregnancy

Causes:
FIGO SYSTEM OF NOMENCLATURE FOR THE ETIOLOGIES OF AUB: PALM-COEIN

- Polyps (P) (Fibroid polyp / Endometrial polyp)
- Adenomyosis (A)
- Leiomyoma (L)
- Malignancy & Hyperplasia (M)
- Coagulopathy (C)
- Ovulatory Dysfunction (O)
- Endometrial (E)
- Iatrogenic (I)
- Not defined (N) (Eg: AV malformation)

(1) ENDOMETRIAL POLYPS *3:05*

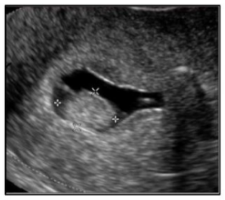
They are localised hyperplastic overgrowth of endometrial glands & stroma which form projection from the surface of endometrium

-C/F-

- Clinical presentation: Mostly they are asymptomatic but can present with:
  - Intermenstrual bleeding (most common presentation)
  - Heavy menstrual bleeding
  - Post-menopausal bleeding
  - Prolapse through cervical ostium
  - Abnormal vaginal discharge.
  - Infertility due to implantation failure

Investigations:
IOC - Saline infusion sonography shows hyperechoic homogenous mass
→ Gold std. for Δ - Hysteroscopy

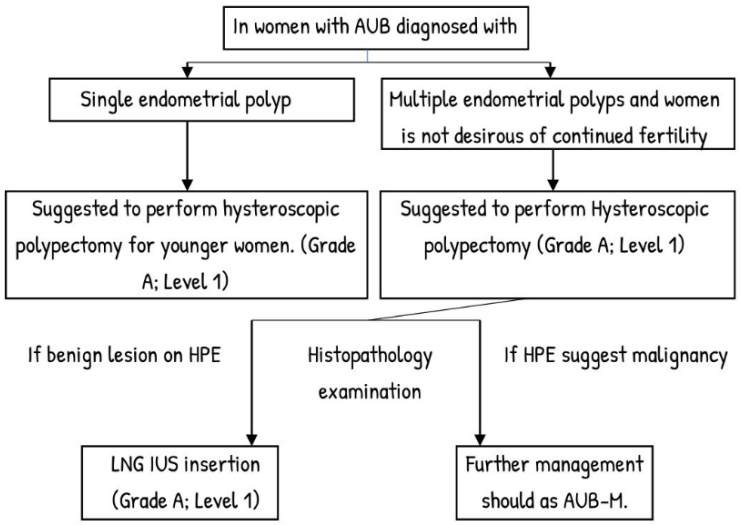
Treatment:
Hysteroscopic polypectomy



Doppler shows single artery entering into polyp: Feeding vessel sign.

Endometrial polyp	Fibroid
Echogenic (white)	Hypoechoic (Black)
Projects into endometrial lumen	Distends the uterine cavity
Stalk may be identified by Saline infusion sonography	Broad based
Feeding vessel sign	Peripheral vessels

APPROACH TO AUB *4:32*



ADENOMYOMA *5:07*

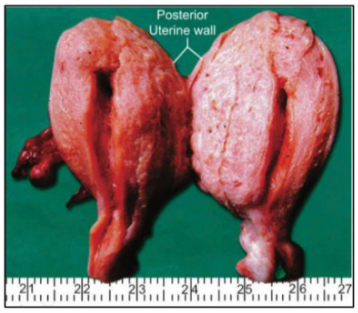
- It is presence of functional endometrium in myometrium.
- It is usually seen in 35-45 year old multiparous women.

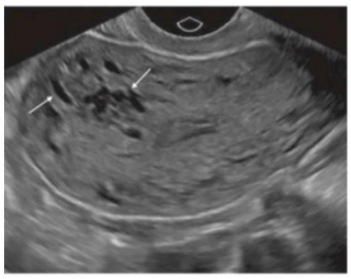
- Clinical picture:
  - Congestive dysmenorrhea (most consistent finding)
  - Heavy menstrual bleeding

- On examination: Uterus will be uniform and globularly enlarged (maximum: 14-16 weeks)
  - Tender uterus: Halban's sign

- **1st line**: Transvaginal USG

- **Investigation of choice**: MRI – Junctional zone (Jn. B/w endometrium & myometrium) thickness will be more than 12mm.
- **Gold standard**: Histopathological examination

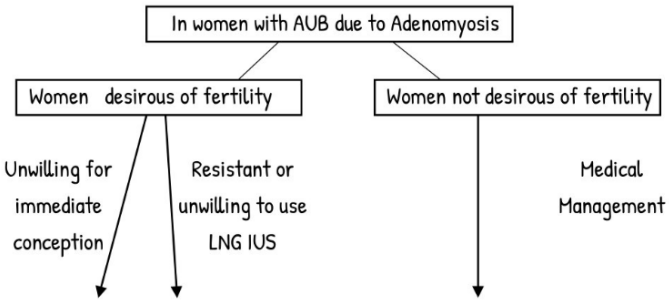


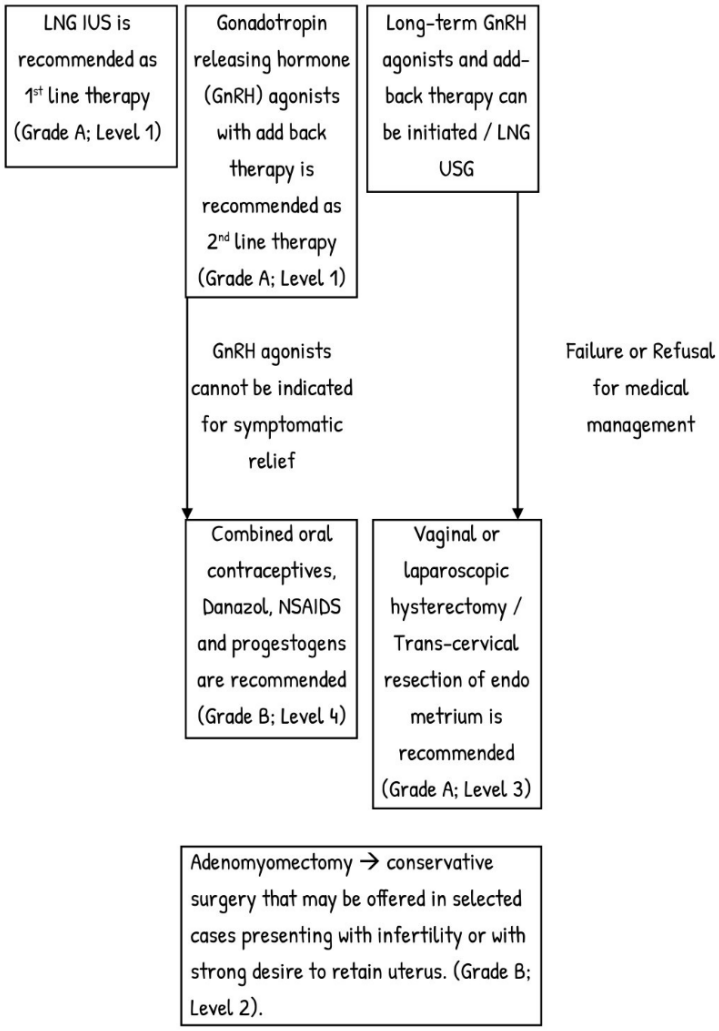


Gross and USG of adenomyosis. USG shows heterogenous echo-pattern-salt & pepper Appearance / Venetian Blind appearance, Scattered vascularity

TREATMENT ALGORITHM: AUB-A *6:19*

Treatment Algorithm: AUB-A





Treatment

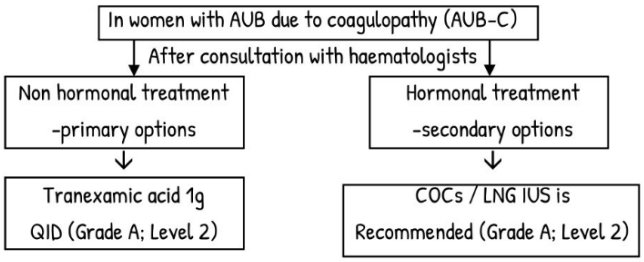
1st line - LNG IUCD

Alternate - GnRH agonist

Definitive Mx - Hysterectomy/Endometrial ablation

COAGULOPATHY 7:07

Treatment algorithm: AUB-C –



Following considerations have to be taken care of:

- In refractory cases von-willebrand disease with uncontrolled uterine bleeding with above medical management, specific factor replacement where possible or desmopressin to be given in consultation with haematologist.

OVULATORY DYSFUNCTION 7:42

Causes

1) PCOS
2) Hypothyroidism
3) Hyperprolactinemia
4) Stress
5) Obesity
6) Excess Wt. loss

1st line drug – Combined OCPs

- Treatment for Endometrial disorders – OCPs

AUB – I 8:11

- Iatrogenic cause – IUCD users
- Breakthrough bleeding;
  - Estrogen break through – low estrogen threshold
  - Supra threshold bleeding – unopposed estrogen
    ↓
    Spiral arteries cannot support
  - Progesterone Breakthrough bleeding –

- High Progesterone → Atrophy & altered endometrium
- Bleeding occurs from unsupported endometrial vessel

AUB – N *8:51*

Rx – LNG – IUCD f/b Hysterectomy

- Everywhere USG s/b done
  Age > 40 yrs → Endometrial Biopsy to be done

Normal and Abnormal

- Puberty – ability to reproduce
- With onset of puberty, this -ve feedback is removed & there is significant ↑ in the amplitude of pulsatile release of GnRH by the hypothalamus

SEQUENCE OF PUBERTY IN GIRLS *00:44*

1) Growth spurt – 1st sign of puberty
2) Thelarche – Breast budding (1st visible sign of puberty)
   – By estrogen
3) Pubarche – Development of pubic & axillary hair
   – By testosterone
4) ↑ in Height & growth spurt
5) Menarche

Mnemonic – Gross BPH in males

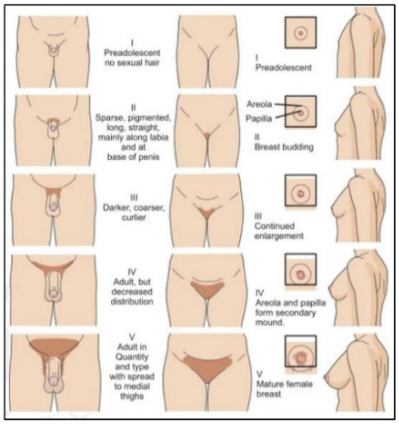
HORMONES *2:04*

1) Thelarche – estrogen (starts at 10.5 yrs)
2) Pubarche & adrenarche – androgens (starts at 10.5 yrs)
3) Growth spurt – Estrogen & GH
   [Bone growth – Estrogen at low doses in both males & females]
   [High doses of Estrogen / androgen – closure of epiphysis]
4) Menarche – LH, Progesterone (start around 12 ½ yrs)
   – d/t pulsatile GnRH

- Puberty in males start at 11.5 yrs →

Testicular enlargement
↓
Penile enlargement
↓
Pubarche
↓
Peak height velocity

TANNER STAGING 3:03



Stage 5 - refers to complete development of breast & pubic hair

PRECOCIOUS PUBERTY 3:08

- Appearance of breast bud before 8 yrs &/or onset of menstruation before 10 yrs in females
- Occurrence of puberty before 9 yrs in males

Causes

1) **Central / True PP-**
   - d/t excessive GnRH, gonadotropins & sex steroids because of premature activation of HPO axis
   - GnRH, FSH & LH → ↑
   - Estrogen & Progesterone →↑
   - Thelarche, Pubarche, adrenarche & Menarche seen
   - m/c cause of PP in female - constitutional / idiopathic
   - TOC - GnRH analogues

   → Pulsatile secretion ↑ HPO axis
   → Continuous secretion ↓ HPO axis

2) **Peripheral / pseudo precocious puberty**
   - d/t excessive production of sex steroids from ovary or from adrenals
   - independent of HPO axis
   - GnRH FSH & LH - ↓

- E &/or androgen - ↑
- Thelarche, Pubarche, adrenarche - may occur
- Menarche - doesn't occur because there is no estrogen / Progesterone withdrawal (static high levels seen)
- Rx - Rx the specific cause

MC CUNE ALBRIGHT SYNDROME *5:16*

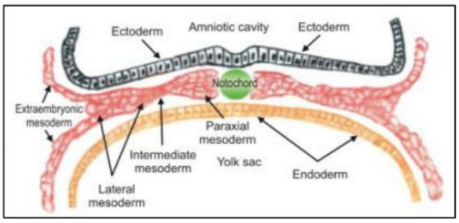
1) PP (central)
2) Café - au - lait spots
3) Polyostotic fibrous dysplasia

DELAYED PUBERTY *5:33*

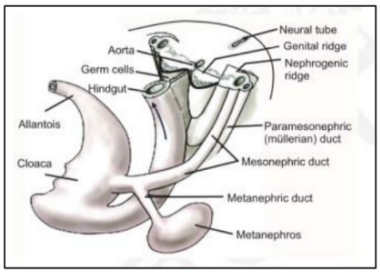
- No breast development by 13 yrs age & no menarche by 16 yrs age

Embryology and Congenital Mullerian Malformations

INTRODUCTION 1:31



- Arises from intermediate mesoderm
- Intermediate mesoderm gives rise to
  1. Mesonephric duct
  2. Paramesonephric duct
- Germ cells arise from yolk sac (endoderm) & then pass behind the dorsal mesentery of hind gut & finally reach the gonadal ridge.
- Bipotential gonads are present at Gonadal ridge

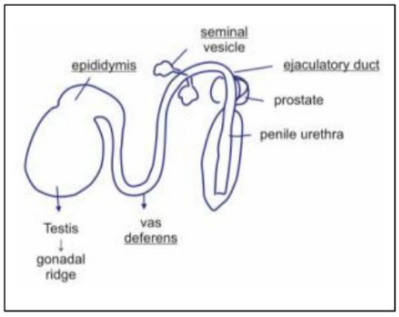


- Deciding factor: SRY gene present on short arm of Y chromosome →
  a) If present - male testes
  b) If absent - female ovaries

Male Genital Tract

- Testes has 2 types of cells -
  1. **Sertoli cells** - Secrete AMH / Mullerian Inhibiting Substance → cause regression of Mullerian duct.
     Remnants of Mullerian duct -
     a) Prostatic utricle
     b) Appendix of testes / Hydatid of Morgagni

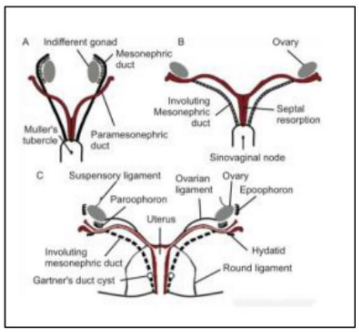
2. **Leydig cells** - Secrete Testosterone → Growth of Wolffian duct → Male internal Genitalia
   ↓
   Epididymis
   Vas deferens
   Seminal vesicle
   Ejaculatory duct
   - Prostate develops from Urogenital Sinus.



FEMALE GENITAL TRACT 7:04

- Females are 46 XX - No SRY gene → No testes → Ovaries develop:
  → No Testosterone → Regression of Wolffian duct

- Remnants of Wolffian tubule-
  a) Cranial remnant - Epoophoron / organ of Rosenmuller
  b) Caudal remnant - Paraoophoron
     → If blocked, it results in paraovarian cyst.



- Wolffian duct remnant - Gartner's duct [If blocked → Gartner's cyst]
- No AMH → Formation of 2 Mullerian ducts

↓

Fusion of the 2 ducts

↓

Septal resolution

↓

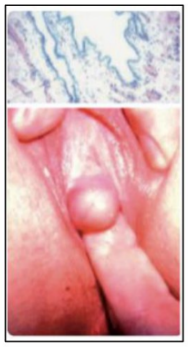
Uterus, Cervix, Upper 2/3rd of Vagina, Proximal F. tubu

- Distal F.tube arises from → Gonadal ridge (ovarian epithelium)
- Lower 1/3rd of vagina → from urogenital sinus

GARTNER'S CYST *11:04*

- Remnant of wolffian duct
- D/D = Cystocele (Herniation of Bladder into vagina)

Gartner's cyst	Cystocele
Margins are well defined	Margins are ill-defined
Tense shiny vaginal rugosity absent	Vaginal rugosity is present
No cough impulse	Cough impulse positive
Non-reducible	Reducible
Treatment: Excision	Treatment: Anterior colporrhaphy

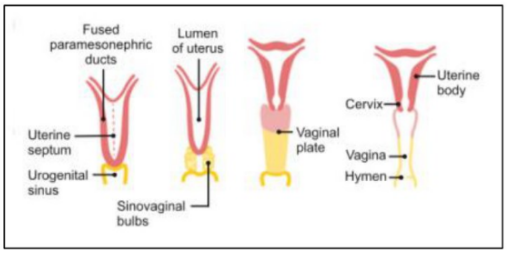


Gartner's Cyst

VAGINA *12:27*

- Upper 2/3rd → arises from Paramesonephric / Mullerian duct
- Lower 1/3rd → from urogenital sinus

- Vaginal plate - lies b/w these 2 parts & normally canalizes at 20 wks
- If it fails to canalise → Transverse Vaginal septum
  ↓
  Causes cryptomenorrhoea / false 1° amenorrhoea
- Mucus membrane of Vagina → derived from endoderm of urogenital sinus
- Muscles of vagina → derived from mesoderm of mullerian duct.

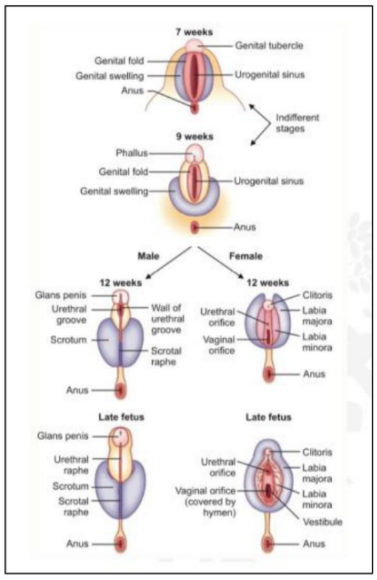


EXTERNAL GENITALIA 13:28

- It is also neutral to start with
- If there is no in-utero exposure to Dihydrotestosterone, male external genitalia will develop.
  If not, female external genitalia will develop

Males		Females
Glans penis	← Genital tubercles →	Clitoris
Scrotum	← Genital swellings →	Labia majora
Ventral aspect Of penile shaft	← Genital folds →	Labia minora

- M/C cause of Ambiguous genitalia in a male fetus
  - Partial AIS
- M/C cause of Ambiguous genitalia in a female fetus
  - CAH (In-utero exposure to testosterone)



CONGENITAL MULLERIAN MALFORMATIONS *16:55*

- Congenital mullerian Malformations result from any defect in Mullerian ducts:
  a) Formation
  b) Fusion
  c) Septal resolution

Classification

- Mnemonic - MUD B SAD
  a) Mullerian agenesis
     1. Complete (MRKH) → both ducts not formed
     2. Partial → One duct not formed

     → Formation defects
  b) Unicornuate uterus
  c) Didelphys (2 uterus, 2 cervix, 2 Vagina)
  d) Bicornuate (2 uterus, 1 cervix, 1 Vagina) — Fusion defects
  e) Septate
  f) Arcuate — Septal resolution defects
  g) Diethyl Stilbesterol exposure

- All uterine anomalies are a/w renal (40%) & Skeletal abnormalities (12%)
- Unicornuate uterus → more a/w renal ab(n)

(1) MAYER – ROKITANSKY – KÜSTER – HAUSER SYNDROME [MRKH]

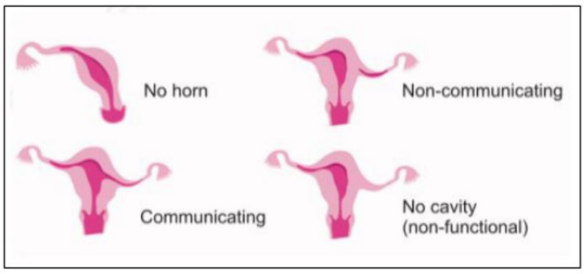
21:00

- Complete Mullerian agenesis
- Uterus, cervix, upper 2/3rd of Vagina & FT except the distal part are absent
- Karyotype – 46 xx
- Ovary – present & (n)
- 2° sexual characteristics – well developed
- Phenotype & external genitalia – female
- PR examination – uterus absent
- C/f – 1° amenorrhoea
- Investigations – USG
- Rx – Vaginoplasty just before marriage

(2) UNICRONUATE UTERUS

21:35

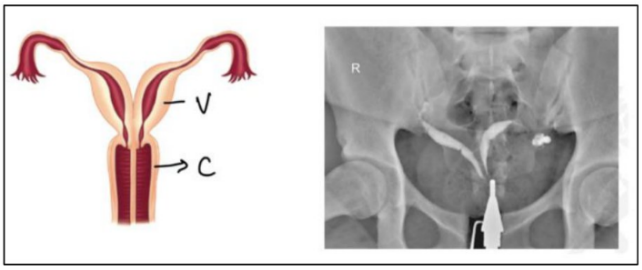
- Only 1 mullerian duct develops
- Banana shaped uterus c̄ single FT
- 4 types –
  a) Communicating horn – risk of ectopic
  b) Non-communicating horn – risk of torsion
  c) No cavity horn
  d) No horn: best prognosis



Rx – Surgical resection of horn

(3) DIDELPHYS UTERUS *22:18*

- Failure of fusion along the whole length of Mullerian duct
- 2 Vagina, 2 cervix, 2 uterus

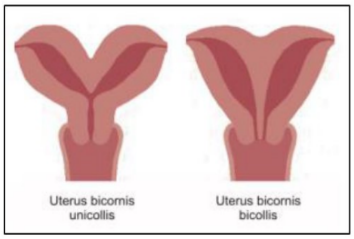


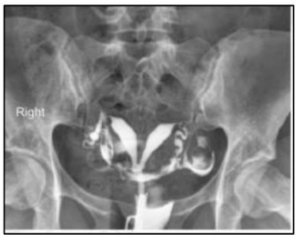
(4) BICORNUATE UTERUS *22:51*

- Only lower parts of ducts fuse
- Cornua separate; only 1 Vagina

Bicornuate uterus

Uterus Bicornis bicollis	Uterus Bicornis unicollis
↓	↓
Vagina – fused	Vagina & cervix fused
Cervix – has septum	↓
↓	Single Vagina, 1 Cx but 2 uterus
2 uterus; 2 cervix	



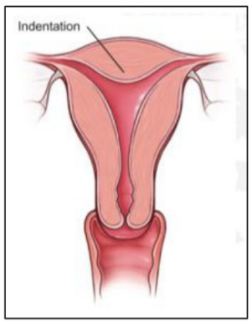


(5) SEPTATE / SUBSEPTATE UTERUS *23:21*

- M/c uterine anomaly
- Worst reproductive outcome
- M/c uterine anomaly a/w recurrent abortions

(6) ARCUATE UTERUS *23:49*

- Incomplete dissolution of the septum
- Flat topped uterus
- Best reproductive outcome f/b didelphys uterus



(7) IN UTERO EXPOSURE TO DES *24:19*

- Cervical hoods, septae, collars & cockscomb
- Uterine hypoplasia (M/c uterine anomaly a/w DES exposure)
- T-shaped uterus
- Wide lower segment
- Constriction bands in uterus
- Prefimbrial paratubal cysts
- Vaginal clear cell adenocarcinoma (rare)
- Vaginal adenosis
- They never cause renal anomalies

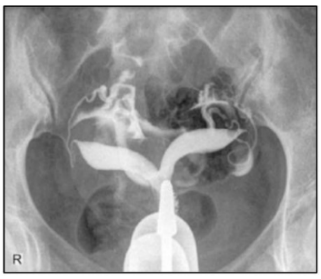
INVESTIGATIONS

25:03

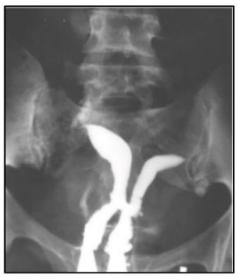
- IOC - 3D - USG > MRI
- Bicornuate uterus & septate uterus are best differentiated by MRI
- Gold std - Hysteroscopy & Laparoscopy
- Other inv - Hysterosalpingography

Hysterosalpingography:

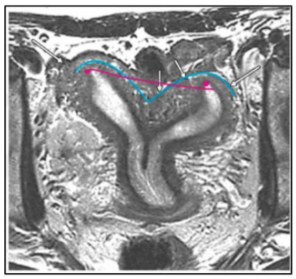
Leech Wilkinson Cannula: It is aimed to detect tubal patency but incidentally picks up uterine anomaly.



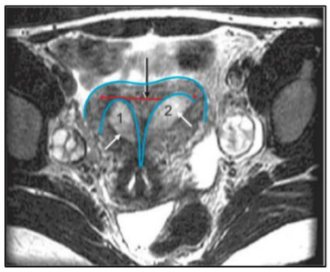
Bicornuate uterus: inter - cornual distance > 4cm and angle > 105°



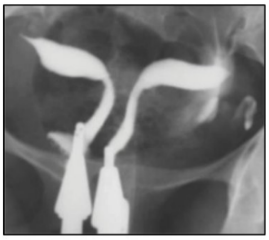
Septate uterus: Inter-cornual distance <4cm and angle <75°



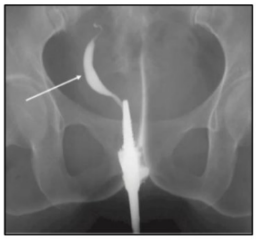
Bicornuate uterus: Midpoint of fundal contour line is below the line joining both cornua.



Septate uterus: Midpoint of fundal contour line is above the line joining both cornua.



Didelphys uterus shows 2 uterus. 2 cervix and 2 vaginal cavities.

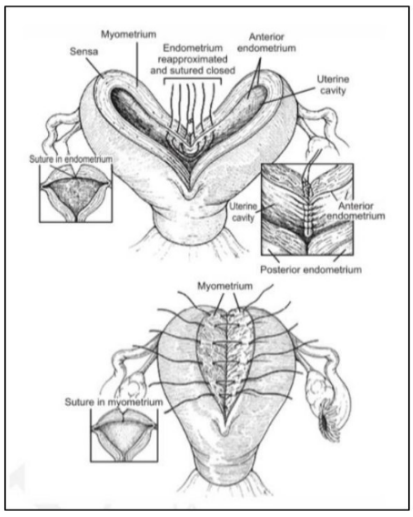


Banana shaped unicornuate uterus

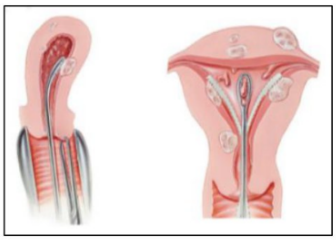
MANAGEMENT

27:16

- M/c indication - recurrent abortions
- Unicornuate uterus - excision of horn
- Bicornuate & didelphys - abdominal metroplasty
  [Middle portion of uterus is excised & is sutured]
- Strassman's metroplasty → M/c metroplasty done nowadays



- Septate uterus - Hysteroscopic transcervical septal resection



- Hysteroscope has an inlet and outlet channel for irrigating the uterus. Hysteroscopic media keeps the uterine cavity distended.

Table 1: Hysteroscopic Media

Medium	Properties	Indications	Risks	Safety Measures
Gas Carbon dioxide	Colorless gas	Diagnostic	Gas embolism	Avoid Trendelenburg Keep fiflow <100 mL/min Intrauterine pressure <100 mm Hg
Electrolyte fluid 0.9% saline	Isotonic 380 mOsm/kg H_2O	Diagnostic	Volume overloaded	Plan to complete procedure at 750ml deficit; stop procedure at 2.2 lit. deficit
Electrolyte - poor fluid Sorbital 3%	Hypoosmolar 178 mOsm/kg H_2O	Operative w/monopolar tools	Volume overload Hyponatremia Hypoosmolality Hyperglycemia	Plan to complete procedure at 750mL deficit Stop procedure at 1-1.5L deficit End earlier in patients with comorbidities elderly
Mannitol 5%	Isoosmolar 280 mOsm/kg H_2O	Operative w/monopolar tools	Volume overload Hyponatremia	Same as above

Glycine 1.5%	Hypoosmolar 200 mOsm/kg H_2O	Operative w/monopolar tools	Volume overload Hyponatremia Hypoosmolality Hyperammonemia	Same as above
Data from Cooper, 2000; American Association of Gynecologic Laparoscopists, 2013; American College of Obstetricians and Gynecologists, 2011.				

Primary Amenorrhea

UTERINE AXIS 00:20

Hypothalamus → pulsatile secretion of GnRH → acts on pituitary to release FSH & LH → they act on ovary

↓

Release Estrogen & progesterone

↓

Acts on uterus for growth of endometrium

PRIMARY AMENORRHOEA 1:42

- In absence of 2° sexual characters, no menses till the age of 13 yrs
- In presence of 2° sexual characters, no menses till the age of 15 yrs

1° Amenorrhoea

Physiological
1) Pregnancy
2) Lactation
3) Menopause
4) Before puberty

Pathological
Primary
1) True
2) False (Cryptomenorrhoea)

Secondary

Causes:

I. Compartment I – Uterine defect

(Eugonadotropic Eugonadism)

1) Mullerian agenesis / MRKH (2nd M/c cause)
2) AIS (3rd M/c cause)

II. Compartment II – Ovarian defect

(Ovarian agenesis < Ovarian dysgenesis)

↓

d/t – (1) Turner Syndrome (more common)
(2) Sweyers Syndrome

[Hypergonadotropic hypogonadism]

III. Compartment III → Pituitary dysfunction

1) Pituitary prolactinoma } Hypogonadotropic
2) Craniopharyngioma } hypogonadism

IV. Compartment IV – Hypothalamus dysfunction

1) Kallmann syndrome – Hypogonadotropic hypogonadism

EMBRYOLOGY *5:07*

- Normally, Bipotential gonads present
- Deciding factor – SRY gene – present – males
  Absent – females
- Testes → Testosterone
- Sertoli cells → AMH → Regression of Mullerian duct
- Female fetus – no testosterone → Wolffian duct regresses
  No AMH → Mullerian duct grows
  ↓
  Uterus, Cx, FT, upper 2/3rd vagina
- Lower 1/3rd of vagina – comes from urogenital sinus
- External genitalia (EG) → mainly dependent on DHT
  ↓
  Present – Male EG
  Absent – Female EG

CRYPTOMENORRHOEA *6:17*

- False 1° amenorrhoea
- HPO axis intact; but no menstruation

Causes

1) Congenital – Imperforate hymen (m/c)
2) Acquired – Transverse Vaginal septum
   Partial Vaginal agenesis
   Cervical stenosis

- Imperforate Hymen–
  - Eugonadotropic eugonadism
  - Phenotype – female
  - Karyotype – 46XX

- Gonads – Ovary → secretes Estrogen ↴
  2° sexual characteristics present
- Uterus – present
- But, there is outflow tract obstruction
  ↓
  Menstrual blood doesn't flow out
  ↓
  Gets accumulated in :
  a) Vagina → Hematocolpos
  b) Uterine cavity → Endometriosis
  c) FT → Hemato salphinx

- C/F
  1) 1° amenorrhoea
  2) Cyclical pain abdomen
  3) Acute retention of urine → d/t Hematocolpos compressing the bladder

- Local examination – a tense bluish bulging hymen seen
- On USG – uterus present
- Rx – Cruciate / X-shaped incision on hymen

TURNER SYNDROME *9:40*

- M/c cause of 1° amenorrhoea
- Incidence – 1 in 5000 live births (or)
  1 in 2500 Female
- Phenotype – Female
- Gonadal dysgenesis → streak ovaries
  ↓
  No estrogen
  ↓
  No 2° sexual characters
  Uterus – infantile
  Female external genitalia
  (Because there is no DHT)

- Karyotype – 45xO
- Turner mosaic – 45xO / 46xY → presents c̄ 2° amenorrhoea

If 46xY present → Gonadectomy s/b done

C/f

1) SHOX gene mutation l/t
   Short stature
2) Webbed neck
3) Low hair line
4) Flat chest c̄ widely spaced nipples
5) CoA
6) Cubitus valgus
7) Short 4th metacarpal
8) Horse shoe kidney
9) Lymphoedema
10) AI Diabetes
11) Thyroiditis

Rx –

1) Growth Hormone supplementation
2) HRT c̄ E+P
   (Conjugated Equine Estrogen 0.625mg + Medroxy progesterone acetate 10mg)
3) IVF c̄ donor oocytes

SWEYER'S SYNDROME *12:34*

- Gonadal dysgenesis
- 85% - idiopathic
  15% - SRY gene mutation
- Phenotype - female
- Karyotype - 46xY
- Height - (n)
- Streak gonads → no estrogen → 2° sexual characters absent

No testosterone → Wolffian duct regresses

no AMH → Mullerian duct grows → Uterus present

→ no DHT → Female EG

→ Rx – (1) HRT c̄ E+P
(2) IVF c̄ donor oocytes

MULLERIAN AGENESIS / MRKH SYNDROME *14:13*

- Karyotype – 46xx
- Gonads – ovaries ✓ → Estrogen ✓
  ↓
  2° sexual characters well developed
- Uterus, Cervix, FT, upper 2/3rd of Vagina – absent (d/t Mullerian agenesis)
- Phenotype – Female
- Uterus not felt on PR
- Δ – USG
- a/w skeletal & renal anomalies

Rx-

- Vaginoplasty just before marriage:
  a) Mechanical dilators like Frank dilator
  b) Surgical –
  1) Mc Indoe vulvovaginoplasty
  2) Williams vulvovaginoplasty
- IVF c̄ own oocytes f/b surrogacy

ANDROGEN INSENSITIVITY SYNDROME (AIS) *15:28*

- Testicular feminisation syndrome
- Karyotype – 46xY
- Phenotype – Female
- Testosterone receptor defect
  All testosterone → converts to estrogen } →Female 2° sexual characters
  (Breast present, but Axillary, pubic hair – absent)
- Female external genitalia (EG)
- Gonads – Testis → Testosterone – Wolffian duct regress
  → AMH – Mullerian duct regress
  ↓
  No uterus

- Rx –
  1. Vaginoplasty

a) Mechanical dilators like Frank dilator
b) Surgical –
   i) Mc Indoe vulvo vaginoplasty
   ii) Williams vulvo vaginoplasty
2. Gonadectomy after puberty after SSC developed
3. Post gonadectomy HRT c̄ ethinyl estradiol

- Partial AIS – Clitoris enlarged
  Scanty axillary hair
  Ambiguous genitalia

- Rifenstein syndrome – Micropenis
  – Ambiguous genitalia

PITUITARY CAUSES *17:23*

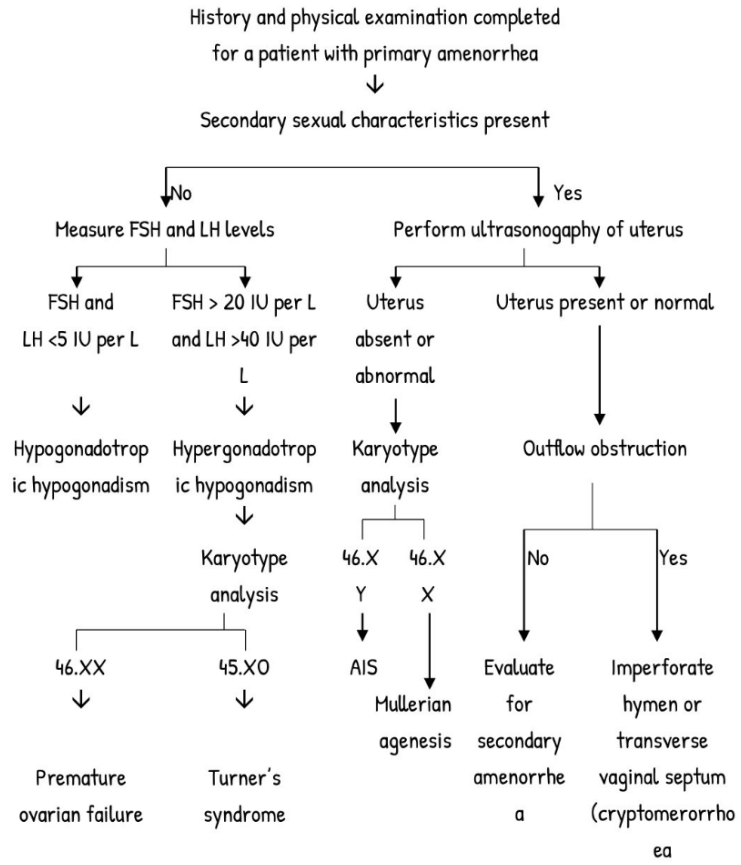
1) Prolactinoma – FSH, LH < 5 IU/L
2) Craniopharyngioma – Tumor of connecting stalk b/w Hypothalamus & pituitary
   – GnRH↓ – ↓ FSH & LH ↴
   Amenorrhoea

HYPOTHALAMIC CAUSES *17:49*

1) Kallmann Syndrome –
   - KAL 1 gene mutation
   - No GNRH production
   - No olfactory placodes → Anosmia
   - M>F
   - Hypogonadotropic hypogonadism
   - Karyotype – 46xx
   - Phenotype – Female
   - Ovary – ✓ ; but no estrogen → SSC not developed
   - Uterus – ✓
   - EG – Female
   - Tall height
   - Rx – Inj. Pulsatile GnRH
     Inj. hCG
     Inj. FSH

WORKUP FOR 1° AMENORRHOEA

19:10



Question: A 19-year-old patient complains of primary amenorrhea. She had well developed breast and pubic hair but on examination there was absence of uterus and vagina. Likely diagnosis is:

A. XYY
B. Mullerian agenesis
C. Gonadal dysgenesis
D. Klinefelter syndrome

Answer: B. Mullerian agenesis

Primary Amenorrhea

Topic Notes: 8

1) SSC	✓	✓	×	×	×
2) Uterus	×	×	✓	✓	✓
3) Karyotype	46xx	46xy	46xy	46xx	45x0
	↓	↓	↓	↓	↓
4) Diagnosis	MRKH	AIS	Sweyer's	Kallmann	Turner

Secondary Amenorrhoea

DEFINITION 00:31

- Absence of menstruation for 3 months or woman having < 9 cycles / year
- M/c cause - pregnancy
- M/c pathological cause - PCOS

CAUSES FOR 2° AMENORRHOEA 00:55

I. Compartment I - Uterine defect → Euganadotropic Eugonadism - Asherman syndrome

II. Compartment II - Ovarian defect → Hypergonadotropic Hypogonadism

a) PCOS
b) Premature ovarian insufficiency
c) Savage syndrome
d) Chemo Rx / Radio Rx
e) Oophorectomy
f) Ovarian tumors

III. Compartment III - Pituitary defect →

a) Craniopharyngioma
b) Prolactinoma
c) Sheehan syndrome
d) Simmonds disease

→ Hypogonadotropic Hypogonadism

IV. Compartment IV - Hypothalamic defect →

a) Eating disorders
b) Excessive exercise
c) Athletes

→ release endorphins → Hypogonadotropic Hypogonadism

d) Stress
e) Hypothyroidism
f) TB
g) Sarcoidosis
h) Vesicovaginal fistula

ASHERMAN SYNDROME 2:42

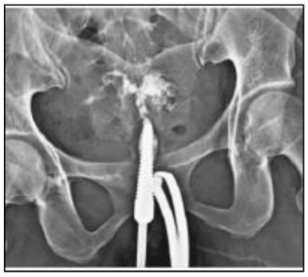
- Uterus has 2 layers -
  1) Stratum basale

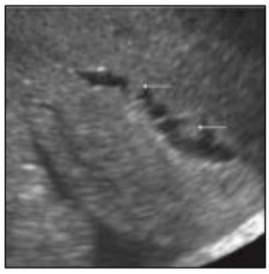
2) Stratum functionalis

- In Asherman syndrome, there is damage to stratum basale layer → adhesions of anterior & posterior wall of uterus (uterine synechiae)

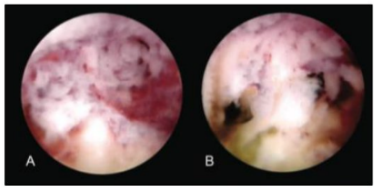
- Causes:
  1) Over zealous curettage
  2) Repeat D&C
  3) Post - partum curettage (Highest risk)
  4) TB

Investigations
IOC / Gold std - Hysteroscopy


Hysterosalpingography: Moth-eaten appearance


Saline infusion sonography showing Intrauterine adhesions

Rx - Hysteroscopic adhesiolysis



Hysteroscopy showing moth eaten appearance

PITUITARY CAUSES 3:40

1) Prolactinoma
2) Sheehan's syndrome -
   - Panhypopituitarism
   - Post massive PPH l/t pituitary necrosis (there is 135% ↑ in Pituitary blood supply during pregnancy)
   - Prolactin def. - m/c

GH, LH FSH def – more common
- Later on, ACTH & TSH def. occur
- 1st hormone to be lost is GH

- Symptoms
  - Failure of lactation after delivery (d/t Prolactin def.) is the most common presentation
  - 2° amenorrhoea (LH / FSH absent)
  - Loss of libido
  - ↑ sensitivity to cold (hypothyroidism)

- Cortisol deficiency causes
  1) Absence of axillary sweating
  2) Loss of axillary & pubic hair (sign of adrenal cortical failure)
  3) ↓ in skin pigmentation

- **Simmonds disease** – Pituitary necrosis not related to post partm

PROLACTINOMA 5:00

- 2 types –
  1) Microadenoma (<1 cm)
  2) Macroadenoma (>1 cm)

Triad of
a) Amenorrhoea
b) Galactorhoea
c) Infertility & ↓ libido

[↑ Prolactin → downregulates GnRH
↓
↓ FSH & LH
↓
↓ E & P]

Other symptoms of macroadenoma–
1) Headache & pressure symptoms
2) Bitemporal hemianopia

Investigations
Sr. Prolactin in fasting level–
a) <25-30 ng/ml – (n)
b) >30 ng/ml → Check Sr TSH → Correct if Hypothyroidism present
c) >150 – 200 ng/ml – MRI

- MX-
  1) If on Dopamine antagonists - stop them
  2) Microadenoma: Medical management - cabergoline 0.25mg twice a week.
  3) Macroadenoma: Medical management → Not responding, tumour size increasing → Trans sphenoidal hypophysectomy
  4) If patient is pregnant / infertile: Bromocriptine is more preferred than cabergoline

OVARIAN CAUSES *6:26*

1. PCOS
2. Premature ovarian insufficiency: depletion of all follicles before age of years.
   - Causes:
     a. Idiopathic
     b. Autoimmune
     c. Chemotherapy and radiotherapy
     d. Genetic:
        i. Fragile X syndrome (FMR1 gene mutation: CGG repeat)
        ii. Turner mosaic
        iii. Perrault syndrome - Premature ovarian failure + SNHL
   - Investigation:
     i. Serum estrogen low < 20pg / ml
     ii. Serum FSH > 40 IU/L on 2 occasions
     iii. Antral follicle count on transvaginal sonography: Absolute Follicle Count <5.
   - Treatment: IVF with donor oocytes.

3. SAVAGE SYNDROME *7:08*

- FSH receptor mutation
- It causes both primary and secondary amenorrhea.
- FSH will not be able to act on granulosa cells → No estrogen.
- Investigation:
  i. FSH > 40 IU/L
  ii. TVS: Increased Antral Follicle Count:> 8
  iii. AMH increased

HYPOTHALAMIC CAUSES *7:26*

- Mainly d/t ↓ pulsatile GnRH
- Causes
  1) TB

2) Sarcoidosis
3) VVF
4) Stress → ↑ GABA & Cortisol
5) Eating disorders → ↓ Leptin
6) Excessive exercise → ↑ Endorphins
7) Athletes → No fat → ↓ Leptin

→ ↓ Pulsatility of GnRH

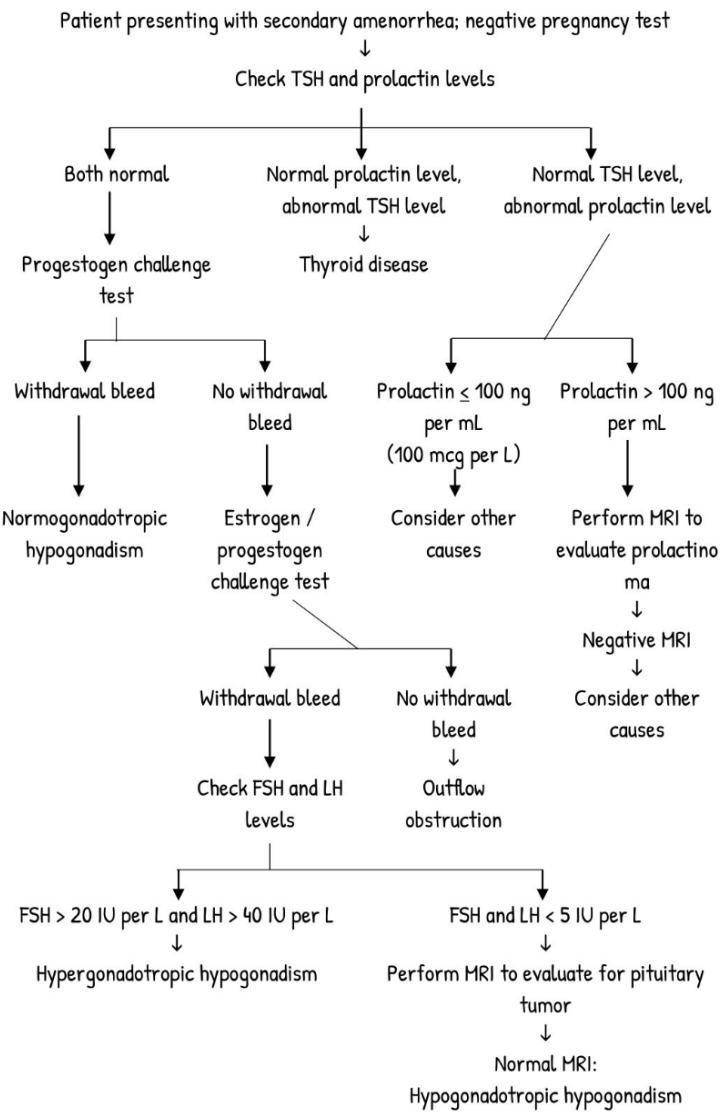
WORK-UP FOR 2° AMENORRHOEA *7:40*

1) Urine Pregnancy Test
2) Sr. TSH, Sr. Prolactin
3) Progesterone challenge Test → 5 days of Medroxy Progesterone acetate & withdraw

- No withdrawal bleeding → E + P challenge test (21 days of EE + last 10 days of Progesterone → withdraw)
  - No bleeding → Uterine defect
  - Withdrawal bleeding present → Measure FSH level
    - <5IU/l → Hypothalamopituitary defect → GnRH Dynamic Test
    - >40IU/L → Ovarian failure
- Withdrawal bleeding present → PCOS

Secondary Amenorrhea

Topic Notes: 6



PCOS & Hirsutism

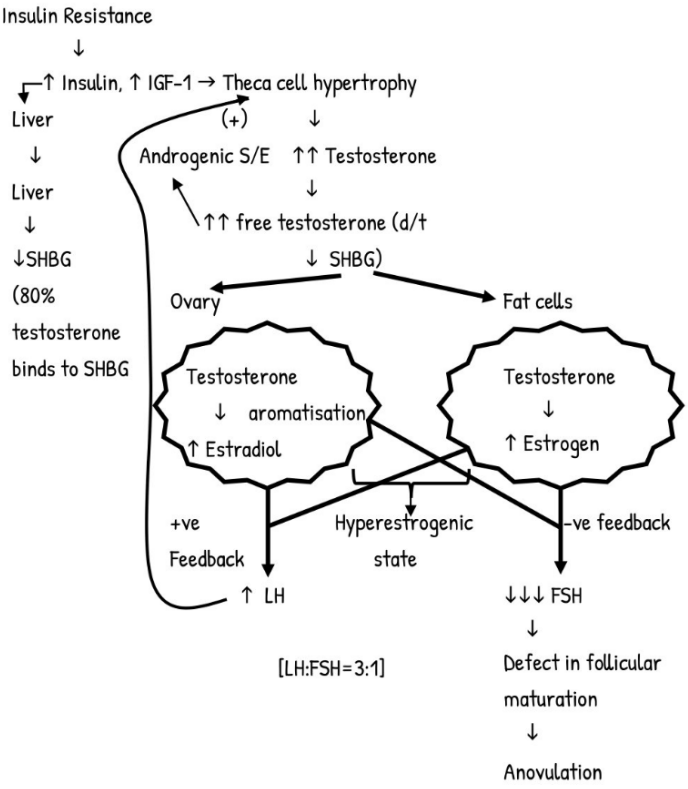
PCOS:

- Poly Cystic ovarian syndrome / stein – Levinthal syndrome

INTRODUCTION 1:05

- PCOS previously known as PCOD was first described by Stein and Levinthal in 1935
- It is now called PCOS because it has a multi factorial and polygenic etiology with a varied presentation and diverse outcomes
- PCOD/PCOS is the most common endocrine disorder among the reproductive age group people (mainly 15-25 years)
- It is the commonest cause of anovular infertility
- It is a treatable cause of infertility

PATHOPHYSIOLOGY 1:42

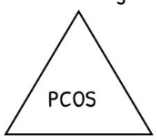


- Metformin given as Rx to ↓ insulin resistance
- Reducing weight → ↓ fat cells

C/f:

1) Prolonged amenorrhoea f/b heavy menstrual bleeding
   (↑ E, but no ovulation l/t endometrial hyperplasia till spiral arteries can bear)
2) Androgenic S/E - Hirsutism, Acne
3) Anovulation - Infertility

Amenorrhoea / oligo menorrhoea

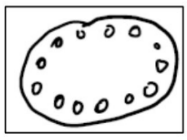


Hirsutism Obesity

- HAIR – AN syndrome
  1) Hyper androgenism
  2) Insulin Resistence
  3) Acanthosis Nigricans

DIAGNOSIS *6:35*

- 2003 Rotterdam Criteria: 2 out of 3 should be positive for diagnosis -
  1. Oligo or anovulation - amenorrhoea / oligomenorrhoea
  2. Hyperandrogenism clinical or biochemical
  3. On USG:> 12 follicles of 2-9mm size which are peripherally arranged. Or Ovarian volume > 10 ml

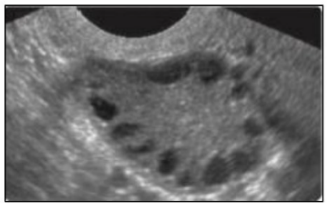


Chair of pearls appearance

2018

- ESHRE criteria: 2 out 3 positive -
  1. Oligo/ anovulation
  2. Hyperandrogenism (Clinical or biochemical)

3. 8 MHz bandwidth: >20 follicles 2-9mm peripherally arranged.
   TAS: Ovarian volume > 10ml

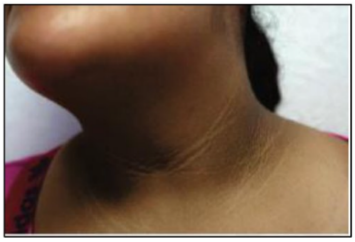


TVS - chain of pearls appearance

INVESTIGATIONS *7:58*

1) FH, LSH
2) 75 gm GTT
3) Fasting lipids every 2 yrs
4) Vit D measurement
5) IR calculated by -

$$\frac{\text{Sr. FBS}}{\text{Sr. Fasting Insulin}} = \text{value of } <4.5 \text{ indicates resistance}$$



Acanthosis Nigricans: Sign of insulin resistance

Q. All of the following are a/w PCOS except:
a) Ovarian Ca.
b) Endometrial Ca.
c) IR
d) Osteoporosis ✓

MANAGEMENT *8:55*

1) Principle Mx-
   Diet + Life style modification

↓

10% Wt. loss improves ovulation

→ Insulin sensitiser - Metformin 500mg - 1500 mg/day
- Myoinositol

[Dangerous S/E of Metformin - Lactic acidosis]

2) Regularising cycles -

1. COCP (like cyproterone acetate, drosperinone)
   - low dose (20μg EE) + Progesterone
   ↓
   ↓ FSH, LH
   ↓
   ↓ Testosterone

   → Advantages →
   a) Cycles regularise
   b) ↑ SHBG, ↓ free testosterone
   c) Helps ↓ing Hirsutism
   d) ↓↓ menstrual blood loss

2. Withdrawal bleeding -
   After 30-45 days of amenorrhoea →
   Medroxyprogesterone acetate x 5-7 days
   (10 mg) ↓
   Then withdraw
   ↓
   Bleeding

3) Infertility-

- Ovulation induction -
  a) DOC - Letrozole (Aromatase (-))
  Testosterone —X→ Estradiol
  ↓
  ↑ FSH → ↑ growth of dominant follicle
  b) Clomiphene citrate
  c) Gonadotrophins

4) Laparoscopic Ovarian Drilling
   - Laparoscopic Ovarian Drilling (LOD) or Laparoscopic electrocoagulation of ovarian surface (LEOS)
   - In this surgery, monopolar current is passed within the ovary to destroy the ovarian theca.
   - Indications: Who are resistant to ovulation with gonadotropin or when very high doses of gonadotropins are required for ovulation.
   - 40 mV: 4 holes → 4mm Depth.
   - Advantage: no risk of OHSS and multiple pregnancy.
   - Disadvantage:
     i. Surgical procedure
     ii. Risk of premature ovarian failure if excessive tissue is damaged
     iii. Adhesion formation post-surgery

HORMONAL REVIEW *13:29*

- **Increased:**
  - LH
  - Testosterone levels increased (both free and total)
  - Insulin, insulin growth factor – 1
  - Estrone > Estradiol
  - LDL and Triglycerides
  - AMH
  - Androgens
- **Decreased:**
  - FSH
  - SHBG
  - Progesterone
  - HDL

COMPLICATIONS *14:08*

1) ↑ risk of cardio vascular diseases (d/t obesity & dyslipidemia)
2) ↑ risk of
   - DM
   - Endometrial Ca (3x)
   - Ovarian Ca (2x)
   - Breast Ca
3) Anovulatory infertility
4) Hirsutism

5) ↑ risk of depression & mood disorders
6) ↑ risk of diseases a/w Metabolic x syndrome

METABOLIC X SYNDROME &PCOS *15:05*

- Metabolic X Syndrome & PCOS
  - PCOS is related to the metabolic X syndrome
  - Any 3 of following 5 should be present to call it metabolic X Syndrome
    i. Abdominal obesity (waist circumference > 88 cm or 35 inches)
    ii. Triglyceride > 150 mg/dl
    iii. HDL-cholesterol <50 mg/dl
    iv. BP>130/85 mm of hg
    v. Fasting blood sugar of 110-126 mg/dl and 2-hour 140-199 mg

HIRSUTISM *16:10*

- Male patterned growth of facial hair in females
- Virilism - male 2° sexual features in females

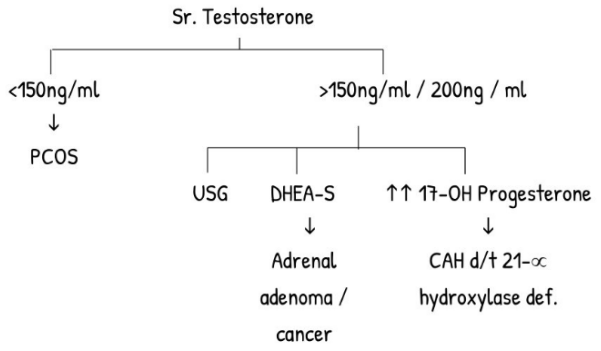
Causes

- M/c cause - PCOS → slow onset Hirsutism
- Adrenal adenoma
- Adrenal Ca
- Testosterone producing ovarian tumors
- Drugs
- CAH

} Rapid onset of Hirsutism

Investigations

- 1st Inv. - Sr. Testosterone
- Score - Ferrimen Gallaway scoring [Check 11 sites]



Rx

- DOC for hirsutism: OCP containing cyproterone acetate for 6 months. → increases SHBG. → Decrease free testosterone. Cyproterone acetate is an anti-androgen (Krimson).
- Androgen receptor blockers:
  i. Flutamide
  ii. Spironolactone
- 5α- reductase blockers: Finasteride
- Eflornithine hydrochloride cream
- Mechanical epilators.

Symptomatic Mx of PCOS

Main Complaint	Management of Choice
Irregular cycles with oligomenorrhea and secondary amenorrhea	OC pills with 3rd or 4th generation progestin
Obesity	Metformin + OCP
Insulin resistance	Metformin
Hirsutism	OCP with cyproterone acetate
Infertility	Letrozole 1st line, Clomiphene citrate (2nd line)

Infertility

Female Infertility

- Infertility
  - Infertility is defined as an inability to conceive inspite of 1 year of regular unprotected intercourse.
  - Primary: Never conceived
  - Secondary: Conceived in the past (irrespective of outcome of that pregnancy)

- If age of patient is > 35 years → Start investigating after 6 months.
- If age of patient is > 40 years → Start investigating after 3 months.

Causes of Infertility

1) Male factors (30-40%)
2) Female factors (40-50%)
3) Unexplained infertility (10%)
4) Combined factors (10%)

Basic investigations

1) Tests for ovulation
2) Human semen analysis
3) Tests for checking tubal patency

FEMALE FACTORS 1:35

- Ovarian (30-40%)
- Tubal (30-40%)
- Unexplained (10-15%)
- Miscellaneous (Uterine / cervical): 10-15%

I. Ovarian causes:
   1. PCOS - m/c
   2. Anovulation
   3. Luteal phase defect
   4. Gonadal agenesis or dysgenesis
   5. Premature ovarian failure
   6. Savage syndrome
   7. Chemotherapy or radiotherapy
   8. Tumours
   9. Chocolate cyst

II. Tubal causes:
   1. Peri-tubal adhesions

2. Salpingitis
3. Kartagener's syndrome
4. Post tubectomy

III. Uterine causes and Cervical causes:
1. Uterine malformation
2. Submucosal fibroid
3. Asherman Syndrome
4. Retroverted uterus

WHO CATEGORY FOR ANOVULATION *2:45*

I. Hypothalamic pituitary failure: Hypogonadotrophic Hypogonadism
II. Hypothalamic pituitary disturbance / PCOS
III. Ovarian failure
IV. Hyperprolactinemia

Category I	Hypothalamo - pituitary failure	Kallmann syndrome / Sheehan's syndrome	Hypogonadotrophic Hypogonadism	Injection pulsatile GnRH / Injection HMG
Category II	HPO Axis disturbance	PCOS	Increased LH Decreased FSH Increased Estrogen	Injection Letrozole
Category III	Ovarian failure	Premature Ovarian Failure, Savage Syndrome	Hypergonadotrophic hypogonadism	IVF with donor oocytes
Category IV	Hyper prolactinemia	Prolactinoma	Increased prolactin	Bromocriptine > Cabergoline

INDICATORS OF OVULATION *3:30*

I. Direct indicators: Laparoscopic visualizatio of corpus luteum.
II. Indirect Indicators:
1. History:
- Regular cycles
- Mittelschmerz: Mid cycle ovulatory pain
- Premenstrual syndrome
- Primary spasmodic dysmenorrhea: Pain on the first day of menstruation.

2. Cervical mucus changes:
   - Before ovulation, it is under the influence of estrogen: Thin, Copious and can be stretched between 2 fingers: Spinnbarkeit. Ferning is positive (crystallization of Nacl over mucin threads).
   - After ovulation, it is under the influence of progesterone: Thick, scanty. It breaks on stretching between 2 fingers: Tack. Ferning is negative.

3. Rise in basal body temperature by 0.5°C post ovulation.
4. Investigations:
   a. Urinary LH surge rises around day 14.
   b. Serum progesterone on day 22:
      - > 5ng/ml: Ovulatory
      - > 25 ng/ml: Pregnant
   c. Smear from the lateral fornix of vagina:
      - Parabasal or basal cells: No hormonal predominance.
      - Intermediate cells: Under the influence of progesterone.
      - Superficial cells: Under the influence of estrogen.
      - Before ovulation: P/I/S - 0:30:70
      - After ovulation: P/I/S - 0:60:40
   d. USG:
      - Follicular study: rupture of dominant follicle
      - Fluid in the pouch of douglas
      - Endometrium: trilaminar endometrium
   e. Endometrial biopsy:
      - On day 22: Maximum activity of progesterone. → Secretory endometrium.
      - Proliferative endometrium: anovulation
      - Lag in endometrial changes by 2 days: luteal phase defect

III. Conclusive indicators: Pregnancy

TESTS FOR OVARIAN RESERVE *5:15*

- Best test: Anti-mullerian hormone
  - It is secreted after puberty from granulosa cells of small follicles.
  - It helps in monofollicular development.
  - Normal AMH: 2-3.5ng/ml.
  - AMH < 1 indicates poor ovarian reserve → Better to go for IVF.

- Antral follicle count:
  - On day 2 of menstrual cycle: 5-8 follicles normally.
  - < 5 follicles suggest poor ovarian reserve
  - It is the 2nd best marker

OVULATION INDUCTION DRUGS 5:53

1. Clomiphene citrate (CC) → 1st line therapy
2. Letrozole
3. HMG
4. FSH-purified urinary FSH (u FSH) – highly purified urinary FSH (Metrodin HP) – recombinant FSH (r FSH)
5. Recombinant HCG
6. Injection Pulsatile GnRH

- Clomiphene citrate is DOC except in case of obesity and PCOS. → Letrozole considered as first line.

CORRECTION OF BIOCHEMICAL ABNORMALITIES 6:34

Insulin resistance – Metformin
Androgen excess – Dexamethasone
Prolactin raised – Bromocriptine

Substitution Rx
a) Hypothyroidism – Thyroxine
b) Diabetes – Antidiabetic drugs

1) CLOMIPHENE CITRATE 7:06

- It is a selective estrogen receptor modulator.
- It has 2 components: Enclomiphene (potent isomer) and Zuclomiphene
- It blocks the pituitary E_2 receptors in pituitary → No Negative feedback → increased FSH.
- Dose: 50mg/day to maximum 150 mg/day.
- It is started on day 1 or 2 and continued for 5 days.

- Side effects
  i. Hot flushes
  ii. Nausea vomiting
  iii. Pain abdomen
  iv. Visual disturbances (Serious S/E: after which it should not be used)
  v. Anti-estrogenic effect on the endometrium.→ Ovulation rate is 80% but pregnancy rate is only 40%

2) LETROZOLE 8:24

- Letrozole, Anastrozole → Aromatase (-)
- MOA – (-) formation of estrogen from testosterone

- As estrogen level ↑, FSH ↓

3) GONADOTROPHINS – HUMAN MENOPAUSAL GONADOTROPHIN *8:41*

- Source - urinary extract of menopausal women
- Contains 75IU LH & 75 IU FSH

4) Other drugs-
   1. R. FSH, R.LH
   2. Inj. hCG → start at 150 IU to max. of 400 IU

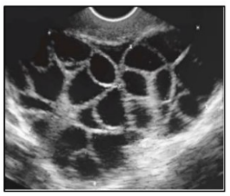
Common S/E of ovulation Induction Agents

- It s/b used max. for 6 cycles
  1. Multiple Pregnancies
  2. Epithelial ovarian cancers
  3. Ovarian hyperstimulation syndrome

- Complications are maximum for gonadotropins > clomiphene citrate > letrozole.
- Follicular study is done from day 8 along with ovulation induction to monitor the growth of follicles and when the dominant follicle is 18-20 mm, ovulation trigger is given to rupture the follicle
- For ovulation trigger, m/c drug used is hCG (derived from the urine of pregnant women or by recombinant technology)
- Recombinant LH can also be used but is very expensive.
- Ovulation occur 36 hours after injecting hCG.
- ↑ VEGF → Anasarca

OVARIAN HYPERSTIMULATION SYNDROME (OHSS): *10:14*

- (A) Clinical Risk factors: PCOS, young patients, low BMI, previous OHSS, genetic predisposition
- (B) Biochemical indices: Plasma oestradiol peak, insulin resistance, serum VEGF, von Willebrand factor, FSH, AMH
- (C) Ultrasound Indices: PCO pattern, high AFC, Ovarian volume, low intra-ovarian vascular resistance.



- Prediction:
  - Young patients

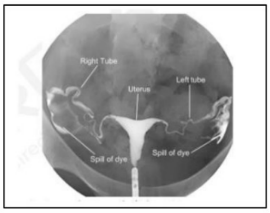
- Lean women
- Polycystic Ovarian syndrome
- Previous OHSS
- Increased antral follicular count (>10 per ovary)
- Increased anti mullerian hormone levels (>3.3 ng/ml)
- High or rapidly rising E_2 levels (E_2 > 5,000 pg/ml)
- High number of follicles (≥ 18)

TUBAL FACTORS

TESTS FOR TUBAL PATENCY

11:24

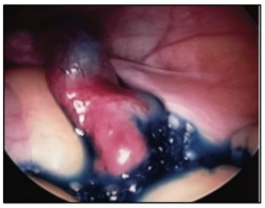
1. Hysterosalpingography (HSG):
   - Leech Wilkinson Cannula is used to push dye into uterine cavity.
   - Cavity of the uterus and fallopian tube patency can be checked.
   - First line, as no anaesthesia required.
   - Advantage: Non-invasive and cheap.
   - Disadvantage: False positive cases due to bilateral cornual spasm.
   - Dye: Urograffin (meglumine diatrizoate)



2. Sono-salpingography/Saline USG:
   - Normal saline is introduced into the uterine cavity, and fallopian tube patency can be checked by seeing free fluid in POD.
   - It is also very useful to evaluate endometrial polyps.

3. Laparoscopy with chromopertubation with methylene blue dye:
   - Best and Gold standard investigation, as tubal patency can be confirmed under vision and, besides, any pathology can simultaneously be corrected with operative laparoscopy.
   - As it requires anaesthesia and admission, it is never the first-line investigation for tubal patency.

   - **Advantage:**
     1. Direct visualisation of fallopian tube.
     2. Diagnostic and therapeutic
     3. Adjacent structures are visualized



- **Disadvantage:**
  1. Expensive
  2. Side effects of laparoscopy
  3. Uterine cavity not visualized.

- **Dye**: Methylene blue dye

MANAGEMENT OF BLOCKS *13:11*

1. Cornual block: Cornual catheterization or cannulation (operative hysteroscopy) to remove the blocks.
2. Mid-segmental tubal blocks: tuboplasty + tubal recanalization
   - End to end anastomosis.
   - Success rate is more if:
     i. Age < 35 years
     ii. Length of reconstructed tube > 4cm.
     iii. Isthmo - isthmic re-anastomosis.
     iv. Reversal is best: Laparoscopic tubectomy with clips > rings > pomeroy.
3. Distal tubal block:
   - Mild: Filmbrioplasty
   - Severe: IVF (Best)

- In cases of hydrosalpinx or pyosalpinx → Bilateral salpingectomy or clipping of fallopian tube → IVF.

UTERINE FACTORS *14:11*

- Fibroid: myomectomy
- Ashermann: Hysteroscopic adhesiolysis
- Uterine malformation:
  - Bicornuate → Metroplasty
  - Septate → Hysteroscopic resection of septum
- First line investigation: USG
- Gold standard: Hysteroscopy

CERVICAL FACTORS *14:27*

- Sims Huhner test: It is used to know whether cervical mucus is proper or not.
  - Abstinence for minimum 2 days to maximum 7 days. (3 days prior abstinence)
  - It should be done preovulatory.
  - Post intercourse cervical mucus examination: Ideally within 2-3 hours of intercourse.
  - **Inference:**
    - > 15 motile sperms / HPF: Normal
    - > 15 sperms / HPF but immotile: Anti-sperm antibody in cervix. → Treatment: Intrauterine insemination.
    - < 5 sperms / HPF: Oligospermia

MALE INFERTILITY *15:05*

- HPO axis s/b intact
- There can be testicular problem
- Conduction path block can also l/t infertility
- Seminal vesicles secrete fructose –
  a) If there is fructose in semen – obstruction is above the insertion of seminal vesicles
  b) If fructose is absent in semen – obstruction is below the insertion of seminal vesicles

CAUSES *16:14*

1) Pre testicular
2) Testicular
3) Post testicular

Pretesticular	Testicular	Post testicular
Kallmann Syndrome	Trauma	Vas deferens obstruction
Hypogonadotrophic hypogonadism	Torsion	Congenital absence of bilateral vas deferens
Drugs	Tumour	Post vasectomy
Stress	Heat irradiation	Kartagener's syndrome
Hypothyroidism	Cryptorchidism	
Hyperprolactinemia	Varicocele	
Erectile dysfunction	Klinefelter Syndrome	
Ejaculatory dysfunction	Rifenstein Syndrome	
Diabetes	Mumps orchitis	
Smoking		

INVESTIGATIONS *17:08*

1. Semen analysis:
   - It is the mainstay of investigations.
   - It should be done after 3 days of prior abstinence. (Minimum: 2 days abstinence and maximum 7 days abstinence)
   - Semen collected should be brought within 30-45 minutes of collection.

   - Parameters (WHO 2021 criteria):
     i. Ph of semen: > 7.2
     ii. Volume: > 1.4 ml
     iii. Sperm count: 39 million/ejaculate or 15 million / ml
     iv. Motility: 42% should be motile and progressive motility should be 30%.
     v. Vitality: 54%
     vi. Morphology: 4%
     vii. Agglutination: <10%
     viii. Leucocytes: < 1 million/ml
     ix. Round cells: < 5 million/ml

   - **If any of the parameters are abnormal:**
     Repeat semen analysis after 6 weeks. → If 2 samples 6 weeks apart are abnormal → Then, it is labelled as abnormal semen analysis.

   - **Abnormalities:**
     a. Aspermia: no semen due to obstruction
     b. Azoospermia: zero sperm count
     c. Oligospermia: sperm count < 15 million / ml
     d. Asthenospermia: motility < 40%
     e. Teratozoospermia: Normal morphology <4%
     f. Necrozoospermia: alive sperms <54%

MANAGEMENT *18:20*

1) Oligospermia-
   a. 3 months multivitamins + Antioxidants + coenzymeQ
   b. Clomiphene citrate

2) Asthenospermia - Carnitor
3) Azoospermia -
   a) Peripheral smear indicating infection With pus cells → antibiotics
   b) Check for Sr. TSH & Prolactin
   c) Also check for Sr. FSH, LH & Testosterone

FSH, LH, Testosterone

All are low	FSH & LH – High	All are (n)
↓	Testosterone – low	↓
Kallmann syndrome	↓	Post testicular
↓	Testicular	↓
Rx – Inj. Pulsatile GnRH	↓	USG
	Testicular Biopsy	↓
	↓	TRUS
	Sperms present	↓
	↓	Vasovasal reconstruction
	Sperm extraction	↓
	↓	Sperm retraction
	ICSI	↓
		ICSI

ARTIFICIAL REPRODUCTIVE TECHNOLOGY *20:40*

- It is also known as assisted reproductive technology: Pregnancy is achieved by manipulation of gametes outside the human body to achieve pregnancy.

- Various techniques include:
  I. Intrauterine Insemination (IUI)
  II. Invitro fertilization (IVF)
  III. Intracytoplasmic sperm insemination (ICSI)
  IV. Zygote intrafallopian transfer
  V. Gamete intrafallopian transfer

1) IUI *20:57*

- Artificial insemination donor
- Artificial insemination husband

- Procedure:
  Semen wash: It is done by different techniques:
  a. Swim up
  b. Swim down
  c. Density gradient (best)
  ↓
  0.5 ml of highly motile sperms is achieved.

- Timing: 36 hours after LH surge onset or 36 hours after injection HCG.
- Important prerequisite: Patent Fallopian tube is required (atleast 1).

- Procedure: 0.5 ml of washed highly motile sperms are injected into the uterine cavity with soft catheter at the time of ovulation.

Indications

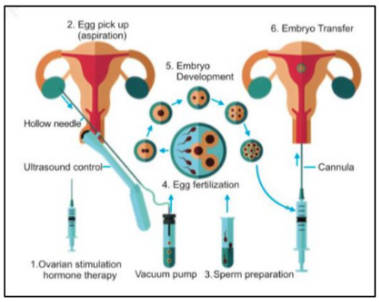
1. **Male:**
   i. Oligospermia: sperm count < 15 million/ml
   ii. Erectile dysfunction
   iii. Retrograde ejaculation
   iv. Hypospadiasis
   v. Epispadiasis

2. **Female:**
   i. Mild endometriosis
   ii. Retroverted uterus
   iii. Anti-sperm antibody in cervix.
   iv. Vaginismus

- Disadvantage – Success rate is only 15%

2) IVF

22:04



- Principal steps of an ART cycle:
  1. Down regulation using GnRH agonist.
  2. Controlled ovarian hyperstimulation (COH): Ovulation induction with gonadotrophins.
  3. Monitoring of follicular growth: Oocytes are 16-18mm.
  4. TVS guided Oocyte retrieval.
  5. Fertilization in vitro (IVF, ICSI, GIFT).
     i. Fertilizing each oocyte with 50,000 to 1.5 lakh sperms: IVF
     ii. Injection one sperm into oocyte: ICSI
     iii. Transfer oocyte and sperm into Fallopian tube: GIFT

     (i, ii) → Day 3-5 Embryo Transfer

6. Transfer of gametes or embryos.
7. Luteal support with progesterone.

- Success rate of IVF and ICSI: 50%

Indications

- **Male:**
  i. Oligospermia
  ii. Unexplained infertility

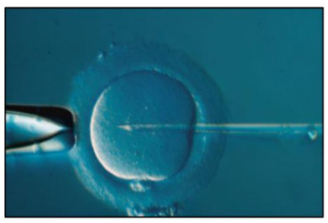
- **Females:**
  i. Severe tubal blocks
  ii. Severe endometriosis
  iii. Poor AMH (<1ng/ml)
  iv. MRKH
  v. >6 failed IUI or ovulation induction agents.
  vi. Ovarian failure: Donor oocyte IVF
  vii. Woman with genetic risk (IVF and peri-implantation genetic diagnosis)

- Patient selection (ideal)
  - Age < 35 years
  - Presence of ovarian reserve (D-3, serum FSH <10 iu/l)
  - Husband - normal seminogram
  - Couple must be screened negative for HIV and hepatitis.
  - Normal uterine cavity as evaluated by hysteroscopy / sonohysterography.

3) ICSI 22:47

- To be done when IVF fails

- Intracytoplasmic sperm injection.
- The steps are identical to IVF (oocyte retrieval and embryo transfer), but for fertilization, one sperm is mechanically injected into one oocyte.



- Indications
  - For severe oligospermia sperm count < 5 million/mL
  - Motility of sperms < 5%
  - Morphologically normal sperms <1%.
  - Whenever sperms are retrieved surgically using techniques of MESA/PESA/TESA/TESE
  - In case of IVF failure
  - Recurrent implantation failure

- It is the last resort.
- Success rate: 50%

Contraception

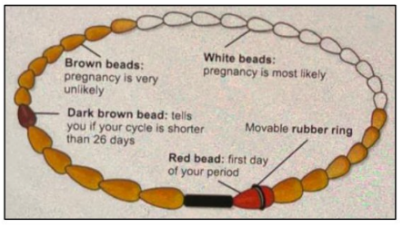
NATURAL FAMILY METHOD 00:10

1. Fertility awareness method/Behavioural method
2. Coitus interruptus / Withdrawal technique:
   - Discharge of semen outside the female genitalia at the end of intercourse.
   - It is not a sufficient method of birth control by itself.
   - Premature ejaculation is the only contraindication.

Rhythm Method / Calender method

- It is based on Knaus - Ogino theory.
- According to this, ovulation in patient with 28 days is 14 + - 2 days
- Sperm life span: 72 hours
- Ovum life span: 24 hours
- Therefore, unsafe period is from 8-18 days.
  If sex was avoided during between day 8-18 days, failure rate: 25-35%
- If sex was avoided during between day 7-21 days, failure rate: 10%
- In regular cycles:
  - Shortest cycle - 18 = 1st day of abstinence
  - Longest cycle - 11 = last day of abstinence

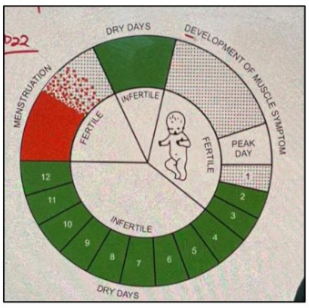
II. Standard days method / Tirumala method



- Cycle beads keep track
- Can be used in women with cycle between 26-32 days
- Days between 8-19 are unsafe.
- Failure rate: 2 HMY

III. Cervical mucus method:

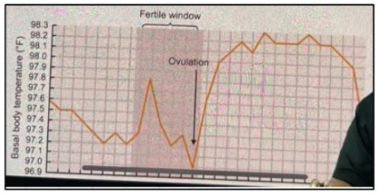
- It is also known as Billing method
- At time of ovulation: estrogen is increased; Cervical mucus is watery, slippery and profuse
  Will be able to stretch between 2 fingers: Spinnbarkeit test.



- Safe period: Dry days immediately after the menses and till the mucus is detected. Thereafter, the couple must abstain until the fourth day after the peak day.

IV. Basal body method:

- Progesterone is thermogenic
- After ovulation temperature raises by 0.5°C which persists for three days.
- Safe period begins from fourth day (after ovulation) to last day of next period.
- Perfect use failure rate: 1 HWY (WHO 2015)



V. Symptothermal method:

- Combination of cervical mucus method and basal body temperature method.
- Perfect use failure rate: 0.4 HMY

- Advantages:
  a. Cost-effective
  b. No side effects

- Disadvantages:
  a. Cannot use it with irregular cycles, cycles shorter than 21 days.
  b. During adolescence, lactation and premenopausal.
  c. Who have had cervical surgery (cautery and conisation)
  d. With STD or PID in last 3 months.
  e. Who had abortion recently
  f. Non-cooperative husbands and couples who have casual sex

VI. Lactational amenorrhea:
- It can be used only when Bellagio criteria is fulfilled:
  All postpartum women in whom:
  i. Menstrual cycles not resumed
  ii. Infant is fully or nearly fully breast fed, day and night.
  iii. Infant < 6 months.
- Pregnancy rate: 1 HMY in first 6 months

- Typical failure rate for all natural family planning method is 20/HMY.

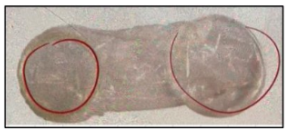
1. Male condom:
   - It is among the most commonly used and effective barrier method in India when used properly.
   - Nirodh is a free free condom given by government of India.
   - Types: Latex, Polyurethane (thinner, hypoallergic), Vylex, Polyisoprene (thinnest).
   - Usually, it is 15–20cm long and 3–3.5cm in diameter.
   - Typical failure rate: 18 HMY
   - Perfect failure rate: 2 HMY

   - **Advantages:**
     i. Easy to buy
     ii. Cost effective
     iii. Easy to use
     iv. Prevents STD

   - **Disadvantages.**
     i. Contact dermatitis
     ii. Rupture tear
     iii. Decreases sensations

   - **Non-contraceptive uses:**
     i. PPH tamponade
     ii. Condom catheter in males
     iii. After vaginoplasty
     iv. On transvaginal sonography probe
     v. Anti-sperm antibody in cervical mucus.

2. Female Condom

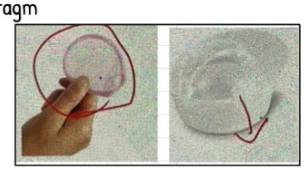


15cm long
7 cm wide

Advantages: Reusable
Under Women's control

Disadvantage: Expensive

- Cervical Cap / Diaphragm

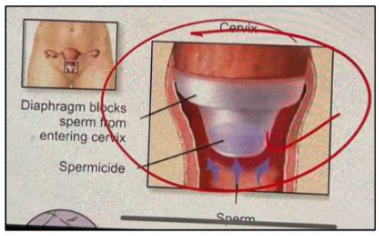


- Latex barrier placed inside vagina during intercourse.
- Fitted by physician.
- Spermicidal jelly before insertion.
- The best time to introduce it is from a few minutes to 2 hours before.
- It should not be removed before 6-8 hours of the last act.
- It should not to be kept for more than 24 hours.
- Typical failure rate: 12 HMY
- Perfect use failure rate: 6 HMY

- Contraindications
  - Prolapse
  - Retroversion
  - Vesicovaginal fistula
  - Badly eroded cervix / infections
  - Recurrent UTI

V. Spermicides:
  - Chemicals kill sperm in the vagina
  - It can be in the form of jelly, film foam and suppository.
  - Some work instantly, other require pre-insertion
  - Examples: nonoxynol-9, octoxynol, menfegol, benzalkonium
  - Failure: 20 HMY

VI. Sponge
  - It absorbs all the sperm and kills the sperm with nonoxynol-9.



- Hormonal contraception

- It includes:
  A. Daily use:
     1. Combined Oral Contraceptive Pills
     2. Progesterone Only Pills
  B. Non-daily use:
     1. Patch
     2. Ring
     3. Injectable contraception
     4. Implants
     5. Hormone releasing IUCD } Long Active Reversible

COCP (COMBINED ORAL CONTRACEPTIVE PILLS) *02:14*

- **It is of further 2 types:**
  A. Monophasic: Amount of estrogen and progesterone remains constant.
  B. Multiphasic: Amount of estrogen and progesterone varies with cycle -
     1. Triphasic: Eg: Triquilar
     2. Quadriphasic pills: Eg - Qlaira: Estradiol valerate is used.

- **Classification based on amount of ethinyl estradiol**
  A. Standard dose pill: 50 µg ethinyl estradiol
  B. Low dose pill: 30-35 µg ethinyl estradiol
  C. Very low dose pill: 20 µg ethinyl estraiol

- Classification based on type of progesterone:
  A. 1st generation:
     - Norethisterone
     - Norethisterone enanthate
     - Norethindrone
     - Lynestrenol

  B. 2nd generation
     - Levonorgestrel

- Norgestrel

C. 3rd generation:
- Desogestrel / Etonogestrel
- Gestodene
- Norgestimate

D. 4th generation
- Drospirenone (anti-mineralocorticoid action prevents water retention)
- Dienogest
- Nomegestrol
- Cyproterone acetate

1st and 2nd generation have androgenic side effect whereas 3rd and 4th generation are anti-androgenic.

- 3rd generation progesterones have side effect of venous thromboembolism.

- Government provides following:
  - Mala N: 30 µg Ethinyl estradiol + 150 µg Levonorgestrel. It is no cost.
  - Mala D: 30 µg Ethinyl estradiol + 150 µg Levonorgestrel. It costs Rs. 2.
  - They are 2nd generation pills.

- Recent advance: Extended cycle pill-
  - Seasonale
  - Seasonique

  } Ethinyl estradiol + LNG is used continuously for 84 days

- Lybrel: 365 days pill (Ethinyl estradiol + LNG)
- Male daily pills are also in research.

- Mechanism of action:
  i. Stop ovulation:
     - Estrogen inhibits LH
     - Progesterone inhibits FSH

     } No follicle or ovulation
  ii. Endometrial thinning
  iii. Cervical mucus thick

- Timing:
  - Pill should be started from Day – 1 of cycle and should be taken on same time of everyday.
  - Pill started after Day – 5 of menstruation: Back-up contraception is needed fro 7 days

Missed pill:
If 1 or 2 pill: Take the most recent pill as soon as remembered
↓
Continue the rest of the pack
If 3 > more: Take most recent pill
↓
Continue rest of pack
↓
Back up contraception for next 7 days
↓
If unprotected intercourse: emergency
Contraception to be taken within 72 hrs

If 3 / more pills in last week:-
- Take most recent pill → continue rest of pack → omit hormone free interval → start new pack immediately

- Side effects
  - Minor
    - Breakthrough bleeding
    - Acne, hirsutism
    - Weight gain
    - Bloating
    - Headache
    - Nausea
    - Vomiting

- Major
  - Thromboembolism
  - Strokes
  - Ischemic heart disease
  - Cancers:
    a. Adenocarcinoma of cervix
    b. Liver carcinoma
    c. Breast cancer (?)
  - Gall bladder disease

- Contraindication:
  1. Thromboembolism
  2. Active liver disease
  3. Ischemic heart disease
  4. Valvular heart disease
  5. Breast cancer
  6. Migraine with aura
  7. Diabetes with vasculopathy
  8. Hypertension >160/110 mmHg
  9. Pregnancy
  10. Postpartum upto 6 weeks
  11. Age >35 years and smoking >15 cigarettes/day

- Relative contraindications:
  1. Obesity
  2. Migraine
  3. Diabetes mellitus
  4. Hypertension
  5. Epilepsy
  6. Age > 35 years and smoking <15 cigarettes / day

- Perfect failure rate: 0.1 HWY
- Total failure rate: 1.8 HWY

- POP / Lactational pill
  - Example: Cerazette containing desogesterel
  - Mechanism of action:
    - Cervical mucus thickening (primary action)
    - Prevents ovulation
    - Endometrial thinning
  - Perfect failure rate: 0.3 HMY
  - Total failure rate: 3-10HMY

- Orthoevra patch:
  - Norelgestromin 150 micrograms
  - Ethinyl estradiol 20 micrograms
  - Applied for 3 weeks and 1 week patch free. (3 patch: every week 1 patch)
  - Advantage: better compliance, avoid first pass metabolism
  - Disadvantage: less efficacious in obese patient.
  - Perfect failure rate: 0.3 HWY
  - Site of application:
    a. Upper outer arm

b. Upper torso (excluding breasts)
c. Buttock
d. Abdomen

- **NUVA ring:**
  - P: etonogestrol 120 mcgm
  - E: ethinyl estradiol 15mcgm
  - Placed in vagina for 3 weeks and then 1 week free.

- **Advantage:**
  - Better compliance
  - No systemic side effects
  - Decreases infections

- **Disadvantage:**
  - Increases leucorrhoea
  - Failure rate: 0.3 HWY

- Recent advance: 1 year ring - Annovera ring

DMPA INJECTABLES

Question: True regarding DMPA including the following except:
A. 0.3% failure rate
B. Does not have protective effect on Ca endometrium
C. Can be given seizures
D. Useful in treatment of menorrhagia
Answer: B. Does not have protective effect on Ca endometrium.

Antara

- DMPA: Depot Medroxy Progesterone Acetate -
  - It contains 150mg of Medroxy progesterone acetate.
  - It is given once in 3 months as IM injection.

- Norethisterone enanthate:
  - 200mg
  - Given once in 2 months as IM injection.

- Mechanism of action: Same as OC pills
  - Stops ovulation
  - Stops menstrual cycle: endometrium thin
  - Thickens cervical mucus.

- Pearl index: typical failure rate of progestogen only injectables, as commonly used, is 0.3 HWY

- **Side effect:**
  - Weight gain
  - Acne, hirsutism
  - Breast tenderness
  - Bloating
  - Irregular bleeding for 1st 3 months.
  - Amenorrhea
  - Mood swings

- **More serious side effects:**
  - Decreases bone mass
  - Diabetes mellitus
  - Return of fertility is slow.

- **Advantages:**
  1. DMPA is best contraceptive for patients of sickle cell anemia.
  2. Raises threshold for seizure in epilepsy patients, (1st line is IUCD)
  3. Can be used 6 weeks to 6 months post-partum.

- **Chaya (once a week pill)**
  - 30 mg for 1st 3 months, given twice in a week.
  - Then it is given once a week.
  - It contains ormeloxifene (Selective estrogen receptor modulator)

- **Recent advances:**
  - DMPA subcutaneous 104mg
  - Combined injectable:
    - DMPA 25mg + Estradiol cypionate 5mg: Cyclofem
    - NET – EN 50mg + Estradiol valerate: Mesiavna

- Emergency contraception
  - It is also called as morning after-pill, post coital pill.
  - They are the contraceptives used after unprotected intercourse.

  - Main mechanism of action: They prevent ovulation.
    - Other MOA: They prevent implantation.

- Most of these are to be given within 72 hours of unprotected intercourse. Emergency window = 72 hours but can be given upto 120 hours. Only copper T and Ulipristal can be given upto 72 hours.

- Copper IUCD
  - It is the most effective emergency contraceptive. Failure rate 0-0.1%
  - It can be used for upto 5 days of unprotected intercourse.
  - Mechanism of action: Prevents implantation, prevents fertilization by killing sperms.
  - LNG IUCD cannot be used as emergency contraception.

- Ulipristal acetate (ellaOne):
  - It the 2nd most effect emergency contraceptive.
  - It is a selective progesterone receptor modulator.
  - Dose: 30mg stat dose within 120 hours of unprotected intercourse.
  - MOA: It acts by suppressing follicular and endometrial growth. It delays ovulation and inhibits implantation.

- LNG Pills (iPill):
  - Mode of action: The exact mechanism of action remains unclear. The following are the possibilities:
  - Ovulation is either prevented or delayed when the drug is taken in the beginning of the cycle.
  - Fertilization is interfered.
  - Implantation is prevented (except E. Pills) as the endometrium is rendered unfavourable.
  - Interferes with the function of corpus luteum or may cause

- Mifepristone:
  - It is selective progesterone receptor modulator.
  - It is also called as RU486.
  - Implantation is prevented.
  - Dose (according to latest WHO recommendation): 10-50mg stat dose withing 72 hours. Earlier it was 600mg.

- Ormeloxifene (Saheli):
  - Dose: 2 tablets 30mg stat followed by 2 tablets after 12 hours within 72 hours.
  - Mechanism of action: prevents implantation.
  - Alternately High dose estrogen 2.5mg can be given for 5 days.

- Combined estrogen and progesterone Pills (Also known as the Yuzpe regimen)
  - 50 µg of EE and 250 µg LNG.

- Mechanism of action: prevents implantation.
- Alternately high dose estrogen 2.5mg can be given for 5 days.

- Combined Estrogen and Progesterone Pills (Also known as the Yuzpe regimen)
  - 50 µg of EE and 250 µg LNG.
  - Two pills should be taken as soon as possible, but not later than 72 h of unprotected coitus; this must be allowed by two other pills 12 h later.
  - Main side effect is nausea and vomiting failure

- Long acting reversible contraception
  - They are mainly:
    I. Implants
    II. Intraterine devices

IMPLANTS *01:07*

- Placed in the body subdermally.
- Plastic capsules the size of paper matchsticks inserted under the skin in the arm.

NORPLANT I	NORPLANT II
• 6 capsules • 5 yrs • LNG	• 2 capsules • 3 yrs • LNG

Not in India

- **Implanon:**
  - 67 mg Etonogestrol (3-keto desogestrel)
  - 3rd gen progesterone
  - Replaced every 3yrs
  - Failure rate: 0.06 HWY

- **Nexplanon**: Radio-opaque implanon.

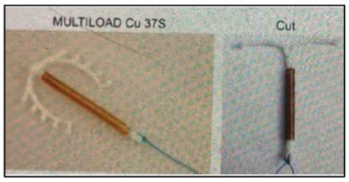
- **Mechanism of action:**
  1. Cervical mucus thickening
  2. Thinning of endometrium
  3. Inhibits ovulation (No LH surge)

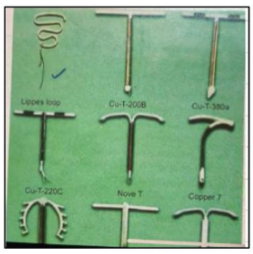
- **Side effects:**
  - Menstrual irregularities (spotting)
  - Amenorrhea
  - Weight gain

INTRAUTERINE DEVICES

- Generations:
  I. First: inert eg: LIPPE'S loop
  II. Second: Cu containing
  III. Third: Hormonal eg: mirena, progestasert

- Mechanism of action:
  1. Inert: Foreign body reaction → Make the endometrium inflammatory and inhibit it for implantation
  2. Copper: Spermicidal by inhibiting capacitation
  3. Progesterone:
     - Makes endometrium thin
     - Cervical mucus thickening





- Government gives the following free of cost in India:

Freedom 5	Freedom 10
• CUT 375 • 5 yrs	• CUT 380A • 10 yrs

MIRENA / LNG IUD

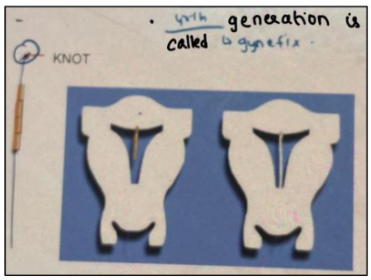
- 52 mg containing and releases 20µg/day.
- It is effective for 5 years.
- It decreases menstrual blood loss.
- Failure rate: 0.2 HWY

METHOD OF INSERTION

- No touch technique / withdrawal techniwue.
- Timing of insertion:
  1) Post placental: Immediately after delivery of placenta
  2) Post-delivery: Within 48 hrs of delivery
  3) Interval: after 4wks of delivery
     - Within 10 days of menstruation (Cervical os open, no chance of pregnancy)

4) Post abortion

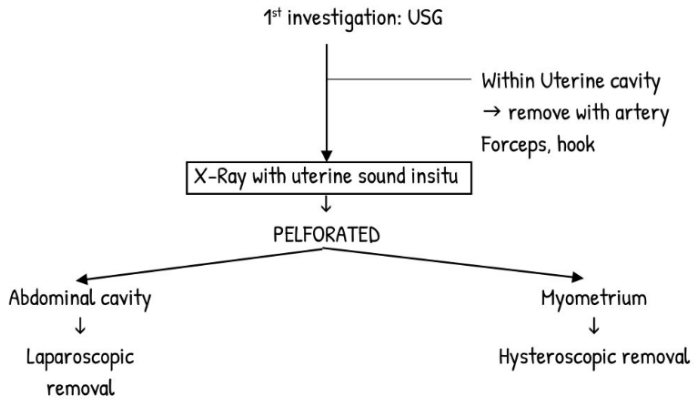
Recent Advances: Frameless intrauterine device



COMPLICATIONS

1. Increased bleeding (most common)
2. Pain is the most common reason for removal.
3. Expulsions
4. Misplaced due to perforation (1 in 1000)

- Missed Thread:



5. Infection (within 2mo) (Actinomyces Israeli):

Rx: Give antibiotics

SUBSIDES	PERSISTS
↓	↓
Leave IUCD in Situ	Remove IUCD

6. Ectopic Pregnancy

ABSOLUTE CONTRAINDICATIONS

1. Distorted uterus
2. Unexplained vaginal bleeding
3. Current PID
4. Puerperal sepsis / post - abortal sepsis
5. Endometrial cancer
6. Cervical cancer
7. Gestational trophoblastic disease

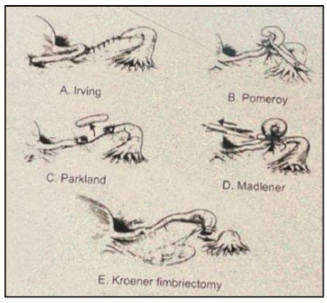
- Progesterone releasing IUD should not be used in ovarian cancer.

- Relative contraindications:
  1. Post - delivery 48 hrs → 4 weeks
  2. Molar pregnancy

- Permanent Sterilisation

Tuvectomy:

I. Minilaparotomy:



LAPAROSCOPIC 'BAND-AID' STERILIZATION

1. Clips: (Damage 1cm)
   - Filsche clips
   - Hulka clemen clips

2. Rings: Fallope ring (Damage 3cm)
3. Cautery: Least chances for reversal

- Failure rate: 0:2 – 1.3 HWY
- Site of tubectomy: Isthumus
- Chance of reversal is best with isthmo – isthmic anastomosis.
- Highest chance of reversal: Clips > Rings > Modified pomeroy
- Least chance of reversal is with cautery or coagulation.

ELIGIBILITY CRITERIA

- Married
- >22 yrs and <49yrs.
- Atleast 1 child > 1yr
- Clients or their partner must not have undergone sterilization in the past.
- Consent of female partner is enough.
- In case of minor: Guardian's consent is required.

TIMING OF OPERATIONS

1. Post-delivery (After 24hrs, within 7days)
2. Concurrent with CS
3. Interval: After 6wks of delivery
4. Post-abortal (after 1st and 2nd trimester abortions)

- Laparoscopic:
  - Interval (after 6 weeks of delivery)
  - After 1st trimester MTP

- It is not done post delivery (CS) and 2nd trimester

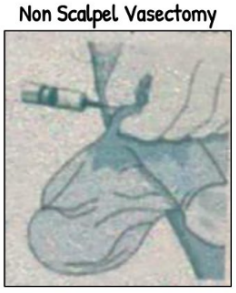
HYSTEROSCOPIC STERILIZATION

- Can be done with Plugs, Quinacrine or cautery.
- Essure: Micro-coil made of Nickel and Titanium is inserted through vagina using Hysterscope, leads to fibrosis in 3 months. It leads to permanent blockage

VASECTOMY

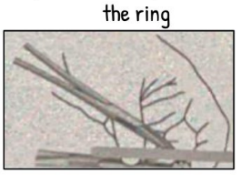
- Ligation of vas deferens
- No scalpel technique available
- Faster, easier than tubal ligation
- Failure rate: 0.1%
- More effective
- Reversal: 90%

Non Scalpel Vasectomy



Local Anaesthesia is given

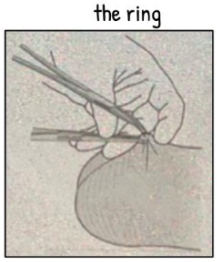
Vas deferens fixed by a ring forceps so that only minimal amount of tissue is present in the ring



Non Scalpel Vasectomy

Local Anaesthesia is given

Vas deferens fixed by a ring forceps so that only minimal amount of tissue is present in the ring



- Precautions:
  1. Additional contraception for 1st 3 months
  2. Minimum 20 ejaculations / 3 months to get sterile.

Method	Typical use (%) (Estimated)	Perfect use (%)
No method	85	85
Fertility awareness based methods	24	0.4-5
Female diaphragm	12	6
Male condom	18	2
Combined hormonal contraception*	9	0.3
Progestogen - only pill	9	0.3
Progestogen - only injectable	6	0.2
Copper intrauterine device	0.8	0.6
Levonorgestrel Intrauterine system	0.2	
Progestogen - only Implant	0.05	
Female sterilization	0.5	

Vasectomy 0.1

Menopause and HRT

MENOPAUSE 00:38

- Menopause is defined as the permanent cessation of menses for 1 year & is physiologically correlated c̄ the decline in estrogen secretion resulting from the loss of follicular / ovarian function
- Depletion of oocytes for 6 months in menopausal age group → menopause
- Menopausal age group - India - 48 yrs
  Developed countries - 52 yrs
- Menopause occurs earlier in -
  a) Nulliparous women
  b) Tobacco smokers
  c) Hysterectomised women

SYMPTOMS 2:07

(1) Hot flushes / vasomotor symptoms - sudden sensation of heat → d/t estrogen withdrawal, coinciding c̄ LH surge
(2) Osteoporosis
(3) Urogenital atrophy → dysuria, dyspareunia
(4) Dementia
(5) Mood swings
(6) ↑ risk of CAD
(7) Wrinkling of skin

DIAGNOSTIC CRITERIA OF MENOPAUSE 4:28

(1) Cessation of menstruation
(2) Appearance of menopausal symptoms like hot flushes on 2 occasions, 1 month apart
(3) Vaginal cytology 100/0/0 [P/I/S]
(4) Sr. estradiol < 20pg/ml
(5) Sr. FSH & LH > 40 mIU/ml

HORMONES REPLACEMENT THERAPY [HRT] 5:26

- Estrogen (E) - Conjugated Equine Estrogen
- Progesterone (P) - Depot Medroxy Progesterone Acetate (or)
  Norethisterone enanthate (or)
  Levonorgestral IUCD

- When uterus is present, E+P given
- When uterus is absent, only E is given

Indications

- Based on the results of Women's Health Initiative (WHI) trial, the following are now the accepted indications for HRT-
  (1) Vasomotor symptoms - eg: Hot flushes
  (2) Vaginal dryness
  (3) Prevention & Treatment of Osteoporosis

- HRT should not be given for 1° prevention of heart disease

RISKS c̄ HRT *7:28*

(1) CHD
(2) Breast cancer [>5 yrs]
(3) VTE
(4) Cholecystitis
(5) Ovarian cancer (>10yrs)

- So, use minimum possible dose, maximum for 5 years

- Hormone replacement therapy is not given for:
  a. Urogenital atrophy
  b. Vasomotor symptoms
  c. Prevention of osteoporosis
  d. Prevention of coronary heart disease ✓

C/I FOR HRT *8:18*

Mnemonic - The left heart is best magnetic door for Htn
(1) Thrombosis / thromboembolism
(2) Active liver disease
(3) Ischemic heart disease
(4) Breast cancer
(5) Migraine c̄ aura
(6) DM c̄ Vasculopathy
(7) Severe HTN > 160/110 mm Hg

- Hot flushes Treatment:
  1. Black cohosh
  2. Isoflavanes (100 mg/day)
  3. Soy milk
  4. Vit E
  5. E + P
  6. P
  7. Tibotone (STEAR)
  8. Clonidine
  9. SSRI
  10. Gabapentin

- **Osteoporosis Treatment**
  (1) Bisphosphonates [1st line]
  (2) E+P
  (3) Raloxifen
  (4) Tibolone
  (5) Denosumab
  (6) Teriperatide - recombinant PTH
  (7) Calcium
  (8) DEXA scan for BMD

QUESTIONS

10:42

HRT is contraindicated in all except:

a. Breast Ca.
b. Cervix Ca. ✓
c. Endometrial Ca.
d. Coronary artery disease

A 48 years old female suffering from severe menorrhagia (DUB) underwent hysterectomy. She wishes to take hormone replacement therapy. Physical examination and breast are normal but X - ray shows osteoporosis. The treatment of choice is:

a. Progesterone
b. Estrogen and progesterone
c. Estrogen ✓
d. none

- Indications of E & P in Hysterectomised women
  (1) Past h/o endometriosis (d/t the risk of adenocarcinoma if treated c̄ only estrogen in such females)
  (2) Supracervical hysterectomy
  (3) Adenocarcinoma of the endometrium
  (4) Endometroid tumors of the ovary

All of the following are the advantages of using Raloxifene over estrogen in postmenopausal women except: (AI 04)

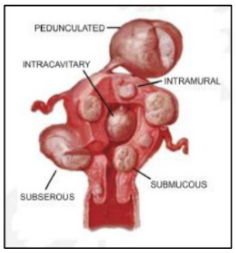
a. Reduces fracture rates
b. Avoids endometrial hyperplasia
c. Reduces the incidence of venous thrombosis. ✓
d. No increase in incidence of breast cancer.

Uterine Fibroid

- Benign smooth muscle tumor of the uterus
- Fibroids are the most common benign solid tumors in females.
- It is the most common pelvic tumor.
- It is monoclonal in origin
- Most common age group affected is 35-45 years
- Fibroid is estrogen and progesterone dependent tumor
- Fibroids are most commonly seen in nulliparous female

CLASSIFICATION 1:12

A. Uterine:
   a. Intramural: Most common. 70% of fibroids arise intramurally.
   b. Submucosal
   c. Subserosal: Sessile or pedunculated.



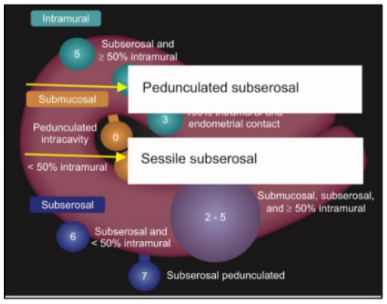
B. Extrauterine:
   a. **Cervical**
      - Anterior
      - Posterior
      - Central

   b. **Broad ligament:**
      - True: Lateral to ureter and arises within the broad ligament.
      - False: medial to ureter and arises from ureter.
        There is high risk of ureteric injury in surgical removal of broad ligament fibroid.

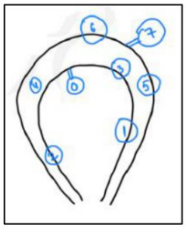
   c. **Abdominal fibroid:**
      - Primary
      - Secondary / Parasitic

FIGO CLASSIFICATION

2:06



- 0: Intracavitory fibroid
- 1: submucosal, <50% intramural
- 2: submucosal, >50% intramural
- 3: Intramural touching the endometrium
- 4: Intramural
- 5: Subserosal with <50% intramural
- 6: Subserosal with >50% intramural
- 7: Pedunculated subserosal
- 8: Cervical, abdominal
- 2-5: Hybrid fibroid - through and through.



CAUSES

3:20

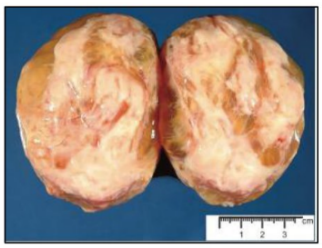
- Genetic:
  - Chromosomal translocation: 12-14, Deletion of chromosome 7.
- Obesity
- Family history
- Nulliparous
- Early menarche
- African American race

PROTECTIVE FACTORS 3:56

- Smoking
- Exercise
- Multiparity

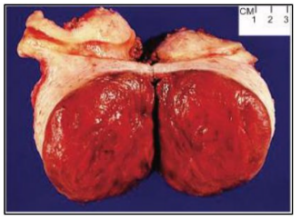
CHANGES 4:01

- **Atrophy**: especially in menopause
- **Hyaline degeneration**: most common degeneration



- **Cystic degeneration**: It is seen most commonly in postmenopausal females and most commonly in interstitial fibroid.
- Fatty degeneration
- **Calcerous degeneration**: It is seen most commonly in subserosal fibroids - Womb stone appearance.

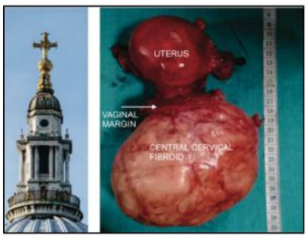
- Red degeneration is common in pregnancy (Red beef appearance).
  - It is most common in the 2nd trimester of pregnancy.
  - Clinical features: Pain abdomen and fever.
  - It should never be removed during pregnancy because of increased vascularity during pregnancy leading to torrential bleed.
  - Treatment: Symptomatic as it is self-limiting. Analgesics and antipyretics.



- Sarcomatous degeneration is the least common variety (0.2-0.5%): malignant transformation is least common.
- It occurs in large fibroids and toward the centre of the tumor.

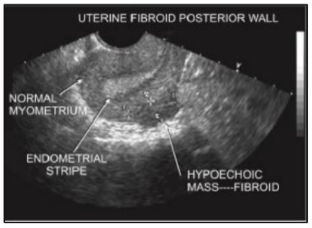
SYMPTOMS 5:08

- >50% are asymptomatic
- Submucosal fibroid causes heavy menstrual bleeding because of increased surface area of endometrium and increased vascularity. It also leads to recurrent abortions and infertility.
- Intramural fibroids cause congestive dysmenorrhea due to improper uterine contractions.
  Subserosal fibroids will mainly cause pressure symptoms.
- Pedunculated subserosal fibroids may undergo torsion.
- Anterior cervical fibroid can irritate the bladder → Increased frequency of micturition.
- Posterior cervical fibroid cause acute retention of urine due to compression of urethra.
- Central cervical fibroid also causes acute retention of urine. It is also described as 'Lantern on dome of St Paul Cathedral'.



INVESTIGATIONS 6:58

- On examination per abdomen: Firm, bosselated, irregular in shape, lower border of mass not felt.
  - On movement of cervix, fibroid also moves.
  - No groove is felt between the mass and the uterus. → Hingorani sign is negative.



- Investigation of choice: USG which shows a hypoechoic homogenous mass.

MANAGEMENT

7:35

- Asymptomatic fibroid:
  a. Conservative management and follow up with USG.
  b. Surgical removal is required when:
     i. Diagnosis is not certain
     ii. Pedunculated subserosal fibroid
     iii. Unexplained infertility
     iv. Pressure symptoms are present.

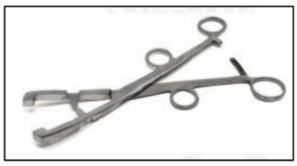
- Symptomatic fibroids:
  a. Medical management:
     - Pain relief: NSAIDS
     - Decrease bleeding: Tranexamic acid, Ethamsylate; COCP for 6 months but it causes thinning of endometrium. Progestin for 6 months: also causes thinning of endometrium like COCP.
     - Decrease size, bleeding and pain:
     - GnRH analogues consisting of:
       - GnRH agonists:
         i. Leuprolide acetate
         ii. Buserelin
         iii. Nafarelin
         Initially, causes upregulation of GnRH and then causes downregulation of GnRH.
       - GnRH antagonists:
         i. Cetrorelix
         ii. Ganirelix
         It directly downregulates GnRH

         Decreased GnRH → Decreased Estrogen and progesterone → Shrink the size of fibroid. Indications of GnRH analogues:
         i. Symptomatic fibroid
         ii. Preoperatively to decrease the vascularity of fibroid.
         iii. Patient approaching menopause

         Antigonadotropins: Danazol, Gestrinone
         SPRM:
     - Mifepristone 50mg/day
     - Ulipristal acetate: 5/10mg/day for 3 months, it can cause liver failure.
     - Alloprisnol

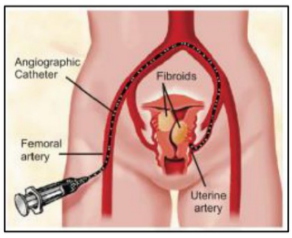
B. SURGICAL MANAGEMENT: 10:20

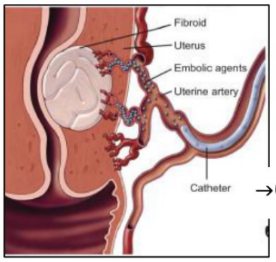
- Myomectomy: only fibroid is removed. It is done in nulliparous women with infertility. Prerequisites are:
  a. Husband semen analysis should be normal.
  b. Endometrial biopsy to rule out endometrial cancer
  c. Consent for hysterectomy
  Methods to decrease bleeding during myomectomy:
  a. GnRH agonists given preoperatively to decrease size and vascularity of fibroid.
  b. Timing in postmenopausal phase
  c. Use of vasopressin or adrenaline infiltration
  d. Mechanical method: torniquets around isthmus and infundibulopelvic ligament. And Bonney's clamp can be used.



For FIGO 0,1: Hysteroscopic
Myomectomy is done.
For FIGO 2: Laparoscopic myomectomy is done.

- **Minimal invasive surgery**: It is done in multiparous women, family completed who are not willing for surgeries. Surgeries include:
  A. Myolysis
  B. Cryolysis
  C. Uterine artery embolization:
  D. HIFU – High Intensity focused USG





→Uterine artery embolism

Ideal candidate for uterine artery embolization:

- Heavy menstrual bleeding
- Secondary congestive dysmenorrhea due to intramural fibroid.
- Premenopausal
- No desire of future fertility

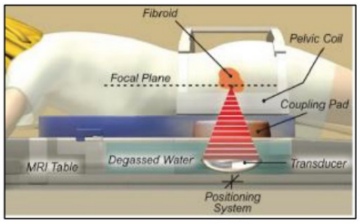
Absolute contraindications of uterine artery embolization:

- Pregnancy
- PID
- Malignancy
- Desire future fertility

Side effects:

- Pain
- Vaginal discharge

D. High intensity focused ultrasound



Prerequisites for high intensity Focused Ultrasound:

i. No. of fibroids should be <3.
ii. Size of fibroids <10cm
iii. Fibroid should not be calcified
iv. Abdominal wall thickness should be <5cm

E. Radiofrequency ablation

- Total abdominal hysterectomy: It is done in:
  a. Elderly symptomatic women
  b. Family completed

  It can be:
  a. Laparotomy / abdominal
  b. Vaginal
  c. Non-decent vaginal hysterectomy

Endometriosis

00:27

Definition: Presence of functioning endometrium outside the uterus.

Sites
1) M/c site - ovary → chocolate cyst
2) 2nd m/c site - Rectovaginal septum / Pouch of Douglas
3) M/c extra pelvic site - Sigmoid colon
4) Endometriosis never affects the spleen

Question: Which of the following is the most common extrauterine site to be affected by endometriosis?
A. Vagina
B. Rectovaginal septum
C. Sigmoid colon
D. Broad ligament (except tubes and ovaries)
Answer: B. Rectovaginal septum

Risk factors –
a. Imperforate hymen
b. Transverse vaginal septum
c. Uterine anomalies - didelphys, unicornuate uterus
d. Obesity
e. Short cycles
f. Nulliparity
g. Early menarche
h. Late menopause
i. High socioeconomic status
j. Late marriage
k. Late childbirth
l. Familial predisposition

Pathogenesis
- Sampsons Retrograde menstruation theory -
  - Most acceptable theory
  - Retrograde blood flow into pelvic cavity through FT

C/F

3:33

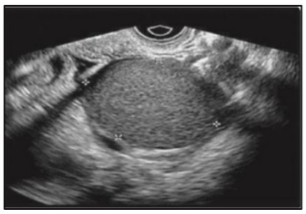
- Triple dysmenorrhea/Progressive dysmenorrhea:
  Pain is the predominant symptom. It is a type of secondary congestive dysmenorrhea.

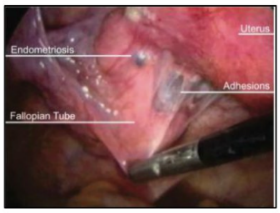
- Infertility
- Dyspareunia

Signs of endometriosis:
- Fixed retroverted uterus
- Firm fixed adnexal mass (endometrioma)
- Tender nodularity of uterosacral ligament (cobble stone appearance)
- Bluish nodules in the pouch of douglas

INVESTIGATION *5:30*

- IOC – Laparoscopy
- Gold std. – Laparoscopic Histopathological Examination
- 1st line – USG shows – ground glass appearance of chocolate cyst
- CA 125 levels ↑
- Early lesions on laparoscopy – look like Petechiae
- Late lesions on laparoscopy – look like powder burn / Matchstick head appearance





MANAGEMENT *6:23*

A. Expectant management: It is done in:
   a. Asymptomatic patients
   b. Pregnancy
   c. Menopause

B. Medical / Temporary management: There are drugs which create a state of:
   a. Pseudo-menopause:
      i. GnRH analogues:
         - GnRH agonist:
            - Leuprolide acetate: 3.75 mg IM monthly for 6 months.
            - Buserelin, Nafarelin } Inhalational Nasal Spray
              200 micrograms intranasally for 6 months.

Mechanism of action: Initially GnRH is upregulated → Once receptor saturate, there will be downregulation of GnRH.

- GnRH antagonist:
  - Cetrorelix
  - Ganirelix } Inhalational Nasal Spray
  - Elagolix: Oral GnRH Antagonist → DOC (ACOG)

  They directly downregulate GnRH
  Low GnRH → Low FSH, LH → Decreased
  Estrogen, Progesterone: This is known as Medical oophorectomy.
  Side effects: Hot flushes, osteoporosis.
  Hence, it is used for a maximum of 6 weeks.

ii. Anti-gonadotrophic drugs:
- Danazol: Anti FSH. It decreases endometriotic implants by 80%. It is no longer DOC because of 40% recurrence and Androgenic side effects.
  Irreversible side effect of danazol: Deepening of voice.

  Dose: 400-800mg/day for 6-9 months orally.

- Gestrinone: Dose - 1.25 - 2.5 mg twice a week for 6-9 months.

b. Pseudo - pregnancy state:

i. COCP:
- Mechanism of action: Progesterone causes thinning of endometrium.
- Dose: 1-2 tablets/day continuously for 6-9 months.
- Eg: Mala-N, Loette, Yasmin

ii. Progestogens: First line drugs
- Dydrogesterone: 10-20mg/day continuously for 6-9 months.
  Mechanism of action: Antiproliferative.
- Norethisterone enanthate: 10-30mg/day for 6-9 months.
- Medroxy progesterone acetate: 10-20mg/day for 6-9 months.
  150mg injection works for 3 months.
  Side effect: Return of fertility delayed.
- Levonorgestrel releasing IUCD: Amenorrhea for 5 years.

iii. Mifepristone: Selective Progesterone Receptor Modulator x 6 months.

SURGICAL MX

11:49

Indications –

1) Pt. not responding to medical mx
2) Intolerable pain
3) Bowel/bladder involvement
4) Chocolate cyst>1 cm

Sx available

1) Laparoscopic fulguration / ablation of endometric implants
2) LUNA – Laparoscopic Uterine Nerve Ablation
3) Definitive – TAH c̄ B/L Salphingo oophorectomy
4) Endometrioma / Chocolate cyst –

Pt. doesn't want to conceive
↓
Cyst size
- <5cm → Medical Mx
- >5cm → Surgical Mx / Cystectomy

Pt. wants to conceive
- <3 cm → Cyst aspiration +Coagulation of cyst wall
- >3cm → Cystectomy

Infertility c̄ endometriosis

- Mild endometriiosis – IUI
- Severe endometriosis – IVF

Vaginitis & Vulval Ulcers

VULVOVAGINITIS 00:36

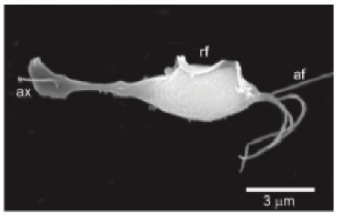
- Inflammation of vulva & vagina
- Causes-
  1) Physiological -
     a. Prepubertal vulvovaginitis - d.t foreign body
     b. Post-menopausal / atrophic / senile vulvovaginitis → d/t absence of estrogen

  2) Pathological / Infectious -
     a. Trichomonas vaginitis
     b. Candidiasis
     c. Bacterial vaginosis

INFECTIONS

1) TRICHOMONAS VAGINITIS 1:29

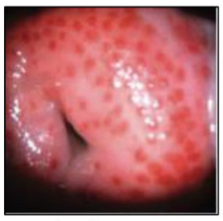
- Caused by Trichomonas vaginalis (Flagellated protozoa)
- STD → both partners need to be treated



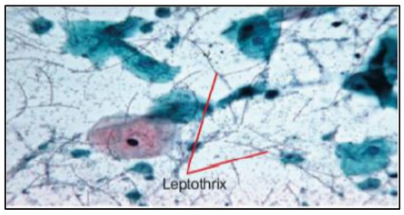
- **Symptoms** - Greenish colour vaginal discharge + itching + dysuria + dyspareunia
- **Signs** - Punctate spots
  Strawberry vagina / Angry looking vagina
- **Investigation-**
  IOC - Saline microscopy
  Gold std - culture on Fienberg Whittington media
  (or) diamond media

- Mx - DOC - Metronidazole - 2gm single dose
  (or) Tinidazole - 2 gm / PO / single dose
  (or)
  Metronidazole - 500 mg BD x 7 days
  - Rx both partners
  - Pregnancy -
    a) 1st trimester - Metronidazole pessary

b) 2nd & 3rd trimester – Metronidazole
2gm stat dose (or) 250mg TID x 5 days



Strawberry Cx



Sphagetti & Meat ball appearance

2) CANDIDIASIS 3:30

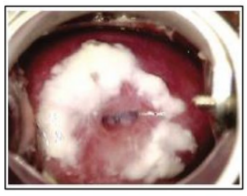
- Caused by candida albicans
- Less commonly by candida glabrata > C. tropicalis
- Only vaginitis which flourished in acidic media
- M/c vaginitis in pregnancy, DM, immunocompromised

- C/f – Curdy white discharge
  Cottage cheese discharge
  Pruritis

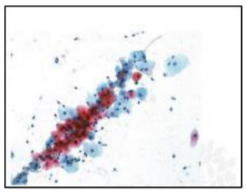
- O/E – White coloured punctate spots on vagina
- IOC – Saline M/S – Pseudo hyphae seen
- Gold std – Culture on Sabouraud's agar

- Mx – DOC – Azole group (Eg: Fluconazole 150mg stat)
  - Rx the underlying cause

- Recurrent Vulvovaginal candidiasis is necessary:
  - It is defined as 4 or more episodes of candidiasis in a year.
  - Management – Fluconazole 150 mg every 3 days for 3 doses followed by 150 mg weekly for 6 months as a maintenance therapy.



Curdy white discharge



Sheekh-kebab appearance on PAP smear

3) BACTERIAL VAGINOSIS 5:35

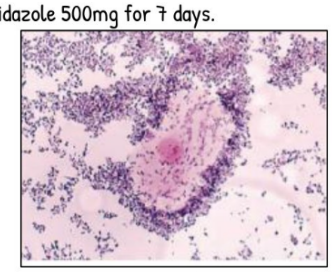
- D/t alteration in the microbial flora of vagina

- Aetiology:
  - Gardnerella vaginalis (most common)
  - Mycoplasma
  - Peptostreptococci
  - **Bacteroides**
    - Ureaplasma urealyticum
    - Mobiluncus
    - Streptococci

- **Symptoms**: Dirty white Malodorous discharge, sometimes grey also. (There is no pruritus as there is no inflammation)
- **Diagnosis by Amsel's** criteria: 3 out of 4 should be positive -
  1. Dirty white foul smelling discharge
  2. pH > 4.5
  3. 10% KOH to discharge → fishy odour is present → whiff test positive.
  4. Clue cells are seen: bacteria attached to vaginal epithelium cells.

- **Nugent scoring:**
  - Gram stain: Gardnerella vaginalis > lactobacilli

- **Treatment**: Metronidazole 500mg for 7 days.



Clue cells

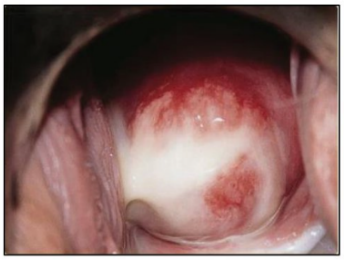
CERVICITIS 8:01

1) Chlamydia Trachomatis D-K
   - Etiology:
     - It is an obligate intracellular organism
     - It preferentially infects the columnar and transitional epithelial cells.

- Epidemiology:
  - Most common bacterial sexually transmitted infection in the US (developed countries)
  - Often associated with Neisseria gonorrhoea (unless proved otherwise)
  - The infection is mostly localized in the urethra, Bartholin's gland and cervix.
  - It can ascend upwards like gonococcal infection to produce acute PID.

- Clinical features:
  - Asymptomatic (80% of women)
  - Mucopurulent endocervical discharge
  - Urethral syndrome: dysuria, frequency, pyuria, no bacteria
  - Pelvic pain
  - Postcoital bleeding or intermenstrual bleeding.

- Investigations:
  - Nucleic Acid Amplification Test (NAAT) is the preferred method
  - First void urine sample or vaginal swab is most effective and specific
  - It can also be detected by Polymerase chain reaction (PCR)
  - It is an obligate intracellular parasite – tissue culture on McCoy or Hela cells can be done.



- Treatment:
  - Doxycycline 100 mg BD for 7 day 'or' azithromycin 1 gm single dose
  - Single dose of azithromycin has results similar to doxycycline 7 days; so, it is the DOC
  - Treat partners simultaneously
  - **In pregnancy:**
    - Azithromycin can be used in pregnancy whereas doxycycline can not
    - Azithromycin 1 g in a single dose or Amoxicillin 500mg TID for 7 days.

2) GONORRHOEA *10:11*

- Etiology: Neisseria gonorrhoea (Gram negative diplococcus)

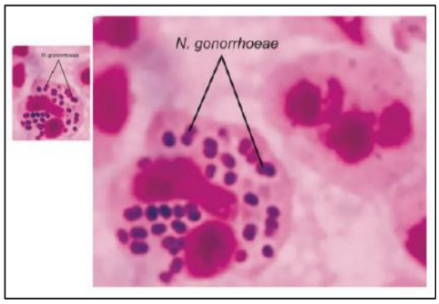
- Clinical features:
  - 50% patients are asymptomatic
  - M/c symptom is of excessive, irritant vaginal discharge
  - Patients may have lower abdominal pain, urethral infection manifesting as dysuria.

- M/c site of gonococcal infection in young female is endocervix followed by Bartholin's gland, urethra and skene gland. (It can cause Bartholin's cyst)
- Gonococcal vaginitis occurs in newborn females.

- Investigations:
  - **Gram stain and culture:**
    - In the acute phase, secretions from the urethra, Bartholin's gland and endocervix are collected.
    - A presumptive diagnosis is made following detection of Gram-negative intracellular diplococci on stain.
    - Culture of the discharge in Thayer - Martin medium further confirms the diagnosis.

  - **Nucleic acid amplification testing (NAAT):**
    - It is performed on urine or endocervical discharge
    - First void morning urine sample (preferred) or at least one hour since the last void sample should be tested.
    - NAAT is very sensitive and specific (95%)

- Treatment
  - Single dose of inj. ceftriaxone 125mg IM stat 'or' cefixime 400mg oral stat 'or' ciprofloxacin 500mg stat
  - Also add doxycycline or azithromycin to treat chlamydia because of high rate of co-infection.
  - If pregnant - cephalosporin regimen (i.e. ceftriaxone cefixime)
  - If patient is allergic to beta - lactam antibiotics: 2g spectinomycin IM



VULVAL ULCERS 12:25

1) Painful ulcers –
   1. Herpes simplex virus:
      - Caused by HSV 2
      - Presents with multiple vesicles
      - It has erythematous base & also erythematous edge
      - Lymphadenopathy: It is bilateral and tender
      - DOC: tab. Acyclovir 400 mg TDS for 7-10 days

   2. Chancroid (soft chancre):
      - Caused by Hemophilus Ducrei
      - Presents with multiple papules
      - It has grey exudate base (pus)
      - Lymphadenopathy: It is unilateral and tender.
      - DOC: Azithromycin 1 gm PO

2) PAINLESS ULCERS 14:32

1. Syphilis:
   - It is a hard chance
   - It is caused by Treponema pallidum
   - It is a papule
   - It is single
   - **Edges**: punched out.
   - **Lymph node**: rubbery and non-tender
   - **Treatment**: Injection benzathine penicillin 2.4 million IU IM

2. Lymphogranuloma venereum
   - It is caused by chlamydia trachomatis (L1, L2, L3)
   - It is a papule > vesicle
   - It is single
   - Edges: Elevated
   - Lymph node: Tender and Groove sign positive
   - DOC: Doxycycline 100 mg BD for 21 days

3. Granuloma inguinale
   - It is caused by Klebsiella granulomatosis
   - It is a papule
   - It is single or multiple
   - It has red velvety base which bleeds on touch.
   - **Edges**: elevated
   - **Lymph nodes**: pseudo bubo
   - **DOC**: Doxycycline 100 mg BD for 21 days

Endometrial Hyperplasia & Cancer

ENDOMETRIAL HYPERPLASIA

00:29

Symptoms – Irregular vaginal bleeding / post menopausal bleeding

- TVS – informs about Endometrial Thickness (ET)
  a) Post menopausal – ET > 4mm → Endometrial Biopsy
  b) Pre menopausal – ET > 12mm

Classification

FEATURE	EXPLANATION	PROGRESSION TO CANCER
SIMPLE WITHOUT ATYPIA	SIMPLE HYPERPLASIA NO DYSPLASIA A.K.A 'CYSTIC GLANDULAR HYPERTROPHY'	1% (least)
COMPLEX WITHOUT ATYPIA	COMPLEX HYPERPLASIA NO DYSPLASIA	3%
SIMPLE WITH ATYPIA	SIMPLE HYPERPLASIA DYSPLASTIC CELLS	8%
COMPLEX WITH ATYPIA	COMPLEX HYPERPLASIA DYSPLASTIC CELLS	29% (maximum)

Newer classification

1) Endometrial hyperplasia w/o atypia
2) Endometrial hyperplasia c̄ atypia → Endometrial intraepithelial neoplasia

1) Hyperplasia w/o Atypia –
   Rx – Progesterone → Anti – proliferative
   ↓ – (–) Estrogen receptor on endometrium
   PROGESTIN
   - Medroxyprogesterone acetate – 10mg TID/BD
   - Norethisterone enanthate
   - LNG – IUCD – Best

Follow up – After 6 months c̄ Endometrial Biopsy

- Regressed → Annual follow up
- Not regressed → Continue same Rx → ↑ dose of Medroxy progesterone Acetate (max. 160 mg/day)

↓
If no regression → Hysterectomy

2) Hyperplasia c̄ Atypia –
   - Best – Simple Hysterectomy
   - Young woman – Megestral acetate 160mg/day

↓
Repeat Biopsy after 3 mo
↓
If no regression → Hysterectomy

ENDOMETRIAL CANCER 3:47

- Hormone responsible for growth of endometrium – Estrogen

Risk factors
- Obesity
- High socioeconomic status
- P.C.O.D
- Fat rich diet
- Estrogen producing ovarian tumor (granulosa cell tumor)
- Infertility
- Menstrual irregularity
- Early menarche
- Late menopause
- Nulliparity
- Drugs: Tamoxifen
  : Unopposed estrogen in HRT

Family History: H/o LYNCH SYNDROME–
- Mutation of MLH1, MSH2, MSH 6, PMS-2
- Hereditary non-polyposis colorectal cancer

COWDEN Syndrome – chromosome 10 –» PTEN mutation
: Lynch syndrome genetic screening recommendations
Patients with endometrial or colorectal CA and tumor evidence of microsatellite instability
DNA mismatch repair protein loss

SCREENING 5:28

Annual pelvic examination and endometrial biopsy
↓
Once family is complete TAH + BSO

Corpus cancer syndrome:
Obesity + DM + Hypertension with Endometrial CA

PROTECTIVE FACTORS 6:02

1) Combined OCP
2) Pregnancy (Multiparity)
3) Smoking
4) Hysterectomy

TYPES OF ENDOMETRIAL CA 6:46

Type 1	Type 2
Estrogen dependent	Estrogen independent
50-60 yr	60-70 yr
Hyperplastic endometrium	Atrophic endometrium
MSH, PTEN mutation	P53 mutation
Adenocarcinoma	Clear cell, papillary serous CA
LN-involvement	Peritoneum involved
Good prognosis	Bad prognosis

M/C Genital CA in developed countries: ENDOMETRIAL CA
C/F: Irregular vaginal bleeding in pre menopausal women

Post menopausal bleeding in PM Women

- MC cause - Atrophic vaginitis / senile endometritis
- MC cancer causing PMB
  - INDIA - CA cervix
  - DEVELOPED COUNTRIES - Endometrial CA

PMB: Pap smear
TVS - ET ┌ <4mm → SENILE ENDOMETRITIS
└ > 4mm → BIOPSY

: Pelvic pain

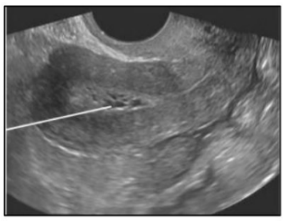
- Closed cervix causes pyometra
- Simpson's pain: Dull aching referred pain to hypogastrium and iliac fossa every day at same time

: Foul smelling discharge

: M/C presentation: irregular vaginal bleeding
: Host specific : Post menopausal bleeding

INVESTIGATION

8:28



USG (TVS)

- In pre menopausal women → ET ≥ 12 mm
- Pt on Tamoxifen → ET > 8 mm
- Post menopausal woman → ET ≥ 4mm (ACOG), ET ≥ 5mm (FIGO)

→ BIOPSY

USG: Heterogenous – Thickened endometrium with tiny cystic foci
↓
USG: Not confirmatory

Confirmatory : Endometrial Biopsy
: Office Endometrial Aspiration →
Done using
: Pipelle
: VABRA ASPIRATOR

Sensitivity – 92-98%

- Hysteroscopic D & C –
  Indication –
  1) Pin-point os
  2) ET ≥ 4mm c̄ focal thickening
  3) ET ≥ 8mm c̄ pt on Tamoxifen

- Spread – Direct extension
  [ET is surgically staged like ovarian Ca]

Staging – Investigations
- CT – to know LN status
  MRP – to know extent

FIGO STAGING 2023 *10:19*

1) Non-aggressive Histological type ↴
   Endometrial Adenocarcinoma
   Grade 1, Grade 2
2) Aggressive Histological type ↴
   Endometrial Adencarcinoma
   Grade 3 ↴
   - Serous
   - Clear cell
   - Undifferentiated
   - Mixed
   - Mesonephric like
   - Carcino sarcoma
   - Gastro intestinal mucinous type Ca

Stage I - Confined to uterine corpus & ovary
IA – Disease limited to endometrium (non-aggressive type)
– <50% Myometrium involved c̄ no focal LVSI
IA_1 –Non-aggressive type confined to endometrium
IA_2 – <50% myometrium involved
IA_3 – Low grade endometrioid Ca confined to ovary & uterus
IB – Non – aggressive endometrial Ca.
>50% myometrium involved
IC – aggressive Histological Endometrial Ca.
Limited to endometrium

Stage II – Invasion to cervical stroma without extra uterine, but c̄ substantial LVSI
2a – Cervical stromal invasion (non-aggressive)
2b – Substantial LVSI (non-aggressive)

2c – Aggressive Endometrial Ca c̄ myometrial involvement

Stage III –
- $3a_1$ – Spread to adnexa
- $3a_2$ – Spread to serosa
- $3b_1$ – Spread to vagina &/or parametrium
- $3b_2$ – Spread to pelvic peritoneum
- $3c_1$ – Pelvic LN – (i) Micromets
  (ii) Macromets
- $3c_2$ – Para aortic LN – (i) Micromets
  (ii) Macromets

Stage IV –
- IV a – Bowel – Bladder mucosa
- IV b – Abdominal peritoneal mets
- IV c – Distant mets

STAGEWISE RX

22:52

- Stage IA grade 1+ grade 2 → TAH + BSO
  ↓
  Tumor size
  ↓
  <2 cm → LN sampling
  >2cm → pelvic LN dissection

  Post – OP Radio Rx not required

- Stage IA – Grade 3
  Stage IB

  Simple Hysterectomy (TAH + BSO)
  +
  Pelvic & Paraortic LN dissection
  +
  Post op RT

	Hysterectomy	Pelvic and Para-aortic LN dissection	Radiotherapy
STAGE IA grade 1 + grade 2	TAH + BSO	<2cm LN sampling >2cm LN dissection	Not required
Stage IA – Grade 3 Stage IB	TAH + BSO	+	Required

Stage II	Type 2 Hysterectomy Or Type 3	+	Given
Stage III Or Stage IV	Cytoreductive / Debulking surgery	+	RT or Chemotherapy

- Chemotherapy Drugs:
  Cisplatin
  Doxorubicin
  Cyclophosphamide

- 5 years survival for stage I = 90%
- Overall 5 year survival for all stages is 60-70%

Ovarian Cancer

OVARIAN CYST

00:23

- M/c - Follicular
- Mainly d/t Hormonal changes

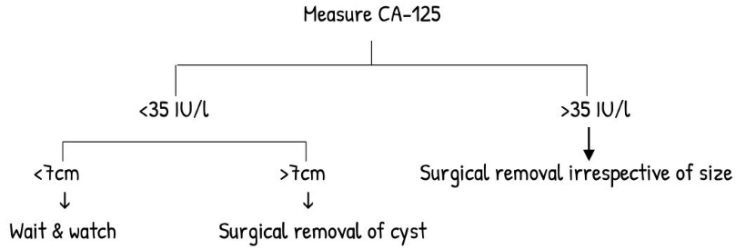
Follicular ovarian cyst	Corpus luteum cyst	Theca luteal cyst
• Regress by themselves • < 3cm	• Highly vascular • May be associated with pregnancy (1st trimester) • M.C to rupture	• Associated with multiple pregnancy, molar pregnancy, infertility treatment • ↑ hCG

- Management

1) **Cyst in Reproductive age agroup -**
   a) Size < 5cm → wait & watch → f/u c USG
   b) 5-7 cm →
      i. Simple - wait & watch → f/u c USG
      ii. Complex - surgical removal of cyst
   c) >7cm → surgical removal of cyst

2) **Cyst in pregnant women-**
   a) <5cm → wait & watch
   b) 5-10 cm →
      i. Simple - wait & watch
      ii. Complex - surgical removal of cyst in 2nd trimester
   c) >10 cm → surgical removal of cyst in 2nd trimester
      - M.C ovarian cyst in pregnancy: Dermoid cyst
      - M.C ovarian cyst to undergo torsion → Dermoid cyst
        ↳ Goes into anterior fornix of vagina Due to long pedicle
      - M.C. torsion is seen in end of 1st trimester of pregnancy
      - M.C ovarian carcinoma in pregnancy → DYSGERMINOMA

3) Cyst in post menopausal women-



OVARIAN CANCER *4:35*

1) Epithelial ovarian cancer
2) Germ cell ovarian cancer
3) Sex cord stromal tumours
4) Metastatic

1) Epithelial
   - 90% of ovarian cancer; > 50-60 yrs
     1. Serous cystadenoma (40% → Benign, 40% → malignant, 40% → B/L)
     2. Mucinous cystadenoma
        - Largest growing ovarian tumour
        - Pseudomyxoma peritonei (mucinous cystadenoma + mucocele of appendix + gelatinous material in abdomen
     3. Brenner
     4. Clear cell
        - Worst prognosis
     5. Endometroid
        - Chocolate cyst as precursor
     6. Undifferentiated
        - 50-60 yrs
        - Most common benign epithelial ovarian cancer: serous cystadenoma
        - Most common malignant epithelial ovarian cancer: serous cystadenocarcinoma

2) GERM CELL OVARIAN TUMORS *6:43*

- 5-7%
- Prepubertal and pubertal age group

1) Dermoid cyst (mature cystic teratoma)
   - M.C ovarian tumour in young girls, pregnancy
   - M.C ovarian cyst to undergo torsion

2) Immature teratoma
   - Most common malignant germ cell tumor
3) Dysgerminoma
   - Most rodiosensitive
4) Embryonal carcinoma
5) Endodermal sinus tumour / yolk sac tumour
   - Rapidly growing germ cell ovarian tumour
6) Non-gestational choriocarcinoma

3) SEX CORD STROMAL TUMORS 7:57

- Reproductive age group
- 5-7%
- Precocious puberty
- Menstrual irregularities
- Hormone producing tumor:
  1) Granulosa cell tumor → Estrogen
  2) Leydig cell tumor
  3) Sertoli cell tumor → Testosterone

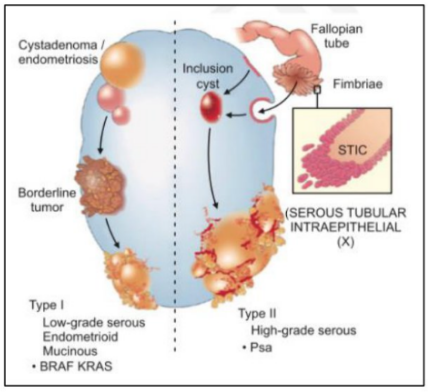
4) Stromal Tumors
   a) Fibroma - a/w Meig syndrome (Fibroma + Rt sided Pleural effusion + Ascites)
   b) Thecoma
   c) Fibrothecoma

   - Pseudo meig syndrome - any other ovarian tumor + Rt sided pleural effusion + Ascites)

5) Metastatic-
1° stomach → Krukenberg ovarian tumor
↓
B/L regular shape
Signet ring cells

RISK FACTORS FOR OVARIAN TUMORS 8:55

- "Theory of incessant ovulation".
- Early menopause
- Late menarche
- Short cycles
- Nulliparity
- Ovulation induction drugs: Clomiphene, letrozole
- Talc and asbestosis exposure
- Family history



	Chr	Breast	Ovarian
BRCA1	17	80%	50%
BRCA2	13		25%
LYNCH	5		15%

- From 30 yrs → start surveillance with annual pelvic examination, USG, mammography
- Family complete → B/L mastectomy

+

TAH

+

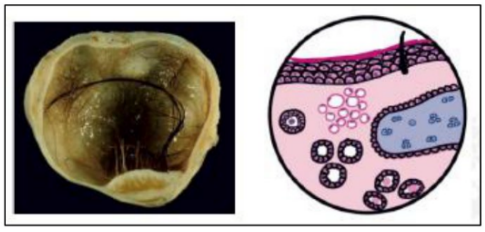
B/L salpingo - oophorectomy
(↓ Risk of ovarian cancer by 99%
1% Risk of peritoneal cancer)

PROTECTIVE FACTORS *10:17*

1) OCPs
2) Multiparity, lactation
3) B/L Salpingectomy
4) Hysterectomy

6) DERMOID CYST *10:53*

- Arises from all 3 layers
- Rx - Cystectomy



CLINICAL FEATURES

11:00

- Nausea, vomiting
- Pain abdomen
- Epigastric pain
- Early satiety
- Wt. loss
- Mass per abdomen
- Abdominal distension
- Menstrual irregularities (sex cord tumors)

Examination

BENIGN	MALIGNANT
• Feel: Cystic	• Solid/variegated
• Laterality: U/L	• B/L
• Mobility; Mobile	• Fixed
• Surface: Smooth	• Irregular
• Cul de sac: Smooth	• Nodular

- Groove b/w mass and uterus (HINGO RANI SIGN (+))
- On movement of cervix → mass will not move

Investigations

IOC - TVUS

BENIGN	MALIGNANT
• U/L	• B/L
• Unilocular	• Multiocular
• (-) / thin septations	• Thick septations
• (-)	• Papillary growth on capsule (atleast 4)
• (-)	• Intracapsular solid areas
• (-)	• Ascites (+)
• Lymph nodes not enlarged	• Lymph nodes enlarged
• Nil	• Omental caking

• High resistance, low flow	• Low resistance, high flow

M features	B features
1. Irregular solid tumor	Unilocular cyst
2. Ascites	Acoustic shadows
3. At least four papillary structures	Smooth multiocular tumor
4. Irregular multiocular solid tumor with the largest diameter of at least 100 mm.	The presence of solid components for which the largest solid component is <7 mm in the largest diameter
5. Very high color content on color Doppler examination	No detectable blood flow on Doppler examination.

TUMOUR MARKERS IN OVARIAN CANCER *13:48*

Tumour type	Serum marker
Epithelial ovarian ca.	CA 125
Mucinous cystadenoca	CEA
Endodermal sinus tumor	AFP
Chorioca	hCG
Embryonal cell ca	hCG & AFP
Dysgerminoma	PLAP, LDH
Granulosa cell tumor	Inhibin

- Endodermal sinus tumour: U/L in 100% cases
- Granulosa cell tumour: U/L in 98% cases

- Ovarian cancer is surgically staged
- Mode of spread: Transcoelomic
- MRI → extent of cancer
- CT scan → pelvic LN status

FIGO STAGING *15:11*

I: Confined to ovary or Fallopian tube
- IA: 1 ovary or fallopian tube
- IB: Both ovaries or Fallopian tubes
- IC: 1 or both, breach in capsule
  - IC1: Surgical spill (capsule rupture during surgery)
  - IC2: Capsule rupture, surface tumour (Capsule rupture before surgery)
  - IC3: Malignant cells in ascites or peritoneal washings

II: + pelvic extension (below pelvic brim) or peritoneal cancer
IIa: Uterine implant
IIb: Other intrapelvic structures

III: + Cytologically confirmed spread to peritoneum outside pelvis and/or metastasis to retroperitoneal LN

IV: Distant metastasis

STAGE I: Tumor Limited to one or both ovaries	
IA	Tumor limited to 1 ovary, capsule intact, no tumor on surface, negative washings
IB	Tumor involves both ovaries, but otherwise like IA
IC1	Surgical spill
IC2	Capsule rupture before surgery or tumor on ovarian surface
IC3	Malignant cells in ascites or peritoneal washings

Stage II: Pelvic spread of disease or primary peritoneal cancer	
IIA	Extension and/or implant on uterus and/or Fallopian tubes
IIB	Extension to other pelvic intraperitoneal tissues

Stage III: Disease Spread Beyond the Pelvis and/or to Retroperitoneal Lymph Node (s)	
IIIA1	Positive retroperitoneal lymph node (s) IIIA1 (i) metastasis $\leq$ 1 cm IIIA1 (ii) metastasis > 1 cm
IIIA2	Microscopic, extra-pelvic (above the brim) peritoneal metastasis $\pm$ positive retroperitoneal lymph node (s).
IIIB	Macroscopic, extra-pelvic, peritoneal metastasis $\leq$ 2cm $\pm$ positive retroperitoneal lymph node (s). Includes extension to capsule of liver/spleen
IIIC	Macroscopic, extra-pelvic, peritoneal metastasis > 2cm $\pm$ positive retroperitoneal lymph node (s). includes extension to capsule of liver/spleen.

STAGE IV: Distant and/or Intra-Parenchymal Spread of Disease	
IVA	Pleural effusion with positive cytology
IVB	Intra-parenchymal metastasis to the liver/spleen; metastasis to extra-abdominal organs; metastasis to extra-abdominal lymph node(s) (includes inguinal nodes)

Surgical staging

1. Midline vertical incision
2. Send free fluid for cytology or peritoneal washings
3. Palpate all intra-abdominal organs (clockwise / anti-clockwise)
4. Any suspicious areas on peritoneal surfaces should be biopsied
5. Sample the diaphragm either by biopsy or scraping
6. Infracolic omentectomy
7. Evaluate pelvic and para - aortic lymph nodes
   - Enlarged nodes should be resected
   - If no metastasis (+) → pelvic lymphadenectomy
8. Affected side → oophorectomy done and sent for frozen

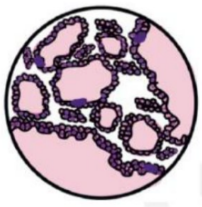
MANAGEMENT *17:38*

1) Epithelial ovarian cancer –
   a. IA, Ib, Borderline → Cytoreductive / Debulking Sx
      No Post-op Chemo
   b. IC - IV → Cytoreductive / Debulking Sx + 6 cycles of chemo
      - Cisplatin / carboplatin + Paclitaxel

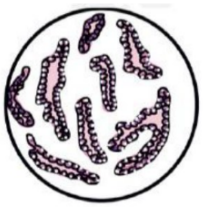
   - HIPEC (Hyperthermic Intraperitoneal chemotherapy)
     ↳ Post cyto reductive Sx
   - New drugs - Bevacizumab (Anti VEGF)

   c. Stage 3, 4 → Neoadjuvant chemo Rx (3 cycles of chemo)
      ↓
      Cyto reductive Sx
      ↓
      Cycles of chemo Rx

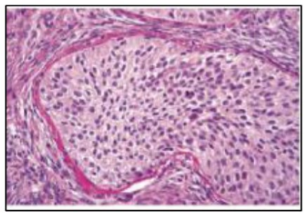
2) Germ cell / Sex cord stromal tumor
   - Benign - U/L Salpingo - oophorectomy
     6 cycles of BEP (Bleomycin, Etoposide, Cisplatin)
   - All stages of Germ cell tumors except Stage I Dysgerminoma
   - Follow up c̄ tumor markers



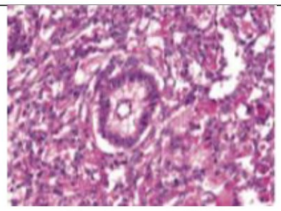
Serous Epithelial cancers → psammoma bodies



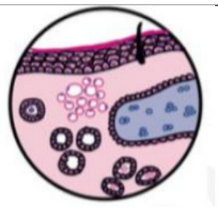
Clearcell tumours: Hobnail cells



Brenner tumours: Walthard cell rests

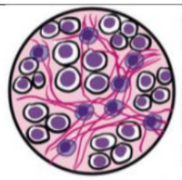


YOLK SAC TUMOUR
SCHILLER DUVAL BODY
(Glomeruloid body)



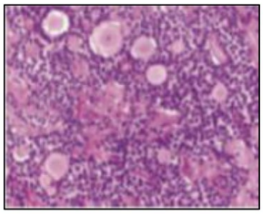
DERMOID CYSTS

- CARTILAGE, BONE, THYROID, NEURAL TISSUE
- HAIR, TOOTH, CALCIFICATION



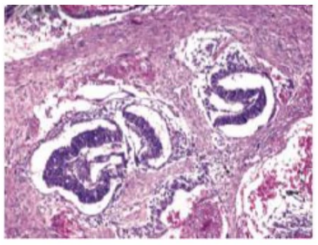
DYSGERMINOMA

- POLYHEDRAL VESICULAR CELLS WITH CENTRALLY PLACED NUCLEI: FRIED EGG APPEARANCE
- SEPARATED BY SCANT FIBROUS STROMA INFILTRATED BY LYMPHOCYTES



GRANULOSA CELL TUMOURS

- CALL EXNER BODIES



- Legdig cell tumours:- Rienke's crystals
- Krukenberg tumour:- signet ring cells

- Embryonal carcinoma → Embryoid bodies.

CIN & CA Cervix

- Cervical Intraepithelial neoplasm

Risk factors for CA - cervix/CIN:

1) Young age of 1st intercourse (<16 yrs)
2) Multiple sexual partners
3) Cigarette smoking
4) Race
5) High parity
6) Low Socia-Economic status
7) HPV infection
8) HIV
9) Immunosuppression
10) OCP for (>5 yrs) → Adeno CA of cervix

HPV infection

HPV - 6, 11 →	Anogenital warts
(Low Risk HPV)	Condyloma accuminata
	Laryngeal papillomatosis in Newborns

HPV - 16, 18

- High Risk HPV
- 16 - Squamous cell CA
  - Most commonly asso.
- 18 - Adenocarcinoma of cervix
  - Most specific

HPV - 31, 33 - CIN

Assoc. C̄	Cervical CA
	Vaginal CA
	Vulval CA
	Penile CA
	Oropharyngeal CA
	Anal CA

E6	• Bind and degrade the tumor - suppressor protein p53 • Inhibit apoptosis

E7	• Bind and degrade the tumor - suppressor protein pRB

HPV → cervical cells → E6 and E7 gene
(KOILOCYTES) ↓SUPRESS↓
P53 RB
Inhibit apoptosis
CIN
↓
Cancer cervix

1st site of HPV inf. or cancer cervix → Transformation zone
HPV inf. cells → Koilocytes → Dysplasia
KOILOCYTES → CIN 1 → CIN-2 → CIN-3 → CA Cervix
Months 5 years 10-20 years
Regression back to normal
CIN 1: 60%
CIN 2: 40%
CIN 3: 30%

KOILOCYTES → 
↓
Have perinuclear halo

↑ Nucleus
↓ Cytoplasm
↑ Mitotic Figure
Nuclear atypia

HPV VACCINATION

21:3

Purified L1 capsid protein
↳ Virus like particle → immunogenic potential
C/I: Pregnancy

CERVARIX	GARDASIL	GARDASIL - 9
Not used now		
HPV - 16, 18	HPV - 6, 11, 16, 18 Girls & boys 11-13 yr - ieal Extended - 26 -	HPV - 6, 11, 16 18, 31, 33, 45 Girls & Boys Can be given - 9-26 yrs

45 yrs

Vaccination schedule –
<15 yrs – 0, 1-2 months
>15 yrs – 3 doses
0, 1-2 Mo, 6 Mo

Recent Update
CERVAVAC

- Serum institute of India, Pune has developed first quadrivalent vaccine (HPV: 6, 11, 16, 18)
- Costs – 200 – 300 Rs
- Doses
  - 9-13 yr – 2 Doses
  - 15-45 yr – 3 Doses (0, 1-2 Mo, 6 Mo)

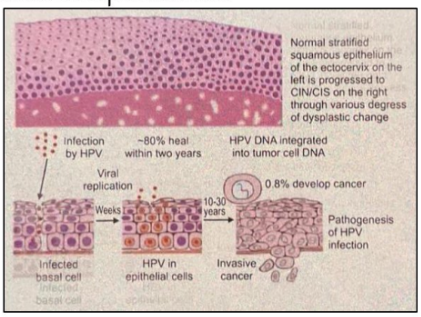
WHO SAGE-
9-15 yr – 1 or 2 Doses
15-20 yr – 1 or 2 Doses
>20 Yr – 2 Doses
HIV (+) pt – 3 Doses

CERVICAL INTRAEPITHELIAL NEOPLASIA

WHO terminology	Bethedsa terminology	CIN terminology	Description
Mild dysplasia	LSIL	CIN 1	Dysplastic cells seen in lower 1/3rd of epithelial lining of cervix
Moderate dysplasia	HSIL	CIN II	Dysplastic cells seen in lower 2/3rd of epithelial lining of cervix
Severe dysplasia	HSIL	CIN III	Dysplasia cells seen in more than 2/3rd of epithelial lining of cervix

Carcinoma in situ	HSIL	Carcinoma in situ	Dysplastic cells seen in the full thickness of cervical epithelium but basement membrane in intact
Cervical cancer	Cervical cancer	Invasive carcinoma	Dysplastic cells seen in the full thickness of cervical epithelium with breach of basement membrane

LSIL: Low grade squamous intraepithelial lesion



SCREENING
VIA → Method of choice in low resource setting
VILI
Papsmear
Liquid based cytology
HPV DNA testing → Best

VIA
Visual Inspection under Acetic Acid
3-5% Acetic Acid on cervix

Unstained → Normal

White patch → CA cervix → Protein – Keratin Coagulates with Acetic Acid

VIL – Visual inspection under lugol's Iodine

Stain cervix with lugol's iodine

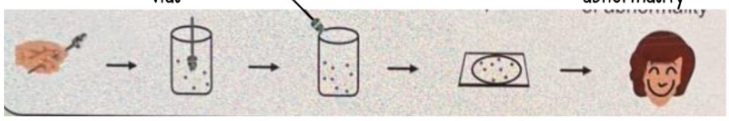
Glycogen in (N) cervix Picks up lugol's Iodine → Mahogany brown

CA cervix → No glycogen left → Unstained

Molecular	Cytologic	Visual inspection
Nucleic acid amplification tests (NAAT)[a] • High – risk HPV DNA / NAAT • mRNA DNA methylation[b]	Conventional Pap smear[a] Liquid – based cytology (LBC)[a]	Visual inspection with acetic acid or with Lugol's iodine (VIA / VILI)[s] • Naked eye • Magnified by colposcope or camera
Protein biomarkers[b] • HPV antibodies • Oncoproteins		Automated visual evaluation of digital images[b]

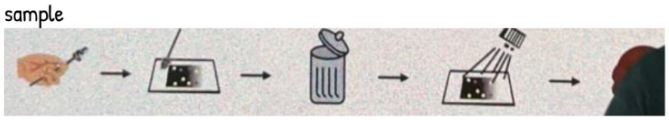
Liquid – based pap test (E-Prep)

Cervical sample → 100% of collected sample rinsed into E-Prep vial → Send to lab safety → Filtering and mono-layer E-Prep → Increased opportunity to detect early signs of abnormality



Pap Smear

Cervical sample | Smear 20% | Loss 80% | Dried cell | Piled cell

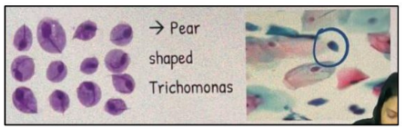


Fixative → PAP SMEAR: 95% Ethanol
→ LBC: Methanol

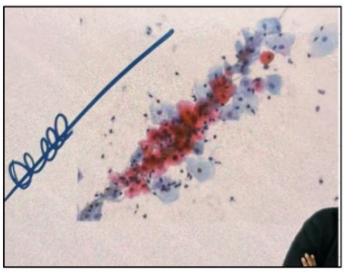
- Negative for intraepithelial lesion or malignancy
- Other: See interpretation / result (Eg: Endometrial cells in a woman > 45 yrs of age)
- Epithelial cell abnormality
  - See interpretation / result specify "squamous" or 'grandular' as appropriate

Organisms:

- Trichomonas vaginalis
- Fungal organisms morphologically consistent with candida
- Shift in flora suggestive of bacterial vaginosis
- Bacteria morphologically consistent $\overline{C}$
- Cellular changes consistent $\overline{c}$ Herpes
- Cellular changes consistent $\overline{c}$
- Cellular changes consistent $\overline{c}$ cytomegalovirus
- Intracellular Gonococci can't be picked up.

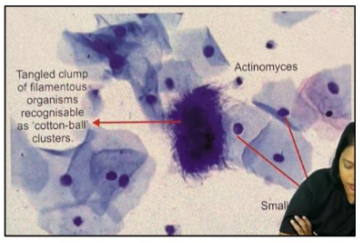


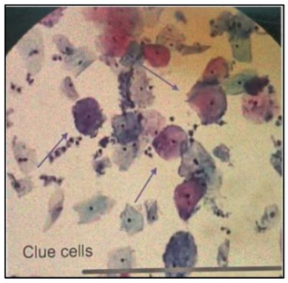
Candida → Seekh kebab appearance



Bacterial vaginosis → Gardenella

Clue cells → Bacteria attached to vaginal epithelial cells





EPITHELIAL CELL ABNORMALITY

- Squamous cell →
  - Atypical squamous cell of undetermined significance (ASCUS)
  - Can't exclude HSIL (ASC-H)
  - Low grade sq. intraepithelial lesion (LSIL)
  - High grade sq. intraepithelial lesion (HSIL)
  - With features suspicious for invasion (if invasion suspected)
  - Squamous cells CA.

Confirmed c̄ colnoscopic guided biopsy

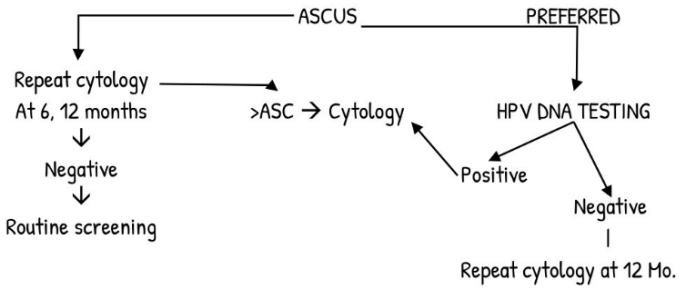
GLANDULAR CELL

- Atypical
- Endo cervical cells (NOS)
- Endometrial cells (NOS)
- Glandular cells (NOS)
- Atypical
- Endo cervical cells favour neoplastic changes
- Endo cervical carcinoma in situ
- Adeno carcinoma

} Confirmation

- Atypical
- Endo cervical cells favour neoplastic changes
- Endo cervical carcinoma in situ
- Adeno carcinoma
- Endo cervical

- Endo metrial
- Extra uterine
- NOS
- Other malignant neoplasms: Specify)

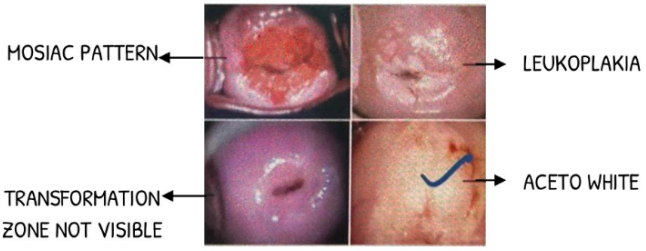


Screening guidelines →
ACS - 2020
Start screening at age 25 years
25-65 years: HPV DNA Testing every 5 years
Or
HPV DNA Testing + PAP smear co-testing every 5 years
Or
PAP smear / LBC every 3 years

Stop screening at 65 yrs if Prev. 3 screens are negative

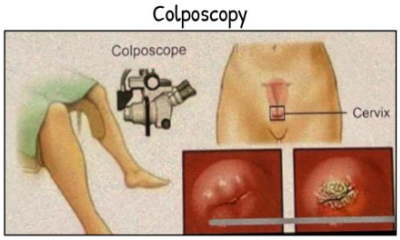
POST CIN Rx
POST HIV
→ Annual screening for 20 years
WHO: Low resource setting

Start at 30 yrs
30-65 years - VIA every 5 years
Stop at 65 yrs - if past 15 years negative for cancer
Atleast screen 1-3 times in lifetime



SATISFACTORY – If Transformation zone is visible
NOT SATISFACTORY – Transformation zone is not visible.

Colposcopy



Indications for Conization

- Therapeutic
  - Limit of lesion not visible
  - It T_2 is not visible
  - Endo cervical curettage is positive
  - Lack of co-relation between – PAP smear, col and Biopsy
  - Micro – invasive CA or Adeno CA suspect
  - Limit of lesion not visible
  - If T_2 is not visible
  - Endo cervical curettage is positive
  - Lack of co-relation between – PAP smear, colposcopy and Biopsy
  - Micro – invasive CA or Adeno CA suspected

- Diagnostic
  - CIS
  - Stage – Ia1

MANAGEMENT OF CIN

CIN 1

- Follow up with cytology at 6 and 12 months for 2 years
- If CIN persists or progresses beyond 2 years

↓

Rx

CIN 2: Ablative / Excision
CIN 2: Excisional at any age group
Recurrent CIN: Hystrectomy

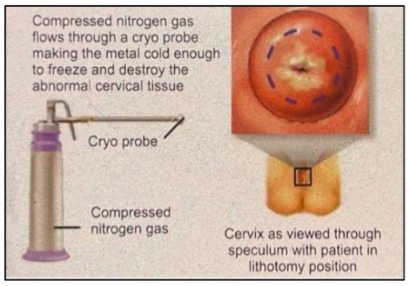
ABLATIVE TECHNIQUE

- Criteria
  - Entire lesion should be visualized within Tz

- No evidence of Micro or Macro invasion
- No endo cervical glandular involvement
- No discrepancy in cytology, colposcopy and biopsy report.

Types:

- Cryotherapy (destruction by application cold)
- CO_2 laser (destruction by application of heat)
- Cold coagulation
- Electro diathermy

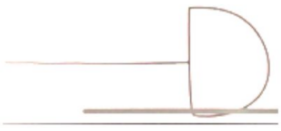


CRYOTHERAPY	LASER ABLATION
Liquid N_2O or CO_2	CO_2 laser
Cold coagulation	Heat coagulation
Depth of destruction – 5	Depth of destruction – 7mm
Mm – 90°C	75 to 100°C
Under mild sedation	Under mild sedation
Freeze – Thaw – Freeze	Can be used when lesion extends into vaginal fornices

Conization

- Cold knife conisation
- Laser excision cone biopsy

Large loop excision of the transformation zone: LETZ
Loop electrosurgical procedure: Leep
} CIN-3 method of choice



Excisional technique

Conization

- Cold knife conization

- Laser excision cone biopsy

Large loop excision of the transformation zone: LETZ
Loop electrosurgical procedure: Leep
} CIN-3 method of choice

2 cm cutting and coagulating electric loop

- Cervix is sliced
- Depth of destruction - 10mm
- Adv: Tissue available for HPF
- Disadvantage: can't be used for endo cervical or micro invasive lesion
- Requires anaesthesia
- Poor compliance with follow up
- Previously for CIN III Hysterectomy was indicated now - LEEP / LLETZ

CA CERVIX

- Age group bimodal peak
  1st peak: 35-39 years
  2nd peak: 60-65 years
  Mean age for cervical CA = 52.2 years
  M/c in low socio - economic status
  M/c Type: Large cell keratinizing type (sq)

Clinical picture:

1. Irregular vaginal bleeding - (MC)
2. Post coital bleeding - most specific
3. Pelvic pain
4. Foul smelling discharge

Causes of post coital bleeding → colposco biopsy

4 CARDINAL SIGNS

- Hard endurated cauliflower like growth
- Firm - fixed
- Bleeds on touch
- Friable

Complications

- PUF
- Pyometra
- Uremia → most common cause of death - Fistula.

Mode of spread: Lymphatics
Sentinal LN: Parametrial / Paracervical
↓
Obturator LN
↓
External iliac and internal iliac LN
Investigations: CBC, LFT, RFT, Urine analysis

Investigations : CBC, LFT, RFT, Urine analysis
: Chest X-Ray, IVP, CT, MRI, PET
: MRI - Tumor size
Extension
Parametrial involvement
: LN involving and distant mets: CT/PET scan
: Cysto scopy / Procto scopy: To look for bowel / bladder involvement
: Pathological examination of LN
Staging: FIGO-
Ia1 < 3mm in stromal depth
Ia2 3-5mm in stromal depth
Ib: Visible lesion on cervix
Ib1: <2cm in size
Ib2: 2-4 cm in size
Ib3: >4cm in size

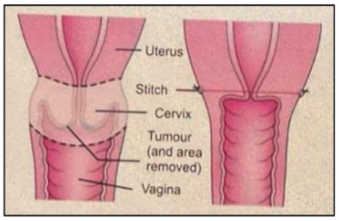
Stage II: Around Parametrium upper 2/
IIa: w/o Parametrial involvement
IIa2 - >4cm
IIb: With parametrial involvement
Stage III: Lower 1/3rd of vagina is involved
III a → w/o lat. Pelvic wall involvement
III b → With lat. Pelvic wall involvement
With Non-functioning Kidney and Hydronephrosis
III c1 → Pelvic LN
III c2 → Para - aortic LN

Stage IV a → Bowel / Bladder
IV b → Distant metastasis
Superficial Inguinal LN

Management
Stage I a1 - II a1 - surgical except Ib3
Stage II a2 - IV b - con current chemo - radio therapy
And I b3

	OLD	YOUNG
Ia1	TAH + LN Resection	Conisation
Ia1 with Lymphovascular space invasion	Type 2 hysterectomy (WERTHIMES) +	Radical Trachelectomy
Ia2	Pelvic Lymphadenectomy	
Ib1, Ib2, IIa1	Type 3 hysterectomy + Pelvic lymphadenectomy	Radical Trachelectomy

Radical Trachelectomy



- Amputation of cervix, till cancer free margin parametrial tissue and vaginal cuff along with pelvic lymphadenectomy
- Followed by cervical stitch: Mode of delivery LSCS

TYPES OF HYSTERECTOMY: PIVER RULTDGE
Classification: Wertheim / Meig's

	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
VAGINA	NOT REMOVED	UPPER 1/3	UPPER ONE HALF	UPPER ¾	
UTERINE	NEAR UTERUS	WHERE IT CROSSES OVER THE URETER	FROM ITS ORIGIN	SUPERIOR VESCIAL ARTERY SACRIFICED	
LIGAMENTS		MIDWAY	WHOLE LENGTH REMOVED		
		WERTHIEMS Ia1 Ia2	RADICAL 1b1, 1b2 IIa1	URETER COMPLETELY DISSECTED	PORTION ON OF BLADDER AND URETER REMOVED

Surgery preferred over radiotherapy
SURGERY

- Ovary can be preserved
- Vaginal length can be preserved
- Tissue available for histopathological examination

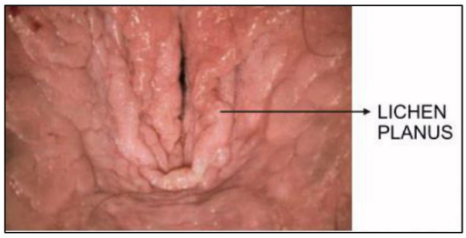
CHEMOTHERAPY with CISPLATIN
+
RADIOTHERAPY

STAGE I - 90% - 5yr survival
STAGE II / III - 70%
STAGE IV - 50%

Vulval Cancer

PREMALIGNANT LESIONS OF VULVA 00:37

1) VIN
2) Paget's disease
3) Lichen sclerosis
4) Squamous hyperplasia / Hyperplastic dystrophy
5) Bowen disease; Erythroplasia of Queyrat



2015 Terminology	2004 Terminology
Low grade squamous intraepithelial lesion of the vulva (vulvar LSIL, flat condyloma or HPV effect)	Condyloma, HPV effect*
High - grade squamous intraepithelial lesion of the vulvar (vulvar HSIL VIN usual type)	Usual type VIN (subdivided) a. VIN, warty type b. VIN, basaloid type c. VIN, mixed (warty or basaloid) type
Differentiated type VIN	Differentiated type VIN

- Symptoms - Asymptomatic (50%)
  - Pruritis (m/c symptoms)

- Prevention -
  a) Quadrivalent
  b) Nano (9) valent vaccine
  - Girls aged 11-12 yrs c̄ catch up upto 45 yrs if not vaccinated in the targeted age

- Diagnosis
  1) Clinical
  2) Biopsy
- Progression to cancer - 5-10%

- Treatment –
  1) Vulval LSIL - Annual follow up & colposcopy if required
  2) Vulval HSIL / VIN undifferentiated -
     a) Wide local excision
     b) CO_2 laser ablation
     c) Topical 5FU
     d) Topical Imiquinomod

     } avoid in pregnancy

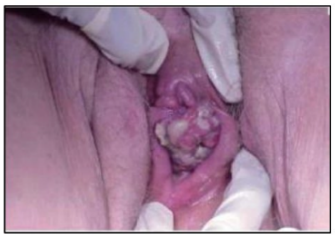
VULVAL CANCER 2:20

- Risk factors
  1) Age - 70-80 yrs
  2) HPV infection
  3) Smoking
  4) HIV
  5) VIN
  6) Lichen sclerosis
  7) Melanoma / atypical moles
  8) Premalignant lesions

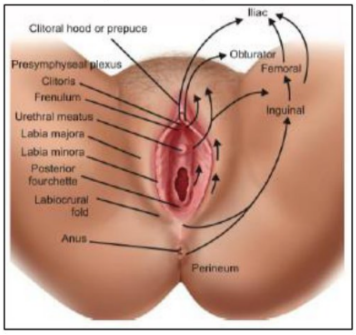
- M/c variety - SCC
- M/c symptoms - Pruritis
- M/c site - Labia majora & minora → Hart's line
- M/c type of spread - Lymphatics

- Lymphatic drainage

  Vulva → Superficial Inguinal LN
  ↓
  Clitoris → Deep Inguinal LN
  (LN of Cloquet)



- Midline 2 cm → into Rt & Lt superficial inguinal LN



STAGING OF VULVAL CANCER 3:22

I - Confined to vulva ± Perineum

IA - ≤ 2 cm in size & ≤ 1 mm deep

IB - > 2 cm in size & > 1 mm deep

But confined to vulva ± Perineum

II - Tumor of any size & has spread to nearby structures including lower part of urethra, vagina / anus

- It has not spread to LN / other parts of body

III - Cancer spread to nearby tissues → Vagina, anus (or) urethra & to groin LN. There are no distant mets.

III A - 1 or 2 mets to LN < 5 mm
(or) 1 met > 5 mm (or) 2 mets < 5mm

III B - ≥ 3 mets to LN < 5 mm (or)
≥ 2 mets to LN > 5 mm

III C - ≥ 1LN along c̄ their surrounding capsule

IV - Spread to upper 2/3rd of vagina / upper 2/3rd of urethra / distant parts of body

IV A - Spread to upper 2/3rd of vagina / upper 2/3rd of urethra. Regional LN mets & ulceration or attached to LN beneath it.

- There are no distant mets.

IV B - Cancer spread to distant parts of the body

MANAGEMENT 5:46

Ia - Simple partial Vulvectomy

Ib - Lateral extension - Radical vulvectomy & I/L inguinal lymphadenectomy

- Medial extension - Radical vulvectomy & B/L inguinal lymphadenectomy

II/IIIa - Radical vulvectomy & B/L inguinal lymphadenectomy

- Advanced vulval Ca stage 3b to 4b - Chemoradiation

Gestational Trophoblastic Neoplasia

GTD (VS) GTN: 00:25

(1) GTD (Gestational Trophoblastic Disease)
   a) Complete mole
   b) Incomplete mole

(2) GTN (Gestational Trophoblastic Neoplasia)
   a) Choriocarcinoma
   b) Placental site trophoblastic tumor
   c) Epithelioid trophoblastic tumor
   d) Invasive mole (chorioadenoma destruens)

- Criteria for GTN:
   1) Plateau for Sr. β HCG level (± 10%) for 4 measurements during a period of 3 weeks / longer – days 1, 7, 14, 21
   2) Rise of Sr. β HCG level > 10% during 3 weekly consecutive measurements / longer, during a period of 2 weeks / more – day 1, 7, 14
   3) Sr. β HCG level remains detectable for 6 months / more
   4) Histological criteria for choriocarcinoma

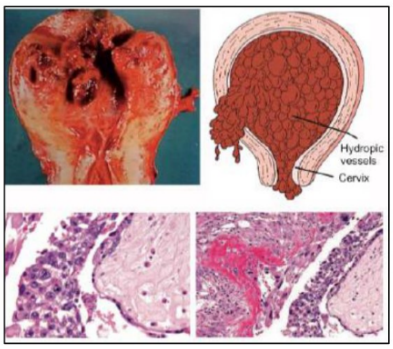
Incidence
- Overall incidence of persistent GTN after complete hydatidiform moles is 15–20%
- Approximately 50% of cases of GTN develop following a hydatidiform mole & 25% following an abortion

Risk factors
1. Complete mole (15–20% cases)
2. Sr. hCG > 1,00,000 mIU/ml
3. Uterine size > LGA
4. Theca Lutein cysts – large (>6cm) / B/L
5. Slow ↓ in β HCG
6. USG – myometrial nodules / hypervascularity post evacuation
7. Size of uterus > 20 wks

INVASIVE MOLE 4:30

- Also called chorio adenoma destruens

- Has extensive penetration abilities through all layers of uterus
- May present c̄ multiple purple perforated areas c̄ massive intra peritoneal haemorrhage
- Later may metastasise to vagina / distant sites
- Excessive trophoblastic overgrowth & extensive penetration by trophoblastic cells including villi
- Villus structure is retained well without signs of muscle necrosis
- **Rx** – Immediate hysterectomy



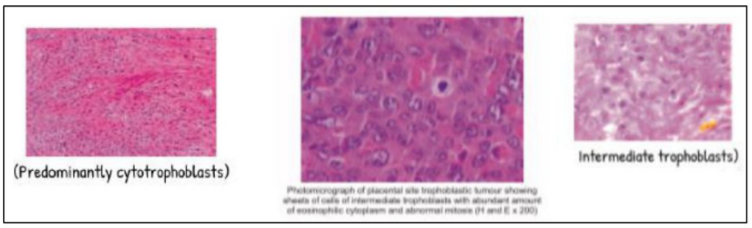
PLACENTAL SITE TROPHOBLASTIC TUMOR 5:12

- Arises at placental implantation site
- Rarest variant of GTN
- Tumor arises from intermediate trophoblasts of placental bed & is composed mainly of cytotrophoblastic cells
- Local invasion → into myometrium & lymphatics
- Metastasises less commonly into the vasculature
- Present c̄ vaginal bleeding
- ↑ β HCG (but produce variant forms of βHCG)
- Free βhCG > 30% – diagnostic
- HPL (Human Placental Lactogen) – also a tumor marker

Histopathology

- Absent syncitiotrophoblast
- Many prolactin producing cells & a few gonadotrophin producing cells are seen

Rx – Hysterectomy preferred (PSTT doesn't respond to chemo)



CHORIO CARCINOMA *6:25*

- M/c among all types of GTN
- Most malignant tumor of uterus
- Arises from chorionic epithelium
- **C/f** - Irregular bleeding (or)
  - Uterine haemorrhage following an abortion / a molar pregnancy / a normal delivery

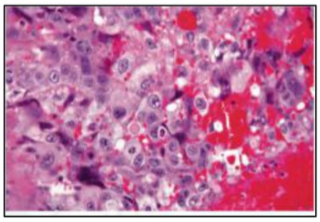
Incidence

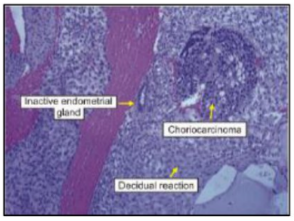
- 50% develop following a hydatidiform mole (low risk)
- 30% develop after miscarriage or ectopic gestation
- 20% develop after apparently normal term pregnancy (high risk)

Histopathology

1) Absence of villous pattern
2) Columns & sheets of trophoblastic cells penetrating the muscle & blood vessels
3) Cellular atypia

- M/c mode of spread → Hematogenous

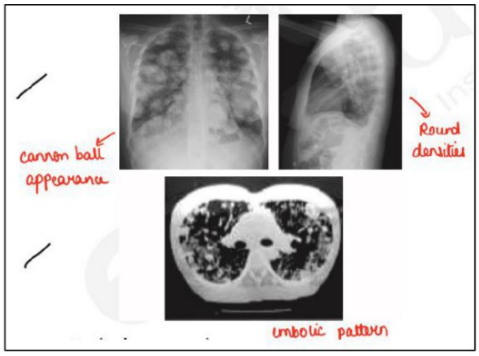




Metastasis

- M/c sites - Lung (80%) > vagina (30%) > Pelvis (20%) > Liver (10%) & Brain (10%)
- Lung & vagina - low risk
- Brain / Liver metastases → a/w worse prognosis

(1) Lung Metastasis –
- Seen in 80% cases
- C/f - Dyspnoea
  Hemoptysis
  Chest pain, etc
- X-ray - 4 patterns -
  a) Alveolar snow storm pattern
  b) Discrete round densities / cannon ball appearance
  c) Pleural effusion
  d) Embolic pattern - caused by Pulmonary arterial occlusion



(2) Vaginal Metastasis –
- Seen in 30% cases
- Metastasis occurs in sub urethral / in fornices
- Mets appear as purple hemorrhagic projections which are highly vascular & bleed on touch (Pathognomic of choriocarcinoma)

- FIGO Staging-
  - **Stage I**: The lesion is confined to the uterus
  - **Stage II**: The lesion spreads outside the uterus but is confined to the genital structures (adnexa, vagina, broad ligament)
  - **Stage III**: The lesion metastasizes to the lungs.
  - **Stage IV**: The lesion metastasizes to sites such as brain, Liver or gastrointestinal tract.

- WHO scoring - ≥7 → bad prognosis
  ≤6 → good prognosis

Scoring				
	Score			
	0	1	2	4
Age (Years)	<40	>40		
Antecedent pregnancy	H.mole	Abortion	Term	
Interval months from index pregnancy	<4	4<7	7<13	>13
Pre-treatment serum hCG, (IU/L) (not pre evacuation)	<1000	<10,000	<100,000	>100,000
Largest tumour size (cm) including uterus	<3 cm	3-5 cm	>5 cm	
Site of metastases	Lung	Spleen Kidney	GIT	Liver Brain
No. of metastases		1-4	5-8	>8
Previous failed chemotherapy			1 drug	>2 drugs

Treatment

Stage	Treatment
Stage I FIGO with low Risk WHO	Single Agent Chemo (Methotrexate)
Stage I FIGO with High Risk WHO	Combination Chemo + hysterectomy (if family completed)

Stage II or III FIGO with low risk WHO	Single agent Chemo + Hysterectomy (if family completed)
Stage II or III FIGO with High Risk WHO	Combination Chemo + hysterectomy (irrespective)
Stage IV	Combination Chemo + Hysterectomy + Metastatic Resection (hepatic resection or craniotomy) + Radiotherapy

(1) Chemotherapy

2 types – a) Single agent chemo
b) Combination chemo

- Single Agent Chemo:
  - Methotrexate is the drug of choice
  - Dose: 1mg/kg bodyweight
  - If the patient has jaundice then actinomycin D should be given.
  - Given on day 1, 3, 5 and 7
  - Alternating with folinic acid on day 2, 4, 6 and 8
  - Repeat every 7 days

- Combination Chemo:
  - Most commonly is Bagshaw regime consisting of –
    1. E = Etoposide
    2. M = Methotrexate
    3. A = Actinomycin D
    4. C = Cyclophosphamide
    5. O = Vincristine (Oncovin)
  - EMA-CO regimen results in response rates of about 90% and survival rates of 80-100%

Follow up

- Weekly β HCG till nill followed by 3 consecutive weeks f/b monthly for 12 months.

UROGYNECOLOGY

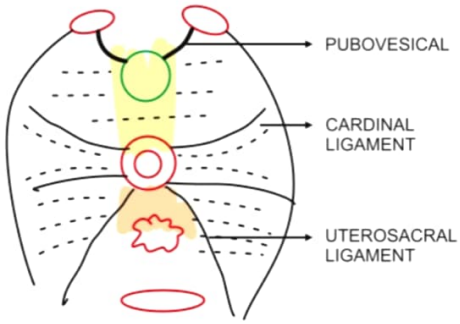
Genital Prolapse

PROLAPSE 00:31

- Pelvic prolapse is defined as protrusion of pelvic organs into or out of the vagina canal

- **We have two main types of prolapse:**
  1. Uterine prolapse: descent of the uterus
  2. Vaginal prolapse: descent of any pelvic viscera in association with vaginal walls

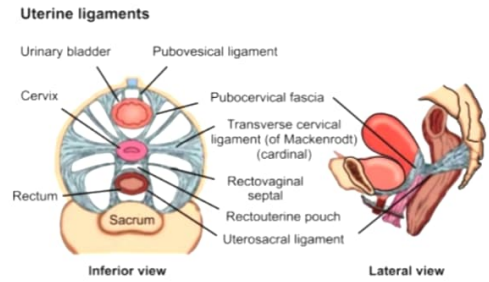
- **Cervical supports:**



  a. Anteriorly cervix is attached to pubic bone: Pubocervical ligament
  b. Laterally attached to cardinal ligament/ transverse cervical / Mackendrot's ligament
  c. Posteriorly, attached to sacral bone: Uterosacral ligament

- **Vaginal supports:**
  a. Anteriorly: there is a fascia – vesicovaginal fascia which is supporting vagina
  b. Posteriorly there is recto vaginal fascia.

- When any of these supports are damaged → It leads to uterine prolapse.



LEVELS OF SUPPORT 04:09

- De Lancey has classified supports of uterus in three levels:

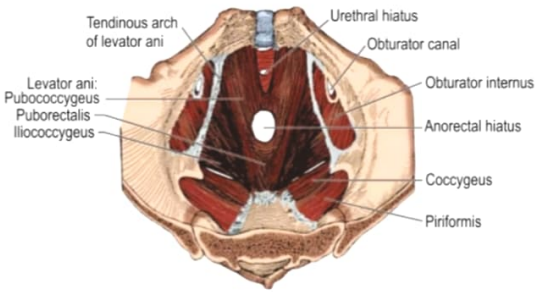
  I. Level I – uterosacral ligaments, Mackenrodt's ligament: (Uterus and cervix mainly supported)
     - Level I support: Apical support
     - Damage to level I support causes uterine prolapse, vault prolapse and enterocele

  II. Level II – mid-vaginal support due to lateral attachment to levator fascia
     - The arcus tendinous fascia pelvis is a condensation of parietal fascia covering the medial aspects of the obturator internus and levator ani muscle
     - It provides the lateral and apical anchor sites or the anterior and posterior vagina. The arcus tendinous fascia pelvis is therefore to withstand descent of the

Active Space

anterior vaginal wall, vaginal apex and proximal urethra.

- Anterior fascia damage: cystocele
- Posterior fascia damage: rectocele & urethrocele



III. Level III – Perineal Body: lower vaginal supports by perineal body or fusion of distal urethra to pubic bone.

- Perineal body is also called as central tendon. It is a condensation of
- 4 Paired muscles:
  - i. Bulbospongiosus
  - ii. Deep transverse Perini
  - iii. Superficial transverse Perini
  - iv. Levator ani
- Other 2 muscles:
  - i. Longitudinal coat of rectal muscle in anal canal
  - ii. External anal sphincter
- Perineal membrane/ Urogenital diaphragm: It is covered by superficial and deep transverse perineal membrane.

Question: Most importance structure preventing uterine prolapse is:

A. Round ligament
B. Broad ligaments
C. Cardinal ligament ✓
D. Uterosacral ligament

Ans- C

- Round ligament maintains anti-version of uterus.

ETIOLOGY 12:23

I. Child birth trauma:
- Precipitate labour
- Prolonged labour
- Instrumental delivery
- Poor spacing
- Early resumption to work
- Improperly repaired perineal tear/episiotomy

II. Increased Intra-abdominal pressure:
- Chronic cough
- Constipation
- Large fibroid
- Large ovarian tumor
- Post-menopausal atrophy
- Nulliparous can get prolapse when they have connective tissue disorders (Ehler – Danlos syndrome, marfan syndrome) or neurological anomalies (Spina bifida occultra)

Active Space

UROGYNECOLOGY

CLASSIFICATION 15:20

- **Subjective**:
  - Shaws: With respect to introitus
  - Balden Walker: with respect to hymen

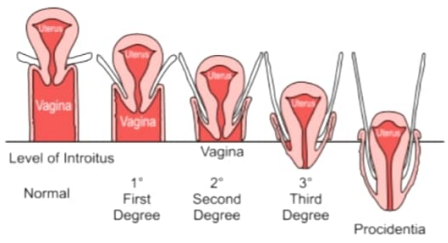
- **Quantitative**: POPQ – Universally accepted classification.

Classification of Prolapse

Anterior Vaginal Wall:
Upper Two-Thirds-Cystocele.
Lower One-Third-Urethrocele } Cystoure Throcele

Posterior Vaginal Wall:
Upper One-Third-Enterocele (Pouch of Douglas Hernia)
Lower Two-Thirds-Rectocele

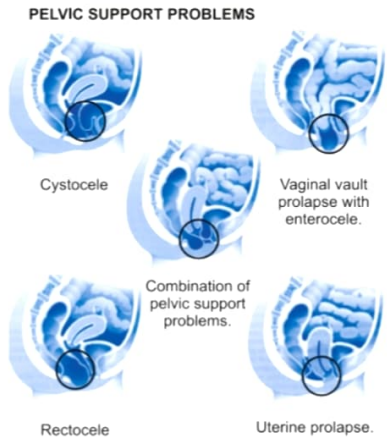
Uterine Descent:
1° ←→ Descent of the Cervix in the Vagina.
2° ←→ Descent of the Cervix to the introitus.
3° ←→ Descent of the Cervix outside the introitus.
Procidentia – All of the Uterus outside the introitus.



Note the descent of the cervix which is accompanied by stretching of the ligaments and by supravaginal elongation of the cervix.

- **Posterior Vaginal Wall:**
  - Upper 1/3rd – Enterocele (Pouch of Douglas Hernia)
  - Lower 2/3rd – Rectocele

- **Uterine Descent:**
  - 1°: Descent of the Cervix in the Vagina.
  - 2°: Descent of the Cervix to the introitus.
  - 3°: Descent of the Cervix outside the Introitus
  - Procidentia – All of the Uterus outside the Introitus



Question: According to Shaw's classification, III degree is:

a. Cervix above introitus
b. Cervix at the level of introitus
c. Cervix outside the introitus √
d. Procidentia

Ans- C

Active Space

SIGNS AND SYMPTOMS 18:53

- Mass per vagina
- Groin or back pain: due to stretch on ligaments
- Urinary symptoms
- Rectal symptoms
- Difficulty in coitus / difficulty in walking

- **Cystocele:**
  - Incomplete emptying
  - Increased frequency of micturition
  - UTI
  - Burning sensation
  - Nocturia
  - Stress incontinence
  - Stream of urine decreases on straining

- **Rectocele:**
  - Presence of faecal matter left in pouch
  - Incomplete emptying
  - Digital splinting in order to pass the stools

- **Decubitus Ulcer**: One of the complications associated with prolapse is decubitus ulcer → pressure / trophic ulcer.

Venous congestion
↓
Venous stasis
↓
Ischemia and necrosis
↓
Decubitus ulcer

  - Rx:- reposition of uterus followed by tamponade Or pessary.

  - **On tamponade:**
    - Estrogen cream to improve vascularity
    - Glycerine to decrease edema.
    - Betadine to prevent infection
    - Acritaviline: to help epithelization

Question: Urinary incontinence in uterovaginal prolapse is mostly due to :

a. Detrusor instability
b. Stress incontinence ✓
c. Urge incontinence
d. True incontinence

Ans- B

Question: In uterine prolapse, decubitus ulcer in the cervix is caused by:

a. Friction
b. Malignant change
c. Venous congestion ✓
d. Trophic changes

Ans- C

- Most common site of decubitus ulcer → Most dependent part: posterior lip of cervix.

INVESTIGATIONS 30:33

- Complete hemogram, routine urine analysis.
- Urine culture and sensitivity - it is mandatory to rule out urinary tract infection (UTI)
- Complete preoperative assessment for anaesthesia - should be done in women planned for surgical treatment which will include blood sugar estimation,

Active Space


1

2

3

4

5

6

7

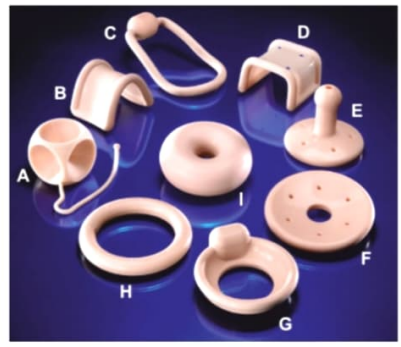
8

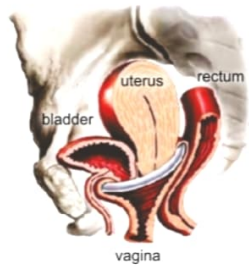
renal function tests, ECG and chest X-ray or any other investigation as advised by anaesthesiologists.

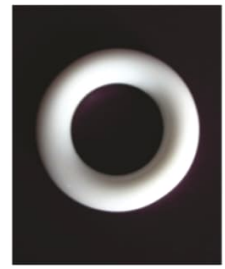
- USG Pelvis: To rule out hydronephrosis and other associated conditions like fibroid.

MANAGEMENT 32:25

- Age, parity status, and /type of prolapse are the factors that decide the type of surgery.
  A. Conservative Treatment (Uterus – preserving surgeries):
    - It is done for young patients desirous of further childbearing / menstrual function.
    - It includes:
      1. Pessary
      2. Pelvic floor exercises
    - Pessary: It has two broad categories – Support and Space Filling.
      a. Support pessaries, such as the ring pessary, use a spring mechanism that rests in the posterior fornix and against the posterior aspect of the symphysis pubis.
      b. Space – filling pessaries maintain their position by creating suction between the pessary and vaginal walls, by creating a diameter larger than the genital hiatus (donut), or by both mechanism (Gellhorn)







- **Ring pessary:**
  - PVC made / rubber made
  - Occupy the entire vagina and prevents uterus, bladder falling out
  - Diameter of pessary: Distance from lower border of pubic symphysis to posterior fornix.

- When you ask patient to cough / laugh → if the pessary is not coming out → it is adequate size and shape.
- If a larger pessary is placed, it compresses urethra and causes retention of urine → So, you should ask patient to void urine after pessary is placed.

- **Indications of Pessary:**
  1. Early pregnancy upto 18 weeks
  2. Puerperium
  3. Patient is unfit for major surgery

Active Space

4. Patient is not willing for surgery
5. For treatment of decubitus ulcer before surgery

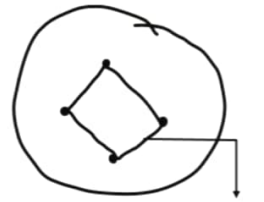
- **Limitations of Pessary:**
  1. Never curative, only palliative
  2. Vaginitis
  3. Needs to be changed every 3 months
  4. Dyspareunia
  5. Expulsion (if vaginal orifice is very patulous)
  6. May cause ulcer, rarely Ca vagina and a vesicovaginal fistula
  7. Does not cure urinary stress incontinence

SURGERIES 39:30

I. **Transvaginal:**
   1. Fothergill's operation
   2. Shirodkar's uterosacral ligament advancement

II. **Abdominal (Sling surgery/Cervicopexy):**
   1. Purandare
   2. Shirodkar
   3. Khanna
   4. Virkud (composite sling)

- **Fothergill's surgery/Manchester's operation:**
  - **Indications**:
    i. Young women but family completed
    ii. Patient willing to preserve uterus
  - **Procedure**:
    - Preliminary D &C
    - Cervical amputation (by joining 4 Fothergill's points)followed by


Fothergill points

    - Advancement of transverse cervical ligament in front of cervix by Strumdorff stitch.
    - Anterior colporrhaphy
    - Posterior colpoperineorrhaphy
  - **Side-effects:**
    - Cervical incompetence
    - Cervical fibrosis
    - Cervical dystocia

- **Modified Fothergill's or Shirodkar's operation:**
  - Advancement of uterosacral in front of cervix.
  - Advantage: Cervix is preserved

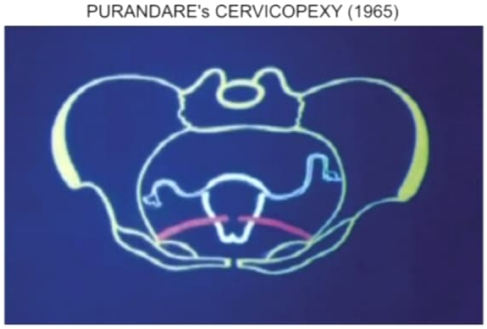
- **Sling surgeries**: Sling used is merselin tape

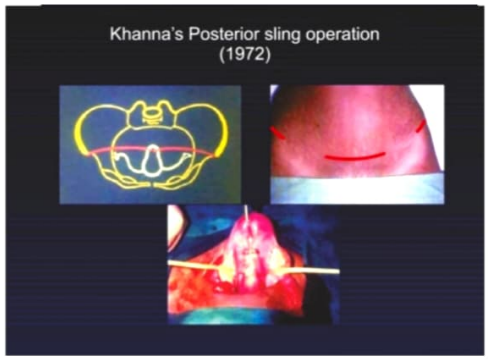
I. **Purandare's Cervicopexy:**
  - Sling is tied from anterior aspect of cervix to posterior rectus sheath.
  - Risk of enterocele development as pouch of douglas is deepened.
  - It is a dynamic sling.

Active Space

UROGYNECOLOGY

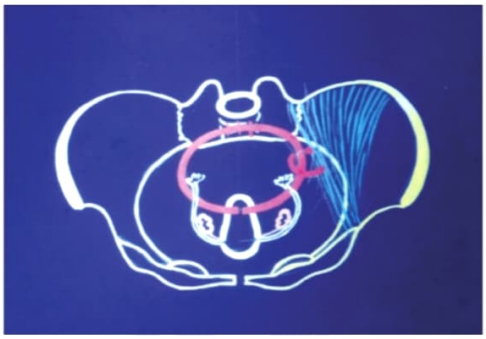
PURANDARE's CERVICOPEXY (1965)





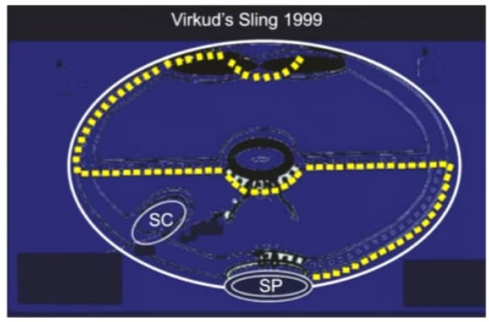
II. **Shirodkar's sling surgery:**
- Sling is tied from the posterior aspect of cervix to sacral promontory
- Side effect: risk of sigmoid colon obstruction.
- Static sling

SHIRODKAR'S SLING OPERATION (1960)



III. **Khanna's posterior sling operation:**
- Sling is tied from lateral aspect of cervix to ASIS
- Static sling

IV. **Virkud's sling:**



- It is a composite sling:
  - Left side: Purandare's operation
  - Right side: Shirodkar's operation (sacral promontory)

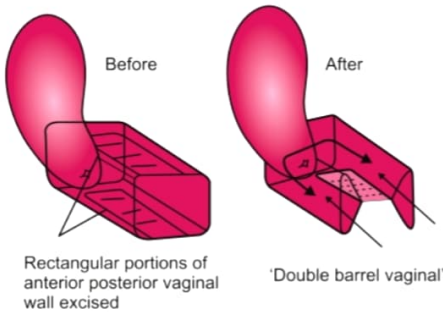
- **Radical surgeries:**
  - For old patients, family complete, postmenopausal women who are medically fit for surgery.
  - Vaginal hysterectomy with or without anterior and posterior colporrhaphy is the best surgery:
  - Anterior colporrhaphy: repair of cystocele and cysto-urethrocele.

Active Space

- Posterior colpoperineorrhaphy: repair of rectocele and lax perineum. (Repair of recto vaginal fascia)

- **Enterocele repair:**
  - Moscowitz repair: concentric purse string suture around the cul de sac.
  - Halbans repair: longitudinal obliteration of cul de sac.
  - Vaginal repair: Culdoplasty. → Anchor uterosacrals to vault; It is most commonly done to prevent post hysterectomy enterocoele.

- Le fort's surgery: push vagina and uterus inside and obliterate anterior and posterior vaginal walls. Hence, it is also known as Total Colpocleisis.



- Partial colpocleisis - Good Powel's surgery

Question: A young nulliparous woman had 3rd degree of uterovaginal prolapse without any cystocele or rectocele. There is no stress incontinence. The uterus is retroverted. Uterocervical length is 3 inches. All other symptoms are normal. The best treatment plan for her will be:

a. Observation and reassurance till child bearing is over
b. Shirodkar's vaginal repair
c. Shirodkar's abdominal sling ✓
d. Fothergill's operation

VAULT PROLAPSE 55:37

- It is a long-term complication of any hysterectomy and occurs more frequently after vaginal as compared to abdominal. It can be prevented by vault suspension at the time of primary surgery.

- **Management**:
  - Transvaginal sacrospinous ligament fixation
  - Transabdominal sacrocolpopexy: mesh is attached to vault and sacral promontory
  - Sacrocolpopexy is considered the gold standard operation for vault prolapse.

Question: Ward Mayo's operation is indicated in:

A. Carcinoma uterus
B. Nulliparous prolapse
C. Procidentia ✓
D. Carcinoma cervix

Active Space

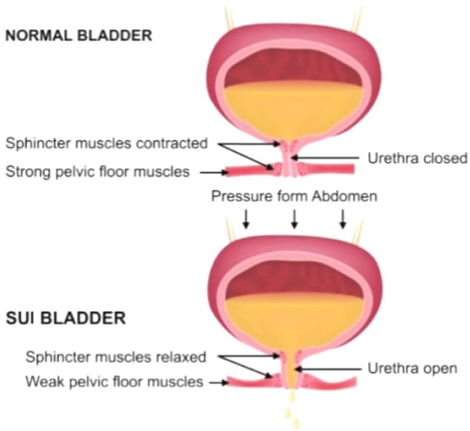
UROGYNECOLOGY

Urinary Incontinence

- Incontinence: involuntary passage of urine

STRESS INCONTINENCE 00:30

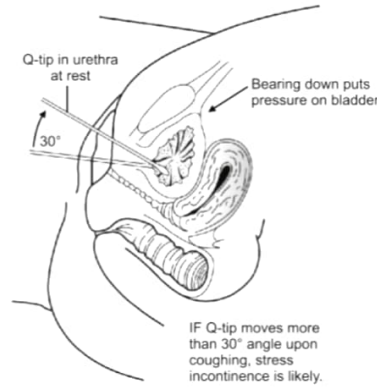
- Stress Urinary Incontinence: Stress urinary incontinence (SUI) is defined as involuntary escape of urine from external urinary meatus due to sudden rise in intra-abdominal pressure (coughing, sneezing, etc.). There are 2 reasons for it:
  1. Bladder neck descent hypermobility (75-80%)
  2. Urethral Intrinsic sphincter defect (20-25%)



- **Another reason**: Bladder neck and proximal urethra goes below the urogenital diaphragm/pelvic floor

- **Causes of SUI:**
  1. Prolapse of uterus
  2. Postmenopausal atrophy
  3. Childbirth trauma
  4. Pregnancy

- **Tests for Stress incontinence:**
  1. Bonney's test is used to demonstrate SUI and find out the cause for it.
  2. Marchetti test
  3. Q tip test: Cotton bud gets angulated due to urethral hypomobility.



  4. Urethral pressure profile test
  5. Leak point pressure test

  } Intraabdominal pressure > Sphincter pressure.

- **In Bonney's test and Marchetti test**: 2 fingers are put on either side of urethra and paraurethral tissue is supported → Patient asked to cough:
  - If no urine coming out: Urethral hypomotility.
  - Urine is coming out: Sphincter defect.

- **Treatment**: In all surgeries, urethra is pulled above the urogenital diaphragm.
  A. **Vaginal**:

Active Space

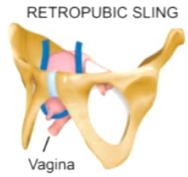

1


2

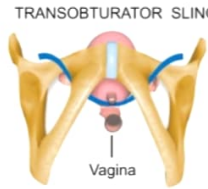

3

1. Kelly's stitch: Strengthen paraurethral tissue. Not done nowadays.
2. Needle suspension surgery: not done nowadays.
   a. Pereyra
   b. Stamey

B. **Abdominal:**
1. MMK: In Marchetti-Marshal-Krantz (MMK) surgery, the periurethral tissue is anchored to periosteum of pubic symphysis.
2. Burch: In Burch colposuspension, the perivesical tissue is anchored to Cooper's ligament (iliopectinate ligament) on the lateral pelvic wall.



The placement of the retropubic sling is like a U

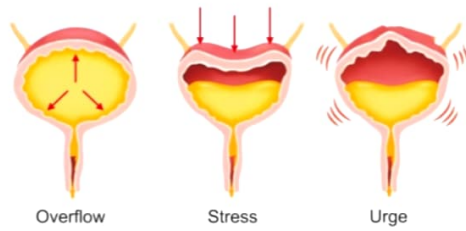


The placement of the transobturator is a "smile"

- Now surgery of choice are Tension free tapes.
- **Currently tension free slings include:**
  1. Transvaginal tape (TVT)
  2. Trans-obturator tape (TOT)

  Tape is not anchored to any structure.
- **Best surgery**: TOT > TVT > Burch colposuspension.

OTHER TYPES OF INCONTINENCE 12:15



	Stress incontinence	Urge incontinence (sensory)	Detrusor instability
Timing of leakage	Increased intraabdominal pressure	After an urge: ususally filled bladder	After an urge: even with incompletely filled bladder
Urge to micturate	Absent	Present and felt	Present and may not be felt.
Amount of leak	Minute amounts increase progressively	Large amounts	Large amounts
Frequency	Absent	Present	Present

- **Management of overactive bladder:**
  A. Antimuscarinic drugs.

Active Space


1


2


3

1. Oxybutynin hydrochloride 5-10 mg TID → It relieves frequency and urgency. Side effects: Dry mouth and skin, constipation, blurred vision.
2. Tolterodine 1-2 mg BD/TID → It also relieves frequency and urgency. Side effects: Dry mouth and skin, constipation, blurred vision.
3. Solifenacin: 5-10 mg PO daily BD → It also relieves frequency and urgency. Side effects: Dry mouth and skin, constipation, blurred vision.

B. Imipramine hydrochloride at dose of 50mg HS is used for treatment of nocturia. It also causes blurred vision and constipation.

C. Vasopressin: 20-40mcg HS for nocturnal enuresis. Side effects: fluid retention and hyponatremia.

Active Space


1

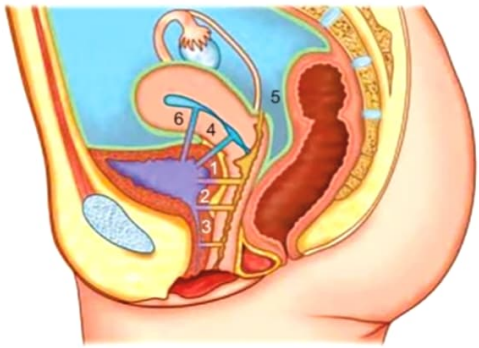

2


3

UROGYNECOLOGY

Genital Fistula

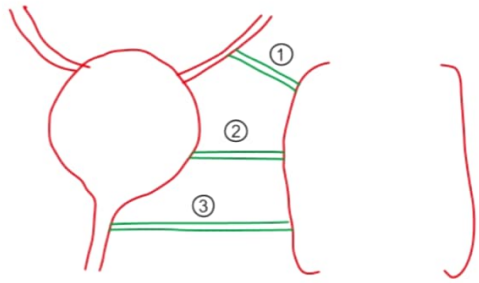
- A fistula is an abnormal communication between two or more epithelial surfaces
- Genitourinary fistula is an abnormal communication between the urinary and genital tract either acquired or congenital with involuntary escape of urine into the vagina.



1. Vesicovaginal fistula (M/c)
2. Vesical urethra vaginal fistula
3. Urethrovaginal fistula
4. Vesicocervical fistula/ cervicovesical fistula
5. Ureterovaginal fistula
6. Utero vesical fistula: cyclical Hematuria (Menuria)

TYPES 04:06

Bladder	Ureter	Urethra
Vesicovaginal Vesicouterine Vesicocervical Vesicourethro-vaginal	Ureterovaginal Ureterouterine Ureterocervical	Urethrovaginal



1. **Ureterovaginal fistula:**
   - Continuous passage of urine from the vagina
   - Normal micturition also present (Bladder gets full)
2. **Vesicovaginal fistula:**
   - Continuous passage of urine from vagina
   - No normal micturition
3. **Urethrovaginal fistula:**
   - Passage of urine from vagina only while micturating.

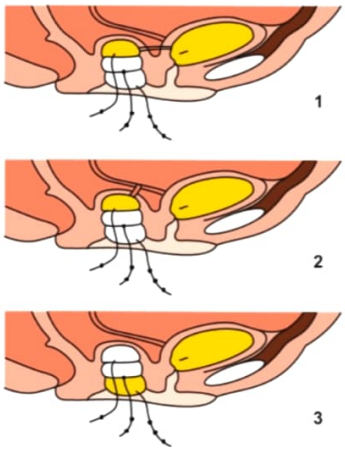
- **Three swab test/Result of 3 swab test:**
  1. Discolouration of topmost or middle swab → vesicovaginal fistula
  2. Uppermost swab wetting but not discolouration → Ureterovaginal fistula
  3. Discolouration of lower most swab but upper two swabs remain dry → Urethrovaginal fistula

Active Space


1


2


3



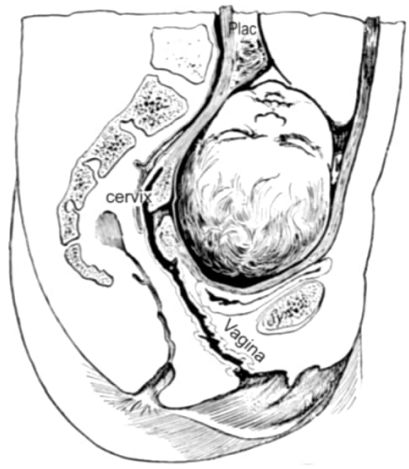
VESICOVAGINAL FISTULA (VVF) 11:35

- It is the most common type of fistula.
- Most common cause of VVF in India – post obstructed labor
- Most common cause of VVF in developed countries – post hysterectomy (during surgery)

- **Causes**:
  A. **Obstetrical**: Ischemic: obstructed labor ischemic necrosis infection sloughing fistula. Thus, it takes few days (3-5) following delivery to produce such type of fistula.
  B. Traumatic

Obstructed labour
↓
Trigone of bladder is nipped in between pubic symphysis and presenting part
↓
Compression ischemia
↓
Necrosis
↓

Fistula formation 7-10th postnatal day



C. **Gynaecological**:
- Operative injury
- Traumatic
- Malignancy
- Radiation
- Infective

- Operative injury likely to produce fistula includes operations like anterior colporrhaphy, abdominal hysterectomy for benign or malignant lesions or removal of Gartner's cyst.
- Traumatic – The anterior vaginal wall and the bladder may be injured following fall on a pointed object, by a stick used for criminal abortion, following fracture of pelvic bones or due to retained and forgotten pessary.
- Malignancy – Advanced carcinoma of the cervix, vagina or bladder can produce fistula by direct spread.

Active Space


1

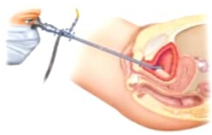
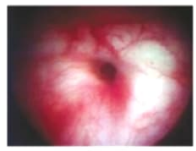
2

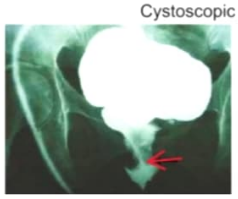
3

UROGYNECOLOGY

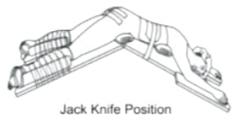
- Radiation - There may be ischemic necrosis by endarteritis obliterans lead to radiation effect, when the carcinoma cervix is treated by radiation
- Infective - chronic granulomatous lesions such as vaginal tuberculosis, lymphogranuloma venereum, schistosomiasis or actinomycosis may produce fistula.

- Clinical Picture: Continuous passage of urine + No normal micturition.
- Diagnosis: Investigation of choice is Cystoscopy.



Cystoscopic view of fistula


Cystogram showing extravasation of dye from bladder into vaginal canal


Knee-Chest Position


Jack Knife Position


Dorsal lithotomy position with Standard trendelenburg


Sim's Position

- **Timings**:
  - If VVF is detected within 24 hours: repair immediately
  - If detected after 24 hours: repair after 6 weeks
  - Radiation fistula: repaired after 12 months

- **General Concepts of surgery:**
  - First attempt is the best attempt
  - Tension free closure
  - Water tight closure
  - Non overlapping suture lines
  - Use of interpositional grafts
  - Use of delayed absorbable suture material

- **Repair of VVF:**
  - Flap splitting method
  - Saucerization
  - Latzko technique - 3-layer technique

- Sims triad → Sims position, Sims speculum and Sims saucerisation
- **Latzko technique**:- separate the fistulous tract and repair the bladder in 2 layers and vagina in single layer

Active Space


1

2

3