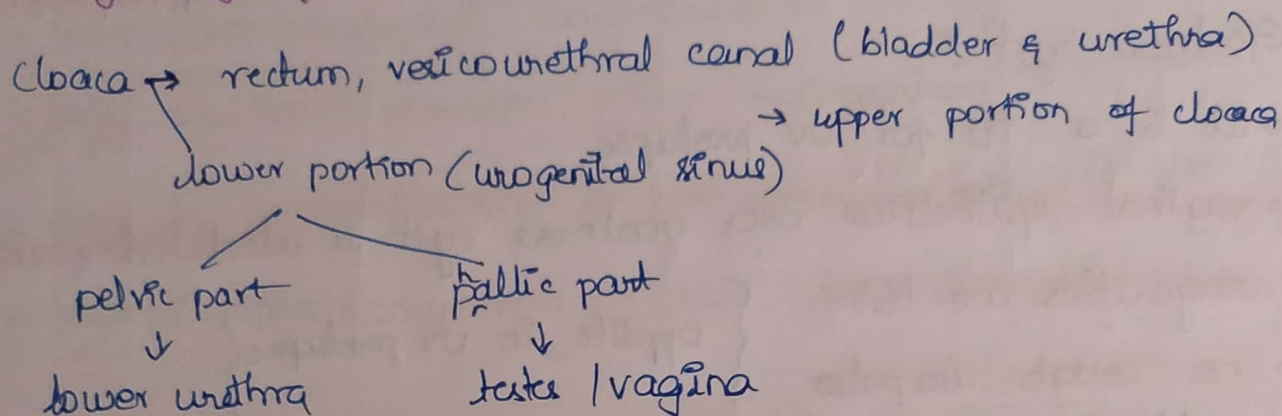


GYNAECOLOGY

Disorders of sexual development

Embryology of female genitourinary system



Homologous structures

Embryonal structure

	♀	♂
• primordial germ cell	ova	spermatozoa
• genital ridge	ovary	testis
• sex cords	granulosa cells	seminiferous tubules, sertoli cells
• Gubernaculum	round ligament	gubernaculum testis
• Mesonephric tubule	epoophoron, paroophoron	efferent ductules, paradiidymis
• Mesonephric duct	gartner's duct	epididymis, vas deferens, ejaculatory duct
• Paramesonephric duct	uterus, fallopian tube, upper vagina	prostatic utricle, appendix of testis, hydatid of Morgagni

→ target gene for SRY is favour testis differentiation is SOX 9

→ genes is favour ovary differentiation are WNT4, Rspo 3, DAX1

Gartner's cyst :

- It is a DD for UV prolapse
 - vaginal epithelium over Gartner's cyst is stretched & shiny, rugosities are lost
 - no cough impulse
 - well defined
 - flaccid
- { opposite in UV prolapse }

Mullerian fusion defects :

Uterus didelphys

- paramesonephric duct fails to unite completely
- two horns of uterus & 2 cervix
- septum in vagina may be seen

Bicornuate uterus

- incomplete fusion of paramesonephric ducts complete
partial

Septate uterus

- similar to bicornuate uterus, but no endometrial tissue in blw, only septum present complete
partial

Aruncate uterus:

- mild indentation in fundus of uterus

Unicorne uterus:

- One paramesonephric duct fails to develop
- only one horn present, other rudimentary horn
- may be communicating or non communicating
- ectopic pregnancy may occur in rudimentary horn

* Modality of choice for investigation → 3D USG

* surgery for bicornuate uterus → Straussman operation
→ Ix → recurrent abortion

* Rx for septate uterus → hysteroscopic septal resection

Mullerian agenesis / MRKH syndrome:

- 1° amenorrhoea
- 2° sexual characters well developed
- no ~~ovary~~ uterus / cervix / vagina
- ovaries are developed
- repair for vaginal agenesis can be done at time of marriage → for coital purpose

STDs :

<u>Bacteria</u>	<u>Viruses</u>	<u>Fungi</u>	<u>Protozoa</u>	<u>Ectoparasite</u>
* Gonorrhoea	* HIV	* candida	* Trichomonas	* Scabies
* Syphilis	* HPV			* Pediculosis
* chlamydia	* HSV			
* LGV	* molluscum contagiosum			
* H. ducreyi				

Bacterial vaginosis :

- (N) flora $\Rightarrow$ anaerobic $\ggg$ aerobic
 $\downarrow$
 eg. Lactobacillus $\rightarrow$ maintains the acidic pH
- pH $\Rightarrow$ 4 to 4.5 (N)
- vaginal cells produce glycogen under the influence of estrogen
- Lactobacillus acts on glycogen & produce lactic acid responsible for acidic pH
- When Lactobacilli are outnumbered by Gardnerella vaginalis, M. hominis, ureaplasma urealyticum, mobiluncus to cause bacterial vaginosis
- presents τ foul smelling, greyish white vaginal discharge
- profuse discharge
- no itching (no inflammation)
- Clue cells are seen in microscopy

amine test

- AMSEL criteria is used to diagnose
- Not transmitted sexually
- RFs: → new sexual partner, many partners, douching, smoking, IUCDs.
- Rx → * no need to Rx the partner (X)
* metronidazole 400 mg daily BD x 7 days
- Whiff test is aka amine test
- abundance of gram variable coccobacilli may be seen
- discharge doesn't contain any cells, WBCs
- On ex → cx is (X) = no discharge

Candidiasis

- caused by C. albicans > C. glabrata > C. tropicalis
- occurs at pH < 4.5
- RF: immunocompromised states
- Sx → - curdy white discharge
- vulva is inflamed & red
- severe itching
- Δ → 10% KOH → dimorphic nature of candida seen
- Types → complicated & uncomplicated
 - ↳ single episode, no RF
- longer duration:
 - > 4 episodes/yr
 - ≥ 1 RF
 - non candida albicans inf
- easy to Rx
- candida albicans

- Rx : •azole group of antifungals (clotrimazole, butoconazole, fluconazole)
• for complicated → boric acid capsules

Treponema vaginalis

- caused by T. vaginalis
- sexually transmitted
- affects female → male
- cause vaginal discharge, cervicitis
- Sx → dyspareunia, spotting, discharge, urethritis, proctitis
- males are asymptomatic
- discharge is frothy green & itching present
- Δ : swab + 10% KOH → motile organisms seen
- Speculum examination → strawberry cervix (X)
- Rx → metronidazole
- Rx the partner too

Sequale

- Bacterial vaginosis → pregnancy : PTL, PROM
pelvic surgery : infection of cuff
marker of other STDs

TB of genital tract

- caused by M. tuberculosis (95%) & M. bovis (5%)
- m/c in childhood TB
- becomes symptomatic by puberty

- Involve fallopian tube / endometrium > ex > ovary > vagina & vulva
- Causes → infertility, ectopic pregnancy (fallopian tube inv)
→ menorrhagia foll by amenorrhoea (endometrium)
→ ulcers (ex, ovary, vagina)
- Δ → moth eaten appearance of tube on HSG
aka beaded appearance / leopard spot appearance
↳ clubbed ends of fallopian tube
- R → ATT (doesn't cure infertility)
↳ gold club appearance
↳ tobacco pouch appearance

PID:

- infection of upper genital tract
- causative → N. gonorrhoeae, Chlamydia trachomatis (m/c)
↳ vaginal flora too

Δ:

- Minimum criteria →
- uterine tenderness
 - cervical motion tenderness
 - adnexal tenderness

Additional criteria →

- white discharge PV
- Fever $> 101^{\circ}\text{F}$
- $\uparrow$ CRP, $\uparrow$ ESR
- NAAT (x gonorrhoea & chlamydia)
- Gonorrhoea → Sx develop in 3-7 days
→ cervicitis, urethritis, PID
- Chlamydia → no direct pathogenic effect on genital organs
→ presents w sequelae of PID
→ delayed hypersensitivity → damage of tubes → PID

fb

NACO $\swarrow$ syndromic m/m $\rightarrow$ KIT $\perp$
lower abd pain $\rightarrow$ KIT 6 $\rightarrow$ cefixime, metro & doxy
 $\downarrow$ $\downarrow$ $\downarrow$
gonorrhoea BV chlamydia

- pt may present $\pm$ tubo-ovarian abscess $\rightarrow$ do laparoscopy, obtain cultures from fallopian tube
- most sensitive test for chlamydia $\rightarrow$ NAAT (PCR)
- Doc for chlamydia in pregnancy is erythromycin

Genital ulcers

Syphilis $\rightarrow$ 1^o chancre

- $\rightarrow$ 14-21 days after sexual contact
- $\rightarrow$ a single ulcer on vulva / vagina / ex
- $\rightarrow$ painless ulcer $\pm$ raised indurated border
- $\rightarrow$ base of ulcer is clean & non infected; deep
- $\rightarrow$ disappears after some time

Ho ducreya $\rightarrow$ cause chancroid

- $\rightarrow$ red beefy, extremely painful ulcer
- $\rightarrow$ occurs on vulva / vagina / ex
- $\rightarrow$ single lesion

Herpes, HSV 2 $\rightarrow$ extremely painful, numerous ulcers

- $\circ$ Hb previous episodes
- $\circ$ occurs on vulva / vagina
- $\circ$ occur in crops

$\circ$ $\rightarrow$ acyclovir / ganciclovir $\rightarrow$ $\downarrow$ no of ulcers / recurrence

LGIV $\rightarrow$ buboes are present

Sex & intersexuality

Puberty :

- 1st sign → thelarche (breast budding)
- 2nd → pubic/axillary hair → pubarche/adrenarche
- 3rd → menarche ≤ is just preceded by a growth spurt

* GnRH → pulsatile secretion (night > day) → responsible for pubertal growth

↓
LH >> FSH

↓
GnRH pulse throughout day

↓
FSH & LH → ovary → follicle development → estrogen

↓
◦ estrogen for 1 yr → 1^o ovulation → progesterone → menarche (priming of endometrium)

◦ precocious puberty → ~~puber~~ 2^o sexual characters before 8 yrs of age

◦ absence of 2^o sexual characters & menstruation at 14 yrs

&
absence of menstruation even in presence of 2^o sexual characters at 16 yrs

→ both need evaluation i.e. delayed puberty

Abn^o pubertal development

① precocious puberty (PP)
 central → aka gonadotrophin dependant precocious puberty
 peripheral → m/c is idiopathic

Central PP causes → hypothalamic hamartoma, optic glioma (in NF), radiation, head trauma, CNS anomalies, infections

Peripheral cause →

autonomous ovarian cyst adrenal estrogen producing tumours, exogenous estrogen

* Hypothalamic hamartomas present c gelastic seizures / laughing fits

◦ precocious puberty → $F > M$

◦ delayed puberty → $M > F$

→ m/c is constitutional → hypogonadotropic hypogonadism

→ gonadal failure : hypergonadotropic hypogonadism

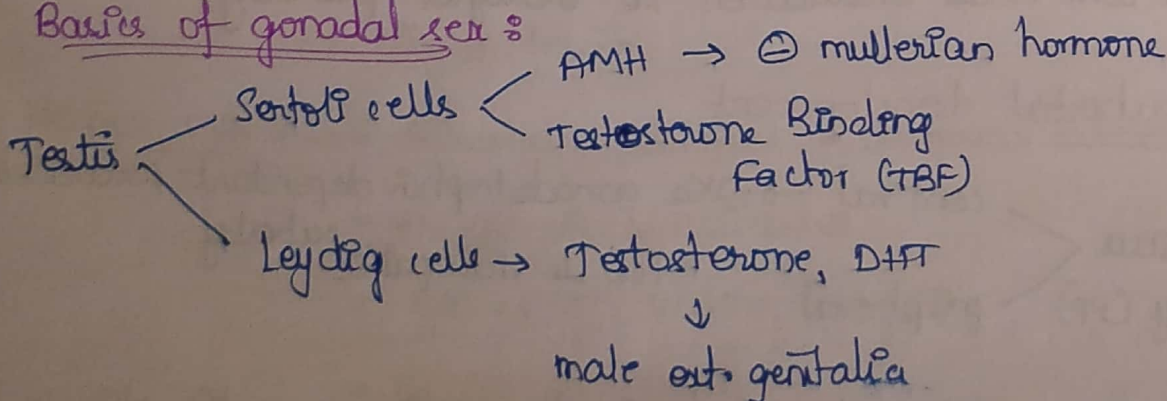
McCune Albright syndrome :

- Precocious puberty
- Café au lait pigmentation
- Polyostotic fibrous dysplasia of bone
- somatic mutation in GNAS1 gene
- girls > boys

Basics of @ menstruation :

@ hypothalamus, pituitary, ovary / gonads, endometrium

Basics of gonadal sex :



De novo sex → ♀

Classification of disorders of sexual development:

• Sex chromosome disorders:

- 45 XO Turner
- 47 XXY Klinefelter

• 46 XY disorders

- pure gonadal dysgenesis (Swyer syndrome)
- partial gonadal dysgenesis

• 46 XX disorders

* m/c of 1° amenorrhoea $\rightarrow$ Turner $>$ müllerian agenesis $>$ testicular feminising syndrome

Cryptomenorrhoea:

- D/t imperforate hymen / transverse vaginal septum / cervical atresia
- pt presents w/ 1° amenorrhoea

Imperforate hymen

- 1° amenorrhoea, monthly abd. pain
- O/E $\rightarrow$ bulging bluish membrane
- USG $\rightarrow$ hemato-colpos (blood in vagina), hematometra (blood in uterus)
 $\rightarrow$ blood may sometimes spill into abdominal cavity
- Rx $\rightarrow$ create incision in hymen

Amenorrhoea

1°
 $\text{2}^{\circ} \rightarrow$ +ve progesterone challenge test

- Kallman syndrome →
 - delayed menarche / puberty + anovulation
 - defect in anosmin gene
 - defective hypothalamus
 - hypogonadotropic hypogonadism
- Withdrawal bleeding following administration of progesterone indicates progesterone deficiency &
 - ① estrogen secretion

◦ Androgen insensitivity / testicular feminisation syndrome = (AIS / TFS)

- 46 XY chromosome
- though ~~testosterone~~ testosterone is produced, testosterone receptor is absent
- failure of testicular descent → inguinal swelling ±
- external female genitalia
- ① breast development
- absent pubic / axillary hair, 1° amenorrhoea

Reifenstein syndrome :

- almost like a lesser degree of AIS
- male + some degree of feminization
- bifid scrotum, hypospadias
- partial androgen insensitivity syndrome
- Other syndromes + delayed puberty → Prader Willi syndrome, Lawrence Moon Biedl syndrome

◦ Sheehan's syndrome

- Pituitary necrosis/apoplexy d/t severe ~~big~~ PPH
- 2° amenorrhoea
- 2° amenorrhoea is seen in persons w/ systemic diseases leading debility, anorexia nervosa etc. → it is hypogonadotropic
- m/c of congenital adrenal hypoplasia → 21 OH deficiency

M/Cs

- Fitz Hugh Curtis syndrome → violin string adhesions between
- (R) fallopian tube & undersurface of liver

- d/t loss of ovarian follicular activity
- cessation of ~~menopause~~ for menstruation for 12 months
- avg age $\Rightarrow$ 45 to 55 yrs (50 yrs)
- before 40 $\rightarrow$ premature ovarian failure
- Menopausal transition $\rightarrow$ begins w/ menstrual irregularity & extends to 1yr after permanent cessation of menses
 $\rightarrow$ average of 47 years & lasts 4-7 years
- classification of female reproductive aging is called STRAW

Prediction of approaching menopause:

- Fall in the level of inhibin B $\rightarrow$ $\uparrow$ FSH
- Fall in anti-müllerian hormone (AMH) suggest low ovarian reserve & low antral follicular count
- $\uparrow$ LH (but $<$ FSH)
- Study of FSH level on ~~day 2-5~~ day 2-5 after last menstrual period detects premenopausal stage

Markers of $\downarrow$ ovarian reserve:

- Day 3 serum FSH $>$ 10-15 IU/L
- day 3 serum estradiol $>$ 60-80 pg/ml
- low AMH (0.2-0.7 ng/ml)
- low serum inhibin B
- antral follicular count (N-20 to 150)
- ovarian volume

AMH

- AMH is secreted by Sertoli cells (in ♂) & granulosa cells (in ♀)
- peptide hormone
- in ♂, AMH secreted by 7th week of IUL till puberty
- in ♀, AMH secreted after puberty
- (N) level is 2-6.8 ng/ml
- Helps in follicular development & oocyte maturation
- Level reflects no. of growing follicles

In postmenopausal period :

- ↑ FSH, ↑ LH, ↑ estrone
- ↓ AMH, ↓ androstenedione

* No. of oocytes at menopause → 1000

Sx of menopause :

- menstrual sx
- hot flushes
- dyspareunia
- ↓ed libido
- urinary stress incontinence
- osteoporosis
- neurological
- psychological

* Hot flushes → are d/t ↓ed estrogen & ↑ed noradrenaline
 → peripheral vasodilatation → skin temp ↑, esp in fingers & toes
 ↓
 sweating, ↑ BP
 → d/t rapid fluctuation in estrogen levels
 → altered serotonin levels

- Rate of bone loss after menopause is 3-5%

Perimenopausal osteoporosis:

- Bone mass measured by DEXA (dual energy x-ray absorptiometry)
- gives i) **T score** (compare your results to a healthy young adult 20-35)

* expressed as std deviations from mean

* 0 score $\rightarrow$ (N)

* **-1.5 to -2.4 $\rightarrow$ indicate osteopenia**

ii) **Z score** $\rightarrow$ compares your results to a person of the same gender & age as yourself

* **score ≤ -2.5 indicate osteoporosis**

- all menopausal women should be given 1g calcium**
(if not on HRT)

- **if on HRT $\Rightarrow$ 500mg calcium is given**

- pH of vagina is maximum during menopause (pH 6-7.5)**

- androstenedione is converted to estone

* most potent oestrogen is estradiol (E2) $\rightarrow$ reproductive age

estron (E1) $\rightarrow$ menopause

estriol (E3) $\rightarrow$ pregnancy (least potent)

[potency $\rightarrow$ E2 > E1 > E3]

- There is 50% reduction in androgen production & 66% reduction in estrogen at menopause

- estrogen level → 10 to 20 pg/mL
- estrogen level >40 pg/mL exerts bone & cardiostrophic effect
& <20 pg/mL predispose to osteoporosis & IHD
- Se₀ FSH >40 is diagnostic of menopause

HRT

- Ix → vasomotor Sx,
vaginal atrophy,
osteoporosis prevention or Rx
- re-evaluation of need for HRT at 6-12 month intervals
- prescribed in lowest possible dose for shortest period
- HRT is not useful in CAD
- Estrogen causes → ↓ LDL, ↓ cholesterol, ↑ HDL, ↑ TGs,
↑ coagulation factors, ↑ lithogenicity of bile (stone forming capacity)
- progesterone causes → ↑ LDL, ↓ HDL

Drugs for postmenopausal osteoporosis:

- Antiresorptive agents:
 - estrogen
 - SERM - raloxifene
 - Bisphosphonates
 - Denosumab → mab against RANK-L
 - Calcitonin
 - vit D
- Anabolic agents (stimulate bone formation)
 - Teriparatide (recombinant human parathormone)

[Raloxifene → for bone, tamoxifen → for breast]

- Raloxifene → $\downarrow$ incidence of $\uparrow$ ~~venous thromboembolism~~
- * $\downarrow$ $\uparrow$ rates,
- * doesn't cause endometrial hyperplasia / breast carcinoma
- * S/E → hot flushes
- * C/I in renal disease

* progesterone is added to estrogen in HRT only if uterus is present to prevent endometrial cancer; $\therefore$ not given in pts who have undergone hysterectomy

* Hot flushes ~~can be~~

to → hormonal agents

- estrogen - CEE, $17\beta E_2$
- progestins - MPA
- combined E & P
- TSEC : CEE + BZA

[conjugated equine estrogen - CEE
Tissue selective estrogen complex - TSEC
Bazedoxifene - BZA]

Non hormonal

- SSRIs
- SNRIs
- clonidine
- gabapentine

C/I for HRT

- Thrombosis
- ~~Est~~
- undiagnosed ab^(R) genital bleeding
- known / suspected H/o Ca breast
- Any estrogen dependant neoplasia
- TE
- stroke / MI
- liver d/s

- DOC for $\downarrow$ libido - androgens
- HRT $\downarrow$ Alzheimer's, colorectal Ca

Abnormal uterine bleeding

Characteristics of (N) menstrual cycle

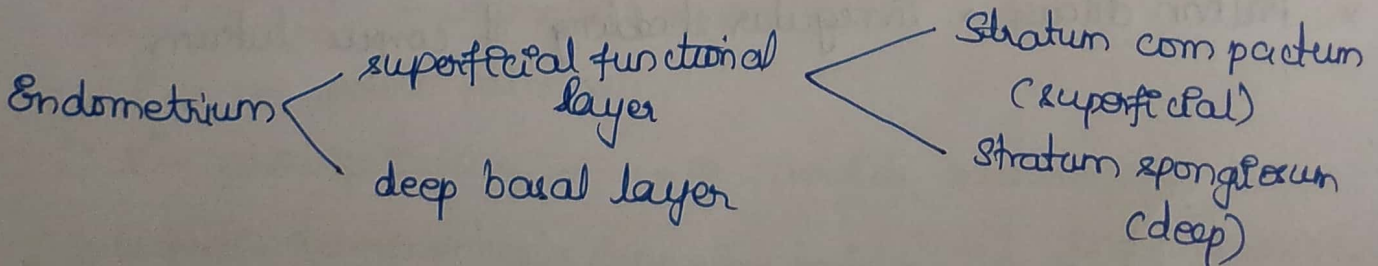
- (N) length of cycle : 24 to 35 days
- avg " - 28 days (seen only in 15%)
- No. of days of bleeding : 2-7d
- Avg. no. of days of " - 4 to 5d
- (N) blood loss : 5-80 ml
- Avg " " : 30 ml

Definitions in ab(N) uterine bleeding :

- Menorrhagia → cyclic bleeding at (N) intervals; the bleeding is either excessive in amount (>80ml) or duration (>7 days) or both
- Metrorrhagia → irregular, acyclic bleeding
- Oligomenorrhoea → occur less frequently i.e. more than 35 days apart
- Hypomenorrhoea → scanty bleeding, least < 2 days

Causes of metrorrhagia

- Fibroid polyp
- IUCD
- Ca ex & Ca endometrium
- decubitus ulcers
- uterine ~~car~~ carcinoma
- withdrawal bleeding in pill users



- The superficial functional layer is hormone sensitive whereas deep basal layer is hormone insensitive & contain stem cells. After every menstruation, regeneration occurs from deep basal layer

AUB

Anatomical causes (PALM)

- Polyp
- Adenomas
- Leiomyoma < submucosal others
- Malignancy & hyperplasia

Functional causes (COEIN)

- Coagulopathy
- Ovulatory dysfunction
- Endometrial
- Iatrogenic
- Not yet classified

Causes of AUB:

General causes

- Blood dyscrasia
- Coagulopathy
- Thyroid dysfunction
- genital TB

Pelvic causes

- PID, pelvic adhesions
- uterine fibroids
- endometrial hyperplasia
- adenomyosis
- feminizing tumor of ovary
- endometritis
- pelvic congestion
- varicose veins in pelvis

Contraceptive use

- IUCD
- post-tubal sterilization
- POPs

Hormonal DUB

- ovulatory - Irregular shedding / bleeding
- Anovulatory - resting endometrium - 80% metropathic hemorrhage

* Halban disease → irregular shedding of corpus luteum

puberty menorrhagia

- Rule out coagulopathy, pelvic lesions, hypothyroidism
- m/c is anovulation > blood dyscrasias
- Rx of PCOS → drospirenone acetate
- Rx of puberty menorrhagia → progesterone, OCPs, GnRH analogues
- m/c endometrial pattern in DUB is (N)

M/m of AUB• Young women

- * progestogens
- + Combined OCPs
- * NSAIDs
- * Tranexamic acid
- * GnRH analogues

• in older women who have completed family

- * hysterectomy
- * endometrial ablation

In AUB → 1st investigation is TVS

IOC is endometrial Bx

- m/c of postmenopausal bleeding
 - globally → Ca endometrium
 - India → Ca cx

Dysmenorrhea - cramping pain during menstruation

1^o → no pelvic pathology

2^o → pelvic pathology + → eg. fibroids, adenomyosis, PID,

• Spasmodic dysmenorrhea → cramping pain on 1st & 2nd day, most prevalent

• Congestive " → manifest as 1st & 2nd day, most prevalent

• Anovulatory bleeding is painless

ENDOMETRIOSIS

Theories of endometriosis:

- * Sampson's retrograde menstruation theory - most accepted & oldest
- * Meyer & Ivanoff's coelomic metaplasia theory
- * stem cell theory
- * lymphatic or vascular spread

Common sites of endometriosis in decreasing frequency

- ovary
- cul de sac (pouch of Douglas)
- outerosacral ligaments
- vermiform appendix
- recto sigmoid colon
- ureters
- urinary bladder

- * Endometriosis does not occur in spleen
- * Endometriosis is hormone dependant
- * 1^o method of Δ is laparoscopy, $\bar{c}$ or without Bx or histologic Δ
(gold std)

RF:

- infertility
- nulliparity
- pelvic pain
- high socioeconomic status, late child birth
- low BMI
- white women > other races
- red hair

Sx

m/c Sx

- I/E = retroverted & fixed uterus may be seen
- cobblestone feel of uterosacral ligament is seen

Scar endometriosis:

- Painful & tender swelling over the scar
- usually not a/w pelvic endometriosis
- can occur at episiotomy sites, hysterectomy/cesarean scars, myomectomy/tubectomy
- cannot be treated w/ hormones
- scar should be excised
- implantation theory explain its entity

Classification:

- American society for reproductive medicine classification: (ASRM 4)

- * stage I - minimal
 - II - mild
 - III - moderate
 - IV - severe

- * menorrhagia may be seen
- * pain w/ endometriosis is diff PG in peritoneal fluid
- * Depth of penetration is more related to sx than spread
- lesions penetration > 5mm are responsible for pain, dysmenorrhea & dyspareunia

Examination findings

- pelvic tenderness
- bluish or blackish spots in posterior fornix & are tender
- U/L or B/L chocolate cysts (adnexal mass) of varying sizes

- Early lesion: papules & red vesicles filled with hemorrhagic fluid & surrounding flame like lesion
- with age → dark red, bluish or black cystic areas
- older burnt areas are inactive old lesions scattered over pelvic peritoneum
- Healed areas are seen as small peritoneal defects (windows) or white patches

Chocolate cyst

- mostly B/L
- lined by columnar epithelium
- pseudoxanthoma cells are large macrophages or scavenger cells & brown colour is due to hemosiderin in them

Rx:

M/m of pain

Drug Rx:

- OC
- mifepristone (RU-486)
- progestogens
- androgens
- GnRH
- letrozole
- RU-486

Laparoscopy

- destruction by cautery, laser vapourization
- excision of cyst
- adhesiolysis
- presacral neurectomy
- LVNA (laparoscopic uterine arterial ablation)

Laparotomy

- incision of chocolate cyst & removal of lining
- salpingo-oophorectomy
- hysterectomy & U/L or B/L salpingo-oophorectomy
- excision of scar endometriosis

In fertility

clomiphene, letrozole (high doses)

- Danazol causes abⁿ liver enzymes

LONG IUCD - noncontraceptive uses (Mirena)

- Menorrhagia / DUB
 - dysmenorrhoea
 - premenstrual syndrome
 - endometriosis
 - adenomyosis
 - leiomyoma
 - endometrial hyperplasia
 - endometrial Ca
 - HRT
- * lifespan of mirena → 5 yrs

Adenomyosis:

- It is ingrowth of endometrium both stromal & glandular components directly into myometrium

Etiology: vigorous curettage, repeated childbirth / excess estrogen

- cf:
- women above age 40, parous women
 - menorrhagia (70%), dysmenorrhoea (30%), urinary frequency, dyspareunia, infertility

- M/m:
- surgery is 100%
 - hormonal therapy is not much effective

- Commonest benign tumor of uterus & commonest benign solid tumor in female
- Histologically, composed of smooth muscle & fibrous connective tissue.
- each myoma is derived from smooth muscle cell nests, either from vessel wall or uterine musculature
- derived from single progenitor myocyte

Classification:

- Subserous
- Interstitial / intramural
- Submucous
- cervical
- intraligamentary

* m/c site → posterior wall of uterus

* m/c sx → abn bleeding

* m/c degeneration → hyaline degeneration

* incidence of sarcomatous degeneration - $< 0.5\%$

* intermenstrual bleeding - sub mucous fibroid

Leiomyoma subclassification

SM - submucosal → 0 - pedunculated intracavity

1 - $< 50\%$ intramural

2 - $\geq 50\%$ intramural

0 - other → 3 → contacts endometrium; 100% intramural

4 - intramural

5 - subserosal ; $\geq 50\%$ intramural

6 - subserosal ~~pedunculated~~ $< 50\%$ intramural

7 - subserosal pedunculated

8 - other (eg: cervical, parasitic)

* Broad ligament fibroid is related to ureter

RF:

- Age
- african american race
- sustained hyperestrogenic environment
 - anovulation
 - PCOS
 - obesity
 - $\uparrow$ BMI
 - early menarche
- Family history

Reduced risk:

- smoking
- combined OCPs ($\downarrow$ risk / no risk)
- post menopausal state
- $\uparrow$ ed parity

* Fibroids are mostly asymptomatic

Pregnancy & fibroids:

- incidence in pregnancy 2%
- 80% of fibroids $\downarrow$ in size / show no change in size
- when they $\uparrow$, it is rarely $> 25\%$
- Complications
 - * preterm labor
 - * obstruction labour, CS delivery
 - * abortion
 - PPH
 - * malpresentation
 - 2nd Trimester abortion

Red degeneration:

- occurs in large fibroid, mainly during 2nd half of pregnancy & puerperium
- cause is vascular (no infection)
- Raw beef appearance & cystic spaces
- Fishy odour d/t fatty acids & colour is d/t hemolysed red cells & Hb
- scope → evidence of necrosis present, vessels are thrombosed
- USG may be helpful, but not diagnostic
- Rx → analgesics, conservative

Degeneration of fibroids:

- ① Calcaneous degeneration - phosphates & carbonates of lime are deposited in periphery along course of vessels. Form "womb stone"
- ② Hyaline degeneration
- ③ Cystic "
- ④ Fatty "
- ⑤ Red "

Sx:

- asymptomatic (80-90%)
- bleeding
- pressure & pain → urinary frequency, incontinence, constipation, dysmenorrhoea, dyspareunia, noncyclical pelvic pain, uterine obstruction & infertility & pregnancy wastage & hydronephrosis

Rare presentation

- Myomatous erythrocytosis syndrome : d/t excessive erythropoietin production by kidneys or leiomyomas themselves
- Pseudo Meigs's syndrome
- Hereditary leiomyomatosis & RCC (HLRCC) syndrome
 - d/t fumarate hydratase (FH) gene mutations.
 - characterised by cutaneous & uterine leiomyomas & RCC

Δs

- pelvic ex : uterine enlargement, irregular contour
- TVS : if tumor within or just above pelvis
- TAS : for large masses
- Saline infusion sonography & hysteroscopy → submucous fibroid
- Fibroid + infertility : HSG or hysterosalpingo contrast sonography
- MRI rarely needed - for more accurate Δ
- CT scan is of no use

M/m

- asymptomatic → observation ± annual pelvic ex
- symptomatic → expectant m/m → surgery
- Medical m/m

Sex steroid hormones {

- mifepristone : max of 3-6 months, can cause endometrial hyperplasia
- ulipristal acetate
- danazol, gestrone

• GnRH receptor agents

- leuprolide acetate
- goserelin, triptorelin, nafarelin
- GnRH receptor antagonists: cetrorelix, ganirelix

• Non hormonal

- tranexemic acid
- anastrozole, letrozole

• Radiological interventions

- uterine A embolization
- Magnetic Resonance guided focused USG (MRgFUS or MR-HIFU)

• Laparoscopic

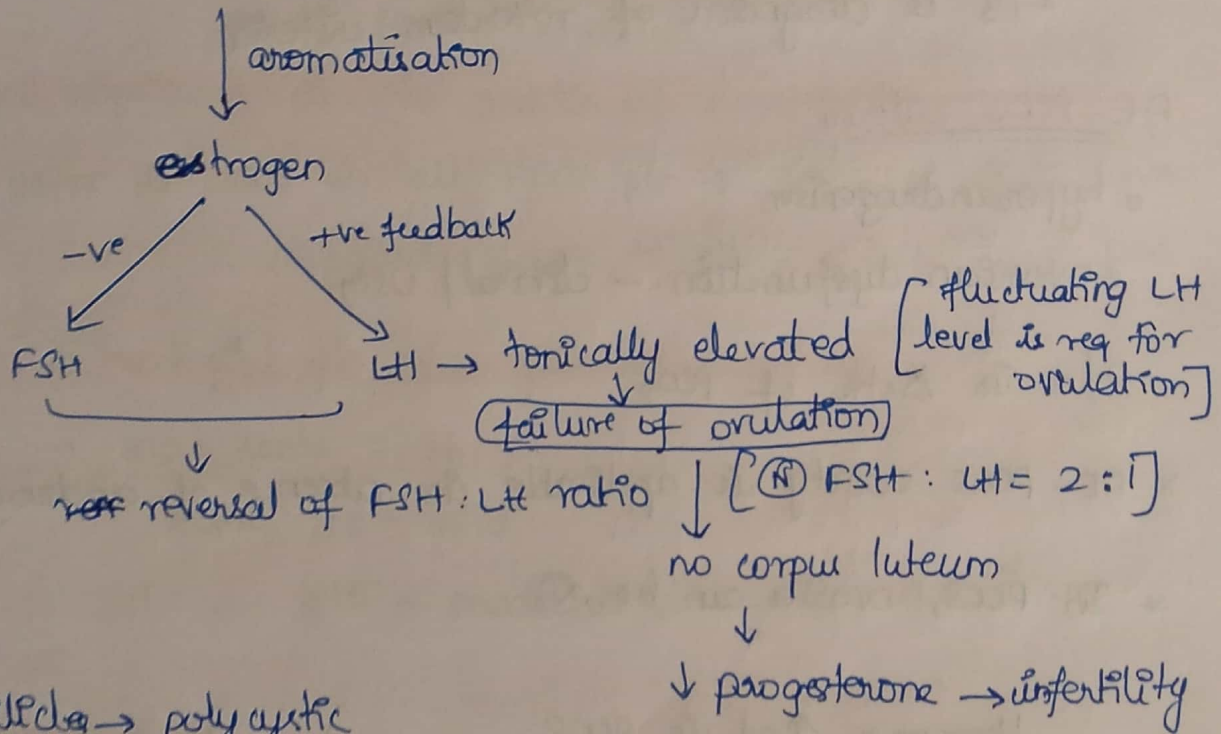
- laparoscopic uterine A occlusion
- laparoscopic myolysis

m/c of hirsutism in young ♀ → idiopathic

m/c pathological c/o hirsutism in young ♀ → PCOS

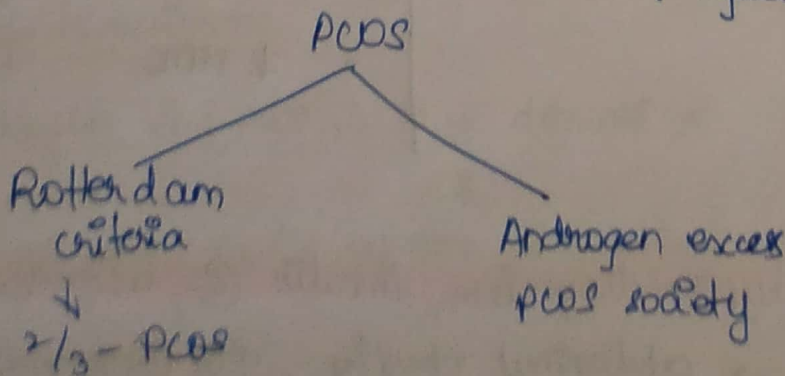
m/c c/o rapid onset hirsutism — testosterone producing tumour

PCOS → ↑ androgen



big follicles → polycystic

• continuous proliferation d/t estrogen ↑
no secondary phase d/t ↓ progesterone } → endometrial hyperproliferation
↓
↓ inadequate blood supply
menometrorrhagia



Rotterdam criteria

- 1) Hyperandrogenism → clinically / biochemically
- 2) Ovulatory dysfunction → amenorrhea / anovulation
- 3) USG features of PCOS → ≥ 12 follicles 2-9mm in one or both ovaries & ovarian volume of $\geq 10cc$

2/3 is diagnostic of Rotterdam criteria

AE-PCOS criteria

- hyperandrogenism
- ovarian dysfunction - clinical / USG

2/2 is diagnostic of PCOS

* AE-PCOS criteria is applicable in absence of androgenic tumour

* In PCOS, ovaries can be $\odot$

Hormones ↑ in PCOS

- 1) androgen (testosterone, androstenedione, DHEA, DHEAS)
- 2) estrone
- 3) ↑ LH
- 4) ↑ prolactin
- 5) ↑ LDL / TGs

Hormones ↓ in PCOS

- ↓ FSH
- ↓ progesterone
- ↓ SHBG (sex hormone binding globulin)
- ↓ HDL

Associated syndromes

- **HAIR AN** synds → hyperandrogenism, insulin $\odot$, acanthosis nigricans
- **Metabolic X syndrome** → abdominal obesity, TG ($>150mg/dl$), HDL ($<50mg/dl$), BP $\geq 140/90$, diabetic status

Features / RF

- obesity
- insulin $\uparrow$ / hyperinsulinemia
- hyperandrogenism

* insulin $\downarrow$ es SHBG $\rightarrow$ hyperandrogenism

* insulin $\uparrow$ = $\frac{\text{Serum fasting glucose}}{\text{serum fasting insulin}}$

◦ Acanthosis nigricans is the marker of insulin $\uparrow$ in PCOS

◦ $\therefore$ 2hr OGTT is done in all PCOS pts $\rightarrow$ 35% of PCOS have impaired glucose tolerance & 10% have DM

◦ Hirsutism $\rightarrow$ modified ferriman gallway scoring

$\rightarrow$ max score = 36

score ≥ 8 - mild

≥ 15 - moderate to severe hirsutism

M/m of PCOS

- weight reduction
- low dose OCPs (for irregular periods)
- metformin (m/c Ad/E - GI upset
dangerous Ad/E - lactic acidosis)

◦ ovulation induction using clomiphene citrate, synthetic LH & FSH

M/m of hirsutism:

- androgen in PCOS is LH dependant (LH stimulates theca cells to produce androgen)
- low dose OCPs for hirsutism $\rightarrow$ desogestrel, gestodene & norgestimate (3rd gen progestogens)

- m/c of vesicovaginal fistula < globally → gynae surgery
India → obstructed labour

• most appropriate method for collecting urine for culture in case of vesicovaginal fistula is - Foley's catheterisation

- ~~uterovag~~ uterovaginal fistula { may present - cyclical hematuria
bladder endometriosis }

Vesicovaginal fistula

- presents - continuous dribbling of urine from vagina, no micturition thro' urethra
- 3 swab test - middle cotton swab is wet & urine & dye
- IOC - cystourethroscopy
- M/m → Latzko repair
- Timing of repair - after 3 months in obstetric fistula, post surgery → within 24 hours + immediate repair
late recognition → 3 months later

Uterovaginal fistula

- D+ hysterectomy
- continuous dribbling of urine from vagina & (N) filling of bladder
- 3 swab test - upper most cotton plug is wet & urine but not & dye
- further evaluation - iv ~~CECT~~ CECT in excretory phase / IVP
- M/m - ureteric reanastomosis to be carried out as early as possible

ureterovaginal fistula - upper most swab soaked w/ urine but not w/ dye. Lower 2 swabs remain dry

• vesicovaginal fistula - upper & lower swabs remain dry but middle swab stained w/ dye

• urethrovaginal fistula - upper two swabs dry, lower swab stained w/ dye

* Chassai-Mair technique → repair vesicovaginal fistula

* most useful investigation in vesicovaginal fistula → cystoscopy

* m/c site of obstetric injury leading to ureterovaginal fistula → below cardinal ligament where uterine artery crosses

* Causes of retention of urine in reproductive age group

→ cervical fibroid

→ retroverted gravid uterus

→ severe UTI

* Retroverted uterus

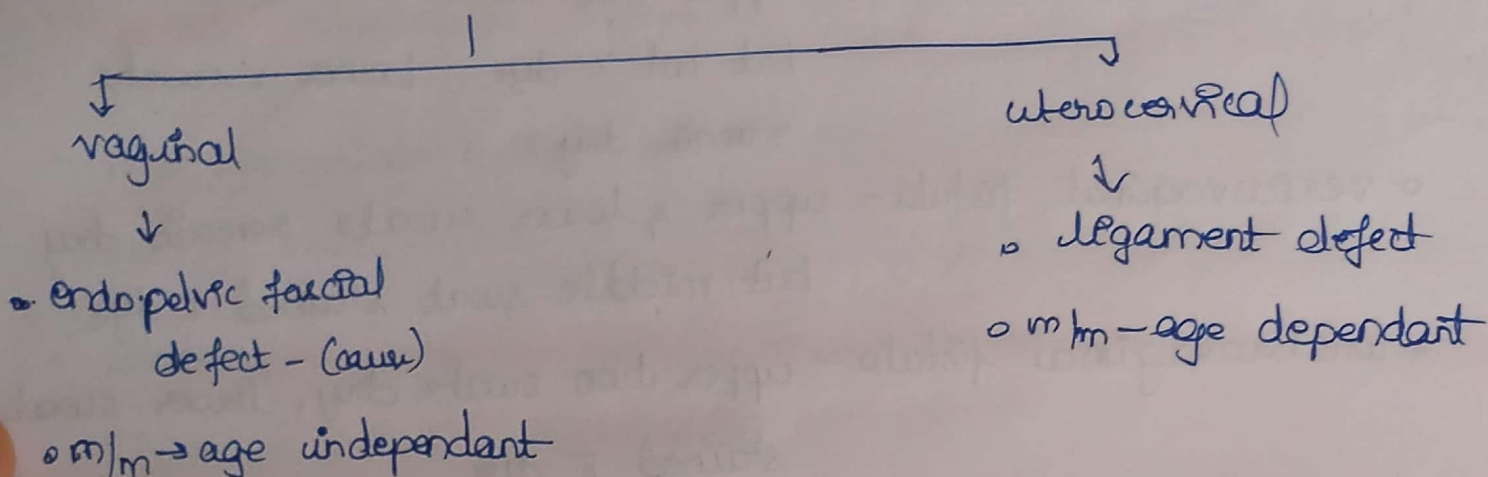
→ may be a/w endometriosis, PID

→ may be a/w infertility

→ may cause menorrhagia

* Kegel's exercise

→ should be started 24 hrs after delivery (once the pt is pain free)

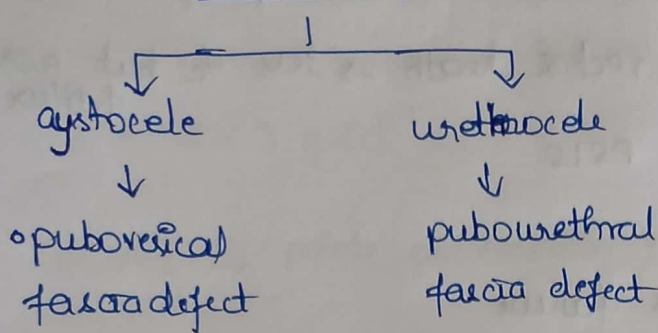


Vaginal prolapse

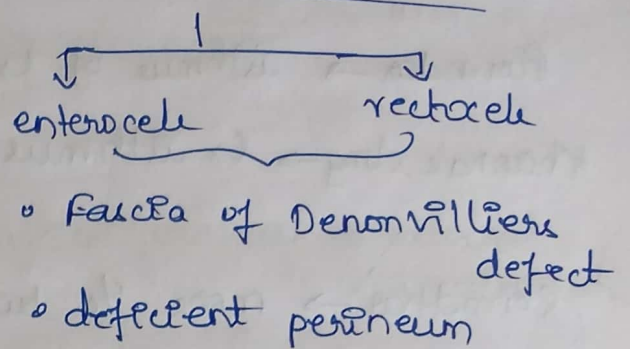
Delancey's vaginal supports

- level 1 → apex → uterosacral & Mackenrodt's
- " 2 → middle ~~and~~ 3rd → paravaginal attachment
 - i) arcus tendineus fascial pelvis
 - ii) " " rectovaginalis
- " 3 → lower 3rd → perineal membrane, muscle & body
- * Defect in level 1 supports → enterocele, apical prolapse, descent of cx, ~~vag~~ vault prolapse
- " 2 support → cystocele & rectocele
- " 3 " → gaping introitus, deficient or lax perineum, urethrocele

Anterior vaginal prolapse



Posterior vaginal prolapse



Management:

cysto & urethrocele → anterior colporrhaphy

rectocele → posterior colpoperineorrhaphy

enterocele → Moscovitz surgery + posterior colpo perineorrhaphy
↓
(purse string suture of POD)

lax perineum / deficient perineum → perineorrhaphy

↓
interval tightening surgery

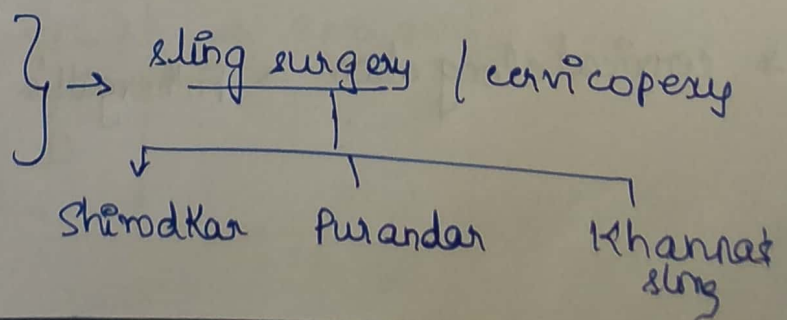
Uterine prolapse

True ligament → Mackendrotz, uterosacral & pubocervical

False " → round, broad ligament, ovarian ligament, angulation & serosa

M/M

- < 40 yrs, infertility, recurrent pregnancy loss



Shenolikar → isthmus of Cx to sacrum → most preferred

Purandara → isthmus of Cx to rectal sheath → less % but more failure

Khanna's sling → Cx isthmus to ASIS

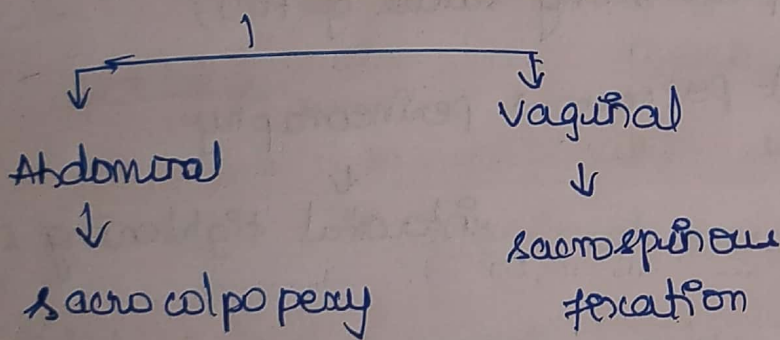
Shenolikar → more % but less failure

Khanna's → ad/le → chronic proctitis

* >40, completed family → vaginal hysterectomy + vault suspension

* prolapse in pregnancy / peripartum → ring pessary

* vault suspension



Ⓡ side preferred as Ⓛ side sigmoid colon may be damaged

* elderly, unfit for surgery → LeFort's surgery (colpocleisis)
(ring pessary is preferred)

* cervical elongation → Fothergill's or Manchester operation

- 9 measurements - hymen as reference point
- 3 x 3 grid

- Aa → points on Anterior vagina 3cm proximal to external urethral meatus (midline)
- Ba → most dependant portion btw Aa & anterior fornix

Aa & Ba are marker of anterior vaginal prolapse

- Ap → posterior vagina midline 3cm proximal to hymen
- Bp → most dependant portion btw Ap & posterior fornix
(Ap & Bp - marker of post. vaginal prolapse)
- C → Cx or vaginal cuff → marker of ^{uterine} prolapse of uterocervical length - ①
corresponds to
- D → apex of vagina / vault → uterosacral & Mackendroff

D is marker of enterocele

vii) Genital hiatus (GH) → distance btw external urethral meatus to posterior hymenal remnant

viii) Perineal body (PB) - posterior hymen to middle of anal opening

ix) Total vaginal length (TVL) → hymen to point D

Aa	Ba	C
GH	PB	TVL
Ap	Bp	D

⇒ 3 x 3 grid

$$GH \propto \frac{1}{PB}$$

GH $\rightarrow$ (N) 4-5 cm ; TVL (N) $\rightarrow$ 9cm

PB $\rightarrow$ 3-4 cm

uterocervical length $\rightarrow$ (N) 3 inches

- All 9 measurements are done $\bar{c}$ full vulva except TVL & is done after reducing the prolapse.

Staging

Type 0 $\rightarrow$ no demonstrable prolapse

1 $\rightarrow$ > 1 cm above the hymen (ie $\begin{matrix} -3 \\ -2 \\ -1 \\ 0 \\ +1 \\ +2 \\ +3 \end{matrix}$ $\rightarrow$ hymen $\begin{matrix} < -1 \text{ i.e. } -2, -3 \end{matrix}$)

2 $\rightarrow$ -1 to +1

3 $\rightarrow$ more than stage 2, but 2 cm less than TVL

4 $\rightarrow$ more than TVL - 2

Max measurement of Aa & Ba $\rightarrow$ +3

" " " Ap & Bp $\rightarrow$ +3

Classification

- temporary → barriers, natural methods, pills, IUDs
- permanent → surgeries

Natural methods

1) Rhythm method

* calendar method (Ogino Knaus theory)

* 1st unsafe day ⇒ length of shortest cycle - 20 days

* last unsafe day ⇒ length of longest cycle - 10 days

* Temperature method → abstinence until 3rd day of rise of temp
(temp. ↑ is dlt progesterone)

* Mucus method (Billings method): abstinence on all days of noticeable mucus & for 3 days thereafter

* Symptothermal method: 1st day of abstinence predicted from calendar or mucus method. End of fertile period detected by
ABT method

7) withdrawal method (coitus interruptus)

21) Breastfeeding

22) Persona - oestrogen-3 glucuronide & LH testing in urine

✓) Cycle beads

* Ectopic pregnancy may be a complication of calendar method

Efficacy of contraception

- No method → 85
- natural → 25
- withdrawal → 27
- lactational amenorrhoea → 2
- condom, ♂ → 15
♀ → 21
- Implanon → 0.01
- vasectomy & tubectomy → 0.15
- nonplant → 0.05
- CuT 380 A → 0.8
- LNG 20 → 0.1
- combined OCPs - 0.1
 - POP → 1
- DMPA & NET injectable → 0.3

 Pearl index =
$$\frac{\text{no. of accidental pregnancies} \times 1200}{\text{no. of pt observed} \times \text{months of use}}$$

↓
indicate contraceptive failure

Barrier methods:

- Condoms, spermicidal agents (nonoxonyl-9)
- occlusive diaphragm -
 - dutch cap/diaphragm
 - cervical cap
 - female condom
 - today (cup & sponge)

- prevents STDs

Diaphragm

- not suitable in pelvic organ prolapse
- proper sizing
- additional spermicide after each episode of coitus
- can cause TSS if left > 24 hours

Sponge (today)

- consists of a nonoxonyl 9-impregnated polyurethane disc that can be inserted for upto 24 hrs prior to intercourse
- disc is moistened
- for efficacy, should be kept in place for hrs after intercourse & no longer than 30 hours

* contact dermatitis is m/c problem also use of condom

* c/I of diaphragm → recurrent UTI, uterine prolapse, herpes vaginitis

* Spermicidal jelly acts by disruption of cell membrane

Combined hormonal contraceptives

- ethinyl (estradiol (10-50 mcg) + progesterone
- mono / multiphase
- MOA: * On of ovulation by suppression of release of FSH & LH
estrogen suppresses FSH & stabilises endometrium to prevent intermenstrual bleeding

- * progestins $\ominus$ ovulation by suppressing LH, ~~thence, oestrogen~~
- & render endometrium unfavourable for implantation & fertilization
- * uterine & tubal contractions may be modified to disfavour fertilization

→ 3rd gen OCPs → contain norgestimate & gestodene $\ominus$ estrogens
→ more lipid friendly

Choice of progestone

- 1st gen pills → ethinyl E₂ + norethindrone
- 2nd gen → " + norgestrel & LNG
- 3rd → " + desogestrel, gestodene, norgestimate
- 4th → ethinyl E₂ + drospirenone

* Drospirenone → has antiandrogenic & antimineralocorticoid properties. useful in acne, premenstrual syndrome, $\uparrow$ in renal / adrenal insufficiency & hepatic dysfunction. Can cause hyperkalemia

Non contraceptive benefits of OCPs

- $\downarrow$ endometrial & ovarian Ca
- fewer ectopic pregnancies
- more regular menses
- less salpingitis
- $\uparrow$ bone density
- less endometriosis
- $\downarrow$ benign breast disease
- probably less RA
- protection against atherosclerosis
- $\downarrow$ fibroids
- $\downarrow$ ovarian cysts
- $\downarrow$ PID

- OCPs does not ↓ Ca ex
- combined OCPs ↑ chlamydia & candida infections
- c/i for OCPs (WHO MEC category 4)
 - impaired liver fn
 - Ca breast (known/suspected)
 - ↑ TG / cholesterol
 - undiagnosed vaginal bleeding
 - smoker over 35 yrs
 - past/present/family H/o TE
 - mod to severe HT
 - diabetes & vascular disease
 - migraine & aura

Amount of estrogen in Mala D is 30mcg

Mala D ⇒ LNG 0.15 mg + ethinyl E2 30mcg (21+7 iron tabs)

Drug Interactions & OCPs (Drugs ↓ long coc efficacy)

- Rifampicin (if EE < 50 mcg)
- Griseofulvin
- phenytoin, phenobarbitone, primidone, carbamazepine, ethosuximide
- Tetra, doxy, penicillins, Epro, ofloxacin
- antiretrovirals

DMPA

MOA - ↑ Cx mucus viscosity, endometrium unfavourable for implantation & ⊖ ovulation (v)

- 150mg i.m every 90 days (104 mg s.c)
- Notable effects →
 - * irregular vaginal bleeding
 - * prolonged ovulation suppression after inj have been stopped
 - * ↓ Bone mineral density
 - * ↑ cervical carcinoma in situ
 - * ↓ ovarian & endometrial Ca

LNG-IUS (Mirena)

- T shaped polyethylene structure & stem encased by a cylinder containing polydimethylsiloxane & LNG
- 52 mg LNG eluting 20 mcg daily
- approved for 5 yrs use, but evidence for 7 yrs
- Noncontraceptive uses
 - ↓ menstrual blood loss,
 - ↓ dysmenorrhea, ↓ PID, HRT in perimenopause
- ↓ menorrhagia

CuT

- Cu 380A approved for 10 yrs use, but can be used upto 20 yrs
- MMA - intense local inflammatory response induced in uterus by Cu containing devices leads to lysosomal activation & other inflammatory actions that are spermicidal.
 - if fertilization occurs, inflammatory action against blastocyst.
 - endometrium becomes hostile for implantation
 - ↑ motility of tubes, induce endometrial atrophy

CI for CuT:

- peripart sepsis / postabortal sepsis
- unexplained vaginal bleeding
- GTN
- current PID/STD within past 3 months, known pelvic TB
- Ca Cx
- Ca endometrium

- If pt becomes pregnant $\pm$ IUCD, the IUCD should be removed to $\downarrow$ R/o infection

Removing IUCD

- PV

$\downarrow$
USG / erect xray abd AP / lateral $\pm$ sound

$\downarrow$
hysteroscopy

$\downarrow$
laparoscopy

- Emergency contraceptive doesn't interfere $\pm$ early pregnancy

$\downarrow$

- CUT, LNG & DCPK can be used

- POP $\rightarrow$ LNG 0.75mg / LNG 1.5mg $\rightarrow$ $\odot$ / delay ovulation

- SPRM (ulipristal acetate) - 30mg

- COC - EE 0.1mg + LNG 1mg - Yuzpe method

- CUT - 380A

* all are preferred within 72hrs, can be used upto 120 hrs

Permanent methods

- Eligibility criteria

* married

* >22 & <49

* atleast one child >14 yrs unless medically infertile

* female (her partner must not have undergone sterilisation in past)

* consent in sound state of mind

♀ sterilization

- Minilap method → ^{used} Pomeroy, Irving, uchida, fimbriectomy/
Knoener's tech, Parkland tech ^{used}
- Laparoscopy → falope ring (m/c used),
Hulka clamped clips,
silicone titanium clip (filx hie clip)
- * ~~least method~~ effective method → vaginal fimbriectomy
- * max chance of reversal → laparoscopic method =
clip or ring
- * tubes are ligated at isthmus
- * reversal of tubal ligation → isthmo isthmie anastomosis
- * No scalpel vasectomy is done now; ~~test~~ involves
ligation & division of spermatic cord; partner may
be on DMPA for 3 months
- * Contraceptive implants → nonplant, implanon, ~~morogga~~
padielle

Urinary incontinence & hyperprolactinemia

• ① post. urethrovaginal angle $\rightarrow 100^\circ$

• initial desire to void $\rightarrow 150$ ml

strong u $\rightarrow 250$ ml

residual $\rightarrow 50$ ml

bladder capacity $\rightarrow 400-600$ ml

flow rate $\rightarrow 15$ ml/sec

• intra vesicle pressure $\rightarrow 10 \text{ cm}^2 \text{ H}_2\text{O}$

intra urethral " $\rightarrow 20-50 \text{ cm}^2 \text{ H}_2\text{O}$

dit urethral sphincter mechanism

• upper 2/3rd of bladder neck $\rightarrow$ above levator ani muscle

• urethral mobility mech $\rightarrow$ when pt coughs, pressure equally transmitted to bladder wall & upper 2/3rd bladder neck
 $\downarrow$
 (70-75% of urinary incontinence)

Urinary incontinence

m/c $\rightarrow$ stress urinary incontinence (SUI) > detrusor instability
 urge incontinence

SUI

• involuntary passage of urine $\rightarrow$ to $\uparrow$ intra abd. pressure in absence of detrusor instability

features $\rightarrow$ • leak on coughs

• small amount

• leak only till $\uparrow$ intra abd pressure

• no urge / frequency / nocturia / dysuria

- other mech of SUI → ~~urethral~~ mobility & mech abn
- * intravesical pr > intraurethral pr
- * upper 2/3rd bladder neck below levator ani
- Causes : age, multiparity, obesity, chr cough, constipation, menopause, surgeries in bladder neck

Δ : clinical

diagnostic tests → i) stress test (pt in lithotomy position → cough & sprinkling of urine)

- ii) tip test → done in empty bladder
- tipped swab introduced thro urethra & asked to cough
 - when tipped swab move more than 30° → +ve test

iii) Bonney's test → 2 fingers in para urethral region push up & ask to cough.

• if SUI corrected → +ve test

iv) Marchetti test → 2 allie forceps used instead of finger

M/m of SUI

• Abdominal surgeries → Burch colposuspension, Marshall marchetti Krantz

Not done now
• ~~Colp~~ → Burch colposuspension

Burch colposuspension	Marshall
→ proximal urethra	bladder neck suspended
• Cooper's ligament	• pubic bone
	• C/c - osteitis pubis

Vaginal Surgeries

TVT (tension free vaginal tape)

◦ mid urethra is suspended in both

◦ both are day care surgeries

◦ mullin tape passed behind midurethra

(retroves space entered where bladder is present, chance of injury +)

◦ cystoscopy must be done at end of procedure

TOT (trans obturator tape)

◦ tape passed thro' both obturator foramen

◦ don't enter space of Retroves, no bladder injury

* TOT is the best method among all 4.
(TOT > TVT)

Urge incontinence

◦ detrusor overactivity & parasympathetic overactivity

Features → ◦ frequency (>7 times/day)

◦ urgency

◦ nocturia

◦ dysuria

◦ m/c is UTI (∴ medical m/m)

◦ CNS causes should be ruled out (eg: parkinson, MS, alzheimer's etc)

◦ structural similarity to GH & human chorionic somatomammotropin

◦ $1/2 \rightarrow$ 20 min

◦ ↑ by stress, sleep, nipple stimulation, pregnancy

◦ drugs ↑ing it $\rightarrow$ antipsychotics, dopamine antagonists, α methyl dopa, verapamil

◦ pathological $\uparrow \rightarrow$ pituitary adenoma, trauma, infection

◦ TRH $\rightarrow \uparrow$ prolactin ($\because$ in hypothyroidism $\rightarrow$ prolactin $\uparrow$)

◦ hyperprolactinemia $\rightarrow$ treat of amenorrhoea, infertility & galactorrhoea

◦ in $\sigma \rightarrow$ erectile dysfunction, hyperlipidemia, stroke, MI

◦ MoA of prolactin

$\rightarrow$ prolactin has -ve feedback of GnRH

$\therefore \downarrow$ FSH & LH $\rightarrow$ no folliculogenesis $\rightarrow$ no ovulation

◦ $\rightarrow$ bromocriptine in medical m/m

◦ $\textcircled{N} \Rightarrow$ 15 to 25 ng/ml

◦ Protocol for $\uparrow$ prolactin

* 1st do UPT $\xrightarrow{+ve}$ ARC clinic
 $\downarrow -ve$

* Rule out stress, sleep deprivation, drug intake
 $\downarrow -ve$

* Rule out hypothyroidism $\rightarrow$ $\textcircled{R}$ accordingly
 $\downarrow -ve$

* CT/MRI $\rightarrow$ pituitary adenoma $\rightarrow$ $\textcircled{R}$ accordingly
 $\downarrow \textcircled{N}$

Repeat prolactin levels after 6 weeks

Infertility

- 1 year is needed for Δ of infertility
- Types - 1° & 2°
- Infertility attributed to ♀ in 1/3rd, ♂ in 1/3rd & both in 1/3rd

Causes (↓ing order)

- Ovarian → anovulation, corpus luteum insufficiency
- Tubal → blockade d/t inf, surgery
- unexplained
- PCOD anovulation
- Uterine → Fibroid, synechiae, TB, malformations
- pelvic → endometriosis, adhesions
- cervical factor → lack of mucus, Abs in mucus

Testing

- Ovulatory dysfunction → ovulation predictor test
 - early follicular FSH ± estradiol level (ovarian reserve)
 - AMH
 - serum TSH, prolactin, androgen
 - ovarian USG (antral follicle count)
- Tubal / pelvic disease → HSG
 - laparoscopy + chromotubation
- Uterine factors → HSG
 - TVS / saline infusion sonography (SIS)
 - MRI
 - Hysteroscopy ± laparoscopy
- ♂ factor → semen analysis

Asherman syndrome:

- Intrauterine adhesions / Asherman synd. is d/t destruction of endometrium in response to ovarian steroids
- Endometrial damage occurs d/t vigorous curettage following
 - PPH
 - miscarriage
 - elective abortion complicated by infection
- Δ: HSG / SIS
- Pl/m → hysteroscopy

* Best investigation for tubal patency → laparoscopic chromotubation

HSG

- Rubin's cannula / Foley's catheter is inserted into Cx & a radiopaque dye (usually 50% iodine + polyvinyl alcohol) is instilled into uterine cavity.
- performed on 9th / 10th day of cycle
- cannot diff b/w cornual spasm & tubal block

Laparoscopic chromotubation

- done = diagnostic laparoscopy & a dye is injected thro Cx
- free flow can be demonstrated at fimbrial end
- Ix:
 - HSG showing abn findings
 - prior to planning tuboplasty
 - prior to IVF
 - prior to induction of labour

- removal of hydrosalpinx prior to IVF
- PCOS to puncture the cysts to improve pregnancy rate of ART & avoid hyperstimulation syndrome
- suspected endometriosis

Sonosalpingography

- under USG, a Foley catheter is inserted, ~~then~~ a 200ml of saline injected into uterine cavity
- flow of saline along tube is visualised
- USG shows presence of free fluid in pouch of Douglas if tubes are patent

M/m of tubal factor infertility

- proximal (cornual) block → tubal cannulation / catheterisation
- distal block - IVF, fimbrioplasty
- midsegmental block - resection & anastomosis
- Tubal recanalization
 - reversal best = clips > fallope rings > modified Pomeroy's > cautery
 - length of frenal tube : 4 cm
 - isthmo isthmie anastomosis has best results

Post coital test : (Cx mucous is examined)

- antisperm antibodies
- Cervical factor ab (N)
- penetration of sperm in Cx mucous - **Miller Kuznetsov test**
- sperm count & ab (N)

- Abnormalities - cryosurgery / LEEP / conization
cervical infection

(cervical mucus is permeable to sperm only during mid cycle)

- Evaluation - post coital test / **Sims Huhner test**

* couple req. to have intercourse on day of ovulation
* a subsequent sample of cervical mucus is ~~is~~ evaluated for elasticity (**Spinnbarkeit**) & no. of motile sperm per high power field

- M/m → intrauterine insemination

Male infertility

Antetesticular

- Endocrine deficiency
- psychosexual
- drugs → anti-hypertensives, antipsychotics
- genetic → Klinefelter's, Y chr. deletion, single gene mutations

Testicular

- immotile cilia
- cryptorchidism
- infection
- torsion
- varicocele
- immunogenic
- 1° testicular failure

Post testicular

- obstruction of efferent duct:
 - cong. absence of vas deferens (cystic fibrosis)
 - acquired inf
 - surgery (vasectomy, herniorrhaphy)
- ejaculatory failure
- retrograde ejaculation
- hypospadias
- bladder neck surgery

* **aspermia** → complete absence of semen

* **oligospermia / oligozoospermia** → sperm count < 20 million / ml

* **polyzoospermia** → > 350 million / ml

* **azoospermia** → no sperm in semen

- **asthenozoospermia** - reduced sperm motility
- **leucocytospermia** - ↑ white cells in semen
- **neurozoospermia** → spermatozoa are dead / motionless
- **teratozoospermia** → >70% sperm = abn morphology
- **oligoastheteratozoospermia** → disturbance of all 3 variables

Semen analysis

- volume - >1.5 ml
- count - >15 million/ml
- Total motility >40%
- morphology >4%
- WBCs <1 million /ml
- Round cells <5 million/ml

In depth analysis

- serum FSH, LH, testosterone, prolactin, TSH
 - * testicular dysfn → ↑ FSH & LH
 - * ↓ FSH & LH → hypogonadotropic hypogonadism
 - * Leydig cell dysfn → low testosterone & high LH level; elevated level d/t pituitary adenoma
- absence of fructose in seminal fluid → cong. absence of seminal vesicle or portion of ductal system / both
- Testicular Bx → Bx material sent in Bouin's soln

M/m of infertility

- ovulation induction
- IVI
- IVF-ET
- ICSI → intracytoplasmic sperm injection

ICSI

- Tx → severe oligospermia (< 5 million sperm/ml)
 - azoospermia / teratospermia
 - sperm Abx
 - obstruction of efferent duct system
 - cong. B/c absence of vas
 - failure of fertilization in IVF

* Aspiration of sperm from testis is done by

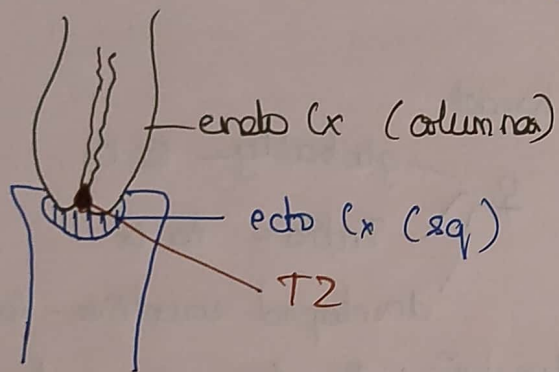
- i) Testicular sperm aspiration (TESA)
- ii) " " extraction (TESE)
- iii) Percutaneous epididymal aspiration (PESA) → trauma to epididymis may occur
- iv) Microsurgical epididymal ^{sperm} aspiration (MESA)

Tx of IUI

- * cervical factor infertility
- * unexplained infertility
- * oligoasthenospermia

Anatomy of Cr:

- 2 parts → endocervix (part close to uterus) - columnar
→ part ⊆ projects into vagina, squamous epi
- squamocolumnar jn | transformation zone
- original SCJ is at external os, but rarely restricted to it



SCT:

- endo Cx $\rightarrow$ red
- ecto Cx $\rightarrow$ pink
- TZ $\rightarrow$ white
- TZ moves out during pregnancy, puberty, OCP
moves in into endo Cx w/ age
- In all ♀, columnar epithelium of endo Cx changes to sq. epithelium of exo Cx. Thus metaplasia - physiological, in all ♀
- m/c site of Ca Cx - TZ
- m/c variety of Ca Cx - sq. cell Ca
- as endo Cx is lined by columnar, adenoca of Cx can also occur
- m/c site for adenoca of Cx $\rightarrow$ endo Cx

- m/c cell in menopausal ♀ → basal & parabasal cells
- in pregnancy & 2nd 1/2 of menstrual cycle → intermediate cells predominate
- in 1st half of menstrual cycle → superficial cells predominate

Superficial cells → large ~~eosinophilic~~ basophilic cell & pyknotic nucleus

Intermediate cells → basophilic cells & smudged outline

parabasal cells → basophilic, smaller cells & large nucleus

Ca Cx:

- m/c Ca in Indian ♀ → Ca breast
- m/c Ca of genital tract in ♀
 - globally - Ca Cx
 - India - Ca Cx
 - developed countries - Ca endometrial - 4th
- Infection of Cx leads to dysplasia in few ♀ & leads to
- Ca formation & takes 10 to 30 yrs
- N:C ratio ↑ in dysplastic cell

Classification

- < 1/3rd epithelium is dysplastic → CIN I
- > 1/3 but < 2/3 → CIN II
- > 2/3 → CIN III
- whole epithelium dysplastic but overlying epithelium intact - CIS
- overlying epithelium broken → invasive Ca

Bethesda classification

- CIN 1 $\Rightarrow$ LSIL (low grade squamous intraepithelial lesion)
- 2, 3 $\Rightarrow$ HSIL
- CIS - no longer used

RF for CIN / Ca Cx:

- early age of intercourse
- " " " 1st child birth
- multiparity
- low SES
- multiple partners
- all STDs
- smoking (RF for SCC)
- OCP (for adeno Ca Cx)
- HPV infection - most (X)

* Early menarche & late menopause are RF for endometrial & ovarian Ca, not Ca Cx

◦ Ca Cx has no familial inheritance

◦ age group for CIN - 20-30 yrs

CIS - 30-35 yrs

invasive Ca - 35-39 yrs & 2nd peak at 5th to 6th decade

[endometrial & ovarian Ca are more common in multiparous]

* all estrogen dependant conditions are more common in multiparous women

* HPV affects basal epithelial cells (epitheliotropic)

The cytological changes are called koilocytosis
koilocyte $\rightarrow$ enlarged nucleus + perinuclear halo

◦ High risk HPV → 16, 18 (70% cases)

→ 31, 33, 45, 52, 58 (30% cases)

◦ low risk → 6, 11 → genital warts / condyloma acuminata

◦ Babies born to ♀ w/ genital warts have laryngeal papillomatosis, hence CS done

* viral protein responsible for malignant transformation

- E6 & E7

◦ E6 affects gene p53

E7 " retinoblastoma gene

* viral proteins req for viral replication - E1 & E2

* m/c HPV a/w Ca cx → HPV 16

SCC cx → HPV 16

most sensitive HPV a/w c Ca cx → HPV 16

" specific " " " " " → HPV 18

m/c HPV a/w adeno Ca cx → HPV 18

Cancers by HPV

◦ ♀ → Ca cx, vagina & vulva

♂ → oral, anal & penile Ca

* HPV vaccines are made from inactivated capsid proteins

i) Cervinax → bivalent vaccine → protects against HPV 16, 18
given to ♀ only

given to ♀ { ii) Gardasil → quadrivalent → 16, 18, 6, 11

iii) Gardasil-9 → 9 valent → 16, 18, 6, 11, 31, 33, 45, 52, 58

• Ideal age of vaccines → 11-12 yrs (9-26 yrs)

• most Ⓢ ad 15 → synovial attach

• not during pregnancy

• can be given to HIV +ve ♀

• protection rate of $\left\{ \begin{array}{l} \text{gardasil} \rightarrow 75\% \\ \text{gardasil-9} \rightarrow 90\% \end{array} \right.$

• screening should continue after vaccine

Screening test → Pap smear

• start by 21 yrs

• universal screening, done 3yrly till 30 yrs

• and then if Pap test ~~negative~~ +ve, HPV DNA testing
- 5 yearly

• only pap smear - 3yrly

• HPV DNA testing in ♀ > 30 yrs

• method - PCR / hybrid capture tech / southern blot

• screening continued if for 65 yrs if last 10 pap Ⓢ

till 75 if last 10 yrs pap susp screen

- After hysterectomy for benign cause - stop screening
- In HIV +ve ♀, annual screening till 3 (N) results & then 3yrly screening
- Sampling instruments → Cx brush, cytobrush, plastic spatula, wooden spatulae (Ayer's spatula)
- 1st slide → smear from TZ
- 2nd " → endocervix
- 3rd slide → control slide → post. wall of vagina

* For hormonal study → lateral wall of vagina
cytology → post. " " "

◦ Fixative used → 95% ethanol + 5% ether

* Liquid based cytology → done w/ Cervical brush
→ better than conventional pap
→ fixative is methanol

Alternative to Pap in rural areas

- VIA - visual inspection w/ 5% acetic acid - white stained areas ab (N)
- VILI → visual " w/ Lugol's Iodine - unstained yellow areas (stained areas are black-brown) ab (N)
- Lugol's Iodine - 5%
Schiller's Iodine - 0.3%

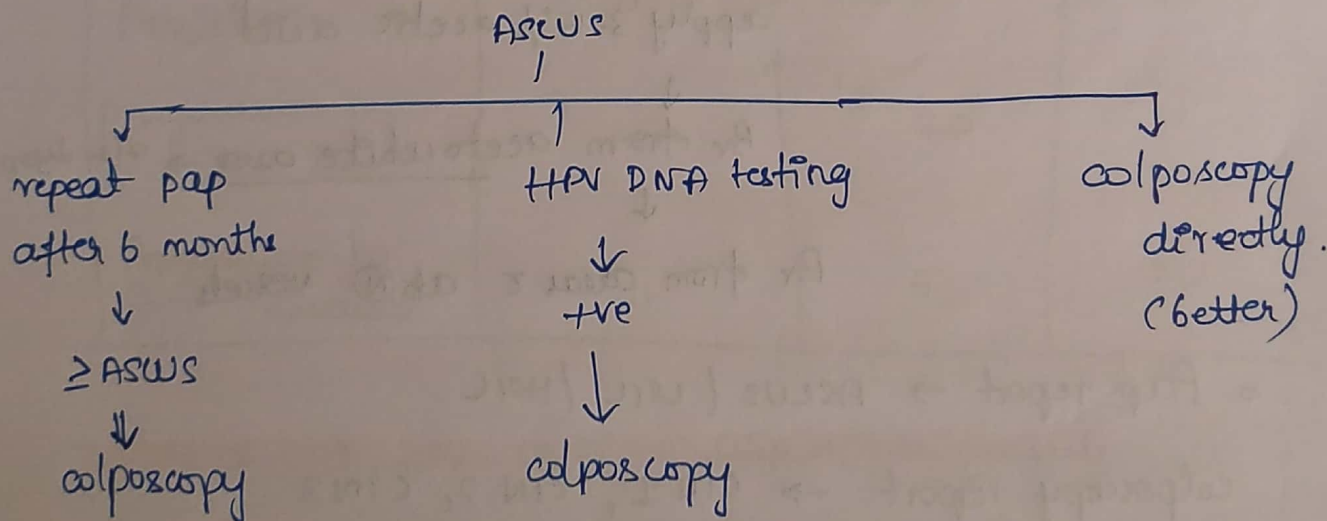
• Pap smear detects - trichomonas, candida, HSV, HPV, actinomyces

doesn't detect - gonorrhoea, chlamydia

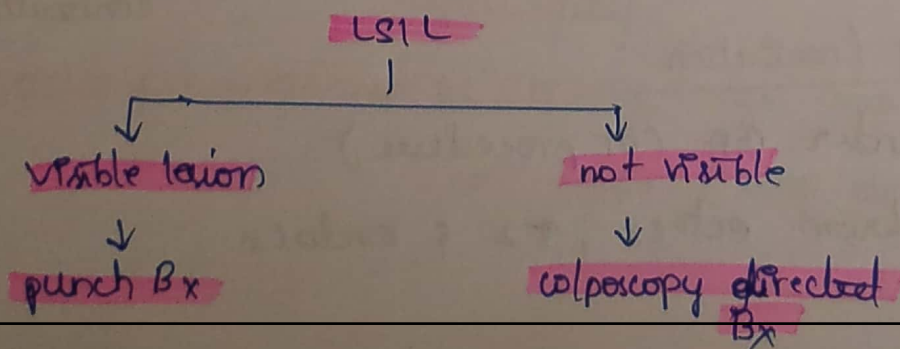
Result of pap smear

- i) (N)
- ii) Infection → R = Abs
- iii) reactive changes
- iv) atypical squamous cells of unknown significance - ASCUS
- v) LSIL → enlarged, dark nuclei than ASCUS, = fair amount of cytoplasm
- vi) HSIL - nuclei wrinkled & dark, very little cytoplasm

ASCUS → cells ~~fair~~ = slightly enlarged & darker nuclei compared to other (N) cells



• 10% of LSIL → HSIL → 100% → Ca Cx



◦ HSIL → colposcopy directed Bx + endocervical curettage

* mild erosion of cx & pap smear shows dysplasia → ABs & repeat pap after 3 months

Colposcope:

◦ minimum magnification → 5 times
magn → 30x

- OPD procedure, no anaesthesia
- disadvantage → cannot visualise endo cx

Bx from any rough area / area appearing white before applying acetic acid - leukoplakia

↓
apply 3-5% acetic acid

↓
Bx from acetowhite area → Ht dysplasia

↓
Bx from areas w abn vessels

◦ Pap report → ASCUS / LSIL / HSIL

colposcopy report → CIN 1, CIN 2, CIN 3

◦ If pap smear → HSIL & colposcopy - (N) ⇒ cone Bx / conization done

Cone biopsy (conization)

◦ done under GA (OT procedure)

◦ Bx from ecto cx, #2 & endo cx

Diagnostic Tx:

- unsatisfactory colposcopy
- discrepancy b/w pap & colposcopy
- pap report is HSIL & are endocervical curettage
- suspicion of microinvasion
- " " adenoca

Therapeutic Tx:

- treat CIS or stage 1A1 of Ca ex in young ♀

Lifecycle of CIN

	CIN 1	CIN 2	CIN 3
Regression	60	40	30
Persistence	30	35	50
progression to CIN III / CIS	10	20	
Progression to invasion	<1	5	20

CIN 1 → HPV DNA + pap smear yearly



if persists ≥ 2 yrs



cryosurgery

CIN 2 & CIN 3 → LLETZ (large loop excision of TZ)

OR LEEP (loop electro excisional procedure)

Gyrosurgery

• N_2O is passed at 20° temp $\rightarrow$ destroys cell

• m/c c/c $\rightarrow$ c/x discharge

• orate c/c $\rightarrow$ c/x stenosis & c/x incompetence

• never 1/2 cervical bleeding

• destroys epithelium upto 5mm deep

laser $\rightarrow$ " " " 7mm deep

• & CIN $\leq$ extends to vaginal fornices i.e. CIN + VAIN

LEEP / LLETZ

• OPD procedure under LA

• diagnostic & therapeutic

• stainless steel wire used $\rightarrow$ thin wire + high power

• upto 10mm depth

Ix for hysterectomy in CIN

• recurrent CIN

• suspected adenocarcinoma & family of pt complete

• associated pelvic pathology for $\leq$ hysterectomy has to be done like fibroid

• pt cannot come for followup

Ca Cx

- m/c variety → SCC → large cell keratinizing (m/c)
- * " " non "
- * small cell → worst prognosis

- adeno Ca → * m/c site is endo Cx
- * seen in young ♀
- * more common in OCP use
- * 9/10 HPV IS

- m/c complaint in Ca Cx → irregular bleeding
- most specific complaint → post coital bleeding.

m/m * post coital bleeding only → pap smear ^{trc} → colposcopy

- * post coital bleeding + growth → punch Bx

m/c in Ca Cx

- age - 35 - 39 yrs / 5th - 6th decade

- m/c route of spread - lymphatic

- site of met - obturator LN

- sentinel LN - paracervical / ~~ute~~ uterine LN

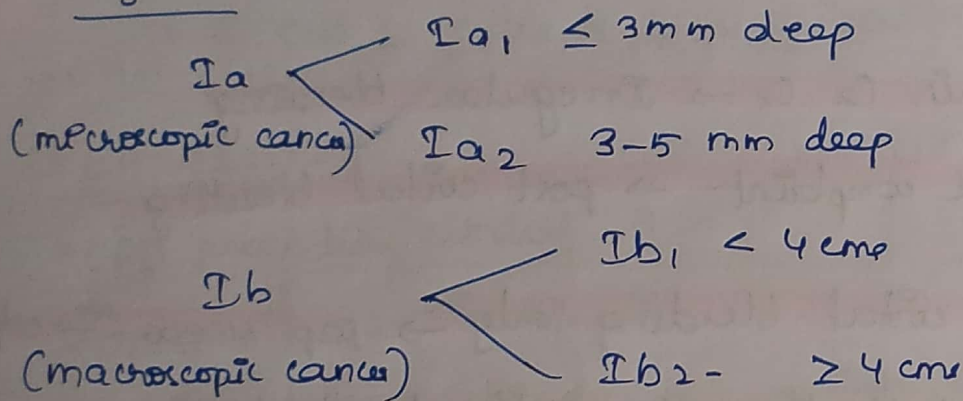
- m/c site of met in hematogenous spread - lungs

- * sentinel LN assessment is very useful in → vulval carcinoma

FIGO staging

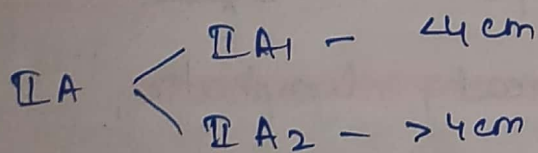
- Investigations not recommended by FIGO → USG, MRI, CT, PET
- CT approved only to look for hydronephrosis
- Investigations like X ray, IVP etc are recommended by FIGO

Stage I → cancer confined to cx



Stage II - cancer involving upper 2/3 of vagina

II A - parametrium not involved



II B → parametrium involved

Stage III - Ca involving lower 1/3rd of vagina

III A - pelvic sidewall ~~involved~~ not involved

III B - pelvic sidewall involved / hydronephrosis / hydroureter

stage IV -

IV A - local spread - bladder / bowel

B → distant met / inguinal LN involved

↓

only LN $\pm$ staging is changed

- Ca Cr rarely spreads to ovaries → no need of oophorectomy
- m/c of death in Ca Cr - uremia / renal failure
- ureter & kidney are involved in stage 3B of Ca, but bladder in stage 4A
- Most $\otimes$ prognostic marker in Ca Cr - stage > LN

Types of hysterectomy

structures removed

- Simple / type 1 → ~~total abdomen~~ uterus + Cr
- Wertheim / type 2 } → uterus + Cr + 1 cm vagina +
modified radical } medial half of cardinal & uterosacral
ligament + uterine artery after it has
given branch to ureter + selective
removal of enlarged LN
- Type III / melage / radical → uterus + Cr + 2 cm vagina + whole
of cardinal & uterosacral ligament +
whole uterine artery + pelvic & para
aortic lymphadenectomy

① Type IV → same like type 3 but upper 3/4th of vagina removed + perineal fissure + superior vesical A

② Type V → Type 4 + distal ureter & bladder also removed (rarely done)

* Highest R/o ureteric injury is Wertheim's hysterectomy
ureteric injury is m/c in simple hysterectomy

M/m of Ca Cr:

• all stages are radiosensitive, but Sy can be done only upto stage 2A.

• Stage 1A1 - 1B1 ⇒ Sy

1A1 → conization / simple hysterectomy

1A2 → Wertheim's

1B1 → radical hysterectomy

Advantage of Sy - ovaries preserved, less vaginal fibrosis, coital fn retained

• m/c Sy done is radical / Wertheim's

• Radical trachelectomy - removal of 80% Cr, parametria, 1cm vaginal cuff + pelvic LN. later if the p becomes pregnant, deliver by CS as vagina & uterus left are stitched

Radical trachelectomy is an option for women in stage 1A1, 1A2 & 1B1 disease of Ca who desire uterine preservation & fertility

from stage 1B2 - IV

• Radiotherapy & cisplatin as radiosensitiser

• So rcc - chemoradiation

• CIS & stage 1A1 & LVSI absent

- Young ♀ → conization

- old → simple hysterectomy (TAH + BSO)

• Stage 1A1 & LVSI present & stage 1A2

* family not complete - radical trachelectomy & pelvic lymphadenectomy

* Sy - Wertheims + pelvic lymphadenectomy (PL)

stage 1B1

• Family complete → Type 3 / merge (radical + PL & paraaortic sampling)

• Not complete < tumor < 2cm - trachelectomy
big - hysterectomy

Postoperative m/m - done in all cases except stage 1A1

• If 3p's present → i) involvement of parametria

ii) +ve LN

iii) +ve margin

post op m/m of choice → chemoradiation

o If 3S are present

- large tumor size
- stromal invasion > 1 cm
- LVSI (lymph vascular space invasion)

post op m/m of choice → radiotherapy

Radiotherapy for Ca Cy

① Teletherapy (EBRT)

- * go to ↓ size of tumor foll by brachytherapy
- * isotope used - cesium

① pelvic radiation -

① extended field rdn includes pelvic & para aortic LN

② Brachytherapy

- isotope → low dose rate tech - cesium 137
- high " " " - iridium 192

	Point A	Point B
location	2cm above & 2cm lateral to external os	2cm above & 5cm lateral to external os
structures present	paracervical / parametrial LN	obturator LN
Dose	early stage 80 Gy to 85 Gy locally advanced → 85-90 Gy	50 - 55 Gy → early stage 55 - 60 Gy → late stage

o if 1st Ca Rx by surgery, recurrent is Rx by chemoradiation

o If 2nd Ca " " chemo radiation → recurrent Ca

- operable → pelvic exenteration
- Inoperable → palliative chemotherapy - cisplatin & paclitaxel

Endometrial hyperplasia

- Estrogen dependant (long term unopposed estrogen is most (X) cause)

Uterine causes of postmenopausal bleeding (PMB):

- i) endometrial atrophy (m/c)
- ii) endometrial hyperplasia
- iii) endometrial polyps
- iv) endometrial Ca

→ corpus cancer syndrome

RF: late menopause, nulliparous, PCOS, obesity, DM, HT, tamoxifen, unopposed estrogen therapy, family history of breast, ovary, colon/endometrium, r/o menopause

Types:

◦ simple (cystic without atypia)

◦ complex (adenomatous without atypia)

◦ simple (cystic ± atypia)

◦ complex (adenomatous ± atypia)

progression to Ca (%)

— 1

— 3

— 8

— 29

Histopathology:

Simple hyperplasia

- glands large, cystic ± ↑ gland to stromal ratio
- glands lined by columnar
- stroma - sparsely cellular
- scanty mitosis

Complex hyperplasia

- glands → ↑ in size & no.
- overcrowding of glands
- pseudostratified columnar
- stroma - densely cellular
- numerous mitosis

characteristics of atypia

- cells large & irregular
- loss of polarity
- hyperchromatic nucleus ± prominent nucleolus
- altered nuclear cytoplasmic ratio

Δ:

Sx → AUB or PMB

Δ → fractional curettage & histology

R: depends on age & type

Simple/complex hyperplasia without atypia

R/o progression to Ca is low

Young ♀ → • cyclic progestogen therapy for 6 months

— MPA for 21 days a month 3-6 months

— progesterone IUD

• follow up after 6 months by endometrial sampling

peri & post menopaual → • cyclic/continuous progestin therapy or
• hysterectomy

Simple/complex with atypia: (R/o malignancy - high)

preferred R → hysterectomy^a

young women → • high dose progestin therapy (Megestrol)^a
• endometrial sampling every 6 months

Role of screening (not as effective as CIN)

methods → TVS, endometrial aspiration (Bx), vaginal pool smear

Endometrial carcinoma

• genital malignancy in developed countries → Ca endometrium > ovary >
developing " → Ca cx > ovary > endometrium^{Ca}

• mostly in post menopaual (55-70 yrs)

• 10% of PMB have Ca endometrium (EM)

RF: same as for endometrial hyperplasia + atypical EM hyperplasia

Protective factors: OCP, progesterone therapy, multiparity, physical exercise

Mode of spread:

- Direct spread → myometrium, serosa, adnexa, Cx, parametrium
- Lymphatic → occurs late to pelvic & para aortic nodes
- LN involvement is most ~~(X)~~ prognostic factor
- Inguinal nodes - involved in stage IV

CF:

- m/c Sx in perimenopausal → irregular vaginal bleeding
- " " " post " → PMB
- watery offensive discharge → hydronrhea / pyometra
- Referred pain in hypogastric region - ~~Simpson's~~ pain
- BME - uterus atrophic / ~~(N)~~ size / enlarged

Δ:

- HPE of endometrium → diagnostic
- 1st inv in PMB → TVS

Features suggestive of Ca

- endometrial thickness $\geq 5\text{mm}$ (ET)
- fluid within cavity
- echogenic EM
- red vascularity
- * ET $< 5\text{mm}$ → review after 3 months / if bleeding recurs
- * ET $\geq 5\text{mm}$ → EM sampling

Methods for EM sampling

- EM aspiration - OPD procedure
- Fractional curettage → gold std
→ endocervical curettage foll by dilatation & EM curettage
- Hysteroscopic Bx → direct visualisation & targeted Bx
→ Tx: focal lesions / focal thickens

• Pap smears → not reliable in 10% of cases

HPE types

- adeno Ca (endometrial 80%) - m/c
- adeno squamous Ca - 15%
- papillary serous Ca (5-10%)
- mucinous adeno Ca (5%)
- clear cell adeno Ca (<5%) → most malignant = worst prognosis

Other inv → CT - myometrial invasion & LN mets

MRI → best inv for "

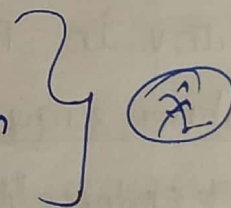
Staging

- FIGO revised staging (2009)
- changes in all stages except stage IV
- surgical pathological staging

Stage I → tumor confined to uterus

IA → $< 1/2$ of myometrial invasion

IB → $\geq 1/2$ of " "



Stage II → invades cervical stroma, not beyond uter

II → local and/or regional spread of tumor

IIA → invades serosa of uterus &/or adnexae

IIB → vaginal &/or parametrial involvement

• IIC → mets to pelvic &/or para aortic LN

Stage IV → involves bladder &/or bowel mucosa &/or

IVA → invasion of bladder &/or bowel mucosa distant mets

IVB → distant mets, including intraabdominal mets &/or inguinal LN

Diagnostic factors

- Most $\otimes$ in LN mets
- age ↑, stage of d/s, histologic type $\left\{ \begin{array}{l} \text{adeno Ca} \rightarrow \text{good prognosis} \\ \text{clear cell Ca} \rightarrow \text{worst} \end{array} \right.$
- histological grade - grade III - poor prognosis
- myometrial involvement & extension to Cx $\rightarrow$ poor prognosis
- tumor size $> 2\text{cm} \rightarrow$ ↑ LN mets
- hormone receptor status (+ve $\rightarrow$ better)
- ploidy status (aneuploid tumors $\rightarrow$ poor prognosis compared to diploid)
- HER-2/neu $\rightarrow$ poor prognosis
- +ve peritoneal cytology $\rightarrow$ controversial role (removed now)

Management

- Surgical staging
 - TAH + BSO + pelvic & para aortic LN sampling $\otimes$
 - clear cell & papillary serous Ca $\rightarrow$ omentectomy & peritoneal Bx in addition $\otimes$
- most pts pd in early stages $\rightarrow$ Sx is 1st line $\otimes$
- adjuvant RT following Sx to prevent recurrence $\otimes$

Tx for pelvic & para aortic LN sampling $\otimes$

- clear cell, papillary serous, squamous Ca
- adeno Ca Gr III
- $> 1/2$ of myometrial invasion
- isthmus Cx extension
- extra uterine spread
- Tumor size $> 2\text{cm}$ (only pelvic lymphadenectomy in absence of others)

Stagewise $\otimes$:

- Endometrioid Ca stage Ia (Gr I & II) $\rightarrow$ TAH + BSO + pelvic & paraaortic LN sampling. No post op therapy req

- Endometrial & stage Ia (Gr II), Ib → TAH + BSO + pelvic & para aortic LN dissection foll by post op RT
- Stage II → MRH + pelvic & para aortic LN dissection foll by post op RT
(mod. rad. hysterectomy)
- II & IV → • debulking surgery foll by chemo ± RT or
• chemo foll by RT or RT foll by Sy.

choice of post op RT:

- Gr III → vaginal vault rad
- adnexa, parametrial, pelvic LN inv → whole pelvis EBRT
- para aortic LN inv → extended field RT

et drug: cisplatin, carboplatin, adriamycin, paclitaxel

Recurrent EM Ca

- m/c within 1st 2 yrs of Rx
- m/c sites of recurrence → vagina & pelvis
- m/c Sy " " → vaginal bleeding

- M/m:
- Hormone receptor +ve → progesterone / tamoxifen
 - RT for isolated recurrence
 - If local therapy cannot be gr → palliative Ct

Ovarian mass

- Non neoplastic & neoplastic

Non neoplastic or Functional cysts

Features : ◦ related to temporary hormonal disturbances

- not > 5-8 cm
- unilocular
- contain clear fluid
- asymptomatic
- usually regress spontaneously

Functional cysts → follicular cyst (m/c)

corpus luteal cyst

theca lutein & granulosa lutein cyst

Follicular cyst

- m/c
- d/t hyperestrogenism
- < 5 cm
- single / multiple; lined by granulosa cells
- o/w ~~seen~~ EM hyperplasia & fibrosis
- OCP prevent formation of new cyst

Corpus luteal cyst

- d/t overactivity of corpus luteum → hemorrhage inside corpus luteum
- may rupture → intraperitoneal hemorrhage (simulate ruptured ectopic)
- USG - cob web appearance
- may p/w amenorrhea / pregnancy
- spontaneous regression

Lutein cyst

- a/w excess HCG like molar pregnancy, chorio G, domiphen therapy
- B/L
- local pain
- conservative m/m

Ovarian tumours

- 2nd common genital malignancy
- 80% benign & 20% malign
- 90% malignant tumours are 1° & 10% are 2°
- 80% are epithelial ovarian tumours. 90% of $\leq$ are benign
- 20% " non " " "

Classification

- epithelial ovarian tumours
- germ cell T
- sex cord stromal T



Epithelial tumours → benign / borderline malign / malign

- derived from surface epithelium
- ^(m/c) serous (75%), mucinous (10%), endometrioid (10%), Brenner, clear cell, mixed epithelial

Sex cord stromal T:

- derived from ovarian stroma or mesenchyme
- secrete male or f hormones
- granulosa cell, theca cell T → estrogen secreting
- Sertoli cell, Leydig cell T → androgen
- gynandroblastomas

- derived from primordial germ cells of ovary
- dysgerminoma, teratoma, yolk sac tumor, chorio ca, embryonal ca, polyembryoma

Benign ovarian T (ovarian cysts)

① Serous cystadenoma

- m/c benign epithelial tumor of ovary
- HPE - psammoma bodies
- arise from surface epithelium of ovary

② Mucinous cystadenoma

- arise from surface epithelium
- 10% BL, 10% malignancy risk
- largest benign ovarian T
- cut section - honey comb pattern
- also pseudomyxoma peritonei

③ Dermoid cyst (teratoma)

- arise from germ cells
- m/c germ cell tumor
- m/c benign ovarian tumor
- m/c " " " in reproductive age
- m/c " " " in pregnancy
- contain derivatives of ecto, endo & mesoderm
- m/c → ectoderm
- contain hair, teeth, bone, cartilage, neural & thyroid tissue
- Rokitansky protuberance - area of localized projection from teeth, bone & hair project
- m/c → 15 to 20%
- R/o malign → 1 to 2%

- white bull app & dot and dash app → d/t hairs in cyst

X ray pelvis → teeth & calcification (radioopaque)

- SCC → m/c malignancy arising in dermoid cyst (1-2% risk)
- m/c c/c → torsion (mostly during pregnancy)
- struma ovarii → contain thyroid tissue
- struma carcinoid → " serotonin & bradykinin from argentaffin cells
- Meigs syndr - fibroma of ovary + ascites + @ PE
- Pseudo meigs syndr - ascites & PE occur in Brenner's tumor, thecoma & granulosa cell tumor
- Benign solid ovarian T → Brenner's, fibroma (m/c)

c/c of ovarian T:

- Torsion → dermoid cyst & serous cystadenoma
if gangrenous → ovariectomy
- intra cystic hemorrhage → rupture d/t trauma/spontaneous/BNE
- Infection
- pseudomyxoma peritonei → mucinous ascites 2° mucinous cystadenoma & cystadenocarc of ovary, mucocoele of appendix/GIB
→ poor prognosis
→ recurrence
→ Rx ⇒ TAH + BSO + removal of mucin, peritoneal implants & appendectomy
- Malignancy (max in papillary serous cystadenoma & least in dermoid)
- M/m of adnexal cyst:
- asymptomatic simple ovarian cysts < 5cm → often physiological & resolve
- 5-8cm, u/c, mobile, cystic → OCB, follow up in 3-6 months if doesn't regress &

o cysts > 8cm, Irregular, B/C, fixed, postmenopausal → further imaging & Rx.

Pseudoovarian cyst

- o arise from vestigial remnants of Wolffian duct in mesosalpinx or from peritoneal inclusion
- o unilocular, contain clear fluid
- o USG → ovary visualised separately from cyst
- o always benign
- o can undergo torsion
- o Rx → enucleation of cyst, ovaries are preserved

Malignant ovarian tumours

- o m/c → epithelial tumours
- o m/c malignant → serous cystadenocarcinoma

o 5-10% hereditary predisposition

- o epithelial tumours → also p53 (aggressive & m/c gene) & K-Ras gene mutation

RF: 50-70yrs, early menarche, late menopause, obese, nulliparous, family Hx ovarian, breast, EM & colon CA (hereditary ovarian cancer)

Protective factors: multiparity, Breastfeeding, OCPs (used for 5yrs → 50% reduction)

* ~~Hereditary~~

* Familial ovarian cancer syndrome

i) Lynch II syndr | HNPCC

ii) hereditary breast-ovarian cancer syndr → also BRCA 1 (chr 17) & BRCA 2 (chr 13)
→ AD inheritance

Malignant epithelial ovarian tumours

- U/F → ◦ present in advanced stages - non specific Sx
- vague Sx → abd discomfort, bloating, dyspepsia, loss of wt & appetite

	Benign	Malign
◦ age	younger	extremes of age
◦ duration & progression	slow	fast
◦ cachectic Sx	-	+
◦ palpation	smooth, well defined border, cystic, mobile	irregular, ill defined border, variable consistency, restricted mobility
◦ site	U/L	B/L
◦ ascites	-	+
◦ POD deposits	-	+
<u>USG</u>	U/L unilocular thin cyst wall thin septations anechoic no ascites high @ flow in Doppler	B/L multilocular thick thick mixed echogenicity d/t solid areas papillary projections, ascites, LFD low @ flow pattern in Doppler

Risk malignancy index (RMI)

- calculated based on → USG features, menopausal status & CA125 levels
- women & RMI score > 200 → refer to oncology centre (multiply all 3)

[Reed index is for Ca ex]

Pattern of spread:

- m/c → exfoliation of cancer cells & implantation in peritoneal cavity (trans coelomic spread)
- less common — lymphatic & hematogenous

Δ: staging laparoscopy is diagnostic

Tumor markers

- ↑ Ca 125 in non mucinous epithelial ovarian tumor ($CA < 35 U/ml$)
also elevated in PID, endometriosis, adenomyosis, genital TB, fibroid, endometrial Ca, colon, breast, pancreas, lung Ca

FIGO staging (surgical staging)

Stage I : Tumor confined to ovaries

IA → limited to one ovary. No tumor on external surface, capsule intact & -ve ~~intra~~ peritoneal washings

IB → both ovaries, no tumor on same as above

IC → one / both ovaries ± tumor on ext. surface of ovaries / capsule rupture / malign ascites / +ve peritoneal washings

Stage II → Involves 1 or both ovaries ± pelvic extension

IIA → extension to uterus / FT

IIB → other pelvic tissues extension

IIC → IIA / IIB ± tumor on ext surface of ovaries / capsule rupture / malign ascites / +ve peritoneal washings

Stage III - one / both ovaries & implants outside peritoneal cavity
retroperitoneal nodes; superficial liver mets equals stage III

III A → histologically confirmed microscopic deposits of abd / peritoneal surface ± +ve retroperitoneal nodes

III B → macroscopic deposits ≤ 2cm

III C → > 2cm

Stage IV → one / both ovaries & distant mets

IV A → PE & +ve cytology

IV B → parenchymal liver mets & / or +ve inguinal nodes

Q:

• Stage IA, Gr I (low grade, low risk)

* surgical staging - TAH + BSO + pelvic & para aortic LN sampling & infracolic omentectomy.
No post op Rx req

* uterus & 1/2 ovary can be preserved in young women & follow up

• Stage IA (Gr II & III), stage IB & IC (high gr. high risk)

* surgical staging foll by post op ct

* chemo → cisplatin / carboplatin + paclitaxel - 6 cycles

• Stage II, III, IV → 1^o cytoreductive / debulking sy foll by post op chemo for 6 cycles

Optimum debulking / cytoreduction → when diameter of residual tumour nodules is < 1cm

Neoadjuvant chemo → initial chemo foll by interval debulking sy in pts in whom optimum debulking may not be possible

Benefits of cytoreduction

- ↑ chemo sensitivity
- improves immune fn
- post op surveillance - physical ex, CA-125, periodic CT scan
- 2nd look laparotomy → to determine response to therapy in pt with no evidence of disease clinically
- 2nd debulking → done for recurrence / persistent d/s after 1st

Progressive / persistent d/s : disease free interval < 6 months till 1st

Recurrence : > 6 months interval

Other tx : intra peritoneal ct, Immunotherapy (interferons & mab's like Herceptin), hormonal therapy → progestagens

• RT → only palliative

Dysgerminoma

- m/c malignant germ cell tumour
- corresponds to seminoma in ♂
- elastic rubbery consistency with smooth capsule
- m/c malign. ovarian T also pregnancy
- highly chemo & radiosensitive
- secretes placental ALP, LDH
- malignant GCT with best prognosis

H/m of germ cell tumours (GCT)

- Sy → mainly
- U/L salpingo oophorectomy
- post op chemo → BEP regime - bleomycin, etoposide, cisplatin
- all cases needs post op chemo except stage IA dysgerminoma & stage IA gr I immature teratoma

Sex cord stromal tumours

- least common
- U/L
- m/c in perimenopausal age
- feminizing + → granulosa cell, theca cell T
- androgen secreting tumor - sertoli, Leydig cell T

Granulosa cell tumours

- secretes estrogen
- CF - children - precocious puberty
adults - amenorrhea foll by prolonged bleeding
PMB
- alow EM hyperplasia in 25-50% (X)
- HPE - Call Exner bodies & coffee bean nucleus
- m/m → Sy → U/L so in young
 - endometrial sampling
 - ~~post~~ ~~menopausal~~
 - post menopausal → TAH+BSO
 - post op chemo - BEP regime

Role of conservative sy in young ♀:

- U/C SO can be done in
 - Stage I epithelial ovarian cancers (Gr I)
 - stage I GCT
 - U/C sex cord stromal tumours

Metastatic tumour

- mets to ovary is mostly from i° in GIT
- mostly B/C
- spread is transcoelomic or retrograde lymphatics

Krukenberg's tumor

- met from i° in stomach > bowel > breast
- always B/C
- characteristic **signet ring cells** in HPE
- mets by retrograde lymphatics
- capsule intact, smooth, no adhesions, freely mobile, solid waxy consistency.

Tumor markers

- | | | |
|-----------------------------|---|-----------------------------|
| ◦ dysgerminoma | — | placental ALP, LDH |
| ◦ yolk sac T | — | AFP, α 1 antitrypsin |
| ◦ embryonal Ca | — | HCG, AFP |
| ◦ polyembryoma | — | HCG, AFP |
| ◦ chorio Ca | — | HCG |
| ◦ Teratoma | — | — |
| ◦ granulosa cell T | — | Inhibin |
| ◦ non mucinous epithelial G | — | CA 125 |
| ◦ mucinous " | — | CEA, CA 19-9 |

Histological characteristics

- papillary cystadenoma - psammoma bodies
- Brenner's - Walthard's cell nest (BMW)
- clear cell T - hobnail cells
- Dysgerminoma - large polygonal cells = lymphocyte infiltration, fibrous septa
- Yolk sac T - Schiller-Duval bodies
- Granulosa cell T - call exner bodies, coffee bean nucleus
- Leydig cell T - Reinke's crystal
- Krukenberg tumour - signet ring cells

Borderline ovarian tumours (BOT) / low malign potential

- 30-50 yrs
- no stromal invasion
- mitotic figures $< 4/10$ HPF
- 90% survival rate
- serous type (m/c) > mucinous

M/M - staging laparotomy

- frozen section → if BOT +ve
- * completed family - TAH + BSO
- * not " " - U/C ovariectomy
- LN sampling not req

M/M in familial ovarian cancer

◦ genetic counselling, BRCA 1 & BRCA 2 genetic mapping

- Follow up = TVS & CA125
- OCPs
- family completed at latter 35 yrs → prophylactic SO

most ~~factor~~ X

- annual mammography after 30 yrs
- OCPs for ≥ 5 yrs $\rightarrow$ $\downarrow$ risk by 50%
- 2 children + OCPs ≥ 5 yrs $\rightarrow$ $\downarrow$ risk by 70%
- prophylactic oophorectomy on family completion $\rightarrow$ only in familial ovarian cancers