GYNECOLOGY & OBSTETRICS

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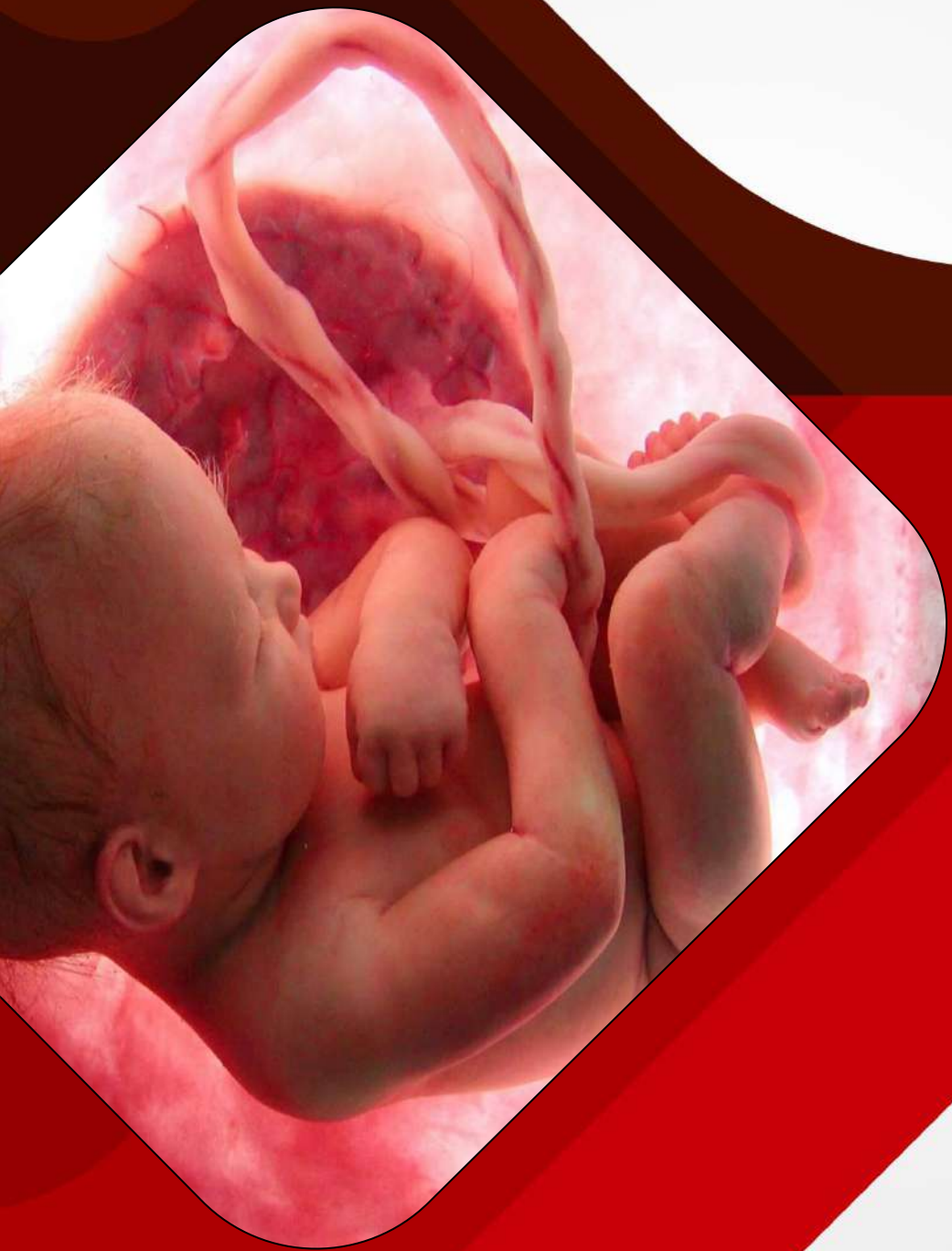


Gynecology

Menstruation & It's Disorders

Frequency	Duration	Volume	Regularity
Mean is 28 days +/- 7 days ** tend to shorten with age and its initially irregular	Normal 4.5-8 d Prolonged >8d Shortened <4.5 Mean is 5 days ** with aging the duration decrease	Normal 25-50 Mean 40 ml; Heavy >80ml Light <5ml	Cycle to cycle variation over 12 months, measured in days

Dysmenorrhea

S/Sx

- suprapubic, sharp, colicky, cyclic pain
- begins just before or with the onset of menses
- lasts 8-72 hours
- Associated Sx: headache, diarrhea, nausea

1ry / 2ry

- ***1ry***: pain just before menses and during menses
- ***2ry***: pain begins several days before menses and gradually increases in severity as menses approaches

2ry causes

- Endometriosis
- PID
- Pelvic adhesions
- Adenomyosis
- IUCD in utero
- Fibroids
- Cervical stenosis (iatrogenic LLETZ/instrumentation)
- Congenital abnormalities causing genital tract obstruction, e.g. non-communicating cornua

Mx

- **reassurance, analgesia**
- **Symptoms control**:

- PGSI (prostaglandin synthetase inhibitors): mefenamic acid
- COCP to abolish ovulation
- data on Mirena IUS
- paracetamol
- hot water bottles

- **treat underlying causes**

- Endometriosis: COCP, progestogens, GnRH
- PID: antibiotics
- Obstruction: surgical
- Laparoscopy: GS for Dx/Mx of endometriosis, adhesions, PID

Premenstrual Syndrome (PMS)

Info

- Distressing psychological, physical, behavioral Sx
- occur mainly during **luteal phase**, or after hysterectomy with ovarian conservation

Types

Physiologic PMS (95%)	Core PMS (5%)
Cyclical, Sx free week in the follicular phase	
Mild, no serious impact on quality of life (QOL)	Cause impairment & impact QOL

Sx

Physical signs	Psychological and behavioral
- breast tenderness - abdominal swelling - headache - skin disorders - weight gain - extremities swelling - joint, muscle and back pain	- mood swings (Irritability, anger, anxiety, depression) - sleep disturbances, changes in appetite, fatigue - poor concentration - social withdrawal, lonely - lack interest, hopelessness

Dx

- *Daily record of PMS Sx for 2 consecutive menstrual cycles*
- we care for timing & severity of Sx more than character
- Cyclical or luteal phase
- Must resolve by the end of menstruation to give at least one week free of symptoms

Mx

- **Mild**: support, reassure, nutrition, exercise, stress reduce
- **Core**:

a. **Suppression of ovulation**: GnRHa, COCP, Danazol, Estrogen

b. **ttt w/o suppression**: SSRI, Diuretics, non-medication ttt (herbal, behavioral therapy, vit B6, Ca^{+2}, exercise)

Heavy menstrual bleeding (HMB – Menorrhagia)

Causes

- Idiopathic (40-60%), Subjective rather than objective
- **Pathologic**:

- Fibroids (20-30%)
- Endometriosis (rare)
- Polyps (5-10%)
- Malignancy (rare)
- Adenomyosis (5%)

Abbrev.

- **HMB (Menorrhagia)**: Heavy menstrual bleeding: HMB in excess of 80mls
- **MBL**: Menstrual blood loss
- **AUB**: Abnormal uterine bleeding
- **IMB**: Inter-menstrual bleeding
- **PMP**: Post-menopausal bleeding
- **PCB**: Post-coital bleeding
- Chronic AUB (> 6 months)

IMB Causes	• Infection (endometritis) • iatrogenic (breakthrough, smear), • Structural (polyp, fibroids, ectropion, tumors, Ca) • natural 1%
PMP Causes	• Polyps 30% • *Atrophy* 30% • Fibroids 20% • Hyperplasia • Ca
AUB Causes (Figo classifica.)	• **R/O pregnancy!!** • **PALM-COEIN**: - **Structural**: **P**olyp, **A**denomyosis, **L**eiomyoma, **M**alignancy - **Non-Structural**: **C**oagulopathy: thrombocytopenia, leukemia, warfarin **O**vulatory dysfunction: PCOS, CAH, Cushing **E**ndometrial disorders: Endometritis **I**atrogenic: COCP, IUCD, progestins **N**ot classified: AVM, endometriosis, ovarian neoplasm
Hx	o **Associated Sx**: • Lifestyle influence • Dysmenorrhea • Dyspareunia (endometriosis, PID) • Pressure Sx • Offensive vaginal discharge (infections) o **Medical Hx**: • Anti-coagulants • Tamoxifen • Thyroid disorders
PE	o **General**: BMI, hypothyroidism, bruises o **Abdominal**: - masses, tenderness (endometriosis, pelvic infection), Cysts, Fibroids o **Speculum**: • Local lesions • Severity of blood loss • Bimanual examination: shape, size, tenderness, mobility - Enlarged: fibroids, adenomyosis - Restricted: endometriosis, pelvic infections - Tenderness: endometriosis, adenomyosis, PID

Investigate	• *TVS USS* (1st investigation): polyp, fibroids, thickness • *Saline infusion sonography* (*SIS*): uterine, endometrium • **R/O pregnancy**: MCC of abnormal bleeding • *Smear* • *TFT*, *FBC* (PID increase WBC) • *Biopsy*: to exclude hyperplasia or cancer • *Sampling*: D/C, hysteroscopy, Pipelle
Thickness	• 96% of PM women with endometrial cancer will have thickness (ET) >4 mm, Women with PMB whose ET is <4 mm still have a 1–2% risk of having endometrial cancer. • **Endometrial biopsy is required if ET is:** - >4 mm in postmenopausal women - >16 mm in premenopausal women - May be selectively performed in postmenopausal with ET <4 mm if other C/P or sonographic risk factors are present.
Mx	o **Medical**: • **Hormonal** - *Mirena IUS*: contains levonorgestrel progesterone to Mx - *Progesterone*: similar physiology - *COCP*: control amount - *Danazol* (used in endometriosis Mx): serious androgen SE • **Non-hormonal**: - *Antifibrinolytics* (50% ↓ in loss): tranexamic acid - *NSAIDs*: mefenamic acid (30-40% ↓ in loss & ↓ in dysme.) o **Surgical**: • *Endometrial ablation*: thermal, curettage, balloon • *Hysterectomy*
Age specific	o **6yo with bleeding**: - if AUB before menarche: do a pelvic exam under anesthesia - DDx. Trauma, abuse, assault, malformations, malignancy

o **15 yr noted menarche at 14 but only had 3-4 periods since, she missed school due to massive bleeding**:
- Coagulation problem
- Thyroid disease,
- Anovulatory cycle
"prolonged heavy bleeding because of estrogen withdrawal, but progesterone withdrawal is short time bleeding"
- PCOS

o **24-year case with bleeding she can't predict her cycle which is heavy and painful:**
- PCOS: why heavy ??? because of oligomenorrhoea "but because of estrogen level it will be prolonged ".
- Reproductive age: usually benign, we have to R/O organic cause to say this is dysfunctional bleeding, if she uses OCPs
- Defloration injuries newly married women: vaginal tears > vaginal repair under GA.
- Vaginal and cervical cancers are unusual in this age.
- Regular cycle suggests anovulatory cycle, Irregular suggest organic disease.
- Ask about Hx of smoking, natural status, multiple partner.

o **49 years old women presented with heavy irregular menses:**
- "We have to rule out endometrial cancers",
- It's usually anovulatory cycle but we have to send biopsy

o 60 years old women presented with 2 days of spotting:
- She is menopausal: Endometrial sample "to R/O cancer".

Endometrial Polyps (localized overgrowths)	
C/P	• HMB, PMB, IMB & abnormal vaginal discharge • Large or multiple are implicated in subfertility
Dx	• USS, SIS & hysteroscopy
Mx	• Removed hysteroscopically in postmenopausal patient or >1cm in size in an asymptomatic premenopausal patient

Menopause

Definition	Permanent cessation of menses for 1 y (12m) at any age
Variations	• *Natural*: lack of follicles • *Induced*(medical:GnRH analog/Surgical:Oophorectomy) • *Premature Menopause* (*POI*) - Conserved ovaries may fail early after (TAH)
Age	Avg is 51 if earlier <45: FHx (30-70% inherited) , DMI, Smoking
Premature menopause POI	
Definition	Menopause <40, unknown cause, ttt. HRT (as OF)
Causes	• Chromosomal abnormality (turner) • Auto-immune hypothyroidism: Addison's • Enzyme deficiencies: galactocemia • Surgical • CT/RT (Concurrent Chemotherapy & Radiotherapy) • Infections: TB, mumps, malaria
Landmarks of OF	• Decline in fertility (no cycle dysfunction) • Menstrual cycle changes (longer, till it disappears)
	o check ovarian reserve of the follicle we either do: 1) ***FSH blood level*** in case of subfertility in correlation with period - Days 2,3 &4) 2) ***Anti-Müllerian hormone*** (***AMH***) - (at any time) if low, that means that ovarian reserve is low
Physiology	• initially, compensated failure happens, FSH ↑ to stimulate ↑ follicles to produce estrogen. • Later on, Decompensated failure occur, Both FSH & LH ↓, mainly FSH • AMH ↓ as the number of follicles ↓, measurement of AMH could help predict the age at menopause

• Not only estrogen is decreased in menopause , but also Androgens ex hormone binding globulin decreases some testosterone continues to be produced that's why some women realize some hirsutism, that's a physiologic event not a pathologic problem.

• insulin resistance ↑ after the menopause > ↑ in central adiposity (android shape)

• Vaginal pH is acidic, after menopause alkaline

S/Sx

o **Acute**:
• Changes in menstrual pattern (length, amount)
• Hot flushes, night sweats (self-limiting)
• Mood swings, panic,..
• Headache

o **Mid-term**:
• Vaginal dryness, dyspareunia
• reduced libido (↓ androgen)
• atrophic urethritis: stress & urge urinary incontinence
• thinning of skin/hair loss, brittle nails
• Aches, pains (↓ estrogen)

o **Long-term**:
• Osteoporosis
• Stroke
• ↑ bodyweight
• CVS disease
• Dementia
• Body fat redistribution (Android)

Mx

• Life-style
• Psychological support
• HRT: oral, patches, IUS, Cream
• HRT alternatives

o **Special group whom HRT should be prescribed**:
• Premature OF
• Gonadal dysgenesis
• Surgical/Radiation menopause
- should be given HRT till menopause expected day, they have no higher risk than ladies with natural menopause given HRT at 50 or 51.

HRT

o **Types**:
• **Estrogen only**: only used in the absence of uterus (TAH)
• **Combined**
• **Tissue selective Tibolone**:
- estrogenic, progestogenic, weak androgenic (for lipido)
- only given for definite menopausal state (not before)
• **Testosterone**: implants SC in abdominal wall

o **Routes**:
• **Oral**:
- 1st choice, cost-effective
- beneficial on HDL/LDL/Total cholesterol
- affects liver protein synthesis (↑ triglycerides)
- high doses required
- all tablets contain lactose

• **Transdermal** (patch, gel, nasal spray):
- lower dose required, expensive
- less SE on gallbladder, coagulation factors
- more physiologic hormonal levels

• **Topical** (**Cream**):
- for urogenital Sx/atrophy, & no systemic SE

• **IUS** (**Mirena coil**)

o **HRT Benefits**:
- ↓ vasomotor Sx
- ↓ Urogenital Sx, better sexuality
- ↓ OP (↑ BMD, ↓ vertebral, hip fractures (BOTH!)
- ↓ colorectal cancer

o **HRT Risks**:
- ↑ breast cancer: P+E > E
- ↑ endometrial cancer: E, Tibolone
- ↑ VTE: P+E > E
- ↑ Gallbladder disease

- Note no POF!!

o **RCOG on HRT**:
- prescribe HRT for significant menopausal Sx
- no Sx, risk > benefit
- women have the final decision
- in POI, HRT can be used until menopause

o **International menopause society IMS**:
- HRT given for clear indication
- women have option
- risk & benefits clearly explained
- lowest effective dose
- HRT women, assessed at least annually

o **Contraindications**:
- **A**ctive liver disease, renal
- **B**reast cancer
- **C**VD, angina, MI, stroke, uncontrolled HTN
- **D**VT
- **E**ndometrial cancer
- **A**bnormal uterine bleeding

o **Exam b4 HRT**:
• BMI
• BP
• Pelvic, breast (if (+) Hx)

o **Exam prior to HRT**: not routinely indicated
• Mammogram (because HRT changes breast density)
• Endometrial sampling
• FSH > 30 IU/l (one reading not enough)
• TSH, T4: menopause & thyroid Sx are common

o **Follow up**:
• recommended: 3/12, 6/12, yearly (BP, breast, V/E)
• 3 yearly smears & 3 yearly mammography aged 50-64

o **Factors influence HRT prescription**:
• Hysterectomy
• Patients Preference: Oral, non-oral preperations

o **HRT systemic SE**:
• ***Oestrogen***:
- fluid retention, breast tenderness/enlargement, nausea, headaches, leg cramps bloating , & dyspepsia.
• ***Progestogen***:
- fluid retention, breast tenderness, headaches/migraine, mood swings, depression, acne, lower abdominal pain, and backache.
• ***Combined HRT***:
- *irregular*, breakthrough bleeding (need investigation).
• ***All HRT***:
- weight gain (not proved in RCT)

HRT Alternate	o **Lifestyle** o **Non pharmacological**: vaginal Sx gel Replens o **Pharmacological**: • Progestogens • α-2 agonists – Clonidine • SSRI (fluoxetine, paroxetine), SNRIs (venlafaxine) • Gabapentin • Dehydroepiandrosterone • Progesterone transdermal creams o **Phytoestrogens**
HRT Complem-entary	o **Phytoestrogens** o **Herbal remedies** o **Other**: hypnotherapy, reflexology o **Vitamins/minerals**: E&C, Selenium
Osteoporosis	
Definition	**BMD by T-score** **Normal**: ≥ -1 SD **Osteopenia**: < -1 SD - > 2.5 SD **Osteoporosis**: ≤ 2.5 SD **Established OP**: <2.5 SD with fragility fractures
RF	• **General**: - Age - Sex - BMI: ≤19 - previous fragility fracture - parental Hx of hip fracture - Current steroid ttt • **Lifestyle RF**: - Smoking - Alcohol - Sedentary life(no activity)
2ry Causes	• **Estrogen deficiency**: untreated POI • **Medical**: RA, DM I, Hyperthyroid, malabsorption, chronic liver disease, COPD, organ transplantation
Mx	• Lifestyle: smoking, alcohol, hip protector, exercise, diet • HRT: recommend in POI till the age of menopause • Calcium and vit D, Calcitonin, SERMs, Strontium • **Bisphosphates**: Alendronate (Fosamax)

Puberty

• **Thelarche**: 1st sign of puberty , breast development (breast budding), it exceeded menarche by 2-3 years
• **Menarche**: Last sign, 1st menstrual cycle
• **Signs of puberty**:
- Thelarche, Menarche, Growth spurt, Axillary, pubic hair
• **Tanner staging**: used to classify development based on breast and pubic hair (5 Stages for each)
• **Pubic hair** is dependent on Adrenal androgen
• **Age of puberty**: Avg in middle east is 12.5 year
• **Leptin** is an important hormone for puberty

Precocious Puberty	
Definition	Onset of puberty *before* age of *8 in females*, *9 in males*
Classify	• **Central**, **true PP**, **gonadotropin-dependent** 80%: - brain T (do MRI), CNS malformation, 75% idiopathic • **Peripheral PP or pseudo-puberty** 20%: - always pathologic and caused by: a. hormone producing ovarian tumor b. exogenous estrogen c. *McCune Albright syndrome* (polyostotic dysplasia, café au lait lesions and precocious puberty)
Investigate	1. Gonadotrophin levels (FSH, LH) 2. Brain imaging: MRI 3. Pelvic, abdominal imaging (ovarian, adrenal T)
Mx	- we care for bone age (maturation) 1. Lesion – Resection 2. GnRH Analogues – ↓ FSH, LH (Pituitary shutdown)

Delayed Puberty

Definition

Absence of all 2ry sexual characteristics by age 14

Classif-ication

- ***Hypogonadotropic hypogonadism***: Causes:
  - Constitutional delay (mc)
  - Chronic illness (DM, CRF, CF)
  - Anorexia nervosa
  - Excessive exercise
  - Kallman's syndrome
  - Hydrocephalus or CNS tumor
  - Pituitary adenoma (prolactinoma)

- ***Hypergonadotropic hypogonadism***: Causes:
  - Abnormal gonadal development
  - Turner syndrome
  - Swyer syndrome
  - Premature ovarian failure (POF)
  - Following chemo, radio
  - Galactosemia
  - Autoimmune
  - Infections (mumps)

Mx

- **Puberty Induction**:
  - low dose of ethynyl estradiol (1/10 COCP) at night, then dose increased at 6 m interval until breakthrough vaginal bleeding occurs then use combined pills
- **Hypogonadotropic hypogonadism**:
  - Pulsatile gonadotropins via SC pump or FSH and LH
- **Long term** (COCP or **HRT** - to prevent osteoporosis)

Kallman's Syndrome

Information

- F:M – 7:1
- X-linked Recessive
- S/Sx: delayed puberty, anosmia (or hyposmia), commonly there are associated midline structural defect and mental restriction

Turner Syndrome	
Genetics	• Mosiaciasm (46 XX + 45 XO)
S/Sx	• **Prenatal**: cystic hygroma, non-immune hydrops, IUGR • **Postnatal**: - Short stature - Gonadal failure (1/3 post menarche - 2ry Amenorrhea) - Shield chest: widely spaced nipples - Short and webbed neck, low hair line - Lymphoedema - Cardiac (Aorta Coarctation), Renal (Horse shoe kidney) - Endocrine (Hypothyroid, insulin resistance)
Dx	• Karyotyping
Mx	• GH to improve height • Puberty induction • Long-term HRT (to grow the uterus) • Childbearing possible by ovum donation, they have inactive ovaries, but they have a small uterus

Sywyer Syndrome	
Genetics	• 46 XY, 10% mutation in Sry gene, 90% idiopathic
S/Sx	• Non functioning testes (no AMH, no testosterone) • Present uterus, fallopian tubes • 30% gonadal malignancy risk (Dysgerminoma) • Gonadal dysgenesis • Female external Genetalia • Tall stature • Absence of pubertal development
Dx	• Karyotyping, Assess Sry mutation
Mx	• Puberty Induction • Childbearing (Ovum donation) • Gonadectomy to exclude malignancy • Long-term HRT

1ry Amenorrhea (3%)

Definition	no menstruation, investigated at age 14 without 2ry sexual characteristics (SSC) or 16 + SSC (mainly breast enlarge.)
Clinical	a. **History**: - Anosmia (Kallman's Syndrome: GnRH deficiency, X-R) - Excessive exercise or competitive sports: this is the MCC - Anorexia Nervosa (infertility cause - low gonadotropins) - Cyclic Pelvic Pain b. **Examination**: - Stature (short: Turner, Tall: Kallman's) - BMI (V.low: Anorexia Nervosa / high & low are causes) - Breast development (gonads are functioning or used to) - Presence of hair (absent in androgen insensitivity)
Investiga-tions	- FSH, LH - Estradiol level - Peripheral blood karyotype - Pelvic U/S and MRI
Mx	- Hormone (if gonadal): induce puberty, protect from OP - Expand the vagina to allow sex as in (CAIS and MRKH) - Psychological support for fertility and sexual implications - Fertility by (ovum donation): in Swyer and turner, in Rokitansky we need a surrogate uterus

Swyer: uterus with non-functioning testes

CAIS: no uterus with functioning tests

1ry Amenorrhea		
Cases	**Breast Development**	**FSH Level**
A. Central defect	**Absent**	**Low**
B. Gonad problem	**Absent**	**High**
Karyotype is required to differentiate:	Turner syndrome (45 XO)	
	Premature ovarian failure (POF – 46 XX)	
	Swyer Syndrome (46 XY)	

C. Puberty Arrest	Normal	High
Karyotype + imaging study	POF, Uterus Present	
	Complete Androgen Insensitivity (CAIS - 46 XY)	
D. Anatomical	**Normal**	**Normal**
Do Pelvic imaging to classify into:	Absent Uterus Rokitansky syndrome or MRKH,	
	Obstructive anomalies: might cause *hematometra*. Or pressure effect urinary *acute urine retention*	

2ry Amenorrhea (97%)

Definition	the absence of menstrual periods for 6 m in a woman who had previously been regular, & 12m in irregular
Causes	• *The MCC for 2ry Amenorrhea is pregnancy,* • *the MCC pathologically is PCOS*
Clinical	a. History b. Physical Examination: - Hirsutism, clitoromegaly, galactorrhea - E2 def: smooth vagina, lacks rugae, dry endocervix
Investiga-tions	• **Hormonal profile** • **TFT**: hyperthyroidism/hyperprolactinemia cause 1ry/2ry • **Endometrium thickness**: - If thick then high estrogen - if think then no estrogen (POF): we check FSH, LH, E2 - in POF: low E2, high FSH (<25) in two occasions • **FSH testing**: FSH is greater than 30-40, indicates OF • **estradiol lvl**: With ovarian failure, estrogen is low (<20-40) • Long period of anovulation: Biopsy: R/O hyperplasia, malignancy • **Progesterone challenge test**

<table>
<tr><th colspan="3">Progesterone challenge test</th></tr>
<tr><td colspan="2">+</td><td>-</td></tr>
<tr><td colspan="2">Anovulation, PCOS</td><td>Low estrogen, Anatomical, POF</td></tr>
<tr><td>Wants to get pregnant:
- Clomiphene citrate, inject gonadotropins</td><td>No:
- OCP
- Periodic progestin withdrawal</td><td></td></tr>
<tr><td>Hypotha-lamic Ammen-rrhea</td><td colspan="2">- do not bleed after the progestin challenge but do bleed after estrogen/progestin and have normal or low FSH/LH

- Possible Causes of Hypothalamic Amenorrhea:
- medications (e.g. phenothiazines),
- extremes of weight loss,
- stress or exercise.
- A pituitary or hypothalamic tumor</td></tr>
<tr><td>Mx</td><td colspan="2">HRT for protection from osteoporosis.</td></tr>
</table>

• **Asherman's syndrome** are intrauterine adhesions that occur after infections or D&C, if the basalis gets damaged think of Asherman's

• **Anovulation**: (Progesterone Lacking, no corpus luteum) - it can manifest in the early stages amenorrhea, but in the late stages menorrhagia, characterized by very thin and sticky cervical mucus

Infertility

UPSI "Unprotected Sexual Intercourse"

Definition	• Inability to conceive after 1-2 y of regular UPSI (NICE) - it is linked to the woman's age, if <35 y she can try for 2 y, if >35y then for 1 y and if >40 y then for only 6 m • **Primary infertility**: couple failed to conceive before • **Secondary**: been pregnant regardless the outcome
Conception Chances	• 85% will conceive within 1 yr (if no Contra & <35 yo) • ½ will conceive in 2nd year (cumulative 92%) • the probability of pregnancy for 1 regular cycle is 20%,
Factors Affecting Fertility	• **UPSI Frequency/timing**: - every 2-3 d optimize chances, the more the better • **BMI**: - high BMI (>30) causes anovulation (long time) - low BMI (<19) have irregular menstruation • **Smoking**: in both parents • **Caffeinated beverages**: no evidence • **Alcohol**: intoxication affect semen quality • **Prescribed, OTC and recreational drug use** • **Occupation** • **Tight underwear**: ↑ scrotal temperature & ↓ quality
Causes	- 25% male, 25% female, 25% mixed, 25% unexplained 1) **Sperm** motility, morphology & concentration (count). 2) Regular **ovulation** of a healthy ovum each cycle. 3) Healthy **fallopian tubes** and receptive **endometrium**.
Basic Work up	• **Carried out by the GPs and should be offered to**: 1. Woman in reproductive age not conceived after 1 year of UPSI, in the absence of any known cause 2. Woman in reproductive age who is using artificial insemination to conceive after 6 failed trials.

• **Consider earlier referral to infertility specialists in:**
- the woman is aged 36 years or over.
- there is a known clinical cause or a Hx of infertility.
- treatment that may result in infertility (as cancer ttt).
- People concerned about their fertility & who known to have chronic viral infections such as hep B, C or HIV.

• **Semen analysis (WHO 2010) – (Kruger's Criteria)**:
- we call it *SFA* (*seminal fluid analysis*) or sperm analysis the pt. abstain from sex for 3 days then take a sample

Semen Volume	1.5 ml or more
pH	7.2 or more
Sperm Concentration	≥ 15 million spermatozoa/ml
Total Sperm count	≥ 39 million spermatozoa/ejaculation Oligospermia: low count Azoospermia: absent count Aspermia: No ejaculation/retrograde
Total Mobility	≥ 40% or ≥ 32% with progressive motility (known as Grade A.)

- ***Retrograde ejaculation*** happens when the bladder neck fails to close, we Dx by telling the pt. to have sex and then we perform a urine analysis, we treat this case by treating the cause, to solve infertility we may do IVF, we obtain the sperms for IVF, by 2 options:
1) ***We alkaline the urine of the pt***. 1-night b4 taking the specimen so that the sperms will survive in acidic urine.
2) ***We do surgical sperm retrieval:*** take sperms directly from the testes (***TESA - testicular sperm aspiration***)

- ***What are the components of seminal fluid***?
96% of the seminal fluid is *seminal plasma*, secretions from prostate & seminal vesicles, and about *3% sperms*

• **Evidence of ovulation**
(Day 2-3 gonadotropins, Day 21 progesterone):
- *Evidence*: we should have a regular cycle to do this:
a. *Menstrual Hx of regular cycle*
b. *serum progesterone in the mid-luteal phase* of their cycle MLP (mid luteal progesterone - day 21 of 28 day cycle – even if they have regular menstrual cycles)
c. *Serum gonatropins* (FSH/LH) on *Day 2-3*: at day 3 we test the level of hormones, (FSH, LH and E2) to check the ovarian reserve (# of eggs) especially in irregular periods

• **Susceptibility of Rubella**:
harmful to the fetus, it causes congenital rubella syndrome (triad: sensorineural deafness (58%), eye abnormalities 43%, congenital heart disease 50%)

• **Cervical Smear Screening**
• **Screening for Chlamydia trachomatis**
• **Serum prolactin**: only needed in irregular cycles
• **TFT**: only needed in irregular cycles

• **Ovarian reserve**:
- more important in >35 yo, suspected ovarian failure and to detect response to ovulation induction
- no evidence for: ovarian volume, ovarian blood flow, inhibin B, E2

- *We have three methods to asses ovarian reserve*:
1) *Early follicular phase* (day 2-5): FSH it should be > 8.9 IU/L for a low response and < 4 IU/L for high response, but this is not too sensitive because of cyclic changes.

2) *AMH* (Anti-mullerian hormone): it prevent the effect of FSH, and decrease follicle recruiting each cycle to preserve eggs, and this test is more sensitive, you can order this test at any point during the menstrual cycle as it is not affected by the cyclic changes: ≤ 5.4 pmol/L for a low response or ≥ 25 pmol/L for a high response

3) *AFC* (Total antral follicle count): we count them using U/S and it is sensitive.

• **HSG**: tubal patency test, used to see the uterus shape.

• **Hysterosalpingo-contrast-Sonography** (**Hy-Co-Sy**)
- tubal patency test
- Consider before IUI
- Requires more expertise.
- Less invasive.

• **Laparoscopy**:
- *Invasive*, check for pelvic disease, endometriosis, and check for tubal patency by using a dye
- Therapeutic as in laparoscopic myomectomy, LOD, and tubal surgery

• **Hysteroscopy**:
- in case of repeated IVF cycles
- therapeutic as intra-uterine septum

Mx

• *Counseling*
• *Treat the cause*
• *Ovulation induction*

• *Artificial* (*Intrauterine*) *insemination* (*IUI*):
- used for female infertility factor (not male): inject the male sample inside the uterus, according to the NICE, IUI is recommended *in only 3 cases*:
1) Inability of the couple to have sexual intercourse
2) HIV infected male
3) Couple of a same sex
- 50% of women will conceive after 6 cycles.
- ½ of unsuccessful, will conceive with further 6 cycles.
- Success rate varies between 8-12% per cycle.
- Do not offer IUI for people with unexplained infertility, mild endometriosis or mild male factor

• ***IVF/ICSI***: intracytoplasmic sperm injection, where we inject the sperm inside the cytoplasm of the egg

o **Treat the Cause**:
• ***Male factors***:
A. Medical Mx:
- Men with hypogonadotrophic hypogonadism should be offered gonadotrophin drugs.
- Men with idiopathic semen abnormalities should not be offered anti-oestrogens, gonadotrophins, androgens, bromocriptine

B. Surgical:
- correct the epididymal block: obstructive azoospermia.
- No evidence for surgical ttt of varicocele in infertility.
- SSR (PESA, TESA and TESE) ...then ART
SSR: surgical sperm retrieval.
PESA: percutaneous episymal sperm aspiration.
TESA: testicular sperm aspiration through a needle.

TESE: testicular sperm extraction, where we open the testes and take a biopsy.
ART (form Wikipedia): assisted reproductive technology.

C. Management of ejaculatory failure:

Causes of azoospermia or oligospermia: it may be
1) higher center hypogonadotropic: give HRT
2) Testicular failure with high gonadotrophins.
3) Post testicular they mostly have obstruction, or retrograde ejaculation, they may also have bilateral absence of the vas like cystic fibrosis pts, and they always check for this in the west as CF is common

• ***Female factors***:
o **Ovulation disorders:**

The WHO classifies ovulation disorders into 3 groups:
1. **Group I**: hypothalamic pituitary failure (hypothalamic amenorrhoea or hypogonadotrophic hypogonadism).
2. **Group II**: hypothalamic-pituitary-ovarian dysfunction (Predominately PCOS).
3. **Group III**: ovarian failure

GROUP 1: - Weight gain if BMI less than 19.
- pulsatile administration of GnRH or gonadotrophins with LH activity to induce ovulation.

• **Hyperprolactinaemic amenorrhoea**:
- Women with ovulatory disorders due to hyperprolactinaemia should be offered treatment with *dopamine agonists* such as *bromocriptine*.

o **Tubal and uterine factors:**

1. *Tubal microsurgery and laparoscopic tubal surgery*:
- May be more effective than no treatment.
- No strong evidence. (e.g.: fimbrial end dilatation)

2. *Tubal catheterization or cannulation*:
- With proximal tubal obstruction, selective salpingography + tubal catheterisation, or hysteroscopic tubal cannulation, may be ttt options.
- pregnancy probability 50%

3. *Uterine surgery*:
- Women with amenorrhea who are found to have intrauterine adhesions should be offered hysteroscopic adhesiolysis because this may restore menstruation and improve the chance of pregnancy.

4. *Surgery for hydrosalpinges before IVF* treatment:
- Laparoscopic salpingectomy or disconnection of both tubes improve IVF/ICSI success (↑ pregnancy rate 50%).

o **Endometriosis:**

1. ***Medical Mx***:
- Ovarian suppression of minimal & mild endometriosis diagnosed as the cause of infertility in women does not enhance fertility and should not be offered.

2. ***Surgical ablation***:
- In minimal or mild endometriosis; surgical ablation or resection of endometriosis + laparoscopic adhesiolysis improves the chance of spontaneous pregnancy.
- Laparoscopic resection of endometriomas may be beneficial, however recent RCTs suggest intervention only in endometriomas > 4cm.

	- In moderate or severe endometriosis; surgical treatment should be offered. (Debatable) - Post-operative medical treatment does not improve pregnancy rates. **Unexplained infertility:** - Ovarian stimulation should not be considered as does not improve pregnancy or birth rates. - Advise to try to conceive for 2 years of UPSI before other options (Fecundity is 3- 5%). - After 2 y (dr:5y) of failure to conceive consider IVF/ICSI.
IVF/ICSI	
Definition	the oocyte is fertilized by sperm outside the body (in vitro) & then gamete retransferred intrauterine There is a criterion in IVF that we should only put back one embryo to avoid multiple pregnancies Unfortunately here in Jordan there is no regulation so
Indications	• In women <40 who have not conceived after 2 y of regular UPSI or 12 cycles of artificial insemination (Where 6 or more are by intrauterine insemination), offer 3 full cycles of IVF, with or without ICSI. If the woman reaches 40 during ttt, complete the current full cycle but do not offer further full cycles. • In women aged 40–42 who have not conceived after 2 years of UPSI or 12 cycles of artificial insemination (where 6 or more are by intrauterine insemination), offer 1 full cycle of IVF, with or without ICSI.
IVF/ICSI Cycle	• **IVF/ICSI cycle consists of**: 1. Down-regulation of gonadotrophins: by GnRH 2. Controlled ovarian stimulation: by FSH 3. Maturation of oocytes. 4. Oocytes retrieval. 5. Fertilization and incubation of the gametes.

6. Embryo-transfer.
7. Luteal phase support: with progesterone
(and cryopreservation choice offered if good quality embryos are available)

Down-regulation:
- shut down the pituitary giving a GnRH analogue, to suppress FSH & LH secretion
- to avoid premature LH surge & spontaneous ovulation
- either GnRH agonist or antagonist protocol
- always use GnRH antagonist protocol in women with high risk of OHSS (Ovarian hyperstimulation syndrome)

Success rate: 40-60%/cycle

Controlled ovarian Stimulation:
- then we inject controlled amount of FSH to induce multiple ovulation.
- By urinary or recombinant FSH and/or HMG.
- Dose depend: age, BMI, PCO presence, ovarian reserve
- Monitoring of folliculometry by USS and E2.

Triggering of ovulation:
- By urinary of recombinant HCG, 36 before oocyte retrieval.

Retrieval:
- under U/S guidance by needle connected to a test tube that we send to lab where they collect eggs.
- Fertilization and incubation
- Embryo-transfer: SET/DET

Luteal Phase support:
- Should be offer luteal phase support with progesterone till 8 weeks of gestation.

- Different form of progesterone with different routes of administration are available, RCT are taking place comparing efficacy of different forms.

Cryopreservation:

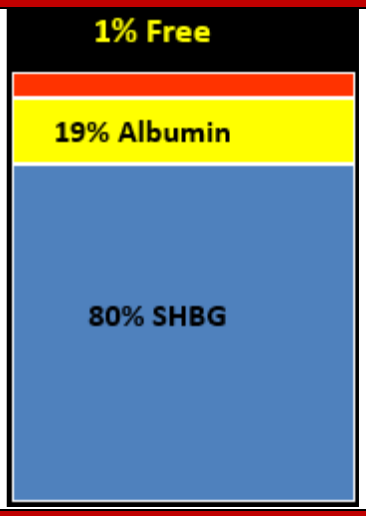
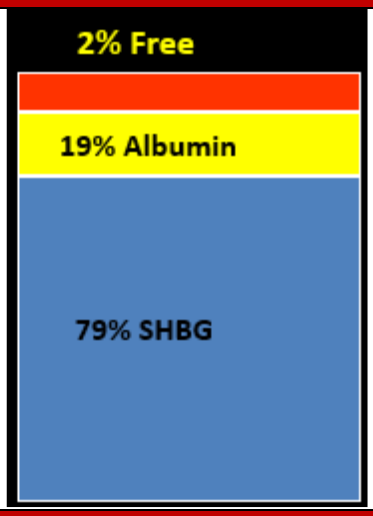
- Cryopreservation of semen, oocytes or embryos should be offered to anyone who may undergo treatment that may affect his/her fertility. (e.g.: chemo for cancer).
- For cancer-related fertility preservation, do not apply eligibility criteria used for conventional infertility ttt.
- Do not use a lower age limit for cryopreservation for fertility preservation in people diagnosed with cancer.

Hirsutism

Definition	• male pattern (terminal) hair growth in a female due to increased androgen production or sensitivity • it is not a Dx but a manifestation
Hypertrichosis	generalized non-sexual (villus) hair growth (short thin), Causes: hereditary, medication, malignancy
Virilism	• Hirsutism + other defeminization Sx: 2^{o} Amenorrhea, male pattern baldness, Clitoromegaly, Voice deepening (irreversible) • Causes: ovarian and adrenal tumors, CAH, Cushing's and acromegaly, Iatrogenic (mainly by danazol)
Causes of ↑ Androgen Level	a. ↑ production of androgens: - adrenal (Cushing's, CAH, tumors) - ovarian (tumors, PCOS) b. ↑ free testosterone: - ↓ SHBG, normal T, ↑ insulin due to insulin resistance (PCOS) c. Increase local activity of 5-α-reductase (5αR) d. Iatrogenic - Hyperandrogenism causes: 75% PCOS, 15% idiopathic, 3% adrenal hyperplasia, 1% tumors ovarian, adrenal, medications, cushing's - MCC of hirsutism is familial not hyperandrogenism - Medications e.g.: androgens, danazol, anabolic steroids, minoxidil, phenytoin, valproate, diazoxide
Physiology of hair growth	- Adult hair is 2 types (terminal, villus) - Hair growth is dynamic, (it goes by 3 phases): a. **Ana**gen (growing): mitosis, e.g. scalp hair, face b. **Cata**gen (ceasing) c. **Telo**gen (resting)

Testosterone level

SHBG has only 1% difference, and only 1% increase in testosterone, but this actually means that the T level doubled

Normal women	Hirsutism
	

Female Androgens

Name	Secreted by
Dehydroepiandrosterone (**DHEA**)	Adrenal Gland
DHEAS	Adrenal Gland
Androstendione (**A**)	Adrenal Gland + Ovaries (50/50)
Testosterone (**T**) produced from A conversion	Adrenal Gland + Ovaries T (Theca cells) > Estrogen (E – Granulosa cells)
Dihydrotestosterone (**DHT**)	produced from T conversion by 5-α-R, it is more potent than T (T x 100 / DHT x 200)

Clinical Assessment

a. Detailed Hx
b. Examination:
- Severity by Ferriman Gallwey Scoring System
- Acne, and Virilization signs,
- Acanthosis Nigricans

Investigations

- Androgens: Testosterone concentration, FAI (free androgen index), DHEA
- 17-OH progesterone (used for CAH (21-OH def.))
- Dexamethasone suppression test/24 hr urinary free cortisol (Cushing)
- Pelvic imaging (US, CT, MRI)

Treatment	I. Treat symptoms: i.e: remove excessive hair II. Treat the Cause: - OCP: ↑ SHBG, ↓ androgen (levonorgestrel) - Androgen Antagonists: 2nd line mono or + OCP in severe cases (Spironolactone, Cyproterone acetate, Flutamide, Finasteride) - Cyproterone Acetate (CPA + ethinyl estradiol) - Elfornithine (Vaniqa®): topical antiprotozoal, inhibit hair follicle ornithine decarboxylase enzyme, S.E (obstruction of sebaceous glands and hence acne worsening), it enhances effect of laser treatment - Insulin sensitizing agents: metformin - GnRH agonists - Weight loss - Surgical

PCOS

Prevalence	5-10%, 25% of IVF patients, higher in south Asians, higher in gestational diabetes, premature adrenarche
Etiology	unknown (mostly familial)
PCOS Criteria	ESHRE/ASRM (2 of the following + exclude other causes): - Oligo and/or anovulation - Hyperandrogenism (clinical) and/or hyperandrogenemia (biochemical) - PCO on U/S (≥12 follicles per ovary, 2-9mm and/or ovary volume (>10ml))
Pathophy-siology	- Ovarian dysfunction: ↑ androgen – by ↑ LH by theca - Hypothalamus dysfunction: ↑ androgen – by ↑ LH - Insulin resistance: compensatory hyperinsulinemia, it ↑ androgen production, ↓ SHBG in liver and ↑ free T,

	note: In patients with PCOS, there is selective tissue insulin sensitivity (skeletal muscle is resistant but ovary and adrenal are sensitive).
Manifest-ations	- Obesity (50%): central android - Metabolic syndrome: DM II , HTN, IHD, Atherosclerosis, - Dermatological: Hirsutism, Acanthosis, alopecia, acne - Long-term: infertility (caused by anovulation), endometrium Ca, CVS, Miscarriages, PET, DM, HTN
Investigate	- TSH - Fasting Blood Sugar (FBS) and lipid profile - Prolactin (PRL): ↑ in 40% 2^{ry} chronic estrogen - Free Androgen Index - FSH and Estradiol (to exclude POF / FSH >25 + E2 <30)
Treatment	**A. Weight Reduction:** - Life style, Bariatric surgery - Medications: Sibutramine (central), Orlistat (peripheral) B. Ovulation Induction: by this *chronological order*: 1) ***Wt. reduction*** to reach optimal BMI around 19-30. 2) ***Metformin*** with 8% rate of success. 3) ***Clomiphene*** for 6 cycles with 75% ovulation rate. 4) ***Letrozole aromatase inhibitor***. 5) Either ***FSH*** & ***LH injections*** or Laparoscopic Ovarian Drilling (***LOD*** – *Success: 80% to ovulate, and 60% in pregnancy, it applies the Rule of 4: 4 punctures, 4 mm depth, 4 seconds on cautery and on 40 Watt*) 6) ***IVF*** (In vitro fertilization) as a last resort. **N.B.:** - GnRH should not be offered with ovulation induction for risk of OHSS, No evidence for the role of adjuvant GH.
WHO Classify Anovulat. (Imp!!)	1) Hypothalamic-pituitary-gonadal: The MCC of hypothalamic is stress by diet and exercise. 2) Hypothalamic-pituitary-ovarian (PCOS): cover 75% 3) Gonadal failure: less than 5%.

Fibroids

Info	• Fibroids are leiomyomas (benign tumor of smooth muscles) • Incidence rate 30% • Life-time risk 80% (by histopathology) • Estrogen – Dependent • Common age pf presentation: 30's • Growth rate: 1cm/yr if rapid consider sarcomatous changes (<0.2%)
Risks	• *Nulliparity* (high estrogen) • *Early menarche and late menopause* (longer estrogen duration) • *Afro-Caribbean* (black racial) • *PCOS* • *Obesity* (High estrogen due to peripheral conversion (aromatization) of androgen to estrogen
Protective factors	• *Multiparity*: post-partum remodeling of the uterus leads to shedding off • *Smoking* • *Late menarche, early menopause* • *OCP*
Classification of fibroid	• According to **Site**: - *Intramural* (MC 70%) - *Subserosal* (most benign) - *Cervical*: difficult to treat, highly vascular, treated by hysterectomy - *Broad ligament* - *Parasitic*: avulsuion of subserosal - *Submucosal* (3 grades): Grade 0: 100% within the cavity Grade 1: 50% - 100% Grade 2: <50% (the remaining within the myometrium – these are the most difficult to resect)

C/P	• Mostly **asymptomatic** (70%!) • Most common presentation: **AUB** (menorrhagia: increase in amount, duration or both at regular interval, if irregular this is menometrorraghia) • Other S/Sx: Pressure Sx (urinary, pelvic and back pain), Secondary infertility, recurrent miscarriages • *This mainly depends on what?* Site, Size of the fibroids
Dx	• C/P • U/S • MRI: site, size, number • Hysteroscope • Gross
How does it cause AUB	• *Endometrial stretching* (most acceptable, due to increase of the cavity size – increase surface area) • *Increase vascularity* (the tumor needs more blood to grow) • *Uterine contractibility* • *Endometrial hyperplasia* (due to hyper-estrogenic state)
How does it cause infertility	• *Interfere with implantation* (and if it occurred, it increase miscarriage risk) • *Anatomical distortion* (indication for surgical Mx) • *Tubal obstruction (mechanical)* (present sperm passage) • *Hypervascularity* (sick endometrium + abnormal hormones) • *Intramural causes infertility* if: > 4cm, and due to abnormal hormonal changes
How to Mx	• According to Age, size, site, number, Sx, fertility wishes • for example read these scenarios: 1. *Pt young in reproductive age, symptomatic*: go for surgery 2. *Pt premenopausal*: medical till menopause (hypoestrogenic state, it will shrink on its own) 3. *Pt during waiting list for surgery*: medical Mx 4. *Pt young, small fibroids with severe AUB and don't want hormonal therapy*: NSAIDs (20-50% decrease the bleeding)

Mx Options

A. Expectant:

- Asymptomatic, small, close to menopause
- Follow up fibroid growth every 3-6 months

B. Medical:

• Indications for medical Mx: close to menopause, unfit for surgery

• *Progesterone (cyclic one)*

• *Mirena (the best choice)*

• *NSAIDs* (decrease the menstrual loss 20-30%, used when the only Sx is menorrhagia, and in small fibroids

• *GnRH Analogue* (*Decapeptyl*):

a. when is it used?

- if you are close to menopause or pre-op (shrink the size by 50%)

b. For how long is it given?

- 3 months (max shrinkage at 8-12 weeks, after that it will not shrink & due to the hypoestrogenic state (you will enter pseudomenopause > osteopenia > osteoporosis (risk after 9 m)

c. How does GnRH act?

- it causes hypogonadotropic hypogonadism, which will shut down the pituitary, NO FSH, NO LH so no folliculogenesis and no estrogen so hypoestrogenic state will occur and this decrease the need of blood supply, so low vascularity leads to low size eventually decreasing the Sx (decrease intra-op bleeding, and decrease the decline in Hb which will provide time to correct the anemia)

d. What is the only bad effect of decapetyl?

- it will obliterate the cleavage plate capsule, there is a fake capsule comes from the compression of the growing myoma on surrounding tissue, and when shrinkage occur adhesions occur in the cleavage plate capsule
- also note that this is a very expensive medication

C. Surgery:

• *Myomectomy*: indications:

a. Young age b. Sx

c. Fertility wishes d. Pt desire

• *Hysterectomy*: if completed family, why hysterectomy?

a. High recurrence rate: 40%

b. Risk of uterine rupture

c. Risk of placenta previa

• *Uterine artery embolization:*

- risk of premature ovarian failure 5%

- indications: single, large fibroid, unfit for surgery

• *Hyphe*: *Radiofrequency ablation* > otolysis

• *Transcervical resection of fibroids* (*TCRF*) by hysteroscope through the cervix in submucosal fibroids

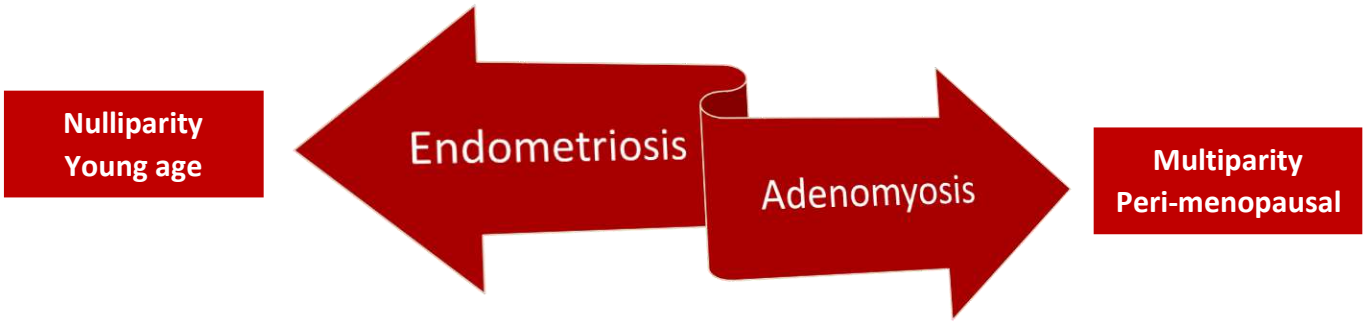
Endometriosis

Endometriosis	
Definition	Presence and growth of endometrial glands, stroma outside the endometrial cavity Can be found in any part, most commonly throughout the pelvis (ovarian, uterosacral ligament 65%) **Ovarian** endometrioma 5% of infertile women scheduled for IVF, **Ovarian**: bleeding and scarring will occur which will cause **Chocolate cyst** (accumulated altered blood), this is very harmful to the ovarian reserve as it destroys healthy tissue.
Pathophys Theories	• **Coelomic metaplasis** (the most acceptable one) • Implantation theory, • Embolization theory
RF	• Caucasian (5-10%) • Nulliparous • Higher socioeconomic classes
Hx	• *Pelvic pain* (MC), *Dysmenorrhea* & *Deep Dyspareunia* • Subfertility (might cause infertility – 30-40%) • Bowel habit alteration • Hematuria • Might be asymptomatic!
PE	• **Abdominal**: mass, ruptured cyst (acute abdomen) • **Speculum**: bluish discoloration of cervix or vagina • **Bimanual**: pathognomonic sign: fixed retroverted uterus that can't be moved due to severe adhesions • **Adnexal**: ovarian mass

Infertility	• **Pathophysiology (Causes)**: 1) Presence of abnormal macrophages (main cause) 2) Extensive adhesions & distortion of anatomy 3) Ovarian endometrioma leads to poor ovarian reserve (Ovulatory and endocrine abnormalities) 4) Impaired implantation • **Mx of infertility in endometriosis**: - Medical Mx: no role (teratogenicity/delay conception) - Mild-moderate: Surgical Mx - Severe: IVF
Investigate	• **Laparoscopy**: gold standard for staging and Mx - Classify: mild, moderate, severe, deep, superficial • **US**: ovarian endometrioma • **MRI**
Mx	• **Depend on**: age, fertility plans, Sx, site • **Conservative**: simple analgesics, avoid hormonal Rx • **Medical**: - Aim is to achieve amenorrhea atrophy & stop growth - *COCP*, progestogen, GnRH agonist - all these medications help in reducing pain - high recurrence rate after Rx cessation • **Surgical**: drainage & stripping, peel & scrape the cyst - Laparoscopic ablation and excision (effective for pain – high improvement rate) - Laparoscopy: Dee-roofed (striping & is indispensable) and excision - TAH + BSO (total abdominal hysterectomy + bilateral salpingo-oopherectomy)

Adenomyosis

Adenomyosis	
Definition	• Presence and growth of endometrial glands and stroma **within** the myometrium (cystic changes)
RF	• High parity (>5) • Curettage of the uterus (Hx of D/C & E/C)
Hx	• HMB • Progressive dysmenorrhea • Deep dyspareunia
PE	• Symmetrically enlarged uterus that may be tender
Dx	• **Histologically** after hysterectomy (only way for definitive Dx) • **MRI** maybe helpful
Mx	• Hormonal therapy: limited response • **Hysterectomy**: often required



Endometrial Cancer

Info	• **Estrogen dependent disease** • Normally progesterone balances the estrogen effect • Endometrium: the part that responds to hormones • MC type: adeno Ca "unopposed estrogen" • Diagnosed early: because it occurs after menopause mainly, and suddenly they have bleeding • **Mean age**: 61 years (75% post-menopausal) • **50% Complex with Atypia**! *highly progress to cancer*
Etiology	↑ Estrogen (theca tumors, estrogen use, unopposed)
Sequence	↑ Estrogen - ↑ growth – hyperplasia simple (normal cells) – Complex hyperplasia (abnormal) – Atypia – Malignancy (if crossed basement membrane)
RF	o **Type of patient**: • Nullipara/low parity • middle or upper social classes • ↑ BMI • Early menarche and late menopause • White people o **Associated factors**: • DM • HTN • Fibroids • PCOS • Tamoxifen use - Tamoxifen: estrogen antagonist on breast, agonist on uterus • Infertility, arthritis, thyroid disease • Pelvic irradiation • FHx of breast, ovarian, colon cancer (Lynch syndrome – HNPCC)

Protective Factors	• Smoking (as Crohn's) • Oral Contraceptives (mainly progesterone) • Progesterone use
	• Endometrioid Adenocarcinoma 50% • 95% adenocarcinoma, 5% SCC are well differentiated than anaplastic • Associated: pyometra (uterine infection) or hematometra
Types	• **there are 2 histopathological types**: Type 1: due to unopposed estrogen: - good prognosis - e.g. adenocarcinoma Type 2: not related to estrogen - bad prognosis, 5YS: <50% - e.g.: serous, clear cells
Spread	• MC Route: Direct invasion • Types: Direct, LN, Blood (least common)
Hx	• Postmenopausal bleeding (R/O Endometrium Ca) • MC Sx is AUB! (20%): • Perimenopausal menstrual irregularities • Blood stained vaginal discharge • Heavy and irregular vaginal bleeding
PE	• mostly entirely normal • check surrounding structures (METS, extension)
Investigate	• **US**: for thickness, invasion and LN staging, thickness: thin (≤ 4mm) reassure her / if thick (>4mm): biopsy • **CBC**, **LFT**, **RFT** • **CXR** • **Cytology brush** (to analyze cells) • **Endometrial sampling**: a. Sample for histology: Piplle b. Examination under anesthesia and D/C c. Hysteroscopy and biopsy

	• **Suspicion of METS**: proctoscopy, sigmoidoscopy, cystoscopy, bone scan
Staging	• **SURGICAL**!!!! • **Staging laparotomy for Endometrium Cancer**: Hysterectomy + Bilateral salpingo-opherectomy (BSO) + Abdomen fluid sample (Peritoneal wash cytology) + LN (pelvic sampling – not always) • **Prognostic factors included in surgical staging**: histologic type, differentiation, stage, depth, result of peritoneal wash, LN METS, adnexal METS, others, Ploidy and GF, age and body morphology
Degree of Differentia-tion	- it is based on the degree of abnormality of glandular architecture and the degree of nuclear atypia • **G1**= 5% or less of non-squamous or non-morular solid growth pattern (well differentiated, glandular pattern similar to normal endo glands) • **G2** = 6-50% of a non-squamous or non-morular solid pattern growth (has glandular structures mixed with papillary, occasionally solid areas) • **G3** = >50% (glandular structures has become permanently solid with a relative Paucity of endometrial glands)

Carcinoma of the Endometri-um (FIGO) Classification

I	**A**	T confined to uterus, no or < ½ myometrial invasion (mc!)
	B	> ½
II		cervical stromal invasion, not beyond uterus
III	**A**	T invades serosa, or adnexia
	B	invades vaginal &/or parametrial involvement
	C1	pelvic node
	C2	Para-aortic node
IV	**A**	bladder and/or bowel mucosa
	B	Distant METS

• **In General**: TAH + BSO + PW + LNB

o **Information**:
• anything beside 1A well differentiated (surgery only), you must give radiotherapy & chemo for stages 3, 4
• laparotomy with a lower midline abdominal incision for better exposure for staging
• pelvic and para-aortic lymphadenectomy are indicated in high RF cases (grade, vessel/myometrial invasion, cervical/adnexal involvement) or if its enlarged LN, or if its serous/clear Ca
• pelvic and para-aortic lymphadenectomy are indicated where high RF (grade, invasion, enlarged LN, serous or clear Ca) are present
• usually external radio followed by intracavitary radio

Mx

• Role of chemotherapy is limited

o **Post-operative radiotherapy indications**:
• Moderate, poor differentiation (G2,3)
• other types than adenocarcinoma
• Invasion of myometrium
• (+) peritoneal wash
• (+) LN

o **Radiotherapy may be used as**:
• adjuvant to surgery: stage I
• radical treatment: stage ILIII
• palliative treatment: stage IV

o **Adjuvants to hormonal therapy**:
• Medroxyprogesterone acetate
• GnRH analogues

Others	o **Synchronous ovarian and endometrial cancer**: found in 5% of women with endometrial carcinoma & 10% of women with ovarian cancer o **Inoperable patients**: For women with presumed stage I disease who are unfit or unwilling to have surgery, primary radiation therapy may be acceptable. o **Fertility preservation**: Women with stage I, grade 1 endometrial carcinoma who wish to preserve fertility may be candidates for treatment with progestin therapy, **megestrol acetate**. evaluation prior to medical therapy (eg, dilation and curettage, imaging studies) is necessary to try to confirm that the lesion is low grade, low stage disease.
Uterine Sarcomas	
Information	• arise from the myometrium or from connective tissue elements within the endometrium. • Compared to common endometrial carcinomas it behave more aggressively and has poorer prognosis. • **Dx by histology after myomectomy/hysterectomy**
RF	• Race (African-American – x2) • Tamoxifen use (long-term) • Pelvic Radiation • Hereditary conditions (HLRCC)
Types & Classification	• **Homologous**: the tissue that is malignant is normally present in uterus (e.g. endometrial stroma, muscle) • **Heterologous**: tissue is not normally present (bone) • **Malignant Mixed Mesodermal T** (**Carcinosarcoma**): - should be managed as grade III endometrial Ca - 50% have distant METS at the time of Dx

• Endostromal Sarcomas and Leiomyosarcomas: are the MC pure uterine sarcomas

o **Leiomyosarcoma**:
• MC 55 yo, poor prognosis
• Sx: pain, bleeding, mass
• most cases not diagnosed pre-op
• Treatment: TAH+BSO (low response to chemo)
• Arises:
- denovo from uterine muscles
- rarely from previous benign leiomyoma (fibroid <1%)
• you can differentiate between malignant/benign by:
- mitotic count (>10 per 10 high power field)
- presence or absence of atypia
- presence or absence of coagulation necrosis

o **Endometrial stromal tumors**: (3 types)
I. Nodule: benign, rare, hysterectomy(curative)
II. Sarcoma: low grade > TAH+BSO
III. Undifferentiated: pre-menopause > TAH+BSO

o **Adeno-Sarcomas**:
• low grade, post-menopausal
• benign epithelial components + malignant mesenchymal components (low grade endo-sarcoma)

Ovarian Pathology

Cyst events	• Rupture, hemorrhage, torsion, infection
Notes	• With adnexal pathology, there may be referred pain down the cutaneous distribution of the obturator nerve (inner side of thigh down to the knee). • Ovarian cancer is the 2nd most common gyne malignancy after uterine and 5th in women • Majority of ovarian Ts are epithelial in origin (originate from fallopian tubes) • 1ry ovarian neoplasms are commonly in: 40-60s • Teratomas & Sex cord T mostly before puberty • Overall 5YS is 35% • Silent killer: asymptomatic & Dx in advanced age-75% • MCC of death from Gyne malignancy o **In Children**: • Cysts, teratomas MC benign/ Germ cells MC malignant • Torsion MC complication 33%
Investigate	• Pregnancy test • US (torsion: enlarged ovary/mass, free fluid) • Urinalysis and culture • FBC, urea, electrolytes • LFT, coagulation screen • CA125 (only if you suspect malignancy) • Swabs for infection (PID suspicion) • Doppler (torsion suspicion)
DDx	• Ectopic (mc) • Appendicitis • PID • Pelvic abscess • Diverticular disease • UTI • Renal colic/urinary calculi • Fibroid degeneration
Mx	• Expectantly with analgesia and observation, rescan after 6 weeks

	• Laparoscopy if: hemodynamic compromise, uncertain Dx, or likelihood torsion, no Sx relief within 48 hr • COCPs for cyst formers • Ovarian cyst in pregnancy intervention indications: Sx relief, malignancy suspicion • Dermoid cysts – 50% cystadenomas (mostly benign) • Conservative MX is appropriate
Types of Cysts/ Tumors	o **Classification A** (**Nature**) • Functional: follicle, corpus luteum, theca lutein • Inflammatory: tubo-ovarian abscess • Benign tumors: Fibroma, brenner T, benign teratoma • Malignant: Malignant teratoma, cystadenoma /cystadenocarcinoma (>50% for serous, 5% mucinous) o **Classification B** (**WHO classification** – **origin**): o **Epithelial Tumors**: • Serous • Mucinous • Endometroid (Endometriosis??) • Clear cell (mesonephroid) • Transitional cells (Brenner) • Mixed • Undifferentiated/unclassified o **Germ cell tumors**: • Dysgerminoma (MC malignant) • Endodermal Sinus Tumors (Yolk sac tumors) • Choriocarcinoma • Teratomas • Gonadoblastoma o **Sex cord Stromal Tumors**: • Granulosa-Stromal T (Granulosa, thecoma-fibroma) • Anroblastomas: Sertoli-leydig cell tumors • Fibromas: ascites + Hydrothorax = meigs syndrome

Krukenberg	• 2ry tumor with gastric origin (signet ring cells) • mucinous METS • mainly bilateral (other mucinous Ts are unilateral)
Ovarian Ca Sx	• Abdominal, GI, Urinary, Constitutional Sx, + SOB • Granulosa cell T often present early, more acutely
RF	• Sporadic, unknown etiology • **BRCA1/BRCA2 & HNPCC groups most significant** • 10% familial: 3 familial syndromes: - familial breast-ovarian cancer syndrome (BRCA1/2) - site-specific ovarian cancer (BRCA1/2) - cancer family syndrome (Lynch type II) • Age: peak > 60 yr • Reproductive Hx: menarche, nulli,… • Fertility drugs • Personal breast cancer Hx • Talcum powder (Baby powder)
Protective Factors	• Multiparity • Hysterectomy • Oral contraceptives • Lactation • Tubal ligation • Bilateral oopherectomy
Diagnostic tools	• History, PE (ask about other systems for METS) • US: TA/TV (limitations: poor PPV, normal ovary size) • Tumor markers: CA 125: poor specifity, sensitivity • Color-flow Doppler • CT/MRI • CBC, urea, electrolytes, LFT • **Risk of malignancy index** (**RMI**): components: **RMI**= U x M x CA125 - **U**: **ultrasound findings** (1 point for each): * Multi-locular cyst * Bilateral * Solid areas * METS * Ascites - **M**: **menopausal status** (post = 3 / pre = 1) - RMI <25 low risk, 25-200 moderate, >200 high

Tumor markers	Serous	CA 125	Endodermal sinus	α-FP & AT
	Mucinous	CA 19-9	Choriocarcinoma	β - HCG
	Granulosa	Inhibin	Dysgerminoma	LDH, Alkaline phosphatase

US Findings	**Benign Tumors**	**Malignant Tumors**
	• Unilateral	• Bilateral
	• Unilocular	• Multilocular
	• Thin-wall	• Thick-wall
	• No papillae	• Present papillae
	• No solid areas	• Mixed echogenicity (solid areas)
	• vascularity	• Greater vascularity, angiogenesis

Spread

•Seeding, lymphatics, blood (sarcoma, teratoma), direct

Mx

o **Surgery**: for accurate staging (surgico-pathological)

- TAH+BSO
- TAHBSO+ infracolic omentectomy+peritoneal cytology
- Unilateral salpingo-oherectomy (to reserve fertility)
- Cytoreductive/debulking
- Peritoneal METS reduction
- Second look laparotomy
- Laparoscopic surgery
- Conservative surgery
- Fertility conserving surgery

o **Chemo**: Ovarian cancer is a chemo-sensitive solid T

- Adjuvant
- Combination
- Neo-adjuvant
- Agents:

- Alkylating: Cisplatin, Carboplatin
- Plant alkaloids: **Pacilitaxel** (MC!)
- Anti-cancer antibiotics
- Antimetabolites

	• **Life-after treatment**: follow up for reassurance, and recurrence, done by CA125, MRI, CT (as palliative) • Chemo SE: N/V, fatigue, sore throat, ototoxicity (cisplatin), peripheral neuritis, nephrotoxicity, myelo-suspression with infection risk, pulmonary toxicity (bleomycin) o **Radio** o Surgery/Plat/Taxol remains standard care for ovarian cancer since 1990s
Ovarian germ cell T (GCTs)	• Benign/malignant • MC ovarian cancer in the 1st two decades of life • Racial: ↑ in African, South & East Asian & Hispanic • **RF for MOGCTs**: - gonadal dysgenesis, - sexual immaturity & - presence of abnormal karyotype • With multimodality ttt: excellent prognosis and preservation of fertility • **MOGCT Radio**: - Dysgerminomas are radiosensitive - Chemo + toxicities + radio are no longer forms a part of routine treatment
1ry fallopian tube Ca (FTC)	• BRCA-1 and BRCA-2 • 90% of FTCs serous papillary adenocarcinoma • 40–60 years (median age 55 years) • Sx are vague and non-specific but similar to EOC • **Latzko's triad of Sx –** intermittent profuse serosanguinous vaginal discharge, colicky pain relieved by discharge and abdominal or pelvic mass • Rx as EOC

SE	Carboplatin	Paclitaxel
Thrombocytopenia	✓	✗
Neurotoxicity	✗	✓
Alopecia	✗	✓
Nephrotoxicity	✓	✓
Neutropenia	✓	✓
N/V	✓	✓
Hypersensitivity	✗	✓
Arthralgia	✗	✓
Myalgia	✗	✓
Cardiac SE	✗	✗
Diarrhea	✗	✗

FIGO ovarian cancer staging	
Note	From stage I c: is considered advanced ovarian cancer
I	Tumor confined to ovaries
II	One or both ovaries + pelvic extension (below pelvic brim) or primary peritoneal cancer
III	One or both ovaries with cytologically or histologically confirmed spread to the peritonium outside the pelvis and/or metastasis to the retroperitoneal lymph nodes
IV	Distant METS excluding peritoneal METS
Grading by "FIGO" for ovarian cancer – Epithelial T sub-classified	
Gx	Grade cannot be assessed
G1	Well differentiated
G2	Moderately differentiated
G3	Poorly differentiated

Cervical Cancer

Info	• It doesn't occur suddenly, it starts as dysplasia then cancer (takes time maybe years unlike endometrial Ca) • 50% of cases are diagnosed btw ages 35-55, 20% >65 y • The cancer depends on the type of the patient, stage • low incidence in Muslims, Jews
Types	1. **SCC**: 80-90% - outside of the cervix into the vagina, likely to be invasive 2. **Adeno Ca**: 10-20% - inside the cervical canal (columnar epithelium) - arise from *glandular* epithelium (glandular tumors) are not detectable by screening and associated with skip lesions & require radical surgery 3. **Mixed**
Sx	• MC is vaginal bleeding and abdominal pain • abnormal discharge • coital pain, bleeding after intercourse or pelvic exam • menses is longer, heavier
RF	• HPV (Main RF! - 16,18 high risk / 6,11 low risk) • Sexual behavior, Diet • Smoking, Low socioeconomic status • HIV, Chlamydia • Pregnancy, OCP • Diethylstilbestrol (DES)
Prevent-ion	• Avoiding the RF • Pap test: 3 y after 1st intercourse or by age 21 *annually*
Dx	• **History**: - many women are symptomatic, with abnormal cx smear - complain of abnormal vaginal bleeding (postmenopausal, perimenopausal, post coital) - blood stain vaginal discharge

	• **Examination**: - always exam the cervix (histology, biopsy - cuscu's speculum), nothing is found in early stages - PV/PR to determine stage - don't see but suspect then do *pap smear*, more suspicion *colposcopy* • **Tools**: - *Coloposcopy*: to examine the cervix - *Cervical biopsies*: colposcopic, endocervical curettage, cone biopsy

Staging: Clinical! Figo system		
	0	In situ
	1	Invaded cervix, no spread, 5YS: 80%
	A1	Confined to the cervix, Dx by microscopy with invasion of <3 mm in depth + lateral spread <7 mm
	A2	Confined to the cervix, Dx with microscopy with invasion of >3 mm & <5 mm + lateral spread <7mm
	B1	Clinically visible lesion or greater than A2, < 4 cm in greatest dimension
	B2	Clinically visible, > 4 cm in greatest dimension
	2	Spread nearby within pelvic, 5YS: 50-60%
	A1	Involvement of the upper 2/3 of vagina, without parametrial invasion, <4 cm in greatest dimension
	A2	> 4 cm in greatest dimension
	B	With parametrial involvement
	3	Spread to the lower part of the vagina, 5YS: 30-40%
	A/B	Unchanged
	4	Spread to nearby organs, METS, 5YS: 4%
	A/B	Unchanged

Spread	Direct	Lymphatic	Dissemination (late)
Prognosis	Depend on: age, fitness, stage, type of T, adequacy of ttt		

• **Mx Options**:
- *Surgery*:
a. pre-invasive: cryosurgery, laser, conization
b. invasive: simple hysterectomy, radical hysterectomy + pelvic LN
- *Radiation*
- *Chemotherapy*

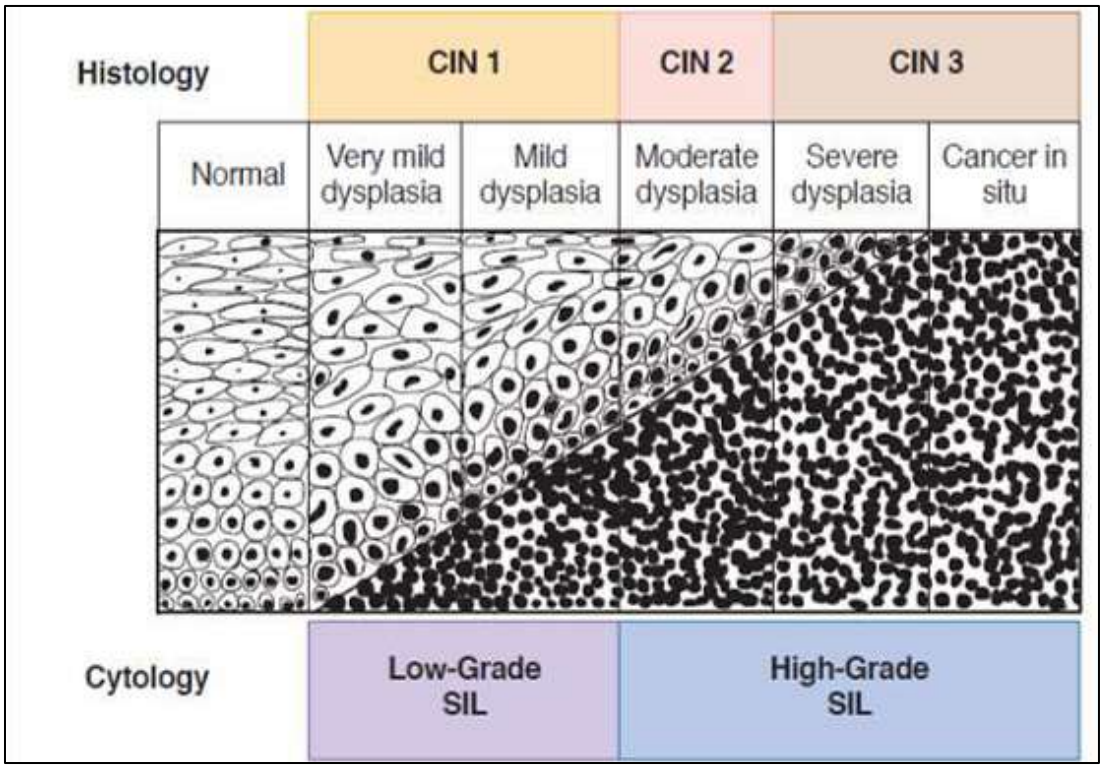
• **Surgery advantages**:
- ovary presentation (radiotherapy will destroy them)
- chance to save sex function (radio: vaginal stenosis 85%)
- Psychological feeling of removing the disease
- more accurate staging and prognosis

• **Surgical complications**:
Mx
- Hemorrhage: primary or secondary
- injury to bladder, ureters
- bladder dysfunction
- fistula, lymphocele
- vaginal shortening

• **P/O XRT Indications after Wertheim's hysterectomy (Stage I. IIa):**
- positive pelvic LN
- tumor close to resection margins and/or parametrial extension

• **Radiotherapy**:
- Stage IIb,III
- Radical radiotherapy, external radiation (teletherapy), intracavitary radiation (brachytherapy)
- in some cases of stage IIa/b radio + chemo to be given then simple hysterectomy

	• **Recurrent disease Mx**: I. Local: radiation (if not used), pelvic exenturation II. Distant: chemo
Follow up	• On completion of treatment all patients are given a vaginal dilator to use until vaginal mucosa healed, this prevents vaginal stenosis • *Premenopausal patients commenced on HRT*: - post hysterectomy-Extraderm skin patches 50 mg 2/w - No hysterectomy- Cycloprogyn 1mg daily. • *The patient to be seen 1/12 post-treatment*. 3 monthly for 2 years. 4 monthly for 3rd year. 6 monthly until 5years. Then yearly all her life. • Patients with stage I and II disease treated with radical radiotherapy will be assessed by EUA approximately 3 months after completing ttt.
What new in ttt	• HPV test and vaccine, radical trachelectomy, other clinical trials

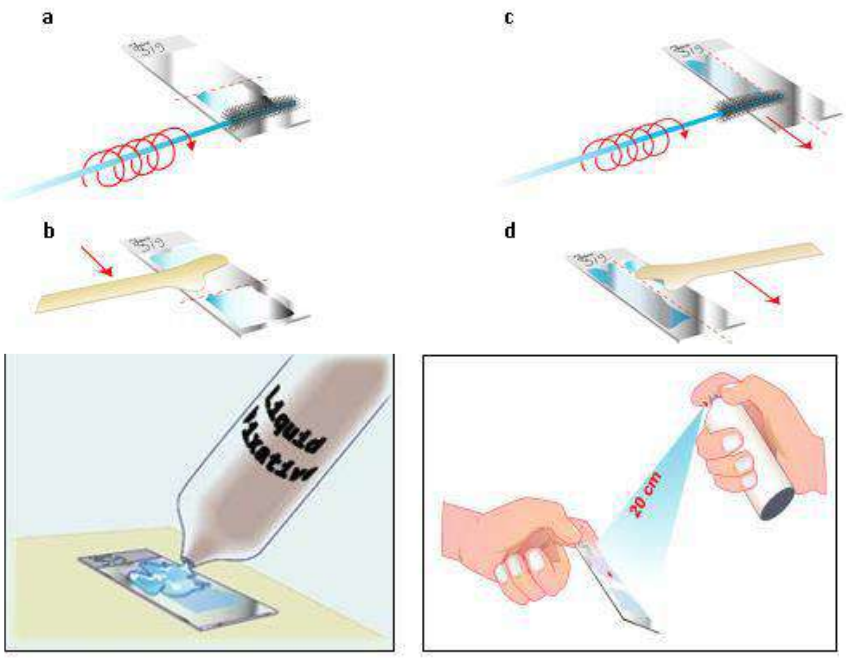


Pap Smear

Cervical Cancer	• SCC • Age peak 35 – 55 • RF: HPV (16/18/31/33/45), smoking, HIV, Chlamydia, diet, OCP, Multiple pregnancies, low socio-economic status, FHx • S/Sx: AUB, Vaginal discharge • Good prognosis • Preventable
Prevention	• Primary: lower the RF, HPV, folate, vitamens • Secondary: Pap smear
Info	• Can be done in the clinic • Best taken across transformation zone (squamocolumnar junction)
Disadvantages	• False negative: 50% • Sensitivity for CIN detection: 50%, after 3 years it become: 87% • Depends on the technique
Screening UK Guidelines	• start at age of 25 • do it every 3 years until 49 • then every 5 years until 65 • at 65 if there was 3 consequence negative smears, you can stop it
Categories of cells	• Normal • Inflammatory • Infection • Dysplasia or cancer
How to prepare for a pap smear	Avoid intercourse, douching, or using any vaginal medicines or spermicidal foams, creams or jellies for two days before having a Pap smear, as these may wash away or obscure abnormal cells. Try not to schedule a Pap smear during your menstrual period. It's best to avoid this time of your cycle, if possible. Why? **Menstrual** blood can obscure the visibility of the **cervical** cells collected in the sample, which can lead to inaccurate results
Tools	• Gloves, Speculum, Lubricant • Collecting device: - Spatula (wooden, plastic): rotate 360° - Endocervical brush: rotate 90° - 180° - Cervical broom: rotate 360° x 5 • Sterile labeled container for the sample/slide, fixative material

Cytology Methods

A. Conventional pap smear:



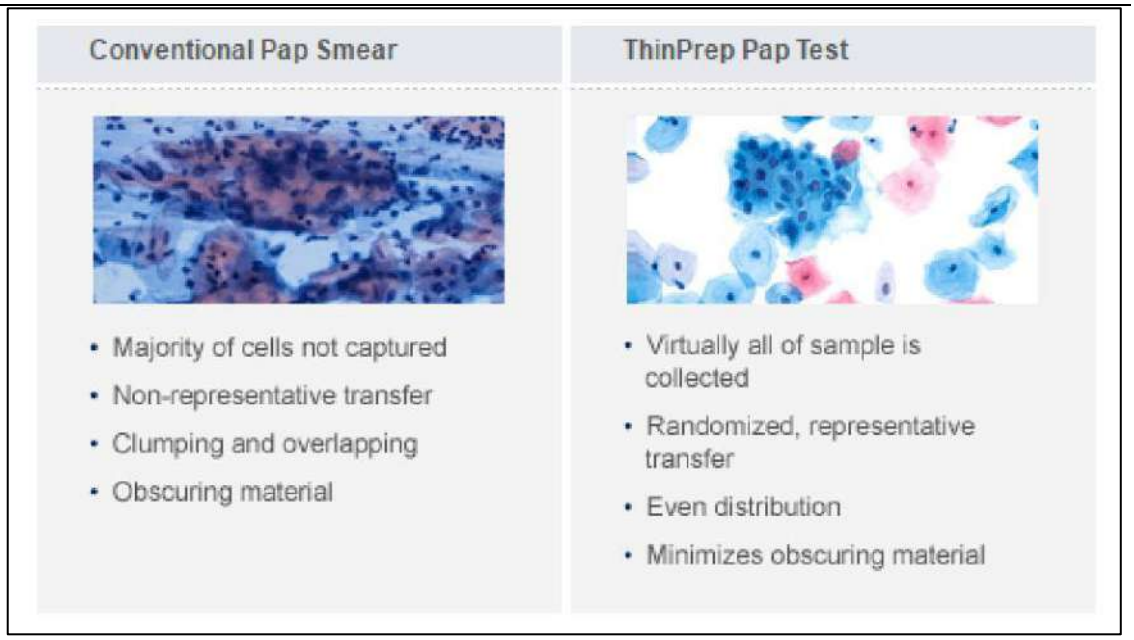
- brush/spatula rolled onto slide

- We use ethyl ether + 95% ethyl alcohol or 95% ethyl alcohol alone

B. Liquid-based thin layer cytology:

- collecting device is placed into a liquid fixative solution and rotated in the solution .When the liquid is processed by the cytology lab, loose cells are trapped onto a filter then plated in a monolayer onto a glass slide.

Which is better



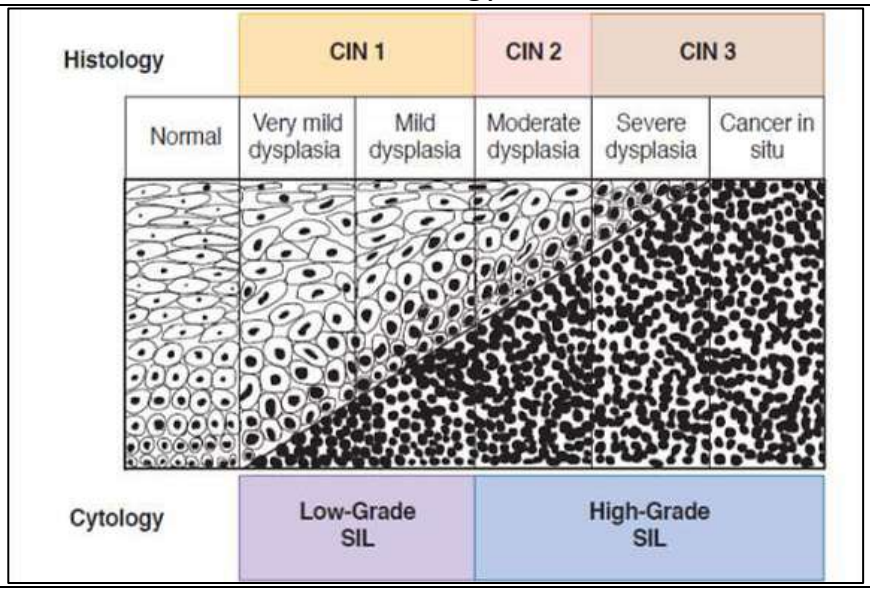
also the thin liquid pap test, allows us to take additional testing of the sample such as HPV

Score interpretation

Cytology (Bethesda System)

Negative	Might be infections
Atypical squamous cells (ASC)	• ASC-US (undetermined) • ASC-H (cannot exclude HSIL)
Low-grade squamous intraepithelial lesion (LSIC)	CIN 1
High-grade squamous intraepithelial lesion (HSIC)	CIN 2,3, CIS
Cancer	Histology shows invasive cancer

Histology (Cervical intra-epithelial Neoplasia (CIN))



Mx of abnormal PAP smear	• **Accelerated repeat pap**: - used in ASC-US - repeat pap at 4-6 month intervals until there are 2 consecutive negative paps If a repeat pap is again ASC-US or worse then do colposcopy • **HPV DNA typing**: - also used for ASC-US & age >25 year - if negative then follow up, If also ASCUS then colposcopy • **Colposcopy evaluation and biopsy**: - LSIL & Age >25 year - used for uncertain patient/abnormal pap smears
Cervical Colposcopy	• Better visualization and magnification • You can take a biopsy if indicated • We apply acetic acid: acetowhite change (it improves visualization of the abnormal area's, it makes vascular patterns more visible) • Satisfactory or not based on if you can see the whole T-zone

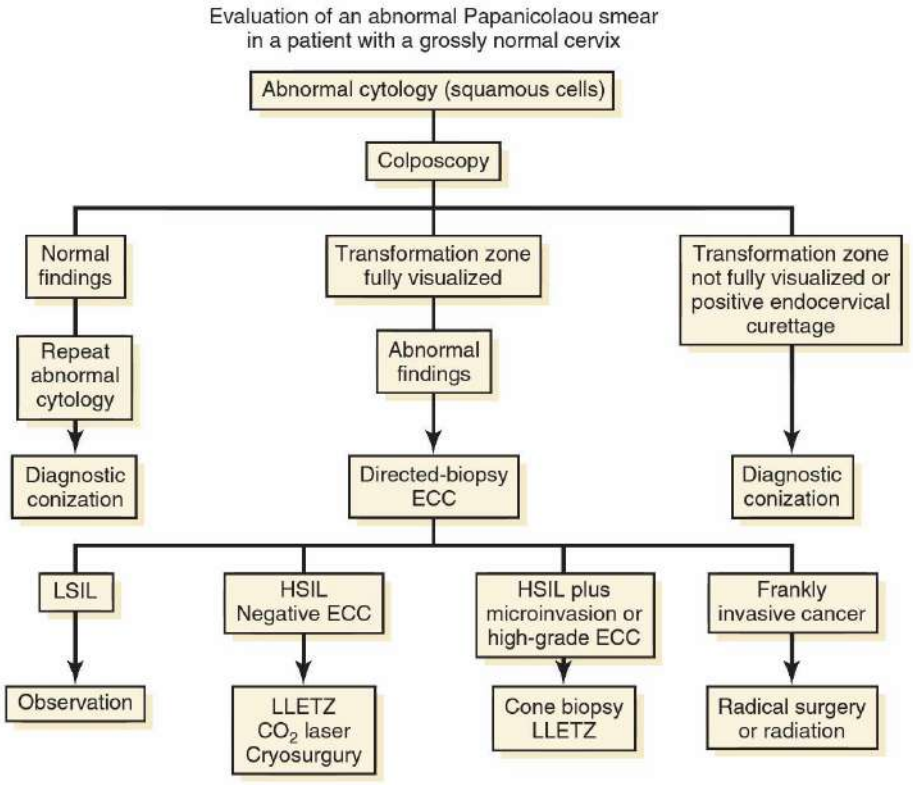


FIGURE 38-3 Algorithm for evaluation of patients with an abnormal Papanicolaou smear and a grossly normal-appearing cervix. *ECC*, Endocervical curettage; *HSIL*, high-grade squamous intraepithelial lesion; *LLETZ*, large loop excision of the transformation zone; *LSIL*, low-grade squamous intraepithelial lesion.

After colposcopy	• **Endocervical curettage** (**ECC**): - for all nonpregnant ladies to R/O endocervical lesions • **Ectocervical biopsy** • **Cone Biopsy** (Conization of the cervix): - Indications: a) Pap smear worse than the histology (some sites are not biopsied) b) Abnormal ECC histology c) Lesion entering the endocervical canal d) Biopsy showing microinvasive carcinoma of the cervix - Risks: a) Deep biopsies result incompetent cervix b) Cervical stenosis
Prevention by Vaccine	• **HPV vaccine** (**Gardasil**): - for females in between 8-26 yo (mainly 11,12) - 3 doses are given at 0,2,6 months - costly - not recommended for pregnant, lactating or immunosuppressed

Lower Urinary Tract Infections

o ***Urine: Storage and Voiding*:**

• Normally you don't feel the process of filling the bladder until you reach a certain level, 200ml this is called the first sensation, and until it reaches 400ml that's when you feel that you have to empty it, though you can hold it until 600ml, where you really have to go

Storage Sx	• *Urinary incontinence*: involuntary leakage • *Urgency*: the detrusor muscle suddenly contracts without leakage, if there was leakage , then its urgency incontinence • *Increased daytime frequency* • *Nocturia*: more times to void at night • *Nocturnal enuresis*: loss of urine occurring during sleep • *Urge urinary incontinence* (*UUI*): involuntary leakage preceded by urgency • *Stress urinary incontinence* (*SUI*): leakage with effort (sudden increase in the intra-abdominal pressure) • *Mixed urinary incontinence* (*MUI*): leakage + urgency + effort • *Continuous urinary incontinence*: continuous leakage (fistula) • *Sexual intercourse incontinence* • *Giggle incontinence*
Voiding Sx	• Slow-stream • Intermittent stream (intermittency) • Hesitancy • Straining to void: muscle effort to void
Post-mictur.	• Feeling of incomplete emptying • Post-micturition dribble

o **Urinary incontinence, epidemiology**: they all affect the UT anatomy:

• Age • Race • Pregnancy • Childbirth • Menopause

o **Urinary incontinence, Causes**:
• Urinary Stress Incontinence (USI)**
• Detrusor over activity (DO)
• Fistula (vesicovaginal, urethrovaginal)
• Congenital (ectopic ureter)
• Urethral diverticulum
• Functional (immobility), Other (UTI, Fecal impaction, medication)

o **Assessment of LUTS**:
1) Clinical evaluation:
• Abdominal and pelvic examination: any mass can increase IAP or a prolapse that squeeze the bladder
• Neurological exam
• patients mobility and mental state
• incontinence associated dermatitis
• vulval and vaginal atrophy
2) Imaging
3) Investigations: focus on urodynamic studies
• ***Basic***:
- ***Urine test*** (for infections)
- ***Bladder diary*** (voiding, frequency & volume): objective information on voids, fluid intake, volume, incontinence episodes, Rx changes
- ***Pad test***: objective, non-invasive, 1hr,4hr,12hr,24hr,48hr:
** The 1 Hour Standardized Test:
o Pre-weigh pad
o Drink 500mls
o Rest 15 mins
o Moderate exercise 30 mins
o 15 mins provocative exercises (laugh, jump, cough),
then you weight the pad and if:
o Positive test >2g increase
o Severe incontinence >10g increase

• ***Advanced***:
- conventional subtracted cytometry
- videocystourethrography
- ambulatory urodynamics monitoring
- urethral pressure profilometry
- imaging studies: bladder wall thickness (BWT), MRI, voiding cystourethrography, upper renal tracts
- cystourethroscopy

o **The urodynamic studies (UDS):**
• Definition: studies of LUT function and dysfunction
• Why urodynamics? Bladder is a poor witness, for correct Dx, Mx
• UDS: free flow study, filling cytometry, voiding cytometry

o **Uroflowmetry**:
• simple, non-invasive, voided volume and flow rate
• normal study:
- peak flow rate: >15ml/sec
- voided volume: >150ml
- post void residual volume (PVRV): <100 ml

o **Filling Cystometry**:
• Retrograde filling of the bladder
• Filling medium is usually Fluid
• Filling rate: 100ml/min
• Performed in: supine, sitting or standing
• Pressures measured via microtip or external transducers
• By a three way catheter, you fill it with normal saline at a rate of 100ml/min , then you record the first sensation at what rate , the rate at which the patient has the desire to urinate for bladder capacity..etc

o **Voiding Cytometry (Pressure flow studies)**:
• the relationship between detrusor pressure and the flow rate
• Obstruction: high detrusor pressure (>50cmH_2O) Poor flow (<15ml/s)
• Under active detrusor function: low detrusor pressure (<20) poor flow

o **Urodynamic Dx**:
• Detrusor overactivity (DO): involuntary detrusor contractions during the filling phase which may be spontaneous or provoked
• Detrusor overactivity incontinence (DOI): DO + urine leak
• Urodynamic stress incontinence (USI): leak due to ↑ IAP in the absence of detrusor contraction
• Mixed urodynamic incontinence: DO and/or DIO + USI

o **Cystourethroscopy**:
- Rigid/flexible
- Confirmation of anatomy
- Visualization: calculi, tumor, diverticula
- Biopsy of urothelium to assess for chronic inflammation, cancer

o **Treatment of urinary incontinence**:
• Lifestyle modifications: fluid intake, drinks (caffeine, tea, coke), weight reduction (over weight on the bladder), smoking
• PFMT: strengthen the pelvic floor muscle not correcting the prolapse

o **Stress urinary incontinence** (**SUI**) **Mx**:
A. Conservative:
• effective, few complications
• does not compromise further injury
• useful in women who: unfit for surgery, have not completed their family, breast feeding, <6m post-partum
• Conservative measures include: PFMT (Pelvic floor muscle training), biofeedback, electrical stimulation, vaginal cones, urethral devices

B. Pharmacological Mx:

• Duloxetine:
- Potent serotonin-noradrenaline reuptake inhibitor
- ↑ urethral striated sphincter activity by a centrally mediated pathway

• Efficacy and safety:
- Significant decrease in incontinence episodes
- Optimal effect: after 4 weeks of therapy
- Nausea: 25 %
- Useful in women awaiting surgery
- Synergistic effect with PFMT

C. Surgical Mx:

• >200 procedures
• the 1st procedure offers the best chance of cure
• Correcting only the prolapse has had a high FR, so we don't use it
• the mid urethral theory or the integral theory concept:
- Maximal urethral closure pressure is at mid-urethra
- Damage to pubourethral ligaments impairs mid-urethral support
- Mid-urethral procedures have largely replaced Colposuspension

• *Colposuspension*: it's a two stage, where you left the bladder "and thus the urethra" and the vagina by attaching them to pelvic ligaments

• *Sub-urethral tapes* (TVT – transvaginal /TOT - transopturator): tension free tape, you put it under the urethra to support it like hammock (GS!)

• *Urethral bulking agents*:
- useful in: elderly, Women who have undergone previous operations and have a fixed, scarred fibrosed urethra and Women who have not completed their families Outcome (long-term follow-up (> two years))
- Objective cure rate: 50% / Subjective improvement: 70%

o **SUI NICE guidelines**:

• *PFMT* of at least 3m should be offered as 1st-line Mx to all women with SUI or MUI

• *Retropubic tapes*: recommended where conservative Mx failed

• *Colposuspension*: recommended alternatives

•*Bulking agents*: considered for the Mx of SUI if conservative Mx failed

•*Anterior repair*, needle suspension procedures, paravaginal defect repair and the MMK procedure are NOT recommended

o **SUI: Key points**:

• Conservative Mx should be offered prior to surgery

• Duloxetine may be used in conjunction with PFMT

• Mid-urethral tape: operation of choice in primary continence surgery

• TVT and TOT procedures have similar success rates

• Urethral bulking agents offer an alternative to continence surgery

o Overactive Bladder (OAB, urge syndrome, urgency-frequency, hyperactive or detrusor instability):

o **OAB Rx**:

A. Conservative Mx:

• Advice regarding fluid intake (1 -1.5 L / day)

• Reduce caffeine and alcohol intake

• Bladder retraining (BT): 1st you void hourly then every 2 hr then after 4 hr.. Etc. as a way to 'train' your bladder / Cure rate: 44 - 90 %

• PFMT

B. Pharmacological Rx:

• no specific drugs act on the bladder & urethra without systemic effect (anti-muscarinic. Because it's the muscle that its overactive)

• Anti-muscarinic

• SE: dry mouth, constipation, blurred vision, insomnia

• Mirabigron: B3 agonist (not anti-muscarinic), daily dose, 50 mg, 25mg in hepatic, renal insufficiency

• DO: intravesical therapy botulinum toxin (inject it to cause relaxation)

Antimuscarenics		
	Advantages	**Disadvantages**
Oxybutynin IR	Flexible dosing, rapid onset of action, cheap	Persistence limited by dry mouth
Oxybutynin ER	Flexible dosing	Cognitive impairment
Oxybutynin TDS	Placebo rate of SE	15-20% rate of pruritus
Tolterodine ER	Well tolerated	Single dose
Solifenacin	Superior efficacy to Tolterodine ER	High rate of dry mouth at 10mg dose
Darifenacin	Low rate of cognitive impairment	High rate of constipation
Trospium	Does not cross BBB	
Propiverine	Well tolerated	Efficacious for frequency
Fesoterodine	Flexible dosing	Limited experience

OAB/DO: Neuromodulation

• Outcome of neuromodulation: > 50 % reduction in Sx & 46% completely cured

o **Sacral neuromodulation**:

• Stimulation of the dorsal sacral nerve root in the S3 sacral foramen

• Sacral nerves contain autonomic and somatic fibers to pelvic floor muscles

• Invasive and expensive

• A useful alternative to medical and surgical therapies in patients with severe, intractable OAB prior to reconstructive surgery

OAB/DO: Neuromodulation

o **Peripheral neuromodulation** (**PTNS**)

• Posterior Tibial Nerve (PTN) originates from the same spinal cord segments as the innervation to the bladder and pelvic floor

OAB/DO: Surgical management

- 10 % remain refractory to medical and behavioural therapy
• Different surgical techniques
• Augmentation to increase bladder capacity:
- Clam cystoplasty
- Auto-augmentation (Detrusor Myomectomy)
• Urinary Diversion

OAB/DO: NICE guidelines

• Bladder retraining (BT) for a minimum of 6 wks
• If no satisfactory benefit from BT: antimuscarinics
• First line drug treatment: Immediate-release oxybutynin
• If not tolerated: darifenacin, solifenacin, tolterodine, trospium or an extended-release or trans-dermal oxybutynin
• Women should be counselled regarding the SE of antimuscarinics

OAB/DO: NICE Guidelines

• Systemic HRT should not be recommended
• Intra-vaginal estrogens are recommended for OAB in postmenopausal women with urogenital atrophy

" In old women to nourish the genital tissue might improve the Sx "

Overflow Incontinence & VOIDING DIFFICULTIES, causes:

• **Neurological**
- MS, Spinal injuries, CVA, brain tumors
- Prolapsed intervertebral disc, cauda equina syndrome, herpes zoster

• **Myogenic**
- Ischemia due to acute retention, e.g. after epidural block

• **Iatrogenic**
- Postoperative retention associated with long operations, epidural, PCA, high dose opiates, large volumes of IVF
- Obstructive outflow procedures as continence procedures

o **Causes**:
• **Obstructive**
- Extrinsic: pregnancy, large fibroid
- Intrinsic: urethral stricture or foreign body
• **Inflammatory**:
- Vulval abscess
- Acute herpetic infections

Diagnosis
• Clinical suspicion
• U/S or catheterization

Management
• Immediate catheterization, catheter left in for 2 days then trial w/o catheter under strict supervision
• If retention then SPC for 2-6 wks
• Bethanechol 25mg tds
• Surgery, Rx cause
• CISC

Pelvic Organ Prolapse

Types

- **Cyctocele** (two types: distension and replacement),
- **Rectocele**,
- **Enterocele**,
- **Uterine Prolapse**

RF

- **Parity is the strongest RF**
- Maximum birth weight
- Age, menopause (conflicting)
- Constipation, and straining
- Heavy lifting
- Obesity
- Chronic pulmonary disease (↑ abdominal pressure)
- Hysterectomy
- Colposuspension (enterocele)
- Sacrospinous Fixation (anterior compartment prolapse)

Sx

- **General Sx**:

- Bulge, heaviness, dragging
- Backache
- Vaginal dryness or irritation
- need to push the prolapse after straining (defecation)
- Sexual activity embarrassing or painful

- **Urinary Sx**:

- Stress urinary incontinence
- Bladder neck hyper mobility
- Urinary frequency and urgency
- Occult stress incontinence
- Voiding dysfunction
- Recurrent UTI
- Ureters

	• **Rectocele Sx**: - incomplete bowel emptying - obstructed defecation - constipation - inability empty rectum without reducing prolapse - fecal incontinence if rectal prolapse
Investiga.	• ***For cystocele****:* -Renal US - mid stream urine (urinalysis , culture) - cystoscopy/urethroscopy - urodynamic studies (Cytometry) • ***For rectocele****:* - anoscopy/sigmoidoscopy - BA enema
Stages	Based on the hymen (reference point), if proximal to it stage 1, on the same level is stage 2, & if below it stages 3 **Stage 4**: procidentia
DDx	• **Cystocele, Urethrocele**: - Urethral diverticula's - Skene gland abscess • **Rectocele**: - Obstructive lesion of colon & rectum (lipomas, sarcomas, fibromas) • **Uterine prolapses**: - Cervical elongation - Prolapsed cervical polyp or cervical - Lower uterine segment fibroids
Mx	• Pelvic floor exercise (if mild) • HRT: for post-menopausal women • Conservative therapy: Physiotherapy or Pessary

• **Surgical treatment**: vaginal, abdominal, laparoscopic:
- Cystocele: anterior colporraphy
- Rectocele: posterior colporraphy
- Uterine prolapse: vaginal hysterectomy

POP-Q System:

Aa "point A of the anterior wall" 3 cm above hymen	**Ba** "point B of the anterior wall" 6 cm above hymen	**C** "cervix" normally: 7 cm above the hymen ring
gh "genital hiatus" - normally: **3 - 4.5** - <3 narrow vagina - >4.5 wide vagina	**Pb** "perineal body" - normally: **2 – 3.5** - <2 deficient perineum	**Tvl** "total vaginal length" - normally: **8-10** - Short < 8 - Long > 10
Ap "point B of the posterior wall"	**Bp** "point B of the posterior wall"	**D** "posterior fornix"

• for **anterior wall prolapse**: look at 1st row (Aa,Ba)
• for **posterior wall prolapse**: look at the last row (Aa, Bp)
• for **uterine prolapse**: "C" value

• **for the anterior/posterior wall**:
- **1st degree**: (-3) – (-1)
- **2nd degree**: (-1) – (+1)
- **3rd degree**: > (+1)

• **for uterine prolapse**: (I'm not sure about this one tbh)
- **1st degree**: (- 6) – (-1)
- **2nd degree**, and **3rd degree** as rectocele and cystocele

Contraception

• **FR** (**Effectiveness**) expressed as failure rate per 100 WY
- 1 **WY** (Woman Years) = 13 Cycles
- *Pregnancy & abnormal bleeding are CI for all contraception methods*

Natural Family Planning (NFP)	
Methods	o **Cycle or rhythm method (Calendar method):** - Safe method, At least 3-6 months must monitor her cycle, it must be a regular cycle, choose the longest cycle & Count fertile days & avoid intercourse in these days. - *E.g:* Cycle is in range of 26-28 days 26-20 = 6 , 28-10= 18 so fertile days are from day 6 to day 18 of the cycle Ova is viable for 24-36 hours, sperm is viable for 3-7 days (3 days in vagina bcz vagina is acidic , 7 days above vagina) o **Temperature method:** - Temperature increases due to progesterone, when it increases it means a sign of ovulation so no intercourse o **Cervical mucus method (Billing's method):** - Mucus is thin "watery" to increase mobility of sperm, it becomes thick" viscous" to prevent further entry of sperm o **Cervical palpation method:** - Cervix is more accessible in 1st phase of cycle, higher and more posterior in 2nd.. all changes is to encourage pregnancy. o **Minor clinical indicators of fertility:** - signs of pre-ovulation like breast tenderness.

	o **Personal fertility monitors:** - Monitor most fertile days in cycle and confirm ovulation o **Lactational amenorrhea method (LAM):** - Unknown mechanism - Inhibition of normal pulsatile LH – anovulation - >98% effective if fully, <6/12, Amenorrhoeic - no medical conditions where LAM is restricted - Alternative contraception when: * reduce frequency of breast-feeding * stop night feed/baby sleep through the night * separation from the baby * introducing supplements * Anxiety, stress

MOA	**Effectiveness**
Awareness	Combined methods are more effective
Advantages	**Disadvantages**
- might be only option - not medical (no clinics) - aware women - enhance communication	- high FR - rely that conception days are known - long periods of abstinence (no sex) - No STI protection

Barrier Methods

- Shouldn't be used with oil-based creams (use *water-based* creams)
- Condoms prevent STI & HIV transmission so use it when on OCP

Types:	o **Male Condoms**: - FR 3-23/100WY o **Female Condoms** (**Femidom**): - FR 5-21/100WY - STI/HIV prevention (used + OCP) o **Occlusive Caps**: Diaphragms, Cervical Caps o **Vaginal Sponges** o **Spermicides**
MOA	- Prevent sperm reaching ovary

Indications	- Client choice - Medical reasons to exclude hormonal - Intermittent/infrequent intercourse - while a new method is taking effect - protect against STI

Advantages	**Disadvantages**
- Male condoms widely available - Protect against STI (*except diaphragms, caps)* - No systemic SE - No lactation effect - Spermicides give lubrication - ↓ risk of cervical cancer	- High FR - Not acceptable in some relations - Diaphrams need clinic fitting - Diaphrams size changed in weight change ± 4kg

Combined Hormonal Contraception (CHC)

Info	- Low FR if used correctly - Variable dose means it changes in 1st 7 d, 2nd 7 d, 3rd 7 d tablets (try to mimic natural cycle) - There is a problem of spotting so ↑ pills to ↓ spotting - Because of risk of thrombosis, dose of estrogen in new tablets is 20µg. but ↓the dose ↑ risk of other problems - ***Gestodene*** and ***Cyproterone acetate*** are antiandrogenic, good for those who have hirsutism and acne (think of PCOS!) - ***Drospirenone*** is called ياسمين in the market. - COCPs don't prevent STI so use condoms too. - The worst SE is VTE (mainly in 1st year after that the risk ↓).
Types	o Pills (mono/bi/tri-phasic) o Patches o Vaginal Ring
MOA	o inhibit Ovulation o Alter vaginal & cervical mucus & inhibit sperm transport o Atrophic endometrium non-receptive

Advantages	Disadvantages
- Reliable - Reversible - Independent of IC - Non-contraceptive benefits	- Minor SE (nausea, fluid retention) - ↑ VTE risk (worst SE!) - ↑ Arterial disease - Drug interactions - Loss of efficacy by diarrhea, vomiting, missed pills

When to start CHC	o **Menstrual cycle**: Immediately after the menses (up to 5 days), to prevent pregnancy o **Amenorrhoeic**: Given immediately after you exclude pregnancy and stop breast feeding, to confirm pregnancy: 3 weeks without intercourse and make pregnancy test if it's negative then start pills. o **Postpartum**: 6 weeks after delivery, why 6 w? Because of thrombosis (pregnancy is a thrombogenic status) so wait until 6 w or 3 w after delivery give only progesterone o **Miscarriage**: 7 days after miscarriage
Combined Oral Contraceptives (COCP)	
FR	0.2-8/100WY (Very low)
Types	- Monophasic (fixed dose): Estrogen + Progesterone - Variable dose (phasic) - Majority 21 Tablets/7d PFI (pill free interval) (1st 7 to inhibit ovulation (most important!), 14 maintain)
Consti-tuents	- Estrogen (*ethinyloestradiol*) - Progesterone: *Levonorgestrel* (LNG)/ *Norgestrel* (NG)
Non-Contra captive Benefit	**o It Decreases:** - menstrual disorders (menorrhagia, irregular bleeding: 50%, dysmenorrhea: 40%, Premenstrual Syndrome (PMS))

	- Functional *ovarian cysts* (not to manage the cyst but to prevent further cysts/ note: *POP have ovarian cysts as a SE*) - Benign *ovarian tumors* - Benign *breast disease* - 50% *endometrial*, *ovarian cancer* (15 year after stopping), *but Cervical cancer risk slightly increase* - *Colorectal* cancer - Protective against RA, thyroid disease, duodenal ulcer
Major SE	- VTE - MI and stroke - Migraine -Cancer (breast, cervical, liver)

Estrogen SE	Progesterone SE
- Breast tenderness - Bloating - Weight gain - Nausea - Non-infective vaginal discharge - Headache - Chloasma (Melasma): dark skin discoloration - Photosensitivity	- Acne - Greasy skin/hair - Hirsutism - Depression - Loss of libido - Vaginal dryness
Absolute CI	**Relative CI**
- Past or present CVD - VTE Hx - Thrombogenic mutations - Familial hypercholesterolemia - IDDM (Insulin dependent DM) - BP (>160/95) - Smokers (>35 y, >15cig/day) - BMI ≥ 40 - Focal migraine with aura - Stroke	- FHx of VTE - BP (140-159/90-94) - BMI 30-35 - Focal migraine + aura >5y ago - Malabsorption - Drug interactions - Gallbladder disease

- Major surgery with prolonged immobilization - Liver disease - Porphyria - Medical condition affected by sex steroids (chorea) - undiagnosed GI bleeding - Estrogen dependent T (breast)	**MENOMIC OF SOME OF CI: ABCD** • A >> ACUTE LIVER DISEASE. • B >> BREAST cancer • C >> COAGULATION PROBLEMS • D >> DVT • AND ABNORMAL BLEEDING
Missed Pills	**EC**: emergency contraception **UPSI**: unprotected sexual intercourse **PFI**: pill free interval - When missing a pill you need to check the efficacy of contraception & if she needs Emergency contraception. **o 1 pill missed:** only take the missed pill when remembered and proceed, and no EC is needed **o 2 or more:** take the most recent pill ASAP, and the remaining pills as usual, also use condoms or abstinence for 7 days, for the EC: **- If missed Pills 1-7 (Week 1):** EC is required if UPSI in the PFI or 1st week because 1st 7 to inhibit ovulation. **- If missed Pills 8-14 (Week 2):** No EC if preceding 7 pills were taken because these pills to maintain anovulation. **- If missed pills 15-21 (Week 3):** she could have minimal spotting because of not taking the pills. Omitting the PFI because in free interval (7 day after 21 days) cycle effect of contraception is determined by correct taking pills before and after PFI thus interruption in 3rd week should be followed by a new pack
Follow up	3 months after 1st prescription and check BP, RF, assess..

Break through Bleeding (BTB)	- Cycle > finish > bleeding > cycle (intermenstrual bleed). **If bleeding occur while on pills it's called breakthrough bleeding. DDx of breakthrough bleeding**: 1. If patient is new to pills reassure, because bleeding is expected in *1st 3 months*, however, examine the patient 2. Did she miss a pill? Default (*2-3 d after missed pill*) 3. Infections such as STI and chlamydia 4. Cervical causes 5. R/O pregnancy 6. Ask about medications (liver enzyme inducers) 7. Diarrhea and vomiting (D&V) 8. Disturbance of absorption 9. Low dose pills (estrogen 20µg): change to higher dose ""IN COCPs"" But In HRT if she has BTB we ↑ progesterone dose, not the estrogen because estrogen is harmful if ↑ in HRT.
Progesterone only Contraception (POC)	
Types	- Progesterone only pill (POP) - Injectable - Implants - Intra-uterine systems (IUS)
Progesterone only Pills (POP)	
Notes	- POPs tab contain 28 pill (for 28 days) and all of them are progesterone and active not 21+7 - Can be given to smokers - Usually well tolerated - For them to be effective must be taken the same exact time (by hour and minutes), because they work for 22 hr - *3 hour window period*: if a patient forgets to take a pill she has till 3 hours to remember taking it, if she didn't , she continues with backup method (condoms for 24 hours) > alarming, (**Cirazette** has a 12 hour period)
MOA	Same as CHC

FR	0.3-0.8/100WY, age > 40 (↓FR), weight (no evidence)
SE	- Change in bleeding pattern (2/10 amenorrhoeic, 4/10 regular, and 4/10 irregular) - Mood changes - Ovarian cysts - Some claim that it may affect tubal motility so might be RF for ectopic pregnancy. - Increase weight by 2 kg.
Advantage	- Age is not a CI, neither Is migraine (+/- Aura) - *No effect on breast feeding* - Not associated with VTE, MI, stroke, breast cancer
Long-Acting Reversible Contraception (LARC)	
Types	- **Non-hormonal**: IUCD or Cu-IUD (Intra-uterine cupper) - **Hormonal**: LNG-IUS (Mirena), POIC, POI) - **IUS**: MIRENA - **POIC**: progesterone only injectable - **POI**: progesterone only implants - If LNG-IUS + HRT it can stay for 4 years - If LNG-IUS (MIRENA) it can stay for 5 years.
IUCD & LNG-IUS	- Standard T shaped IUCD copper 10 years - Other Cu-IUDs and LNG-IUS 5 years - FR: 0.2-2 HWY
IUCD/IUS MOA	- Inhibit fertilization by *direct toxicity* - *Anti-implantation* inflammatory reaction endometrium - Copper in Cx mucus inhibits sperm penetration - LNG-IUS mainly on endometrium and Cx mucus
Insertion & Removal	**o STI risk assessment (sexual Hx):** - Sexual hx, multiples partners is a risk for STD so the pt must be screened for Chlamydia, managed and then she can have the IUCD

o Screening

o Prophylactic Abx:
it's a request from cardiologist if the pt has mechanical heart valves. Or for Chlamydia if it risk.

o Timing:
*_**Immediately after bleeding (menses),**_ eg: if a lady has a period of 4 days, she puts it the fifth day, because cervix will be slightly dilated and to rule out pregnancy . (Not inserted in first day of menses because of uterine cramps increase risk of expulsion)
* If a patient is ***breastfeeding, Amenorrhoeic***, and you are sure she's not pregnant and no intercourse she can insert it at anytime
*_**Miscarriage**_: after 1 week
* _**Delivered**_: 4-6 weeks post-delivery
*If she want to be ***pregnant***, she can remove it anytime.
* if she wants to remove it because she's ***not comfortable*** with it, but wants to continue with her contraception, we don't remove it if there was intercourse over the last 3 days. (important).because sperm will survive and she can become pregnant.

*if she ***wants to switch*** to another IUCD , we can remove it regardless if there was intercourse or not.
(but those should be copper not MIRENA)
*In MIRENA tell the pt no intercourse before removal if she doesn't want to become pregnant.

o Follow up:
after 4-6 weeks of insertion to check it is still in. do U.S or by speculum can see thread, X-ray for perforation

Risks

- **Expulsion**
- **PID**:

only in the *first 3 weeks of IUCD insertion*, after that IUCD wearers and non-wearers have the same chance of getting PID.

- **Perforation**:

mostly at the time of insertion, if it occurs pull it out, observe and cover with antibiotics. Do laparoscopy if *after 3 days* patient has abdominal pain or if she's unstable and bleeding.

- **Ectopic pregnancy**: the overall risk of ectopic pregnancy is not increased with IUCD, however, if pregnancy occurs while having IUCD in uterus then rule out ectopic.
- **Bleeding pattern and pain**:

menorrhagia and dysmenorrhea *For those who have menorrhagia it is better to use for them mirena*

- **Vasovagal syncope**:

only at time of insertion, and the patient can take ibuprofen before 30 minutes of insertion as a pain killer.

- **Pregnancy** (failure of procedure)
- **Lost threads**:

If we can't see the thread by speculum, we do U/S, & we see a *white line of copper IUCD*, in MIRENA its not a line, it appears as two dots and needs experience

o DDx of missed thread:

- *Expulsion*
- *Perforation*
- *Short thread*
- *Pregnancy*: uterus enlarges, goes up and becomes abdominal organ so can't see the device.

	** If the thread is not seen with U/S, we do plain abdomen, because copper is radio-opaque. MIRENA is not seen on x-ray, so we do CT scan, if still not seen think of perforation, if pt is coming 6 weeks after insertion & clinically stable, we do elective laparoscopy and remove the IUCD, because it's a foreign body and might cause adhesions. But if perforation is at time of procedure and pt is unstable we do ER laparoscopy. **o Pregnancy with IUCD:** - R/O ectopic - Remove *<12 w* if visible thread - Increased risk of 2nd trimester *miscarriage*, Pre-term Delivery (*PTD*), *infection* if left inside - Small risk of miscarriage with removal ** If it's intra uterine pregnancy, remove the IUCD in the first 12 weeks of pregnancy, but tell the pt we have to remove the IUCD , bec if we keep it in , there's a chance of infection and sepsis. If we remove it, there's a chance of miscarriage, if you can't see IUCD leave the IUCD in, removed with placenta at delivery
Info	- Q: all of the following are hormonal methods of LARC, you should differentiate btw hormonal & non hormonal - Mirena inhibits ovulation. **20µg /day** of progesterone is released from mirena - Direct toxicity of copper IUCD inhibits fertilization - MIRENA: causes atrophic endometrium and changes in the cervical mucus. - MIRENA releases levonorgestrel.
Hormonal SE	- Weight Change - Bleeding pattern/blackish discharge - Headache

	- Acne - Mood changes - Breast tenderness - Change in libido - Ovarian cyst-functional: if using progesterone preparation. if functional cyst found with combined pills the cyst will be suspicious because combined pills prevent ovulation
NCB	- LNG-IUS ↓ blood loss and pain - Endometrial protection - Mx of endometriosis
Progesterone only Injectable Contraception (POIC)	
Names	- *Depot medroxy progesterone acetate* (**DMPA**): 12 weekly: given every 3 months (12 weeks). If she forgets a week or 10 days (comes at week 13 instead of 12) its ok because it's duration of action is 13 weeks and 5 days - *Norethisterone enanthate* (**NET-EN**) 8 weekly
MOA	Same as POP and CHC
FR	- **DMPA FR**: <4/1000 over 2 years - *Delay in return of fertility up to 18 m!* (the others fertility return once removed/stopped)
SE	o **Bleeding problems:** - amenorrhea (up to 6 m), spotting, infrequent or prolonged amenorrhea 1/3 at 3 months & 70% by 1 year - R/O STIs, pregnancy - Estrogen is given if irregular bleeding occurs (bleeding is because of low estrogen) o **Weight gain:** - 2-6 kg, more in women with BMI ≥ 30
DMPA Concerns	- **CVD**: safe when estrogen is contraindicated - **Bone mineral density**: small loss but recovers when D/C (discontinued) <18 yrs (DMPA is not recommended

	in those who are <18 years old and perimenopausal) - **Enzyme inducing drugs do not reduce efficacy**
NCB	Improve dysmenorrhea and endometriosis
Progestogen Only Impant (POI)	
Name	**Implanon**: Estonogestrel (ENG)/3 yrs - Placed in left arm, shouldn't keep touching it because it release progesterone continuously
MOA	Same as POIC, POP, CHC
SE	- Bleeding problems, weight gain (not significant) - removal complications (occur only if insertion is wrong) - Side effects of all progesterone's is the same.
Concerns	- Enzyme inducing drugs reduce efficacy - No evidence it decreases bone mineral density
Emergency Contraception	
Hormonal method	o **Progestogen only EC: Levonorgestrel levonelle**: - ASAP after UPSI – 72 hr (*73-120 hr limited efficacy*) - can be used more than once in a cycle (advantage) - Double the dose if taking liver enzyme-inducing drugs liked anti-epileptic, anti tb. - MOA is the same. **o Ulipristal acetate-ellaOne:** - selective progesterone receptor modulator - is one of the up to date treatments for ***endometriosis*** - 72-120 hrs of UPSI - effective as levonelle - repeat dose is not advised in the same cycle
IUCD	- Cu-IUCD inserted up to 5 days of 1st episode of UPSI and up to 5 days of the estimated day of ovulation - Effective immediately - Long-term - FR: 1% (the least!)

	- Screening for STIs, HIV, Chlamydia/Prophylactic Abx - C/I same as IUCD - the problem is progesterone is not easily found so pt use combined pills with high dose estrogen increasing risk of thrombosis o **SE of hormonal IUCD**: - vomiting: if it occurs within 2 hr must repeat the dose - Ectopic Pregnancy: If failure of contraception, you must R/O ectopic - Timing of next menses - No evidence of teratogenicity
Sterilization	
Types	- Female tubal occlusion (FR 1/200) - Male Sterilization-Vasectomy (FR 1/2000)
Notes	- if pt wants to reverse with reopening of the tube, it's an abnormal tube so chances of ectopic increases. - Mirena is as good as sterilization - In those with multi pregnancy sterilization reduces obstetric complications - Tubal occlusion can be done by laparoscopy or laparotomy. laparoscopy: cut or cautery laparotomy:, band or clip with General anesthesia - Can the pt get pregnant after tubal sterilization? Yes, most failures occurs early, if the pt is pregnant, so before doing a sterilization make sure she's not pregnant, by preventing UPSI. - Male sterilization is better, because of less FR, & reversibility can be done & this is a procedure under LA. - Early failure of male sterilization is due to: wrong structure cut, or due to congenital abnormality. - Male sterilization: must confirm azoospermia before stopping the contraceptive method they're using (this

usually needs *12 weeks*), We confirm it by a sample 6 w after the procedure, and repeat the azoospermia sample again another 6 w after.

- Cause of failure in tubal ligation in female is accidently clipping the round ligament rather than the tube itself

Contraception after 40

- No contraceptive method is CI by age alone
- Progesterone is effective
- Combined is used up to menopause provided no CI

UMKEC	Definition
1	No restriction
2	Advantages outweigh
3	Risks outweigh
4	Unacceptable

Notes	- Liver disease by all means is UKMEC 4, - Smoking if >35 years old it is UKMEC 4, if <35 years old - Smokes more than 15 cigarettes/day it is also UKMEC 4 - BMI: 35 is UKMEC 4, If controlled HTN then its UKMEC 2

POP

3 (All PO methods)	4
- Pregnancy - Past breast cancer, clear for 5 yr - Active liver disease - Abnormal HCG due to GTD	- Breast disease (current cancer) - Undiagnosed vaginal bleeding

IUCD

4	- Pregnancy - Unexplained vaginal bleeding - GTD - Cervical Cancer - Endometrial Cancer - Ovarian Cancer - Current PID (chlamydia, gonorrhea.) - Pelvic Tuberculosis

LNG-IUS	
4	- same as IUCD + - Puerperal Sepsis - Post-septic Abortion - Breast Cancer (Current)
POIC	
3 (DMPA)	- CVD - HTN – vascular disease - Current and Hx of IHD and Stroke - Unexplained vaginal bleeding - Past Breast Cancer - Diabetes – end organ damage - Cirrhosis - Liver Tumors - SLE
4	- Current Breast Cancer
POI	
4	- Current Breast Cancer

Obstetrics

General Concepts

Gravida	• Number of pregnancies despite the outcome and despite the gestational age (any pregnancy what so ever)
Para (Parity)	• The number of pregnancies >20 weeks (duration varies from region to region, 20 - 28 weeks, depending upon age of viability). • P (Pregnancy >24 weeks + Pregnancy <24 weeks)
Expected date of delivery	• EDD = LMP – 3 months + 7 days
Lie	• Relationship of long. axis of fetus to long axis of uterus e.g longitudinal, transverse, oblique
Presentation	• Presenting part of fetus occupying the lower pole of uterus i.e cephalic (vertex), breech, face, brow or shoulder
Position	• Relation of denominator (occiput/ sacrum) of presenting part to the quadrants of pelvis e.g LOA, LOP
Engagement	• Widest diameter of head below the pelvic brim
Station	• Position of presenting part in cm in relation to ischial spine
Descent	• Passage of the presenting part of the fetus through the birth canal, this occurs as a result of the active labor forces.

Physiologic Changes in Pregnancy

CVS	↓ tone ↓ Systemic vascular resistance SVR ↓ Peripheral vascular resistance ↓ Systolic pressure, ↓↓ Diastolic pressure ↓ MAP ↑ CO, SV, HR (20% of the CO for the placenta!! PPH!) ↑ Ventricular distension (LVH, pericardial effusion) ↑ Dysrhythmias, physiologic hypokalemia • Murmurs 96%, mainly systolic • ECG – ST Changes: non-specific • Venous pressure doesn't change
Blood	↑ Blood volume (dilutional ↑ in blood volume) ↑ RBC (relative, physiologic anemia), ↑ WBC ↑ Coagulation factors, fibrinogen (risk: thromboembolic) ↓ Platelets, Factor XI, XIII (mild thrombocytopenia)
Uterus	• Pelvic organ till **12 weeks** (not-palpable – not affected), - if a pt said her abdomen is full b4 12, this is gases because progesterone causes relaxation of the smooth muscle • **week 20-22**: umbilicus, afterwards 1 w = 1 cm • **Supine hypotensive syndrome**: because the uterus compress veins and IVC, in the supine position, and ↓ VR, CO, so ↓ BP & Hypotension Sx, it is relived by laying on left, also the compression might lead to varicose, hemorrhoids • **Poseiro effect**: the uterus compress on aorta/branches, ↓ pressure in the femoral artery compared to brachial, also contractions may ↑ the compression causing fetal distress (in supine position & the femoral pulse isn't palpable)

S/Sx of pregnancy mimic Heart disease	o **Auscultation**: • S3 Gallop • Systolic ejection murmur o **CXR**: • Change in heart position and size • increase vascular markings o **EKG**: • non-specific ST-T wave changes • Axis deviation • LVH o **Signs**: • Peripheral edema • JVD o **Sx**: • Reduced exercise tolerance • Dyspnea
Kidney	↑ Renal blood flow ↑ Water retention (Renin-stimulated by progesterone) ↑ GFR ↑ Ureteral dilation/Hydroureter (progesterone SM relax) ↑ Kidney Size ↓ Albumin (Oncotic colloid pressure) ↓ Afferent, efferent arteriolar resistance (due to vaso-relaxation induced by: relaxin, endothelin, NO)
Lungs	• Constant rate, IRV • Compensated respiratory alkalosis (due hyperventilation) ↑ minute ventilation (TV x RR) ↑ tidal volume ↓ FRC (due to enlarged uterus, so less negative pressure) ↓ ERV, RV • Constant VC, because it doesn't affect the diaphragm or thoracic muscle motion

GI	↓ GI motility (constipation) • Relaxation of LES: GERD • N/V: proportional to HCG • Liver/gallbladder: stasis, more stones
Endo-crine	• Pancreas: Insulin resistance • Thyroid: ↑ TIBG, T4, T3, unchanged-free, ↓ TSH (by HCG) • Adrenal: ↑ cortisol, by CRH (↑ ACTH) ↓ plasma Ca+2 conc. (due to ↓ in albumin conc.)
Immu-nology	• must accept the allograft • IgG crosses placenta (protect baby by mother immunity) ↑ hormonal/innate immunity ↑ susceptible to CMV, HSV, Varicella, Malaria ↓ autoimmune disorders Sx ↓ NK cells
Other	• Relaxin hormone, secreted by placenta: causes relaxation in cartilaginous joints, for more flexibility, to make the birth process easier (widening: symphysis pubis, CVA) • Altered gait, center of gravity • Fatigue, somnolence
Integu-menta-ry	• Spider angiomata, palmar erythema • Hair grow (pregnancy hormones as steroids enhance hair) • Mucosal hyperemia • Striae gravidarum • Hyperpigmentation (especially linea nigra) • Rashes, acne (common)

Cardiac Diseases in Pregnancy

Cardiac Diseases			
Info	• Most common cause of maternal death during pregnancy • Diseases decreased at first then re-increased (still increasing) due to ***Acquired*** heart diseases • We have 2 types of cardiac diseases: Acquired, congenital - Congenital: *Pulmonary HTN* (the mcc of death) - Acquired: *MI* (mc), SADS, Aortic dissection, Cardiomyopathy • Postpartum death is more common than antenatally • Time of greatest risks (when the CO is high or changing rapidly): early pregnancy, 2nd stage & immediately postpartum		
Physiologic Changes during pregnancy	• O2 consumption increase (demand) • **CVS changes**: - ↓: SVR, afterload, pulmonary vascular resistance - ↑: HR (10 bpm), plasma volume, preload, SV, CO (30-50%, ½ of the total increase occur by 8 weeks of gestation) - BP full in the 2nd trimester, rising slightly in late pregnancy - COP & SV peak by week 16 • **Physiologic ECG changes**: - Atrial, ventricular ectopic - left QRS axis shift - small Q wave and inverted T wave in lead III - ST segment depression and T wave inversion in the inferior and lateral leads * ECG in pregnancy is useful in detecting arrythmias rather than structural abnormalities		
Maternal Mortality Risk	**Low <1%**	**Intermediate 5-15%**	**High 25-50%**
	- ASD - VSD - Minimal mitral stenosis - Corrected TOF	- Mitral stenosis + A.Fib - Uncorrected TOF - Marfan with normal aortic root diameter - Artificial valve	- Pulmonary HTN - Eisemenger's synd. - Peripartum Cardiomyopathy (PPCMP) - Marfan (dilated root)
Antenatal Mx of Cardiac disease	• Multidisciplinary team • Ensure rest, stop smoking, prevent anemia • Mx the respiratory infections		

Labor Mx of Cardiac disease	• Aim: vaginal delivery term • Give antibiotics, analgesia • Avoid aortocaval compression • Shorten 2nd stage by using forceps or vacuum • *Ergometrine is best avoided*
Rheumatic Disease (RD) & Mitral Stenosis (MS)	
Info	• Incidence decreased (available Rx) • Rheumatic endocarditis cause 75% of MS • MS: Diastolic murmur at apex • risk of pulmonary edema
Mx of MS	• β-blockers: ↓ HR • ↓ physical activity: short active 2nd stage or elective forceps • Avoid anemia, good analgesia • treat and anticoagulated arrythmias (specially A.fib) • *Avoid Syntometrine* (might lead to pulmonary edema) • Avoid fluid overload: diuretics may have a role, keep her on the dry side (80 ml/hr)
Aortic Stenosis (AS)	
Info	• Late Sx, sudden death may occur • PE: Loud (>3/6) harsh systolic murmur • if severe might lead to acute left ventricular failure, and they don't tolerate hypotension or tachycardia
AS Mx	• Avoid hypotension, fluid depletion • Apply lateral tilt if pregnant (or semi-sitting position)
Valve Problems (Regurgitant Valves)	
Info	• Regurgitated valves are well tolerated in pregnancy • During pregnancy, thrombotic risk increase (29%, 2.9% of maternal morality – need of effective anticoagulation (warfarin, unfractionated heparin (UFH) or LMWH)
Valve Replacements	• Prosthetic artificial valves: lifelong anticoagulation/warfarin • Prosthetic tissue valves: deteriorate with time
Eisenmenger Syndrome	
Info	• Long-standing left to right shunt caused by congenital defect • Maternal morality: 20-40% • Fetal outcome (Poor): Cyanosis, Low O2 sat, Polycythemia
Mx	• Most maternal death occurs in puerperium • Risk of death remain high (7%) with pregnancy termination

Ischemic Heart Disease (IHD)	
Info	• Incidence is increase • It occurs suddenly, unexpectantly • 20% with acute MI die in pregnancy or within 1 w of delivery • MI in 2nd trimester has lower mortality rate than the 3rd
IHD RF	• Multigravida, smoking, DM, HTN, obesity, hyper-cholesterol
Cardiomyopathy (CMP)	
Peripartum CMP (PPCAMP)	• Presents near term or 1st few weeks postpartum (up to 5 m) • Common in older, black, multiparous, obese or HTN pt • Perform Echo in: unexplained SOB, tachycardia, edema or SVT • we check after delivery (up to 5 m) if it was unresolved then we tell the pt that pregnancy is contraindicated (due to high recurrence in future pregnancies)
Heart Failure (HF)	
Info	• Maternal health takes priority • *ACEI* is contraindicated (teratogenic, cause fetal renal failure) • *ACEI* can be used during breast feeding • *β-blockers*: ↓ HR • *Furosemide* can be used • *Digoxin*: can be used (it crosses the placenta but at therapeutic levels it doesn't harm the fetus) • Consider prophylactic *anticoagulation*
Arrythmias	
Info	• Ectopic beats, palpitations are common
Investigations	• 12 lead ECG (ideally when an episode occurs) • TFT, Hemoglobin, 24 hr ECG • Echocardiography and cardiology review
General Points for Cardiac Diseases	
• Risk of fetal congenital heart disease (CHD) for a mother with a CHD is 4% (50% it is the same case) Fetal echo is ordered if 1 of the parents have CHD • Prophylaxis against bacterial endocarditis: NICE guidelines (do not give), while the AHA (give prophylaxis – the Dr supports giving)	

Venous Thromboembolism (VTE)

Venous Thromboembolism (VTE)	
Causes of pro-thrombotic state in pregnancy	• ***Stasis***: a) Compression of iliac veins (gravid uterus, right iliac artery over left iliac vein – hence most DVT's are left in pregnancy) b) Hormonally mediated vein dilation c) Immobilization • ***Vascular Damage***: a) Vascular compression at delivery b) Assisted or operative delivery • ***Hypercoagulable blood***: (= ↑ Thrombin ↓ clot dissolution a) ↑ Procoagulant factors: ↑ Fibrinogen, ↑ V, IX, C and VIII b) ↓ Anticoagulant activity: ↑ Protein C resistance, ↓ Protein S c) ↓ Fibrinolytic activity: ↑ PAI1 & 2 activity, ↓ tPA activity
Prophylaxis	• Risk assessment • ≥ 4 current RF (beside VTE Hx or thrombophilia): give prophylactic LMWH during antenatally & for 6 w postnatally • ≥ 3 current RF: give LMWH from 28 w & 6 w postnatally • ≥ 2 current RF: give LMWH for atleast 10 days postnatally • Women with previous VTE only (no other RF): - RCOG: offer anti-coagulation for 6 weeks postpartum, - British Society: prophylaxis the time pregnancy is confirmed
Thrombophilia's	
Definition	• Predisposition to thrombosis, 2ry to hypercoagulable state • it might be inherited or acquired
Antiphospholipid Syndrome	
Thrombosis	• ≥ 1 clinical episodes or arterial, venous thrombosis
Pregnancy Morbidity	1) ≥ 1 unexplained death of morphologically normal fetus ≥10 w 2) ≥ 1 Preterm birth (PTB) of a normal neonate <34 w due to: (i) eclampsia or severe PET or (ii) placental insufficiency 3) ≥ 3 consecutive miscarriages <10 w
Laboratory Criteria	1) Lupus Anticoagulant (*LAC*): ≥ 2 occasions at least 12 w apart 2) Anticardiolipin Antibodies (*aCL* – IgG &/or IgM): present in medium or high titre on ≥ 2 occasions at least 12 w apart 3) *Anti Anti-β2-glycoprotein I antibody* (IgG and/or IgM) , present on ≥ 2 occasions at least 12 w apart

Pregnancy Risks

• *Pregnancy loss*, *PET*, *Fetal growth restriction*, *PTD* (iatrogenic or spontaneous), *Thrombosis* (DVT, PE, Cerebral infarct)

VTE Prophylaxis

Info

• All VTE risk assessment should be individualized (not all thrombophilia's carry the same risk for example)
• Hereditary thrombophilia screens are not done in pregnancy.
- Protein C, Protein S, Antithrombin III are altered

Inherited Thrombophilia	Antenatal Prophylaxis	Postnatal Prophylaxis
Anti-thrombin deficiency	Yes - LMWH	Yes - LMWH
Protein C deficiency	Yes - LMWH	Yes - LMWH
Homozygous factor V Leiden	Yes - LMWH	Yes - LMWH
Homozygous prothrombin gene	Yes - LMWH	Yes - LMWH
Protein S deficiency	No – ? Aspirin	? – LMWH
Heterozygous factor V leiden	No – ? Aspirin	? – LMWH
Heterozygous prothrombin gene	No – ? Aspirin	? – LMWH
Other-thrombophilic defects: e.g. Anti-phospholipid syndrome	Yes - LMWH	Yes - LMWH

Which Agents To Use

1) ***LMWH***:
• *Agent of choice* for AN/PN, weight safe in breastfeed
• *1st line anticoagulant*
• Risks:
- Heparin induced thrombocytopenia (*HIT*): v. rare in pregnancy
- *Osteopenia*: rare
- *Allergic* reaction: pruritis, ulceration: try histamine, steroid

2) ***UFH***

3) ***Aspirin***: not recommended (unless heparin is not used)

4) ***Warfarin***:
• Restricted in pregnancy to few situations where heparin is unsuitable (e.g. mechanical heart valves)
• Contraindicated in the 1st trimester (*Teratogenicity 5% risk*)
• *In 2nd, 3rd trimester*: cause retroplacental and intracerebral fetal bleeding leading to poor growth & CNS abnormalities
• Long term anticoagulation can be converted from LMWH to warfarin postpartum when the risk of hemorrhage is reduced, mostly 5-7 d after delivery (*reserved for the postpartum period*)
- Warfarin is *safe in breast feeding*

DVT	
Info	• Maybe asymptomatic • Sx: swelling, pain, hotness, erythema (redness) • 80% DVT's in pregnancy are left sided • 70% DVT's in pregnancy are iliofemoral (above knee) as compared to a non-pregnant rate of 9%
Dx	• When you suspect DVT start treatment immediately! • Compression duplex US: reliable and sensitive for proximal DVT but not for calf DVT • If US is negative & low suspicion: discontinue the treatment • If US is negative and high suspicion: stop the anticoagulant and repeat the US on days 3 and 7 • D-dimer: not used because it increase in pregnancy • CBC, Coagulation screen, Urea & Electrolytes, LFT • Thrombophilia screen: not recommended
Mx	• Elevate leg & elastic compression stocking: to reduce edema, used up to 2 years post thrombotic syndrome • Anticoagulation • Mx with LMWH during the remainder of pregnancy and 6 weeks postnatally and until atleast 3 months of treatment has been given in total
Pulmonary Embolism (PE)	
Info	• Leading cause of maternal death • Difficult to clinically diagnose it: 2-20% of pregnant patient with clinically suspected PE prove to have PE
C/P	• Dyspnea, Chest pain, Cough, Hemoptysis, Pyrexia, Tachycardia, Tachypnea, Cyanosis, Raised JVP, Pleural rub, Pleural effusion, EVF
Investigations	• *ABG*: hypoxemia, hypocapnia (respiratory alkalosis) • *ECG*: - Inverted T wave and atrial arrythmias - Right axis deviation, T wave inversion (lead III), Q wave (lead III), are normal findings in pregnancy • *CXR*: doesn't harm the fetus (minimal radiation amount) • *Ventilation perfusion scintigraphy*: - used when PE suspicion, leg doppler are (-) - low radiation (increase risk for childhood malignancy)

	- negative predictive value of a normal VQ scan in pregnancy is excellent, making this a useful first line investigation - if low probability but there is a high suspicion consider further imaging types - if medium-high probability then anticoagulation is continued • *CT Pulmonary Angiography (CTPA)*: - less radiation than VQ but expose maternal breast tissue - used in high suspicion only and V/Q is equivocal - gold standard for Dx, but CI in pregnancy (invasive) • *Compression US* – *leg doppler*: - if there is symptoms of DVT – indirect confirmation (can be confirmatory), if it's positive no further investigations needed - Pelvic DVT is easily missed - Venous stasis and reduced venous return can also result in false positive in pregnancy (mainly at 20 weeks) - if asymptomatic the sensitivity is poor • *D-Dimer*: not useful in pregnancy
Mx	• Call for help, multidisplinary team, high dependency unit • High flow oxygen • +/- ventilation • LMWH (175 IU/kg) • +/- Thrombolysis (Streptokinase – controversial) • IVC filter in: - recurrent VTE despite therapy - can not tolerate anticoagulant or contraindicated - extensive VTE at ≥36 weeks of pregnancy

Liver & GI in Pregnancy

• **Physiologic Changes in Pregnancy:**
- ↓ lower oesophageal sphincter pressure
- ↓ gastric peristalsis
- delayed gastric emptying
- ↑ small and large bowel transit times.
- Thus, gastric reflux and constipation are common in pregnancy.

• **Liver function tests (LFTs) are altered:**
- ALP ↑ with gestation due to placental production (2–4x by term)
- ALT, AST and GGT are reduced
- albumin ↓ by 20–40%; this is partially dilutional due to increased total blood volume (contributes to most of the ↓in total serum protein)
- fibrinogen, caeruloplasmin, transferrin, & many binding proteins ↑
- bilirubin levels do not change.

• **S&S of normal Pregnancy**: they mimic GI and liver disease,,
- Nausea and vomiting
- Dyspepsia and heartburn, gastric reflux
- Constipation, Abdominal pain
- Spider naevi and palmer erythema (due to high estrogen lvls)

Hyperemesis Gravidarum (HG)	
Definition	• Intractable vomiting • >5% weight loss • Dehydration • Ketosis • Electrolyte imbalance
Onset	Always ***1st trimester***!

Causes	Unknown, there are contributing factors	
	Maternal	**Fetal**
Complica-tions **(Sx)**	• Hyponatremia • Hypokalemia • vit B1 (Thiamine - Wernicke's encephalopathy Korsakoff psychosis) • vit B12, B6 • Metabolic hyperchloremic Alkalosis • Mallory-Weis • Central pontine myelinolysis (rare) • Abnormal liver function • Biochemical thyrotoxicosis	• Small for GA • IUGR • PTB
Mx	• Admission: rehydration, R/O molar, UTI • Anti-emetics • Vitamins • Steroids (Corticosteroids) • Thrombo-prophylaxis (risk: dehydration + pregnancy)	
Constipation		
Frequency	40%	
Mx	Reassurance, hydration, fibers, laxatives	
Gastric Reflux		
Mx	• Antacids • Avoid food/fluid • H_2 receptor blockers (Cimetidine, Ranitidine) • Omeprazole	
Pancreatitis		
Sx	• Epigastric pain • N/V	
RF	• Alcohol • Hypertriglyceridemia (triglycerides ↑ 3x in pregnancy) • 1^{ry} Hyperparathyroidism	
Investigate	• Serum amylase > 1000	

Mx	• IV fluid • Analgesia • NBM • Intubation • ERCP • Stent drainage • Gallbladder/stone removal
Peptic Ulcer Disease (PUD)	
Info	Rare, Pre-existing disease tend to improve in pregnancy (PG and E2 induced by pregnancy protect the mucosa)
Sx	• Epigastric pain • Complications: Hemorrhage, perforation are rare
Mx	• H2 Antagonists, PPI, Antacids • Avoid misoprostol • H.pylori eradication after delivery • Upper GI endoscopy (if significant Sx, hematemesis)
Obstetric Cholestasis	
Info	• Unique to pregnancy, 3rd trimester, recurrence 90%
Sx	• Pruritis • Excoriations (scratching) without rash
Investigate	• LFT abnormal • Dx of exclusion
Complica-tions	• Malabsorption • PPH • PTD • IUFD • Fetal distress • Fetal ICH (intracranial H, stroke)
Mx	• Delivery ASAP • vit. K for both • Anti-histamine • UDCA (ursodeoxycholic acid) • Avoid COCPs

Acute Fatty Liver of Pregnancy (AFLP)	
Note	• Rare, fatal, 3rd trimester • Risk of fulminant hepatic failure, encephalopahy
Sx	• Severe vomiting • Abdominal pain
DDx	• HELLP Syndrome (hemolysis, elevated liver enzymes, low platelets)
Investigate	• Liver dysfunction: hypoglycemia, hyperuricemia, renal impairment, coagulopathy

Neurological

Epilepsy in Pregnancy	
Info	- MC neurological problem in pregnancy - Subfertility
Effects	- *Pregnancy effects on epilepsy*: 30% ↑, 10% ↓, 60% NC, risk of seizures is highest peripartum - *Epilepsy effects on pregnancy*: fetal loss (miscarriage), fetal growth restriction, fetal malformations (4-10% - general 2-3% - we give sodium valproate)

Preconception	During	Postparum
- Drug withdrawal/ dose change if indicated Monotherapy - preconception folic acid 5 mg daily - discussion of potential maternal and perinatal risks - advice about the most appropriate contraception.	- Booking US scan – anencephaly can be detected at 11 weeks - Review seizure frequency & AEDs - Detailed anomaly & fetal cardiac US scans - Clinical assessment of fetal growth - Vit K last 4wks of pregnancy - Baby should receive Vit K 1 mg at birth.	- Encourage breastfeeding - Review anticonvulsant therapy and contraception - Advise the woman on strategies to minimise harm to her and her baby

Thyroid Diseases

Hyperthyrodism	
Causes	Graves (90%), toxic nodule, toxic multinodular goiter, hydatiform mole, HG
Outcomes if uncontrolled for both mother and baby	- PET - neonatal *hypo*thyroidism - thyroid storm and thyrotoxic heart failure - fetal growth restriction - prematurity - stillbirths - fetal or neonatal thyrotoxicosis
Mx	- ***Medications***: **carbimazole** (CBZ), **methiamazole** (MMI) or **propylthiouracil** (PTU), cross the placenta, but PTU less so than CBZ and MMI (because it crosses the placenta in lesser amounts). - ***Surgery*** is rarely performed in pregnancy, possibly if drug resistance or serious side effects with antithyroid drugs, e.g. agranulocytosis. - ***Radioactive iodine*** treatment is contraindicated during pregnancy and should be avoided for at least 6 months after treatment.
Hypothyroidism – Overt hypothyroidism (OH)	
Causes	OH complicates 2–10/1000 pregnancies & is due to: • Hashimoto's thyroiditis • previous radioiodine therapy/thyroid surgery • previous postpartum thyroiditis • hypopituitarism • iodine deficiency.
Outcomes if uncontrolled	- higher risks of spontaneous miscarriage, PET,PIH, PPH & low birth weight.

for both	- There is a risk of a slight reduction in IQ in the fetus but no increased risk of congenital malformations.
Mother and baby	- Pregnancy itself probably has no effect on hypothyroidism although approximately 25% of women will require an increase in their thyroxine dose in pregnancy
Congenital Cretinism	well-documented syndrome of growth restriction, deafness and neuropsychological impairment, resulting from severe iodine deficiency or untreated congenital hypothyroidism

Diabetes in Pregnancy

Types

pre-existing (type I,II), or Gestational (pre-existing, TRUE)

Pre-existing

• effect of pregnancy on pre-existing:
- ↑ insulin requirement
- nephro, neuro, retino-pathies deterioration
- Hypoglycemia, DKA

Effects

Maternal	Fetal
- increase risk of (miscarriage, PET, infection, lower segment caesarian section (LSCS))	- congenital abnormalities, mortality, late stillbirth, hypoglycemia, polycythemia, jaundice

Mx

a. ***Diet***: low carbs, high fibers (orlistat + metphormin), avoid starvation, & frequent snacks might be needed
** note: hypoglycemia after birth is caused by ↑ in insulin

b. ***Insulin***: 3 pre-meal short acting insuln (actrapid) +/- intermediate acting (protophane – 3 m) as it allows max flexibility
- target glucose level: fasting (<5mmol/L), 2hr (<7mmol/L)

c. ***Oral hypoglycemic agents***:
- risk of congenital abnormality
- for DMII, we stop oral hypoglycemic & change to insulin

• ***Biguanides*** (*Metformin*):
- can be used in pregnancy (not teratogenic), category B
- in PCOS: for insulin resistance & reproductive function,
- ↓1st trimester miscarriage, 10x ↓ GD

• ***Sulfonylureas***: category C

	- 1st generation (↑ risk of neonatal hypoglycemia), - 2nd generation (Glyburide, no such effects) - 4-20% pt fail to achieve glucose control with max dose, - ↑ risk of pre-eclampsia and need phototherapy d. ***Insulin Analogues***: • *Rapid acting* (*Lispro*): - cat B, teratogenic concerns, antibody formation, growth promoting properties, majority of evidence showed that it doesn't cross the placenta and has no maternal/fetal S.E • *Long acting* (*Glargine*): - cat C, not well studies
Delivery	- control sugar during delivery, timing and mode, intrapartum insulin infusion with glucose monitoring, *no CI for breast feeding at all* o **Pre-conception Counselling**: - to optimize control prior conception - If needed, proliferative retinopathy treated with photocoagulation before conception - *the only CI to pregnancy are*: ischemic heart disease, untreated proliferative retinopathy, severe renal impairment (creatinine >250)
Gestational Diabetes (GD)	
Definition	carbohydrate intolerance first recognized during the present pregnancy (includes pre-existing unrecognized, 30% identified as GDM in fact are pre-existing)
Screening	- the test is performed between 24-28 weeks (because the diabetogenic effect can be manipulated at this time), in 1st trimester check for blood sugar, at 24-28 weeks (end of 2nd) check glucose intolerance test if there is risk, if high risk then at week 10 - Screening by fasting, random glucose, glucose challenge test (50gm)

RF	- Age >25y - BMI > 25 - previous GDM - FHx of DM in 1st degree relative - previous macrosomic baby (≥ 4Kg) - polyhydramnios - large for date baby in current pregnancy - previous un explained stillbirth
Dx	- Glucose challenge test (75gm/100gm) - fasting glucose 75gm glucose

	Fetal	Maternal
Complic.	- Macrosomia (>4kg) - increase C-section, instrumental deliveries, birth trauma (brachial plexus injuries, clavicular fractures) - ↑ in neonatal hypoglycemia (24%), hyperbilirubinemia, polycythemia - ↑ risk of DMII, obesity in life	- ↑ risk of hypertension - ↑ risk of c –section, instrumental deliveries - ↑ risk (40-60%) of developing DMII within 20-15 y (hence woman should be screened annually)

Mx	- similar to pre-existing, monitor glucose, diet control, insulin for poor control, delivery plan individualized

Pregnancy Category	Description
A	No risk in controlled human studies
B	No risk in other studies
C	Risk not ruled out
D	+ evidence of risk
X	CI in pregnancy
N	FDA has not classified it

Hypertension in Pregnancy

Gestational	- BP ≥ 140/90 Hg for 1st time during pregnancy - no proteinuria - BP appear after 20 w GA & return in <12 w Postpar. - Final Dx only made postpartum
PET	- same as gestational HTN + proteinuria (≥ 300mg/23 hr or 1+ dipstick)
Eclampsia	- same features as PET + tonic clonic seizures - Seizures that cannot be attributed to other causes in a PET
Chronic HTN	- increase in BP either before pregnancy or before 20 w of gestation or 1st dx after 20 w of gestation & doesn't disappear 12 w postpartum
PET superimposed on chronic	- chronic HTN + worsening of BP + worsening of proteinuria
HELLP	- life-threatening pregnancy complication usually considered to be a variant of PET. Both conditions usually occur during the later stages of pregnancy, or after childbirth. **H** (hemolysis, which is the breaking down of RBCs) **EL** (elevated liver enzymes) **LP** (low platelet count)
RF	• FHx • Obesity • 1st Pregnancy of a couple • Age extremities (<20, >40) • Medical: antiphospholipid, DM, renal disease, • Obstetric: multiple pregnancies, previous PET, hydrops fetalis, triploidy, hydatiform mole

Sx	• Asymptomatic (most commonly) • flashing lights, photophobia, headache, visual field loss, epigastric pain, vomiting ** Remember: BP decreases in pregnancy then increase but stays within normal range
Screening	• Mammogram • Abnormalities in maternal uterine artery Doppler waveform (notching) between 18-24 w gestation may identify increased risk

• **Potential 2^{ry} effects in pre-eclampsia**:
- ***Placenta***: infarction, retroplacental bleeding, abruption (Pre-mature separation of the placenta due to increased BP (normally placenta separates from uterus during delivery)
- ***Fetus***: impaired uteroplacental circulation might lead to growth retardation, hypoxemia and intrauterine death

Pre-Eclampsia (PET)	
Mild form	- B/P 140-159/90-109, proteinuria 300-5K mg/24 hr - no end organ dmg - conservative ttt & follow up (to prevent progression) - delivery at term (37w)
Severe form	signs of end organ damage - B/P >160/>110 on 2 occasions at least 6 hrs apart - proteinuria ≥ 5g/24 hr - Oliguria <500 cc/24 hr - cerebral or visual Sx, epigastric or RUQ pain - pulmonary edema or cyanosis - low PLt - IUGR - ↑↑ liver enzymes

Mx	- Delivery of the fetus even if preterm (to avoid compl.) -If fetus <24 w then terminate pregnancy - >32w GA there is no cause not to deliver the fetus!
Indications for Termination	- Term pregnancy with mild or severe PET - Severe PET regardless of the GA - Warning signs: headache , visual disturbance, epigastric pain, oliguria - Eclampsia: the Pt must be stabilized & delivered - Preterm mild PET: Assess fetal by NST, BPP, Doppler
Methods of Termination	- IOL with PG followed by IV oxytocin - Elective CS: Severe PET with unfavorable Cx
Anti-HTN therapy	- Mild: no benefit - Severe: used to prevent maternal stroke (complica.) - Methyldopa - Nifidipine or labetalol may be added to Methyldopa - ***Avoid: diuretics, atenolol, ACE's, ARBS*** - If BP >170/110 mmHG: Labetalol or Hydralazine, or Nifedipine - Check BP every 15 m until stable
Prevention & Control of Convulsions	• **MgSO4**: - is given in SEVERE PET to prevent eclampsia - MgSO4 is Ca^{+2}CB - If MgSO4 isn't available, use Phenytoin or Diazepam - **$MgSO_4$ Toxicity**: BURP (blood pressure ↓, urine output ↓, RR <12, patellar reflex absent)
Fluid Mx	- Total fluid should be limited to 80ml/hr or 1 ml/kg/hr - Historically Pulmonary edema was a cause of death - Fluid should be maintained (if low: renal failure, if high then pulmonary edema)
Fetal Assessment	o CTG o Further assessment tests include; - US measurement of fetal size

	- Umbilical artery Doppler - Assessment of fluid volume o Women in labor with severe PET should have continuous CTG
Prevention of PET	- **Low dose aspirin**: before 2nd pregnancy - Ca^{+2} Supplements: for prevention but doesn't ↓ risk
Chronic HTN	
To check for HTN Comp.	- Booking tests - CXR (Cardiomegaly) - ECG (Left ventricular hypertrophy) - ↑ serum creatinine, ↓ creatinine clearance & proteinuria (5-10%, might be before pregnancy)
Maternal Compli-cations	- Superimposed PET in 1/3 of Pt - ↑ risk of abruption placentae • **Renal function**: - If renal function is well creatinine < 1.5 mg/dl - pregnancy doesn't change the course of renal disease - If function is affected prior to pregnancy, deterioration occur more rapidly
Fetal Complica.	- Prematurity 25-30% - IUGR 10-15% - Stillbirth & fetal distress
Mx	- mild CH HPT (140-179/90-109) only monitor no Mx - Pt with severe CH HTN should have their BP controlled before pregnancy & continue Rx in pregnancy - α Methyle Dopa - Calcium channel blockers - β blockers can be used but > IUGR - Labetalol - Serial U/S for fetal growth. BPP, NST > 34wk - Follow up every 2 wks till 30 then weekly

- **Investigations**:

- Renal function test, uric acid , calcium ,LFT, 24hrs urine for creatinine clearance & protein, CBC, Urinalysis, ECG.GTT
- Early U/S for dating of pregnancy
- Not allowed to continue past 40wks, IOL at 40 wks
- Regular diet no salt restriction
- IOL > for superimposed PET,IUGR, fetal distress, worsening renal function

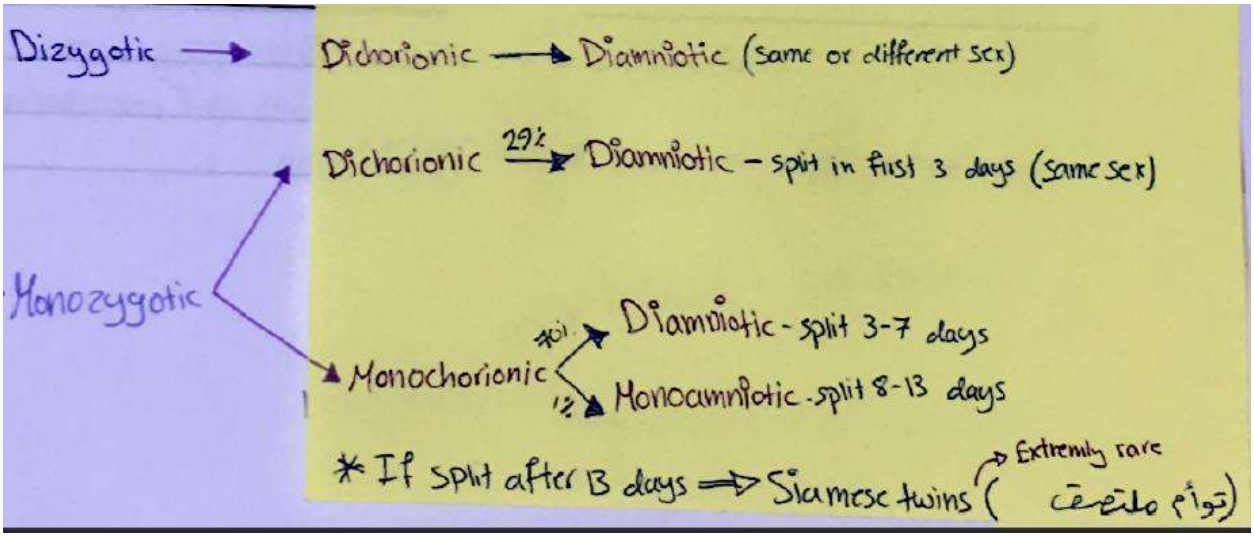
Twins

• the rate of monozygotic twins is constant (3-5/1000)
• Prevalence: 1% JOR
• only 4 per year are monoamniotic, monochorionic in JOR
- Chorion (sac), Amniotic (Placenta), Zygosity (Zygote)

• dizygotic twins have separate placenta but can be fused (DCDA)
• Monochorionic Monoamniotic (MCMA): no separating membrane
• MCDA
• DCDA

o **Monozygotic (identical twins) Twins**: if division of inner cell mass occur after the amniotic cavity occurs (8 days) the twin will be MCMA (1%), 70% of are MCDA, 29% DCDA

Complications	
Maternal	**Fetal**
• Miscarriage • PTL • PET • GD • Abruption • Anemia • UTI • Anomalies • Polyhydramnios • Malpresentation • CS • PPH	• Prematurity (MC!) • PROM • Congenital anomalies • Umbilical cord: velamentous, prolapse, vasa previa • Discordance – unequal weights • TTTS (all MC carry risk) • Antepartum death of 1 twin • IUGR • unequal placenta surface • genetic syndrome • Cerebral palsy risk



Antenatal Care	• US (every 4 w): discordance, AFV, umbilical • Doppler: umbilical artery flow velocity (mainly in MC) • Serum screening: risk of Down • Nuchal translucency • CVS or amniocentesis • Fetal reduction or termination even • Nutritional advice • more antenatal visits • Twins grow should be followed by the singleton growth curve until 32-25 w (b4 32w – normal, >32 w, less space)
Discorda-nce cause	• IUGR • TTTS • Aneuploidy • Anomaly • Viral infection
MC twins	• Higher risk of TTTS, Death of one twin (it leads to hypotension, and give the 2nd baby thromboplastic death or neurological damage)

	• 15% of MC • Vascular communication (artery-vein, anemia for one, polycythemia for other) o **Grades**: - Bigger bladder - more amniotic fluid - gets bigger size
TTTS **Twin To Twin Transfuse Syndrome**	- bigger baby die from heart failure • Fetal hydrops is pre-terminal sign • Recipient twin: cardiomegaly, CHF, polyhydramnios, die • Donor twin: IUGR, HF if anemia (severe), hydrops, oligo- • Stuck twin: sonographic appearance of extreme TTTS o **Treatment**: • Amnioreduction (by amniocentesis) • Laser ablation of vascular anastomoses • PTD o **Death of one twin**: - most feared sequalae is neurological damage (for the survivor – thrombotic arterial occlusion) - Mother: DIC
	• biggest RF for mortality, morbidity • **Problems of PTL**: corticosteroids help!
PTL	- Lungs: RDS - GI: NE - Neuro: intra-cerebral hemorrhage - Infection: sepsis

	• most important element in deciding the MOD is fetal presentation (determined by US) • 37 w is the best to deliver twins • **Frequency of fetal presentation**: - vertex/vertex: 40% - vertex/breech: 30% - breech/breech: 9% - vertex/transverse: 7% • **Vaginal birth indications**: - Diamniotic twins - Twin 1 is cephalic - neither has fetal compromise requiring CS
Intra-partum Mx	• CBC, blood group • Continuous electronic fetal monitoring (EFM) • US • Epidural anesthesia might be useful o **Elective C/S if**: - MA twins - Discordant twins - 1st twin non Vertex - Other major obstetric RF ** Breech of 2nd twin is not a CI of Vaginal Delivery
Post-partum Mx	• IV Syntocinon (prophylactic)

Assessment of Small for Gestational Age Fetus (SGA)

IUGR ≠ SGA ≠ LBW

Definitions

- **SGA**: newborns who are smaller in size than their normal for the same GA, weight is <10th percentile for appropriate GA
- **IUGR** (Intra-uterine growth restriction): presence of a pathological process in-utero that inhibits the fetal growth, birth weight is below 10th percentile for a given gestational age
- **LBW** (Low birth weight): birth weight below 2500

SGA V.S IUGR	IUGR	SGA
Definition	Fetus growth is restricted or retarded while in the uterus	Size of the fetus is SGA
Appearance	Appear malnourished	Small, not always malnourished
Dx	- US - Doppler flow - Measure fundus to pubic bone	- US - Measure fundus to pubic bone
Measurement	Measure is based on the change in growth over time	Measure is based on a one-time measurement that falls below a statistical value
Growth rate	Always slower than normal	Might be normal
Birth weight	Might be normal	Always lower than normal
Pathological condition	Always pathological	Not always pathological, mostly due to Genetics

SGA

Things you need to know

- GA (Gestational Age), Growth Curves, Centile
- Ovum lives for 48 hours after ovulation

GA

- *You can know it by two methods*:

1) ***Calculation***:

- We calculate GA depending on LMP or EDD
- To use LMP: must be regular, known date, no OCP or lactation
- EDD = LMP + 7 days – 3 months + 1 year
- Duration of pregnancy = 266 days (from conception till birth) + 14 days = 280 days (from LMP) = 40 weeks (could be up to 42)

LMP → GA → EDD (280 days in total)

• *How to calculate*?
a) Calculate EDD, LMP
b) Check todays date, and which one is closer to it?
- if it's closer to LMP: then GA = todays date – LMP
- if it's closer to EDD: then X = todays date – EDD / GA = 280 – X

• *Example 1*:
- LMP = 1/5/2019
- Today = 3/9/2019
- EDD = 8/2/2020
- so LMP is closer: 2 days difference + 4 months (16 weeks)
- GA = 16 week + 2 days (or count the days)

• *Example 2*:
- LMP = 22/2/2019
- Today = 3/9/2019
- EDD = 29/11/2020
- so EDD is closer: 26 days difference + 2 months (total 86 days)
- 86 days / 7 = 12 weeks and 3 days
- GA = 40 – (12 weeks + 3 days) = 27 weeks and 4 days

2) ***US***:
- the earlier the more accurate, for example:

if you do US in …….	Error days …….	
8/9 week	+/- 3 days	you can't
20 week	+/- 10 days	know it
35 week	+/- 21 days	exactly

Growth Curves	• Graphical representation of how a particular quantity (weight, height,…) increases over time • there is a normal curve for every variant (bell shaped curve) you must be within this curve, beside that there is a problem
Centile "Percentile"	• Term used to describe the degree of the fetal growth based on the normal curve • 50 Percentile: is the mean where most babies exist in • > 95 Percentile: small % of babies that are more than average • < 5 Percentile: small % of babies that are less than average - e.g.: if a child weight is at the 50 centile line, that means out of 100 children at the same age 50 will be bigger and 50 smaller

How to measure SGA	• We measure head circumference (**HC**), abdominal circumference (**AC**), femur length (**FL**) • Then we put them in a certain equation to measure the estimated fetal weight (**EFW**), we put this weight in the growth curve depending on the fetal GA, compare it to the normal to see at what percentile is this fetus

IUGR	
IUGR Complications **"Important-ance to differentiate IUGR/SGA"**	• 40% of unexplained stillbirths • 30% of sudden infant death syndrome (SIDS) • 8 fold increase risk of infant mortality • Operative delivery • Hypoxic Ischemic Encephalopathy (HIE), Mental retardation • Prematurity • Meconium Aspiration • Asphyxia, Hypoxia, Polycythemia, Hypoglycemia, Acidemia • Risk of adult onset conditions: DM, HTN, Atherosclerosis, Strokes, Adult metabolic syndrome (Barkers hypothesis)
Threshold	• <10^{th} centile for GA - high sensitivity, low specificity, might be SGA • <5^{th} centile for GA (worse outcome)

	Maternal	**Placental**
Causes	- Poor nutrition - Smoking - Alcoholism - Drug abuse - Early CVS disease - Cyanotic heart disease - HTN, DM - Obesity (Leptin resistance) - Pulmonary insufficiency - Anti-phospholipid syndrome - Hereditary thrombophilia's	- Placental insuffiency - Essential HTN - Obesity (leptin resistance) - CKD - Pregnancy induced HTN - Velamentous cord insertion **Fetal** - IU infections: TORCH - Congenital anomalies

IUGR RF	• Previous Hx • HTN, DM • Twins • Smoking, Alcohol, drugs • Maternal anemia (Hgb <10) • Maternal Hypoxia (Cardiac, pulmonary or high altitudes)

Phases of fetal growth	• 1-16 weeks: mostly cellular hyperplasia • 16-32 weeks: both hyperplasia and hypertrophy • >32 weeks: mostly hypertrophy - Hence early IUGR affect number and have a global (symmetrical) effect, while later IUGR size will be affected
Factors influencing Intrauterine growth	• High altitudes (smaller) • Multiple gestation • Race, Gender • Smoking, Alcohol • Socioeconomic status • Pathologies: Maternal, Fetal, Placental
Early IUGR	• Can occur in: - Multiple gestations - Chromosomal abnormalities: Triploidy and Tri 18: very early and severe, Tri 13: less severe, Tri 21: no IUGR but short femur and humorous - Cardiac malformations - Early pregnancy infections: rubella, CMV, toxoplasmosis
Symmetric IUGR	• 1/3 of all cases • Fetus is small (HC, AC, FL), normal HC:AC ratio • Growth rate is decreased • Diagnosed early: mostly due to IU infections or anomalies • Early insult affecting the cell number
Asymmetric IUGR	• 2/3 of all cases • Nutritional (DM, HTN,…) • Found late at 2^{nd} , 3^{rd} trimester • Placental insuffiency • Slow AC growth, normal HC and FL; the bran is prefentially spared at the expense of abdominal viscera (HC > AC) - Why AC slow? Because not enough O2 supply reach the fetus, so the blood goes to the vital organ (heart, CVS) and less supply reach the kidneys and intestines (hence the small AC) - Pancreas and liver are the one mainly affected - Glycogen utilization by liver (failure of storage), liver shrink, decreased AC; preferential shunting to brain (maintained HC) - Due to the liver changes: the fetus is at risk of obesity, DM later in life

IUGR Dx	• GA measurement must be correct • **Serial Ultrasound Measurements** (more than 2 w interval): - it detects 50-90% of IUGR 1) Biparietal diameter (BPD) 2) Head circumference (HC) 3) Abdominal Circumference (AC): most effective parameter, because it is affected in both symmetric/asymmetric 4) Femoral length (FL) - HC:AC ratio, FL:AC ratio (to know is it symmetrical or not) 5) Amniotic fluid volume: Oligohydramnios in IUGR 6) Calculated fetal weight, Estimated fetal weight (EFW) 7) Umbilical and uterine artery Doppler 8) Transcerebellar distance 9) Cheek-cheek diameter - *Amniotic fluid source*: <12 weeks (shedding of cells) > 12 weeks (fetal urine), so when the blood supply to the kidneys decrease due to IUGR, there is less urine output so less fluid - As pregnancy advances the HC remains > AC, until 34 weeks the ratio is nearly 1, After 34 weeks the normal pregnancy is associated with AC > HC
IUGR Mx	• *Pre-pregnancy*: - improve nutrition, avoid smoking - check the presence of maternal causes - women with antiphospholipid syndrome and a previous IUGR: give low-dose aspirin (81mg/d) in early pregnancy - for women with hereditary thrombophilia's: give low-dose heparin (5000 U twice daily), with/out low-dose aspirin ** so aspirin and heparin are used as prophylaxis • *Antepartum*: with an IUGR case: - Avoid maternal preventable causes (better nutrition, smoking) - Work leave (if work fatigue), hospitalization (will increase the uterine flow hence better nutrition) - Aim is to deliver before fetal compromise but after lung maturation, so you need monitoring by NST, AFI, …

	- Based on the fetus: a) US normal growth, Fetal monitor normal – no intervention b) US: Strongly suggest IUGR: consider delivery at 34 weeks if at risk of fetal death, also pulmonary maturation should be documented by amniocentesis c) US: equivocal for IUGR: bed rest, serial US (3 week interval), fetal surveillance, assessment of fetal movements (kick counts), Doppler-derived umbilical artery systolic-diastolic ratios are abnormal in IUGR fetuses • *Labor* & *Delivery*: - IUGR per se is not a CI for IOL - C/S if fetal distress: in labor these high risk patients should be monitored to detect earliest fetal distress evidence - Combined obstetric-neonatal team are needed in fear of fetal asphyxia • *After Delivery*: - Examine infant to R/O congenital anomalies, chronic infection - Monitor fetal blood glucose (due to no adequate hepatic glycogen stores): hypoglycemia is common - Hypothermia is uncommon - RDS is more common in presence of fetal distress due to fetal acidosis (which reduces surfactant synthesis and release)
When to Deliver	• Fetal lung maturity achieved • Absence or reverse end diastolic flow velocity of umbilical artery wave-form • In PT IUGR: it should be based on maternal health, fetal function tests, biochemical tests of fetal lung maturity
IUGR Prognosis	• should be monitored, short-term outlook is good, but there is higher risk of co-morbidities in the adulthood

Early Pregnancy Complications & Miscarriages

- **Definition**: <12 w of gestation
- **Investigations**: Routine (urine analysis, CBC) + US + βHCG
- **Gestational Sac** (**GS**): ↑by 1.3 mm/day, seen around 4th w TVUS
- **Yolk sac**: appear at 5 w, disappears at 10 w
- **CRL**: crown-rump-length: to estimate GA

o **Human chorionic gonadotrophin βHCG**: most useful test

- double every 48 hr till 8 week (plateau, max: 100K)
- increase <66% over 48 hr is associated with EP, miscarriage
- Discriminatory zone: 1000-2000 TVUS, >4500 TAUS

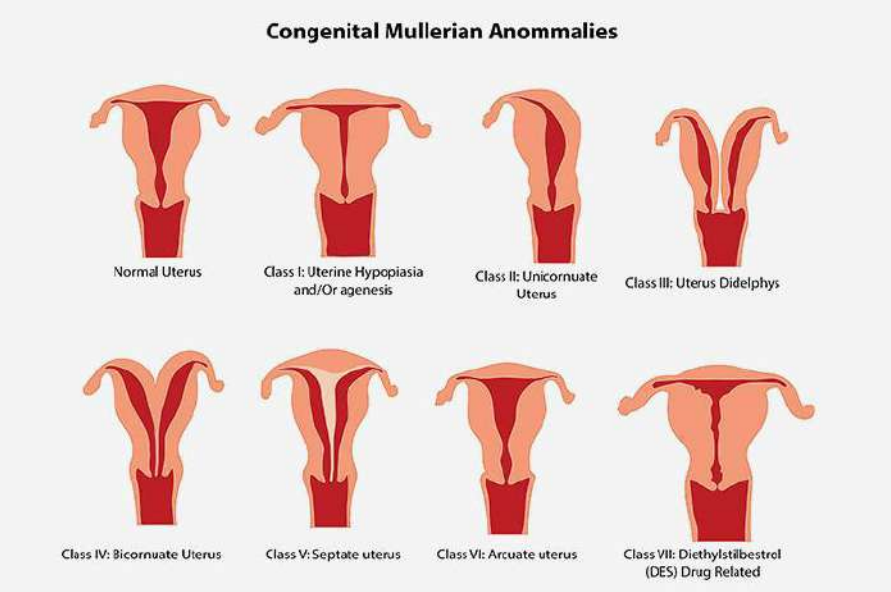
Miscarriage	
Definition	- Vaginal bleeding w/o loss of pregnancy b4 24 w - Early ≤ 12 w, Late ≥ 12 w
Terms	• Clinically detected: US & detect heart beat at the 6th w • Biochemically detected: pregnancy test +
Causes	• 1st Trimester: Genetically 50% (chromosome abnormal) • 2nd: inf, unexplained (20%), uterine abn., Cx weakness
Types	
Threatened	- any vaginal bleeding, painless/painful b4 24 w - Dx: US, Rh, Speculum, βHCG
Septic	- RPOC (retained product of conception) become infected - Sx: offensive vaginal discharge - Mx: admission, IV antibiotics, Surgical: evacuation
Missed	- embryo has died or has not been developed normally - Dx: US (GS ≥ 25mm) with no embryo or no FHB when | CRL ≥ 7mm - Sx: asymptomatic

Incomplete	- some RPOC passed and some remained - Dx: clinical: tissue seen passing by US, HMB because cervix cant contract due to RPOC
Complete	- Endpoint miscarriages: all product of conception passed - Dx clinical: no pregnancy Sx, US: empty uterus
Mx	o **Expectant**: - 90% will miscarry within 3 w, rescan and contact early pregnancy unit - Complications: infection, hemorrhage o **Medical**: • Uterotonic agent: misoprostol (PG) - CI: mitral stenosis, HTN, hemoglobinopathy, anti-coagulation, asthma o **Surgical**: • Vacuum, E/C, D/C o **Anti-D**: >12 w
Pregnancy of unknown location (PUL)	
Definition	• + pregnancy test, but no IU/EU pregnancy on TVS • 50% failing pregnancy, 27% very early IU pregnancy, 9% complete, 14% early ectopic
Mx	• HCG repeat in 48 hr • repeat TVS when HCG >1000 • follow up
Recurrent Pregnancy Loss (RPL)	
Definition	2 or more consecutive pregnancy loss <24 w gestation
Causes	- unexplained, age, uterine abnormality - abnormal parental karyotype - anti-phospholipid antibody syndrome - Genetic thrombophilia

Investigate	• Karyotyping • HSG +/- hysteroscopy • pelvic US • Antiphospholipid syndrome screening: - anti-cardiolipin Abs - lupus anti-coagulant - DRVVT (Dilute Russell's viper venom time)
Mx	• **Parental chromosomal abnormality**: counseling, pre-implantation genetic diagnosis (PGD), pre-implantation genetic screening (PGS) • **Anti-phospholipid**: - LMWT heparin, low dose aspirin • **Congenital uterine anomalies**: - Hysteroscopic resection of seprum • **Unexplained**
Ectopic pregnancy	
Definition	is the implantation of a fertilized ova outside the endometrial cavity, it results because of a problem during the journey of the ova from the tubes to the cavity
RF	• Tubal damage (from a previous surgical infection) • Hx of previous EP (25% more risk) • Smoking • Altered tubal motility • Hx of infertility • Hx of Multiple sexual partners… PID • Contraception**:** all contraception methods will cause a decrease in risk of ectopic pregnancies as they decrease the risk of pregnancy in general, except for Mirena IUD because it alters the motility of the tubes
Sx	Triad: pain, amenorrhea, vaginal bleeding
Complicate	• Massive hemorrhage • Infertility • Death

Dx	• Clinically by: HCG, US (empty uterus, adnexal mass, fluid collection), then **laparoscopy** (GS!!)
Mx	• Expectant: if HCG <1000 • Medical (MTX): Methotrexate (chemical agent, anti-metabolite) if stable pt, and HCG <5K, and sac <3.5 cm • Surgical: laparotomy or laparoscopy with salpingectomy, or salpingostomy

Uterine anomalies are caused by any dysfunction in the development of the Mullerian ducts, any error in the formation, descend, fusion, separation or resorption of the separating septum will end up by a uterine anomaly.



Class II: caused by failure of formation or descend by one of the Mullerian ducts, which will cause a small uterus leading to RPL or preterm delivery here we can't do anything except expectant Mx, & after a few failed pregnancies the uterus will expand in size and we may have a normal pregnancy.

Class III: this is the worst uterine anomaly but has the best obstetric outcome, caused by (complete) failure of fusion after normal descend, here the pt. will end up with two different cervixes and uterine.

Class IV: here we have (incomplete) failure of fusion, only in the upper part of the uterus, we have one cervix and one mid cavity but two upper parts.

Class V: normal descend and fusion, at the site of the fusion we have a separating septum, this septum should normally resorb but here it doesn't resulting in mildest uterine anomaly that is associated with with the worst obstetric outcome, because the septum is an avascular fibrous tissue, so unhealthy for implantation.

Class VII: in the past a drug called Diethylstilbestrol that was used for pregnancy support, it was stopped because it leads to congenital anomalies in female babies, it results in a small room T-shaped uterus with abnormal tubes.

Labor & Delivery

• **Labor**: is a physiological process during which the products of conception are expelled outside the uterus, it's a clinical Dx

• **Labor**: the onset of regular, painful contractions with progressive cervical effacement and dilatation accompanied by the descent of the presenting part

• what initiate labor? We don't know exactly (theories – read them)
• in primigravida the dilation is slow, thus if she admitted because she could sense contractions we leave her a little bit to check if there is dilation progression if present then its labor, if not then send her home

• **Factors that influence the progress of labour:**
o **Power**:
a. *uterus contractions*:
- *inorder for contractions to be efficient 3 things need to apply*:
1. Frequency: 3-5/10 min
2. Intensity: strong (>50 mmHg) measured by CTG
3. Duration 40-60 seconds
b. mother pushing (additional force)
o **Passenger** (baby)
o **Passage** (Pelvis)

• **Zero station**: on ischial spines

• **Moulding**: happens because the sutures are not closed: it is the change in the shape of the fetal head from external compression leading to reduction in its diameter

o Ranking:

0	No molding
+1	Sutures opposed
+2	Overlapped but reducible
+3	Overlapped but not reducible (mostly lead to obstructed labor)

• **Braxton Hicks Contractions:**

- mild, irregular, non-progressive contractions that may occur from 30 weeks gestation (mc after 36), it does not induce labor (don't apply the rules of labor contractions, also called false labor)

• Cervical changes during labor:

o ***Dilation and Effacement***:

- Dilatation: examined by PV examination
- Effacement: measured by either % > effacement cm > dilation, we try to feel the distance between the internal and external orifices (os – length of the cervix because in pregnancy it shortens)
- Normally the cervix length is 2.5-3.5 cm during pregnancy so if you measured it as 2 cm then its 20% effacement
- In primi effacement always occur before the dilation, while in the multipara, it might occur after or together

- ***these changes are a result of profound alteration in biochemical properties of cervical tissue and include:***

a. reduction in collagen concentrations
b. increase water content
c. change in proteoglycan/glycosaminoglycan composition
d. Rearrangement and realignment of collagen

• **Rupture of fetal membranes (ROM):**

- vital part of normal labor, might be done mechanically
- 90% remain intact until after the onset of labour
- 10% of women rupture prior to the onset of labour (PROM)

True Labor	False Labor
Contraction occur at regular intervals & become more frequent	Irregular
Duration of each contraction gradually increases	Remain unchanged (long/short)
Intensity becomes stronger	Remain unchanged
Cervix progressively dilates	Doesn't dilate
Don't respond to simple analgesia	Responds

Mechanism of Labour (LOA Position)

the baby is responsible for the 7 cardinal movements

1. Head floating before engagement
2. **Engagement**, **Descent**, **Flexion**
3. **Internal Rotation**
4. Complete rotation, beginning extension
5. Complete **Extension**
7. **Expulsion**

(Engagement, Descent, flexion, internal rotation, extension, external rotation, expulsion)

** External Rotation (**Restitution**): This is the spontaneous realignment of the head with the shoulders.

** Expulsion. This is anterior and then posterior shoulders, followed by trunk and lower extremities in rapid succession

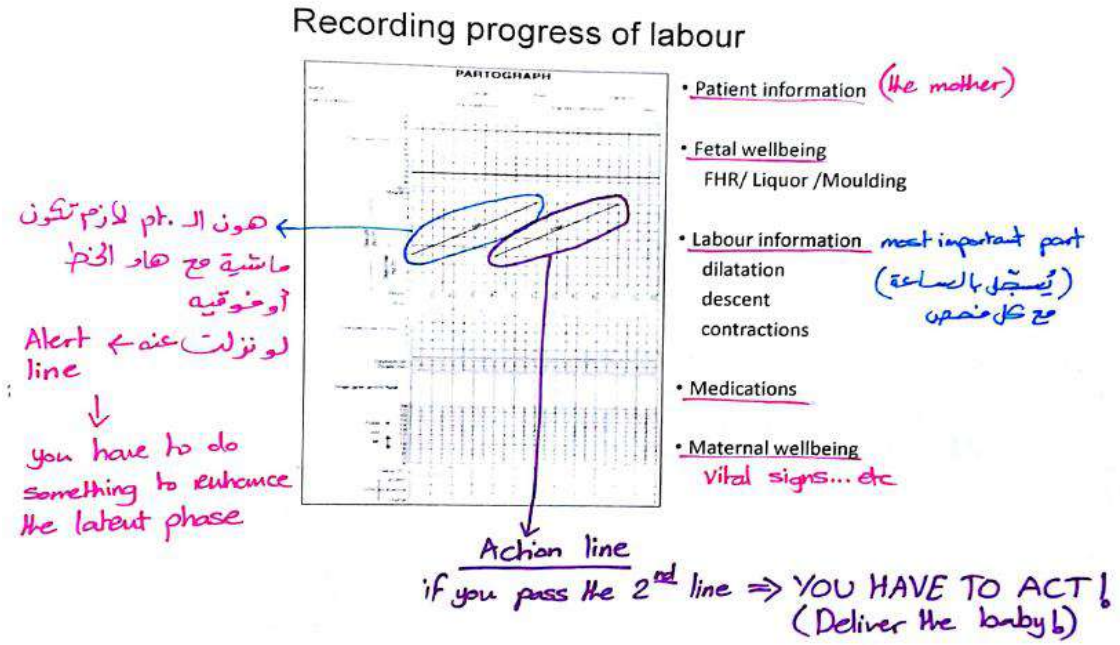
** **Shoulder dystocia** occurs when a baby's head passes through the birth canal and their **shoulders** become stuck during labor. ER

Stages of Labor	
1st Stage	• **Latent first stage of labour:** - period of time (hours even days!), not necessarily continuous when: there are painful contractions & there is some cervical change, including cervical effacement and dilatation up to 4cm • **Established first stage of labour (Active Phase):** - when there are regular painful contractions & characterized by progressive cervical dilatation from 4cm. - In Primi: 1cm/hr (1.2 to be exact) - In Multi: 2cm/hr (1.5 cm to be exact) - *Dysfunctional labor patterns*: lack of progress in any phase of cervical dilatation - **NICE**: active phase in primi lasts avg 8 hrs (unlikely up to 18 hr), multi lasts 5 hrs (unlikely up to 12 hr) - **Listen to HR**: every 15 min after a contraction & for 1 min
2nd Stage	- Starts with fully dilation - includes propulsive and expulsive phases - usually they wait an hr before they tell her to start pushing unless they are afraid for the baby then they wait a full 2 hrs - **Listen to HR**: every 5 min or after every contraction - **NICE**: nulliparous, birth is expected within 3 hr of the start of the active 2nd stage of labour, for multi women within 2 hr **o Features of expulsive:** - mothers irresistible desire to push - perineum distension - anus dilation

	o Management of 2nd Stage: - maternal position - bearing down - observation - fetal monitoring - uterine contraction - descent **o Consequences of unduly prolonged second stage of labour:** • *Fetus*: acidosis, hypoxia • *Mother*: urinary tract dmg**,** vesicovaginal fistula formation
3rd Stage	- delivery of the placenta (*within 5 m*), cord & membranes - includes separation and expulsive phases - prolonged if not completed within 30 min of the birth with active Mx and 60 min with physiological Mx (NICE) **o Signs of placental separation:** - uterus become globular and firm - gush of blood (placental detachment from the uterus wall) - the uterus rises because the placenta passes sown into the lower uterine segment and vagina - the umbilical cord protrudes farther out of the vagina **o Active Mx of 3rd stage:** - Syntometrine (oxytocin) + anterior shoulder delivery - Placenta delivery by controlled cord traction - Early clamping and cutting of the cord
4th Stage	- The 1-2 hr post-delivery when the tone of the uterus is established and the uterus contracts down again, because most complications after delivery happen at this stage

• **Partogram**: (v. important, u should know about it!):
- represent the changes that occur in labor (to identify deviations.
- Using a partogram leads to ↓operative births and ↓ use of oxytocin

Monitoring in labour (recorded on the partogram):
- Intermittent (for low-risk) /continuous (for high-risk) FHR monitoring
- Contractions should be assessed every 30min.
- PR should be checked hourly.
- BP & temperature should be checked 4-hourly.
- VE every 4h to assess progress.
- Urine 4-hr (*or when she go to WC* or when passed for ketones/protein)
- Regular bladder emptying should be encouraged



• **Mx of Labor**:

o on Admission: Check AN record, define risk, G/E pallor, edema, BMI, V/S, Heart & lungs, Urine dipstick, Abdominal exam, Vaginal exam, Position in labour, Monitoring progress in labour, Pain relief

o Causes of Labour pain:

- *Hypoxia* of contracted myometrium
- *Compression* of nerve ganglia in the cervix and lower uterus
- *Stretching* of the cervix during dilatation
- *Stretching* of the peritoneum overlying the uterus

o Analgesic methods during Labour:

- Psychological Counteract "fear-tension": 30-40% don't need analgesia
- Narcotics: pethidine
- Inhalational: Entonox
- Regional analgesia: *epidural* (continuous), *spinal* (no catheter, fast, lasts 2 hr, not continuous), *CSE* (combined spinal and epidural)

Narcotics in Labour		
Advantages	**Disadvantages**	**Contraindications**
• Ease of administration • rapid analgesia • Low incidence of serious side effects • Antagonists available	• Inadequate analgesia • Nausea & vomiting • Psychic disturbance • Delayed gastric emp. • Neonatal Resp. Depr.	• Previous Allergic reactions • Current mono-amine oxidase inhibitors

o Transcutaneous electrical nerve stimulation (TENS):

- Low grade electronic waves to nerves supplying the uterus via skin electrode. Provides good pain relief to 25% of pt. and it Carries no risk

o Epidural Analgesia:

- will provide analgesia in up to 90% , 16–20-gauge needle in L2–L5.
- Isobaric bupivacaine solution or with fentanyl.
- Continuous fetal monitoring - Foley's catheter
- *CI for spinal/epidural*: maternal refusal, hypovolemia, severe back deformities, local infection, coagulation disorders

Maternal Hazards of Epidural Analgesia	
Immediate	**Delayed**
- *Dural tap*: leads to "spinal" headache - *Total spinal*: loss of sensory and motor function, unconsciousness, hypotension, apnea, results from subarachnoid injection - *Hypotension*: avoided by nursing the pt on her side and IV infusion of Ringer lactate /lower risk due to low-dose local agents - *Motor paralysis*: reduces maternal expulsive effort, tends to prevent fetal head rotation, and makes instrumental delivery more likely - *Toxic reactions*: to local anesthetic agents	- *Severe spinal headache;* due to spinal tap, *Keep the patient lying down, Slow IV injection of 1-1.5 L saline over 24 hrs* - *Urinary retention* - *Sepsis*; unlikely if bacterial filter used - *Diminished sensation of dermatomes;* temporary effect

o Performing an Episiotomy:
- Infiltrate perineum with local anesthetic agent
- we do it after crowning because at this stage the muscles are very stretched & have the least vascularity to allow minimal loss of blood
- Episiotomy is considered a 2nd stage laceration.
- note: it's important that absorbable sutures be used for closure
- each layer is sutured separately (vaginal mucosa – continuous suturing / muscle layer – interrupted / Skin – interrupted or subcuticular)

o Lacerations:
First degree: Involve the *fourchette, perineal skin, and vaginal mucosa*,
Second degree: as 1st stage *and muscles of the perineal body*
Third degree: as 2nd stage *and involve anal sphincter*
Fourth degree: as 3rd stage and through *rectal mucosa*

o Apgar Scoring System:
- The condition of the baby is assessed at 1, 5, and 10min using the Apgar scoring system, if all is well, baby is handed to the mother ASAP

o Care immediately after delivery:

• Most complications occur in the first 2h after delivery, including; PPH/uterine inversion/hematoma
• Usually women are kept in LW to observe
• Where there is an increased risk of PPH an oxytocin infusion should be given prophylactically for 3–4h.
• Encourage skin-to-skin contact ASAP (don't separate for the 1st hr).
• Support should be provided for breast-feeding (1^{st} hr)
• If no complications during these 2h, the mother may then be transferred to the postnatal ward: some women may then go home after a further 3–4h of observation.

o Poor labor progress Types of delay in progress:

• *Latent phase delay* is difficult to define/ can last 2–3 days or stop
• *Delay in the first stage* consists of dilatation of <0.5–1 cm/h or crossing the 4-h partogram line
• *Delay in the second stage*

o Obstruction is suspected if:

• Arrest of cervical dilatation & descent of the presenting part.
• Large caput
• Excessive moulding,
• Edematous cervix and vulva
• Maternal or fetal distress.
• Ballooning of LUS, formation of a retraction ring

o Amniotomy: Artificial rupture of the membranes (ARM):

- often shortens labor length if the woman is contracting regularly

o Diagnosis of Normal Labor:

Spontaneous onset	Spontaneous expulsion	Singleton
Presented by vertex	Within a reasonable time (not <3h and not > 18hrs)	Alive
Through birth canal	Without complications for both	Term

Obstructed Labor (Dystocia)

Definition

• The presenting part cannot progress into the birth canal, despite strong uterine contractions

Etiology

Passenger	Passage
Head:	*Bony pelvis:*
• Large fetal head (big for that pelvis)	• Contracted (due to malnutrition)
• Hydrocephalus (brain surrounded by fluid, which makes the skull swell)	• Deformed (due to trauma, polio)
Presentation and position:	*Soft tissue:*
• Brow, face, shoulder	• Tumour in the pelvis
• Persistent malposition	• Viral infection in the uterus or abdomen
Twin pregnancy:	• Scars (from female circumcision)
• Locked twins (locked at the neck)	
• Conjoined twins (fused together with some shared organs)	

Dx

• *Partogram*
• *General*, *Abdominal*, *Vaginal Examinations*
• *History*: prolonged labor, labor become more severe and frequent, bearing down
• *Abdominal Exam*:
- *General*: maternal distress, painful state, scanty urine, foul smelling meconium from vagina
- *Inspection*: tonically contracted uterus, distended full bladder, Badnl's ring (in multi), uterine inertia (in primi)
- *palpation*: uterus is tender, liquor all drained, fetal heart sounds absent
• *Vaginal Exam*:
- Edematous vulva, dry hot vaginal mucosa, cervix poorly applied to presenting part, cervix loosely handing/partially dilated, meconium draining, caput on presenting part, molding, if uterus is ruptured the fetal part will be palpable

Complication

✔ **Fetal Complications:**

• Neonatal sepsis
• Facial injury
• Severe asphyxia
• Intracanial hemorrhage
• Moulding
• Death

	✔ **Maternal Complications:** • Bandl's ring • Fail to empty the bladder (trauma/blood) • Pressure necrosis to the bladder/urethra • Cut to the blood supply • Fistula (due to compression of the soft tissue, between the vagina and the bladder/rectum/urethra/ureter) • PPH • Sepsis • Hypovolemic shock/death • Paralytic ileus • Annual detachment of the cervix • Uterine rupture
Prevention	• Antenatal care • Intranatal: partogram
Mx	• *Immediate*: - IV and catheterization - Blood grouping and cross matching - Correct maternal dehydration - Adequate analgesia - Broad spectrum antibiotics - Sodium bicarbonate infusion for acidosis - Contraction prevention by tocolytics • *Agents used to delay premature uterine activity include*: - Magnesium sulphate - Beta-mimetics (Terbutaline) - Oxytocin Antagonist - CCB (Nifedipine) - Adrenergic beta-receptor agonists (Fenoterol) - NSAIDs (Indomethacin) • *Symphysiotomy* (rarely used now) • *Episiotomy*
Delivery	• C/S or Vaginal (if vaginal delivery not risky) • Empty the bladder to avoid the fistula risk!

Induction of Labor (IOL)

IOL	• Artificial stimulation of uterine contraction before the onset of spontaneous labour • Done after 24 weeks GA **(Termination is done < 24 weeks!)** • **IOL is always inpatient!!!**
Augmentation	• stimulation by spontaneous contractions that are considered inadequate (most common obstetric intervention)
Indications of IOL	• Prolonged pregnancy (beyond 41 weeks – most common!) • PROM • Fetal: IUGR, Oligohydromnios, Isoimmunization, IUFD - Note: IUFD is fetal death after 24 weeks so it's induction and not termination • Suspected macrosomia • Social factors • Maternal request • Maternal diseases (DM, HTN, SLE..) • Pregnancy complications
Predictors for successful IOL	• GA at induction (the advanced GA the better) • Parity (In multi, the induction is faster and quicker) • Modified bishops score
CI for IOL	• *Any CI for vaginal delivery is a CI for IOL!* • Placenta previa/vasa previa • transverse lie • prolapsed umbilical cord • active genital herpes • previous classical uterine incision/2LUSC/myomectomy • maternal/fetal anatomical abnormalities that CI VD

Modified Bishop Score				
Cervical Feature	**Pelvic Score**			
	0	**1**	**2**	**3**
Dilatation (cm)	<1	1-2	2-4	>4
Length of cervix (cm)	>4	2-4	1-2	<1
Station	-3	-2	-1/0	+1/+2
Consistency	Firm	Avg	Soft	
Position	Posterior	Mid/Anterior		

The cervix is favorable when modified bishop score >8
A score <4 is unfavorable cervix

- ***Where do we induce***? In Antenatal ward
- We give PG and monitoring, once we need to start oxytocin we transfer the patient to the labor ward (but if your patient initially is considered high risk, from the beginning transfer to the labor ward
- Always remember: before starting induction, confirm the GA, check indications for induction, check bishops score, examine the patient and make sure the baby is cephalic, baseline CTG

Methods of IOL

• **PG** (**Dinoprostone**), **Oxytocin**, **Misoprostol**

a) ***PG*** (PGE2)
- different formulas: tablets, gel, slow releasing pessary 24 hr
- give 3 doses, examine every 6 hours with tablets/gel
- continuously monitor the CTG in first hour after inserting the first pessary if you are happy with the CTG and it's reactive then the patient can mobilize and walking
- if we induce by PG we should continue with oxytocin (once the cervix is favorable), but we don't start oxytocin until 6 hours after the last dose of PG
- PG very important to be used specially in unfavorable cervix
- Asthmatics are not suitable to take PG

b) ***Oxytocin (syntocinon)***
- forms: syringe, infusion pumps (pump advantage is the you can adjust the dose & change it according to the contractions)
- still you can increase the syntocinon till you have adequate moderate contractions
- We don't start it with intact membrane
- What is the advantage of oxytocin over PG? we can stop it, it has a short duration (PG only if it's a pessary we remove it)
- we should not start oxytocin before 6 hours after last dose of PG. why? Risk of hyperstimulation and ruptured uterus

c) ***Misoprostol*** (***Cytotec***):
- not available and we don't use it
- unlicensed for IOL, used in termination, IUFD, clinical trials

• **Mechanical methods**:

a) *Stripping of the membranes* (*Stretch* & *Sweep*):
- do vaginal exam, but to be able to do that, cervix should be dilated atleast admit 1 finger (if closed, you cannot do it)
- Technique: admit 1 or 2 fingers and move between cervix and membranes: this will lead to release of PG
- 3% will go in spontaneous labor in 7 days
- we offer this for ladies by 40 weeks
- midwife usually do that

b) *Catheter* or *Laminaria tents*:
- we use foley's catheter with 2 balloons one endo one ecto cervix & we inflate both to compress the cervix and shorten it
- Laminaria is a type of herbs, you put it in the cervix and it absorbs water and enlarge which will dilate the cervix
- Adv.: Simple, low cost, less SE, no need to keep inpatient
- Dis.: difficulty of insertion, risk of infection

c) *Caster oil*:
- might be used for better sexual intercourse
- it enhances cervical ripening

	- it also stimulate the bowel movement (which is the worst thing to do for a pregnant lady) - Previously, they were using enema to make clean environment for delivery d) *Surgical ARM* (*Amniotomy*): - we initiate or augment labor - other indications: apply fetal scalp electrode - fetal blood sampling - risks: cord prolapse, chorioamnionitis, rupture of vasa previa
Complication of IOL	• *Hyperstimulation*: Tachysystole, Hypertonus - Mx: reduce/stop oxytocin, consider tocolytics (terbutaline) • *Fetal distress*: - if not due to hyperstimulation, do immediate C/S • *Failed induction* (we try 3 doses of PG): - What to do (Options): a) repeat attempt at later GA b) Wait for the labor to start spontaneously c) Schedule a C/S d) Consider use of alternative cervical ripening strategies • *C/S* • *Ruptured uterus*: Uterine Dehiscence (Disruption of the uterine muscle with intact uterine serosa) • *SE of drugs used*
Mx of labor after induction	• Antenatal ward • LW – high risk • Oxytocin + continuous FHR & uterine monitoring
Cases	1) lady 41 weeks, previous C/S. Can we induce her?! In Fact, we have small randomized clinical trials (Inadequate data), but we may offer **Stretch and sweep** or **catheter** for induction. PG some units Allow to be used in such a case. But, In General **NO we cannot use.** 2) Grand multipara? = para 5 and more **Be aware .. In Both cases , the Risk of rupture uterus is high !!**

Post-Date

Info

- > 42 weeks (>294 d)
- 30% recurrence
- Incidence 5-10%
- it is not a pathological condition

Risks

Maternal	Fetal
• Increase operative delivery, hemorrhage and infection • Psychological morbidity " more common in primi "	• Post-maturity syndrome • More mortality/morbidity risk • More still-birth risk • Intrapartum fetal hypoxia • More birth trauma and shoulder dystocia risk • Macrosomia

Mx

- IOL or CS (mainly at 41 weeks)
- if mother refuses IOL do the following:

- Expectant Mx

a) Fetal surveillance: CTG/US twice weekly

b) Biophysical profile

BIOPHYSICAL PROFILE

variables	normal score = 2	abnormal score = 0
fetal breathing movements	≥1 episodes in 30 min each lasting ≥30 sec	absent or no episode ≥30 sec in 30 min
gross body movements	three or more discrete body or limb movements in 30 min (episodes of active continuous movement = a single movement)	less than 3 episodes of body or limb movements in 30 min
fetal tone	≥1 episodes of active extension with return to flexion of fetal limb(s) or trunk; opening and closing of hand is considered normal tone	slow extension w/return to flexion, movement of limb in full extension, or fetal movement absent
reactive fetal heart rate	≥2 episodes of accelerations (≥ 15 beats/min) in 20 min, each lasting ≥ 15 sec and associated with fetal movement	< 2 episodes of accelerations or acceleration of < 15 beats/min in 20 min
qualitative amniotic fluid volume	≥1 pockets of fluid measuring > 1 cm in 2 perpendicular planes	pockets absent or pocket < 1 cm in 2 perpendicular planes

score		notes
normal	8 – 10 (if amniotic fluid index is adequate)	CNS is functional & fetus is not hypoxemic
equivocal	6	
abnormal	< 4	along w/oligohydramnio→ labor induction

Image Credit: wordpress.com

Dating Scan

- reduces rates of IOL for post-term, we determine the GA by:

a) Crown rump: measurement from 10 weeks 0 days to 13 weeks 6 days, it's the same time we go nuchal translucency

- Head circumference: if crown rump length > 84 mm

PTL (Pre-term Labor)

Definition	Between 24 – 37 (≥ 37 is term)
RF	• **Previous PTL** (strongest indicator) • **Infections**: Intra-uterine (ascending - bacterial vaginosis), Extra-uterine (pyelonephritis) • **Cervical**: dilation, surgery, trauma • **Fetal**: congenital or chromosomal abnormality • **Uterine**: abnormality, overdistension (multi, twins, polyhydramnios) • **Social**: extremes of age, BMI <19, short pregnancy interval, poverty, black, smoking, alcohol, drugs, stress, domestic violence • **Other**: APH, PET, uteroplacental insufficiency
Hx	• Abdominal pain (MC), colicky • Vaginal Discharge • Gush of fluid • Pressure (presenting part descended)
PE	• SFH • Lie, presentation • Tenderness (infection) • Pooling of fluid in vagina • Digital: only if regular contraction already
DDx	• UTI • Placental abruption • Gastroenteritis • Constipation • Fibroids
Investigate	• Fetal fibronectin (should not be seen 24-34 weeks) • Cervical Length TVS
Mx	o **Bed rest** o **Maternal steroids**: to mature the lungs (RDS, between 24-34 w/up to 39w in elective C/S): Betamethasone, Dexamethasone (admit b4 giving if the pt is diabetic) o **Tocolytics** (**anti-contraction**): opposite of uterotonics: • **β-agonists**: MC

	- **S.E**: hypotension, tachycardia, headaches, hyperglycemia, hypokalemia, the most serious is pulmonary edema & in rare cases maternal death - **C.I**: symptomatic cardiac disease, uncontrolled DM, hyperthyroidism, multiple pregnancies • **Oxytocin antagonist** (**Atosiban**): - less S.E, similar effectiveness, but more expensive • **Calcium channel inhibitors** (**Nifedipine**): - easy to administer (orally). - **S.E**: headache, flushing, dizziness • **Magnesium sulfate** (**MgSO4**): - used for neurologic protection (not used as tocolytic) - **S.E**: flushing, headache, fatigue, diplopia, at toxic lvl of Mg (>10) respiratory depression, hypoxia and cardiac arrest, the DTR are depressed and lost at <10mg/dl, also, pulmonary edema might occur • **Prostaglandin inhibitors** (**indomethacin – NSAIDS**): - we do not use it after 32 weeks because it causes premature closure of ductus arteriosus, but the - it also causes oligohydramnios and thus we may use it in some cases of polyhydramnios, but it increases risk of necrotizing enterocolitis & intraventricular hemorrhage o **Antibiotics**: erythromycin, in complicated PTL (PROM) o **In-Utero-transfer** o **Fetal Assess**: US, NST (non-stress test (similar to CTG))
Mode of Delivery	- if breech C/S - Case-related - No Vacuum before GA 36, and Forceps before GA 34
Outcomes	o **Maternal**: tocolytics risk, depression, underlying cause o **Neonatal**: mortality, morbidity (neural), RDS, NEC, PDA , Jaundice, Hypothermia, Feeding difficulty, lung disease, and Retinopathy
Mx of future	• Minimize RF • Treat infections • TV cervical length – if short do cerclage • Pessary • Progesterone (NOT ESTROGEN!)

PROM

Definition	ROM prior labor, either at term or preterm
Hx	• Gush of fluid (Timing, Amount, Color, Odor)
PE	• SFH • Presentation • Tenderness (chorioamnionitis) • Speculum (Definitive Dx): pool of fluid, cough sign • Cord: prolapsed of not • NO DIGITAL EXAMINATION
DDx	• Seminal fluid collection: sexual intercourse • Amniotic fluid: PROM • Infections: UTI, Vaginal • Urinary Incontinence (color: yellow) • Leukorrhea: cervical glands ↑ active, ↑ discharge • Abruption of placenta (color: red)
Investigate	• Nitrazine test • Ferning Pattern • Genital tract swabs: HVS to rule out GBS infection • Maternal and Fetal wellbeing • US • AmniSure ROM test: 99% sensitive, 100% specific detects PAMG-1 protein marker
Mx	• Based on GA • Admission (risk of labor, cord prolapse) • Medications: - Hydration - IV Anti-biotics - Tocolytics (Q) - Dexamethasone
Chorioam-nionitis	- infection of the amniotic fluid & membranes, we deal with it by Abx and immediate delivery

• **Dx**:
- *Maternal pyrexia* (>38) & at least 2:
- maternal PR (>100bpm), Fetal
- tachycardia (>160bpm),
- Uterine tenderness,
- Offensive vaginal discharge,
- Raised CRP

Examples of some Cases

o **Pre-viable ROM <24 w**:
- by definition it is a miscarriage and some pts. Are given the option to terminate the pregnancy, before 2 years, a 20 weeks pregnant lady with history of infertility and miscarriages had ROM, even though the Dr. advised her to end the pregnancy she was determined to continue so they continued with Abx and follow up, at 24 & 28 weeks she was given steroids and gave birth at the 34 week as an emergency C/S for abruption and she delivered normal male baby, she was very lucky for this to happen.

- ***Major risks***:
- chronic pulmonary morbidity, fetal limb contractions, extremely preterm with co-existent morbidity/mortality

- ***Treatment***:
- *Individualized Mx*: after full & frank discussion with parents

o **24-34 weeks**:
- confirmation of dx and presentation
- baseline FBC, CRP, swabs, and MSU (mid-stream urine)
- US for fetal wellbeing
- Steroids, oral erythromycin for 10 days
- MOD (either we wait for 37 weeks or we deliver at 34 weeks, the Dr. prefers the latter)

o **34-37 weeks**:
- controversial, immediate IOL (less hospitalization, perinatal infection & NN morbidity)

Antepartum Hemorrhage (APH)

" APH Weakens, PPH Kills "

Definition	bleeding from after 24 w and before delivery
Causes	• Abruption Placenta (mc – 30%) • Placenta praevia (20%) • Uterine rupture • Vasa previa • Other: local causes, GU tumor, unknown
Mx despite the cause	• **Rapid assessment of both mother & fetus** • **Quick history initially then detailed** o **Maternal assessment:** • **Vital signs.** • **Abd:** **- SFH** (Symphysial fundal height)**,** **- tenderness** **- lie & presentation**, in placenta previa we said whatever the lie and presentation, you deliver by a cs, while in placental abruption our target is to deliver vaginally, but if the baby is transverse, you do CS • **NO Vaginal exam until a placenta previa has been excluded** The 1st investigation to do is U/S, to localize the placenta • **Assess bleeding** o **Fetal Assessment:** • **fetal heart** • **If gestational age is >26 weeks**: **CTG** not before 26 weeks, it is difficult because there is fetal heart tachycardia

Placental Abruption

Definition	Premature separation of a normally sited placenta ** the decidua (line of separation between placenta & uterus) is detached from uterus (decidua = endometrium)
Can be	A. Concealed , patient complain of abdominal pain but she doesn't have any Accurint vaginal bleeding B. Apparent, Accurint vaginal bleeding. ** Uterine pain is local while labor pain is generalized

SSx

- Vaginal bleeding: mostly dark
- Abdominal pain: mostly constant
- Uterine tenderness
- Uterine contractions (35% - induce labor PTL 25%)
- Fetal distress/fetal death (15%)
- Disseminated IV coagulopathy: non-clotting bleeding

Classification

Class	Presentation
0	• Asymptomatic • Diagnosis is made retrospectively (finding)
1	• Mild/No vaginal bleeding • No maternal/fetal compromise
2	• Moderate/No vaginal bleeding • Possible maternal blood loss (tachycardia/mild hypotension/no coagulopathy) • Fetal distress
3	• Severe/No vaginal bleeding • Maternal compromise (tachy/hypo/coagulopa) • Tense, tender uterus, 'woody hard' • Intrauterine fetal death

Dx

- **Clinical**
- **US**:

- not used to Dx but to know where is the placenta, to exclude other causes, assess the fetal viability, confirm GA
- Retroplacental haematoma

- **Lab tests**:

- FBC, Blood group and crossmatch
- Urea, creatinine and electrolytes
- LFT
- Coagulation screen
- Kleihauer-Betke test: to quantify the feto-maternal hemorrhage or blood transfusion between them

RF

- Previous (MI! 10x!, 10%,25%)
- FHx
- Underlying thrombophilia's
- Trauma
- Rapid uterine decompression
- ↑ maternal age (>35 & <20)
- Prolonged ROM (>24 h)
- Chorioamnionitis
- HTN
- Abnormal placentation
- ↑ parity
- Smoking
- Drug misuse
- Anemia

Mx

- **Depend on**: blood loss amount, mother/fetus status, GA
- **Resuscitate as indicated**:

- Conservative: consider steroids
- Delivery

- **Case-Related**:

- Maternal/Fetal Jeopardy: ER C/S
- Term/stable/in labour: Vaginal delivery (main target)
- Pre-term/stable: Conservative in hospital/steroids

- **Notes**:

We manage these patients as In-patient, never send the patient home even if she is stable , if preterm we give steroids to enhance lung maturity , *and Anti-D if needed*.
We wait 48-72 hours, if the patient is stable and want to continue pregnancy, send her home. if mother is – & her husband is + we give anti d , in abruption we need ↑ dose

Complica-tions

Maternal		Fetal
• Hypovolemic shock		• IUFD
• DIC	• PPH	• Hypoxia
• ARF (mostly reversible)		• Anemia
• Couvelaire uterus (bruised, can cause Atony of the uterus)		• IUGR
		• Preterm birth
• Ischemic necrosis of distal organs		
• Feto-maternal hemorrhage		

Placental Previa

Definition

Insertion of the placenta, partially or fully in the lower uterine segment (lower segment usually is formed after 28 w, b4 that the uterus is 1 segment), the placenta normally in the fundus

Grading

Minor	I	in lower segment but does not reach os
	II	Reaches os but does not cover it
Major	III	Cover part of the os
	IV	Completely covers the os

RF

- Hx of PP with a previous pregnancy
- Uterine scars
- Large placenta (multi)
- Abnormally shaped uterus
- Age >35 (9x! >40 y)
- Asian
- Smoking (more in abruption)

Symptom	• Painless bleeding (main Sx – unlike abruption) • Bright red • Variable amount (from 'spotting to torrential/life threat) • May be recurrent • Provoked by sexual intercourse or labor onset • The fetus is usually well and in good condition
Signs	• Shock (due to blood loss) • Presenting part is usually high/non-cephalic (or think of an abnormality that is blocking the lower part of uterus) • Soft and non-tender uterus • Digital vaginal examination is CI • Speculum exam: to exclude local causes • **Note**: Multipara mothers engagement is late, it's even could be at labor compared to primary, if not engaged at 38 week think of an abnormality like pp .
Dx	• **US**: to know where is the placenta - Safe, more accurate - we start by TA then TV • **MRI**: - Expensive/not superior - considered if suspected accreta when US is inconclusive
Mx	• **Case-Related**: - Maternal/Fetal Jeopardy: ER C/S - Term/stable/in labour: Vaginal delivery (main target) - Pre-term/stable: Conservative in hospital/steroids >> **Timing of delivery:** • The ultimate plan is to deliver CS (always) at 37 w • **indications before 37w**: - onset of labor - fetal distress - severe growth restriction - intrauterine death - severe bleed - suspected placenta accrete (advisable before 36-37 w) • Anti-D as always

	• **Notes**: - we deliver by cs (always) , grade of cs (is it elective or emergency) ? emergency is grade 1 and we do it if there is a distress whatever the gestational age, Stable conservative and deliver as plan (elective) if preterm and stable - Timing – minor previa we deliver at 37 weeks - Major at 36 -35 w bcuz we worry about sudden bleeding

Morbidly Adherent Placenta

- Placenta is usually at the level of residua
- Anterior placenta previa more worrying than posterior previa
- if no bleeding think of adherent placenta

• **Placenta Accreta**: 80% Villi penetrate through the *decidua*:
- antenatal dx using color/power Doppler US MRI
- repeated C/S with an anterior placenta previa
- Dx in 3rd stage

• **Placenta Increta**: villi penetrate into *myometrium*.

• **Placenta Percreta**: through the myometrium to *serosa/bladder*.

Vasa Previa

Definition	Fetal vessels traverse the membranes over the internal os
Dx	• **Classic Triad**: - *Membrane rupture* - *Painless* vaginal bleeding - *Fetal bradycardia*: this is fetal blood loss (not maternal) - Dx is usually at the time of ROM unless we did Doppler antenatally and saw the vessels over the internal os, and this is when we don't allow the vaginal delivery, we do a cs • **Colour-flow Doppler**: crossing vessel • Dx is usually confirmed after delivery on examining placenta and membranes
RF	• Velamentous cord • Accessory placental lobe • Multiple pregnancy
Mx	• Emergency CS (crash: emergency section grade one)
Complic-ations	• Fetal death from hypovolemia - So in vasa previa the mother is bleeding but her vitals are stable, there is fetal bradycardia

Ruptured Uterus	
Definition	Full thickness loss of integrity of the wall & visceral peritoneum
Diagnostic Criteria	• Painful bleeding (tearing): even + epidural (pain not relieved) • Lost FHR • Loss of station (fetal head): It is supposed to be head in a previous cs because you wouldn't allow a breech in a previous cs • Inability to identify uterine contractions: due to integrity loss
Notes	• **Unscarred uterus**: no previous D/C, myomectomy or cs - Any lady who had myomectomy should be asked if the doctor told her she can have a vaginal delivery, if she can't, that means the uterine cavity was opened, & it is better if she has a report. • **VBAC**: vaginal birth after CS, higher risk of rupture uterus - If the pt is in labor & there is a catheter, you will see hematuria - Have a low threshold for rupture uterus in a lady with previous cs - In labor you have to think and act, if the fetal heart rate is in variable deceleration, think if it's a rupture uterus, do an ER CS.
RF	• Classical C/S (opening in the upper uterine segment) • Previous myomectomy • Excessive oxytocin ** ***The common indications for a classical CS (5%) include***: - preterm - breech in a woman with an undeveloped lower uterine segment, transverse back - down fetal position, - poor access to the lower segment because of myomas or adhesions, or a planned cesarean hysterectomy. - The presence of cervical cancer is a rare indication. **LUSCS:** 0.5% lower uterine segment cs, the common procedure nowadays, but it cannot be done before 20 w of pregnancy, as this is the GA at which the lower uterine segment is formed
Mx	• Uterine Repair (Hysterectomy) • Notes: - Laparotomy, do a cs - Uterine Repair in ladies with low fertility - Ideal management: (hysterectomy), this decision is not easy but does not have to be delayed, due to risk of death for both
Complic-	• Maternal and fetal death

Post-Partum Hemorrhage (PPH)

Definition

• Excessive bleeding that makes patient symptomatic: light-headedness, vertigo, syncope, also results in signs of hypovolemia (hypotension, tachycardia, oliguria)
• Blood loss >500 ml after vaginal delivery or 1000 after CS
• HCT drop of 10% or need for blood transfusion
** ladies tolerate blood loss well, until there is significant blood loss. 1.5 L are lost before having tachycardia, don't wait, act!

Classification

Class	loss	Lost%	Physiologic response
1	1000 cc	15	Dizziness, palpitations
2	1500 cc	20-25	Tachycardia, tachypnea, sweat
3	2000 cc	30-35	Significant tachycardia, hypotension
4	> 2500 cc	40	Shock, oliguria, anuria, air hunger

Diagnosis

• Estimation of blood loss: 1ml of blood = 1 gram
- Visual underestimate by 33-50%

Primary VS Secondary

• **Primary**: PPH within 24 hr
• **Secondary**: more than 24 hr – 6 weeks (RCOG: up to 12 w):
- Mainly caused by intra-uterine infection with pyrexia due to retained tissues (endometritis) - (retained tissue by US!)
- Choriocarcinoma: rare. If a patient comes 6 w after delivery complaining of abnormal bleeding you will do b-HCG for her.

Causes

PPH is not a Dx

Tone 70-90%!	• ***Antepartum***: - previous PPH - placenta previa - maternal obesity - baby >4kg - multiple pregnancy - IOL	• ***Intrapartum***: - Prolonged labor >12 hr - Prolonged 3rd labor stage - Sepsis
Thrombin	• ***Antepartum***: - PET - Sepsis - Anticoagulants - Inherited bleeding	• ***Intrapartum***: - Placental abruption - Sepsis
Trauma	- Uterine/cervical/vaginal injury (instrumental, CS)	
Tissue	- retained products (placenta, membranes)	

Main Causes (4 T's)

• Multidisciplinary effort
• Call for HELP, Check ABCs, vital signs, insertion of 2 large bore IV lines for IV fluids, send CBC, KFT ,clotting profile, prepare cross match 4-6 units of blood, insert a catheter, then check the uterus, is it atonic, if the placenta is out, check if it is complete, check for vaginal or cervical tears
• ***How to check for coagulation before lab results are back***? Check the blood on the floor, there should be clotting immediately, if there is no clotting, think of coagulation defects

• **Medications**:
o Uterotonics, stimulate the contraction of uterus
- **Syntocinon** (oxytocin), used commonly
- **Methergine** (Methylergometrine)
- **Syntometrin** (Oxytocin/ergometrine)
- **Haemabate** contains PG F2α, given IM or intra-myometrial, it is not licensed to be given intra-myometrial though
- **Misoprostol**

Mx

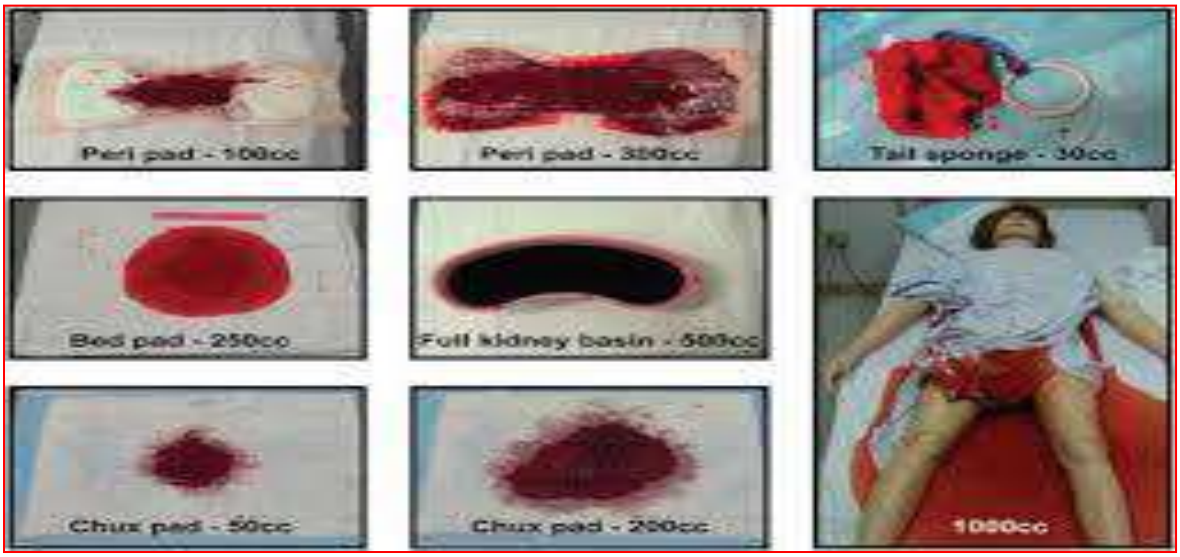
• Examine the uterus to R/O atony
• Examine vagina, cervix to R/O lacerations (& repair if found)
• Explore the uterus to R/O retained placenta

• **Manual Uterine Massage**
• **Removal of retained placental tissue**: can occur in vaginal, CS
• **Packing the uterus** (to compress bleeding areas):
- **Ballooning**: inflating a balloon inside the uterus to cause compression, and filling it with 500 ml saline, using oxytocin to keep the uterus well contracting. After 24-36 hour, the balloon is deflated gradually until removed completely
• **Trying off bleeding vessels**
• **B-lynch suture:** Applied if we do a laparotomy, done to compress the uterus
• **Internal iliac artery ligation**
• **Hysterectomy:** it is a Definitive Mx (don't delay)
• **Consideration the use of tranexamic acid:** it is an antifibrinolytic, used in cs or PPH as injections to ↓ blood loss
• **Arterial Embolization**: Only done in *stable* patients. call the *interventional radiologist*.

	• **Recombinant Activated Factor VIIa** (**Novoseven**): - Enhances platelet aggregation - Promotes clotting by extrinsic pathway (binds to tissue factor) Complexes with TF activates Factor IX,X & generates thrombin - Controls bleeding rapidly –10 minutes! - Adverse effects < 1% - Short ½ life (2 hours) - High cost
Complica-tions	• **Sheehan's syndrome : Pituitary ischemic injury (necrosis of the anterior lobe of the pituitary gland):** clinically presents as difficult lactation or agalactorrhea • **Postpartum infection** • **DIC** • **Anemia** • **Transfusion hepatitis** • **Asherman's syndrome**
Document	- Documentation of PPH delivery is essential (medicolegal issue)
Debriefing	Debriefing is at later time. Early the patient is only told that we are dealing with a bleeding, and later debrief the patient, her family and the team themselves, bcz this is traumatic event
Blood Transfer	• **Classic thinking:** - Resuscitation using crystalloid and PRBCs - FFP, cryo, and plts only if hematologic parameters are abn (plts<50K; FBG<100K; PT/aPTT<1.5XNL) *<u>FAILED TO PREVENT COAGULOPATHY IN MASSIVE HEMORRHAGE – DILUTIONAL COAGULOPATHY</u>* • **New Concept:** - Limit early aggressive crystalloid use - Early admin. of FFP and PLTs (with PRBCs) ratio 1:1:1 - Early use of fFVIIa

Stages	Pathophysio	Clinical	Lab tests
1: Hypercoagulable	Activation of clotting factors & development of microthrombi	Hyper-coagulation	- ↓ clotting, - ↑ platelet adherence
2: Consumptive Hypercoagulable	↑ consumption of platelets & clotting factors	Bleeding	- ↑ clotting, - ↓ platelets, - greatly ↓ fibrinogen
3: Secondary Fibrinolytic	Substantial formation of fibrin degradation products and plasmin	Marked bleeding	- ↑ thrombin time - ↓ clot lysis time - ↑ fibrin degradation products

Type	Contents	Indication	Volume	Shelf life	Effect
PRBCs	RBC's, WBC's, Plasma	Anemia	300	42 d	↑ Hb 1g
Platelets	Platelets, plasma	Bleeding due to low plt	50	5 d	↑ Plt count 7500/unit
FFP	FBG, plasma, clotting factors	DIC, coagulation disorder, reverse warfarin	250	12 m frozen 2 hr thawed	↑ FBG 10-15
Cryoppt	FBG, factor VIII, vWf, XIII	DIC, von Willebrands, Hemophilia A	40	4-6 h thawed	↑ FBG 10-15



Uterine Rupture

Definition	Full thickness loss of the uterine musculature through all of its layers
RF	• Previous uterine scars (dehiscence of a CS scar is the mcc) - Classical C/S has x20 risk than LUS C/S • Trauma (External/Obstetric) • Excessive use of oxytocin • Grand Multipara • Uterus Distension (Polyhydramnios, Multiple Gestations) • Placenta Percreta
C/P	• Diagnostic Criteria: - Painful bleeding (tearing – not relived by analgesia) - Loss of FHR - Loss of station (fetal head) - Inability to identify uterine contractions • Other S/Sx: - Maternal/Fetal distress - LUS is stretched and painful to touch - Prolonged fetal bradycardia is the 1st sign mostly • Bandl's ring: abnormal junction between the two segments
Mx	• Call for help, resuscitation (blood transfusion) • Good control: use of oxytocin, stop bleeding (ligation) • Immediate laparotomy and delivery of the fetus • Broad spectrum antibiotics • Hysterectomy v.s uterine repair
When to repair "mainly based on the extent of the injury"	• if the rupture is local, clean edges not edematous • no infection, good general condition • desire for future childbearing • low transverse • No extension to surrounding area • No evidence of coagulation consequences • if the patient undergoes a repair of the uterus, all subsequent pregnancies will be delivered by C/S birth at 36 week

Complications	**Maternal**	**Fetal**
	Hemorrhage, Shock, DIC, Death Amniotic fluid embolism (AFE) Bladder laceration, Hysterectomy	Hypoxia , Anoxia, Asphyxia Neurological sequalae, Death

Retained Placenta

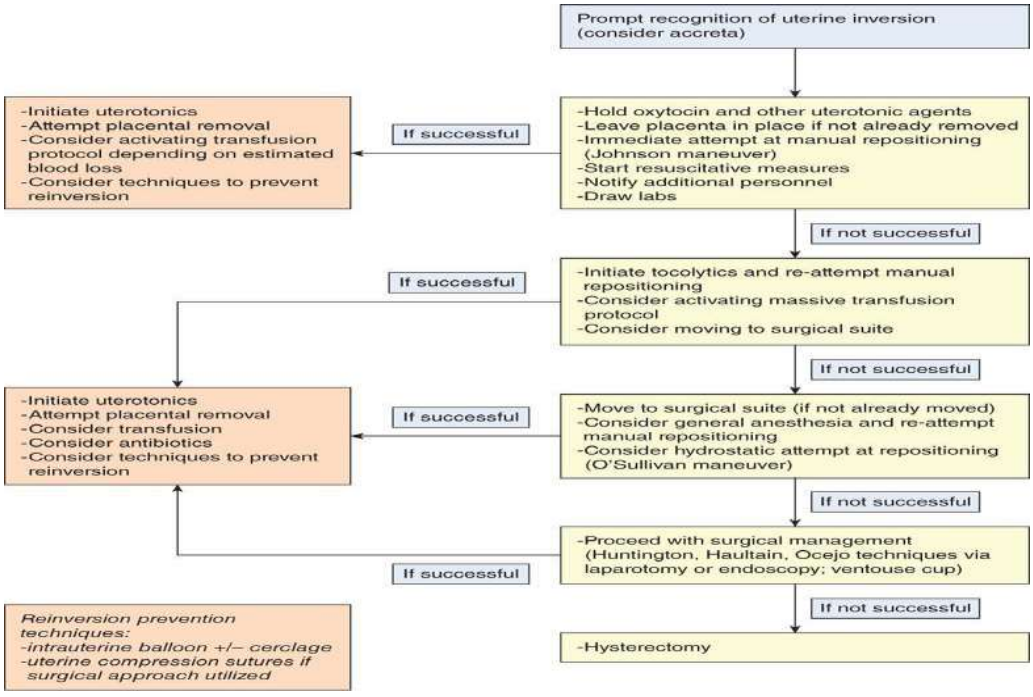
Definition	Lack of placental expulsion within 30 min of delivery of an infant, this period can extend to 90-120 min for births in 2nd/3rd stages if labor managed without oxytocin
Types	A. Trapped or incarcerated placenta (separated/detached but not delivered) B. Placenta Adherens: the placenta is adherent but easily separated C. Placenta Accreta Spectrum: pathological invading of myometrium - Accreta should be diagnosed antenatally
Phases in the 3rd stage	• Latent > Contraction > Detachment > Expulsion
RF	• Previous Hx • Preterm gestational age (strongest factor) • Use of ergotamine (Trapped placenta) • Uterine Abnormalities • PET, stillbirth, small for gestational age (defective implantation) • Velamentous cord insertion (risk for manual removal) • Maternal age > 30 year • Delivery in teaching hospital
C/P	• Placental separation signs present: - Lengthening of the umbilical cord - Gush of blood from the vagina - Change in the shape of the uterine fundus from discoid to globular - Elevation of palpable through a small but patent cervical os
Dx	• US • Dx of placenta adherens or accreta: made by the absence of the S/Sx of the placental separation, also after separation. Adeherens leaves clean separation signs, in the Accreta no clean signs (due to invasion)
Complications	• PPH, Postpartum endometritis • Uterine inversion • Death (very rare)
Mx	• Retained placenta should be manually removed ASAP, globan uterine contractions (reduction of bleeding) • In the absence of heavy bleeding, we suggest intervention when the third-trimester placenta has been retained for 30 to 60 minutes rather than expectant management or earlier intervention

	• Gentle cord traction is the initial maneuver. If unsuccessful and the lower uterus/cervix is constricted, we administer nitroglycerin to release the constriction. If the uterus is atonic, we administer an oxytocin infusion to promote uterine contraction. If these measures fail to result in placental expulsion, we suggest manual rather than instrumental extraction of the placenta • administering a single dose of a broad spectrum prophylactic antibiotic before manual extraction of the placenta • For women with a second-trimester birth and no significant bleeding, the time period before manual extraction can be extended as the frequency of retained placenta is higher and the risk of hemorrhage is lower. • We suggest not waiting > 2 hour due to the risk of infection • For women with a small area of placenta accreta, we slowly create a plane of separation at the maternal-placental interface using finger dissection. Curettage is a second-line option if finger dissection is unsuccessful
Complicated Cases	• Instrument extraction • Incomplete extraction • Unexpected placenta accrete spectrum
Recurrence	• 6-12% recurrence risk • 17% absolute risk of recurrent manual removal of the placenta

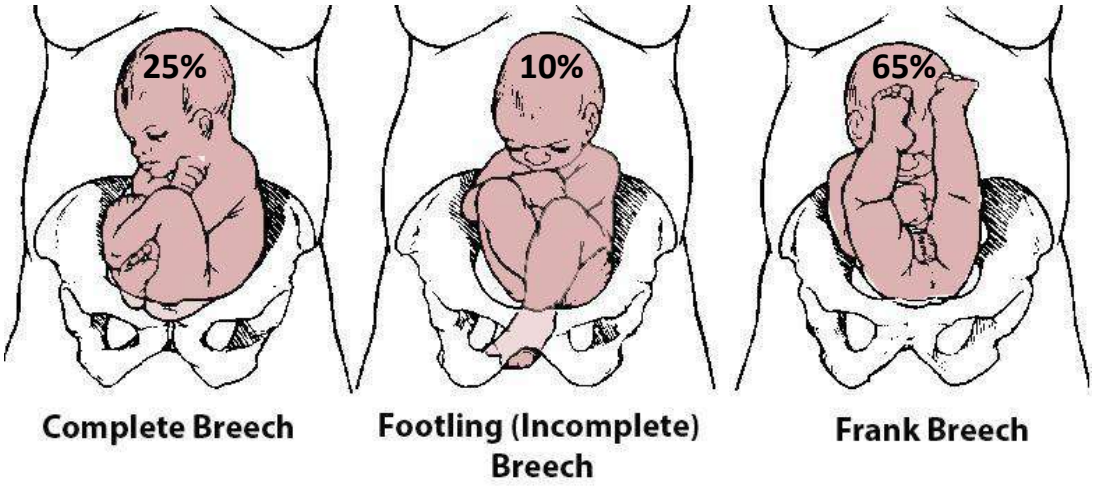
Uterine Inversion

Definition	Descent of uterine fundus into the cavity, through the cervix or vulva
Info	• almost all cases are in the 3rd stage (puerperal uterine inversion • life-threatening (due to shock & hemorrhage) • Frequently followed by endometritis • Traction may elicit vasovagal response
Types	• Complete: Incomplete, complete (through the cervix)
Degrees	• 1st: the uterus is partially turned out • 2nd: fundus has passed through the cervix but not outside the vagina • 3rd: the fundus prolapsed outside the vagina • 4th: the uterus, cervix and vagina are out and visible
Onset	• Acute: 1st 24 hr before the cervix constricts • Subacute: within 4 weeks of delivery • Chronic: after 4 weeks of delivery
Active Mx of the 3rd stage	• Oxytocin upon delivery of the anterior shoulder • Controlled cord traction ** never pull on the cord to deliver the placenta. Gentle traction will be sufficient in a normally implanted placenta • Brandt-Andrews maneuver
RF	• *Previous uterine inversion (the most common risk factor!)* • Maternal: Uterine anomaly, connective tissue disease (Marfan's) • Placental: Fundal placenta, abnormal adherence, placenta previa • Short umbilical cord • Macrosomia • Uterine Atony • Iatrogenic: Antepartum tocolysis (MgSO4) mis-Mx in 3rd stage
C/P	• Vaginal bleeding • Lower abdominal pain • Sensation of vaginal fullness with a desire to bear down after delivery of placenta • S/Sx of hypovolemic shock • Abdominal Exam: Cupping of the fundus, absence of the uterus • Vaginal exam: soft purple (dark bluish red mass in the vagina/vulva) • PPH, based on the degree of blood loss the C/P is more prominent
Dx	• C/P (bimanual exam) • US to confirm

Complications	• Death • Anemia (mc!) • Hypotension and Hypovolemic shock - *the most important complication is shock wither hemorrhagic or not* • Renal failure • Sheehan's syndrome • Risk of blood transfusion • Surgery complications and Sepsis
Mx	1) Call for help (resuscitate, evaluate, identify cause, surgery if needed) 2) Repositioning: a) Tocolytics to relax the uterus (nitroglycerin, terbutaline or MgSO4) b) Try manually to return it (Johnson method) c) if failed: try hydrostatic correction - complications: infection, failure or saline embolus d) if failed: laparotomy: pull the fundus up and that's it you don't need to fix it in place and after you put it in consider oxytocin agent to contract the uterus well and avoid PPH • Post procedure care: - Oxytocin infusion, if still failed to contract give ergometrine or prostaglandins - Give prophylactic antibiotic: ampicillin/cefazolin + metronidazole, if there is signs of infection add gentamicin + analgesics • consider uterine inversion in both vaginal and C/S delivery: - why C/S: once the baby is out you can go and pull the placenta immediately (that's wrong)



Breech Presentation

Info	• most common type of malpresentations is breech • 25% of breech fetuses becomes vertex at a later time of gestation
RF	• Prematurity (most important, most common) • Uterine anomalies (bicornuate) • Multiple Gestation • Extended legs preventing spontaneous version • Placenta previa • Hydramnios • Contracted maternal pelvis • Pelvic tumors that obstruct the birth canal
Types of breech	 ** Footling is more common in **multiparous** *due to laxity of abdomen*
Dx	• By Leopold's maneuvers and vaginal exam
Mx	• ***External Cephalic Version*** (***ECV***): - immediate ECV 35-75% success rate - It reduces the CS rate - not done before 36 weeks of gestation (before the onset of labor) - ***When***? IV Access, NPO for 8 hours, No CI to ECV, in hospital for ER C/S - ***Complications***: PTL, Abrupto placenta, cord accident, uterine rupture - ***Contraindications***: a. *Absolute*: Multiple pregnancy, APH, Ruptured membranes, oligohydramnios, significant fetal anomaly, evidence of uteroplacental insuffiency, non-reassuring fetal monitoring b. *Relative*: IUGR, HTN, Rh iso-immunisation, Grande multi-parity, previous CS, Obesity

• ***Vaginal Delivery***: *Criteria for VD in breech*:
1. Frank or complete breech
2. Term baby (>37w)
3. Weight 2.5 – 3.8 K
4. Fetal head must be flexed
5. Normal maternal pelvis dimension
6. No other C/S indication present
- Assisted breech delivery (piper forceps – fully dilated)

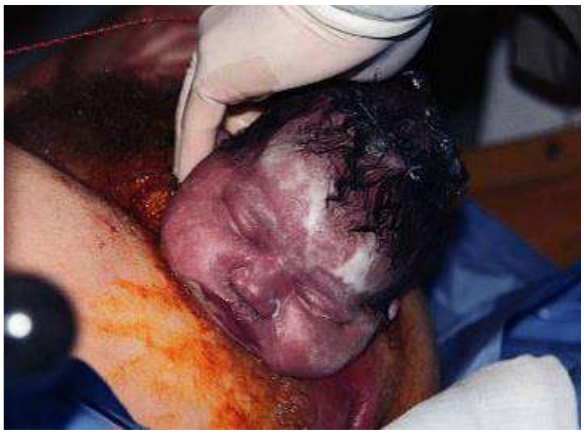
• ***Cesarean Delivery***:
- Nearly all breeches are delivered by C/S now to avoid complications
- Less perinatal mortality and morbidity than vaginal delivery
- ***C/S Indications***:
1. Hyperextension of the head
2. Abnormal pelvic bone
3. Failure of $1^{st}/2^{nd}$ stage of labor
4. Previous C/S
5. Previous difficult labor
6. Complications: IUGR, HTN, DM, Hypoxia, Asphyxia
7. Premature baby (Risk of head entrapment)

Notes

• Breech & Transverse lie if there is ROM, your main concern must be cord prolapse

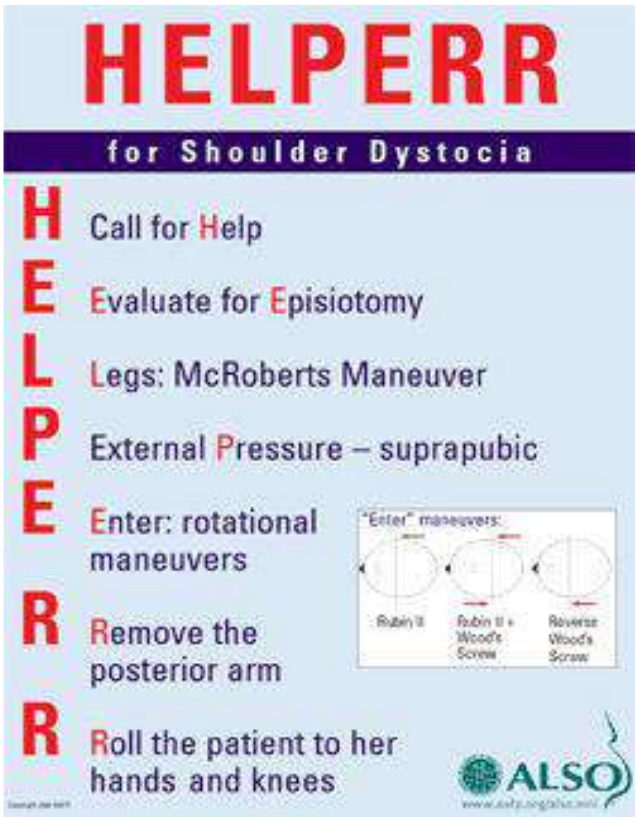
• Twin delivery:
- both breech: perform C/S
- 1^{st} vertex, 2^{nd} breech: the 1^{st} is delivered vaginally then the 2^{nd} might turn, if not use breech extractor (grabbing the 2^{nd} baby feet and pulling him into the birth canal to help deliver him vaginally if failed then C/S)
- 1^{st} breech, 2^{nd} vertex: locked twins – C/S immediately

Shoulder Dystocia



Definition	• Arrest of normal labor after delivery of the head by impaction of the anterior shoulder against the symphysis pubis		
Info	• Obs emergency, unpredictable, unpreventable • Very rare (0.6 - 0.7%)		
RF	**Maternal**	**Fetal**	**Intrapartum**
" DOPER " **DM** **Obesity** **Prolonged pregnancy/ Prolonged 2nd stage of labor** **Expected big baby** **Previous shoulder dystocia**	• Abnormal pelvic anatomy • Short stature • Multiparity • 2ry arrest of cervical dilation • Excessive pregnancy weight gain • Vaginal delivery after longer gestation (40-41 weeks)	• Male Gender • Macrosomia: RF: - Gestational DM - Maternal obesity - Hx of macrosomia - Post-date gestations - Advanced maternal age	• Prolonged active 1st stage of labor • Prolonged 2nd stage (labor dystocia) • Instrumental delivery • IOL • Use of oxytocin
Characteristics	• Additional maneuvers required to deliver the fetus • Head-to-body delivery time > 60 seconds		
When to expect the dystocia	• Failure of rotation • Difficulty of delivery of face and chin • Turtle sign • Failure of delivery of the anterior shoulder after traction		
Complications	• Brachial plexus damage (Erb's palsy – only 15% are permanent) • Umbilical cord entrapment • Inability of child's chest to expand properly • Severe brain damage or death due to hypoxia or acidosis (Asphyxia) • Pneumothorax • Birth trauma		

• Call for help
• 70% will deliver by Mcrobert (Fixation & abduction of the maternal leg) + Suprapubic pressure
• Patient head should be down
- Why we do the previous 2 points?
a) increase anterio-posterior diameter
b) Flattening of the sacrum
- both a/b give more space



- the mother is told not to push
- excessive neck rotation, excessive downward traction on head an fundal pressure should be avoided
- distended bladder, should be drained

• ***Episiotomy***:
- We do it to increase space, not to deliver because he is stuck behind the bone, it might cause trauma

Mx

• ***McRoberts Maneuver***: (1 in the pic)
- it needs 2 assistants grasping the maternal legs flexing the thighs against the abdomen; resulting in a cephalad rotation of the symphysis pubis and a flattening of the sacral promontory. It Can relieve 40-50% of shoulder dystocia (especially when combined with suprapubic pressure)

• ***Suprapubic pressure*** (***Rubin I*** – 2nd pic):
- hand should be placed on top of the mother's abdomen over the fetal anterior shoulder, so that the shoulder will *adduct* and pass under the symphysis (less space between the shoulders), the pressure is not continuous just like the CPR

• ***Enter (Internal Rotation – Rubin II):***

- the anterior shoulder is impacted against symphysis pubic
- go to the posterior aspect of the anterior shoulder and try to push it out
- if failed then go to the anterior aspect
- if failed go for the posterior shoulder
- posterior arm try to pull it out
- if still failed: do roll on all four/clavicle fracture/symphysiotomy

• ***Other Methods:***

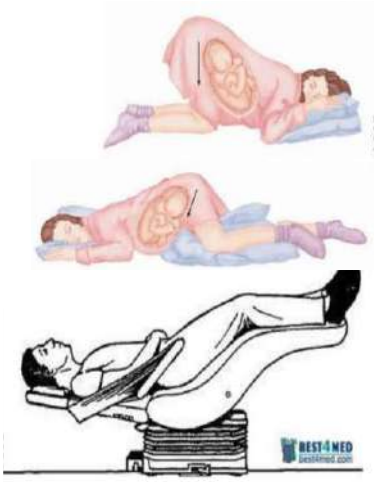
- Reverse wood's screw
- Reverse wood's screw maneuver
- Jacquemier's maneuver (Barnum's maneuver – removal of the posterior arm)
- Rolling the patient (All-fours or gaskin maneuver)
- Zavanelli's maneuver
- Intentional fetal clavicular fracture
- Maternal symphysiotomy

Case: a lady just had instrumental delivery with forceps, the head is coming out with difficulty, but the delivery is completed: **what you will worry about?**

Maternal	Fetal
• PPH: due to atony, trauma, prolonged 2nd stage of labor • Uterine rupture • Vaginal/Cervical tear	• Hypoxia/Asphyxia • Brachial plexus injury (Erb's palsy) • Death

Cord Prolapse

Definition	Descent of the umbilical cord into the LUS where it lie adjacent to the presenting part or below it with *rupture fetal membranes*, if the membranes are intact it is *cord presentation (here do elective C/S)*	
Info	• rare, most commonly associated in transverse lie (20%), footling (15%), complete breech (5%) • unknown incidence because it can be detected only by fetal HR changes characteristic of cord compression	
Types	• *Occult* (*hidden*) *cord prolapse*: - cord adjacent to presenting part - not felt on exam, might lead to unexplained distress • *Funic* (*cord*) *prolapse*: - cord below presenting part, with no rupture of fetal membranes - palpated • *Overt cord prolapse*: - below + rupture of membranes and displacement through the vagina	
RF	**Fetal**	Congenital/fetal anomaly, prematurity/IUGR, multiple pregnancy, abnormal lies, malpresentation (footling)
	Maternal	ROM (Spontaneous/ARM), Pelvic tumors (fibroids), Pelvic contraction, PTL
	Placental	Polyhydramnios, Minor degree of placenta previa
	Procedure	ARM, ECV, IOL, Applying fetal scalp electrode, amnion infusion, placement of cervical ripening balloon catheter
Risks	• Umbilical artery vasospasm • Birth Asphyxia • Hypoxic ischemic encephalopathy • Perinatal death	
Dx	• Mostly clinical • CTG: abnormal FHR, marked carriable decelerations • Vaginal exam: - sudden appearance of a loop of umbilical cord after rupture - you can palpate it in absence of membranes - or cord presentation if membranes are intact • US not sufficient	

Mx	• **CORD**: **C**onsider cord prolapse **O**rganize for help **R**elease pressure by 4 maneuvers **D**ecrease manipulation • Immediate vaginal exam to R/O cord prolapse • if cord presentation: - Term: C/S before membrane rupture - Pre-term: no consensus on Mx (monitoring), left lateral position • Mx is based on the type: for occult we monitor, for overt we interfere • Prevent/relieve cord compression and vasospasm by: - Manual placement (elevation) - Bladder filling - ***Adjust maternal position***: a) knee chest position (Genuperctoral) b) Sim's lateral position, c) Trendelenburg position • Fetal Assessment Viable or not: - Category 1 (cord prolapse + abnormal HR) - Category 2 (cord prolapse + normal HR) • ***Prompt delivery***: - Cervix fully dilated, tend to do vaginal birth within 20 min of Dx (instruments might be used) - if not dilated, do a C/S within 30 min of Dx - Don't forget to drain the bladder, check for HR, call a neonatologist due to risk of needing resuscitation (based on APGAR score) 
Prevention	• Admission: if abnormal lie/non-cephalic or PROM/PTL at 37 week • Labor/Ruptured membranes of an abnormal lie are indications for CS • Fetal distress is associated with cord prolapse so do a vaginal exam • Artificial rupture of membranes should be avoided (if it's a must then to it in the OT if you needed to do immediate C/S)
Notes	• Oblique lie, transverse lie, unstable lie: we admit them at 37 week and we monitor them • PROM & non-cephalic: we manage them as an inpatient
Case	Q: Patient came to hospital with cord prolapse, 1st thing to do is? - Check for FHR if IUFD then no need for emergent C/S

Amniotic Fluid Embolism (AFE)

Definition	• Sudden cardiorespiratory collapse and DIC
Info	• Similar DDx to shock • Quickly R/O hemorrhage • Incidence: 2-6 : 100,000 deliveries
RF	• Multiparity (Gravida >=5) • Advanced maternal age • Male fetus • Trauma • CS, Operative vaginal delivery, D/C, IOL, Recent amniocentesis • Placental problems: Placental Abruptio, Placenta Previa • Polyhydramnios • PET • Short labor • Uterine rupture • Cervical laceration
C/P	• **Triad**: Hypotension, Hypoxia, Coagulopathy - Sudden cardiorespiratory arrest or both hypotension - Respiratory compromise (dyspnea, O2 sat <90%) - Documentation of over DIC (Coagulopathy) • Dyspnea, Agitation • Onset: during labor or within 30 min of the delivery of the placenta • Absence fever (≥38.0 C) during labor • Physical signs: - Hypotension, dyspnea, seizure, cough, cyanosis, fetal bradycardia, pulmonary edema, cardiac arrest, uterine atony, coagulopathy (severe hemorrhage), altered mental status
Complications	• Pulmonary edema • Left heart failure • DIC, Shock
Investigations	• *Coagulation* (DIC): Elevated D dimer, low fibrinogen, thrombocytopenia • *CBC* • *ABG*: hypoxemia, metabolic acidosis, rarely hypercapnia • *CXR*: pulmonary edema, effusion or enlarged heart

	• *ECG*: tachycardia or arrythmias • *Echo*: rise in pulmonary pressure or left ventricular failure • *FHR* if before delivery: absent baseline FHR variability, late decelerations or terminal bradycardia
Mx	• The principal objectives of treatment for amniotic fluid embolism are to support the respiratory system, correct the shock, and replace the coagulation factors. • *Unstable patients*: - Call for HELP - Manual displacement of the uterus to the left - ABCs - Respiratory/Hemodynamic support: Intubate, O2, IV line + fluids, if still hypotensive consider vasopressor therapy (norepinephrine) - Control hemorrhage and coagulopathy: rapid transfusion required - R/O other causes and deliver the fetus if still alive
Delivery of the Fetus	• *Urgent delivery includes*: 1) Category 3 FHR tracing (preterminal) in a fetus at or above the limit of viability 2) Rapid and progressive deterioration of the mother's condition • Perimortem C/S (Resuscitative hysterotomy): - Done at 4 min and complete delivery by 5 min following cardiac arrest
Prognosis	• 10% of al maternal death (mortality rate in AFE 20-80% • Hypoxemia causes 50% of deaths in 1st hour • Those who survive have a poor outcome with 85% suffering neurological injury due to cerebral hypoxia • if AFE occurs prior to delivery: neonatal outcome is poor (mortality rate 20-60% & only up to 50% of the survivors are neurologically intact)
AFE DDx	• Eclampsia • Anaphylactic Shock • Septic Shock • Pulmonary Embolism • Drug toxicity • APH, PPH • Aortic Dissection

Maternal Collapse

Defined

as an acute event involving the cardiorespiratory systems and/or brain, resulting in a reduced or absent conscious level (even death), at any stage in pregnancy & up to six weeks after delivery

Causes

1) Vasovagal attack (1 of the mc)
2) Post-ictal state following an epileptic seizure (1 of the mc)
3) Hemorrhage/Hypovolemia (APH, PPH, ICH)
4) Eclampsia and PET (Eclampsia seizure is self-resolving in minutes)
5) Sepsis
6) Cardiac causes (aortic dissection, cardiomyopathy, MI)
7) The 4 T's and 4H's

Reversible cause		Cause in pregnancy
4H's	Hypovolaemia	Bleeding (obstetric/other; may be concealed) or relative hypovolaemia of dense spinal block, septic or neurogenic block
	Hypoxia	Pregnant women can become hypoxic more quickly. Cardiac events – peripartum cardiomyopathy, myocardial infarction, aortic dissection, large vessel aneurysms
	Hypo/hyperkalaemia and Hyponatraemia	Hypo and hyperkalaemia are no more likely. Hyponatraemia may be caused by oxytocin use
	Hypothermia	No more likely
4T's	Thromboembolism	Amniotic fluid embolus, pulmonary embolus, air embolus, myocardial infarction
	Toxicity	Local anaesthetic, magnesium, other
	Tension pneumothorax	Following trauma/suicide attempts
	Tamponade	Following trauma/suicide attempts
Eclampsia and pre-eclampsia		Includes intracranial haemorrhage

- ICH
- Anaphylaxis: sudden and rapid progression of symptoms, life-threatening airway &/or breathing or circulation problems
- skin or mucosal changes
- we are facing more cardiac cases due to increased age so there is IHD pregnant lady & correction of congenital cardiac diseases. Those patients need certain care during pregnancy
- IV lidocaine or regional anesthesia on high level or large doses regionally given and increase systemic absorption is one of the causes of heart failure

Thromboembolism	• mcc of direct maternal death • use thromboprophylaxis • Amniotic fluid C/P: Acute hypotension, respiratory distress and acute hypoxia
Sepsis	• Bacteremia • mc organisms: GAS, GBS, GDS, Pneumococcus, E. coli
Drug toxicity	• Magnesium sulphate in the presence of renal impairment • Local anesthetic agents
Mx	• ABCDE approach: Check for breathing, pulse, start CPR immediately • Relieving aorto-caval compression: - done in women above 20 week GA (uterus above umbilicus) - At what GA it become a challenge? 20 weeks (significant cut off) - Placing it left lateral 30 degree positioning • Placing Oxygen • Two wide-bore cannula • Fluids (volume replacement) • US • **If all that didn't work go for perimortem C/S**: - **Perimortem C/S (Resuscitative Hysterotomy) Definition**: is a hysterotomy performed to resuscitate a woman in middle to late pregnancy who has entered cardiac arrest. Combined with a laparotomy, the procedure results in a Caesarean section that removes the fetus, thereby abolishing the aortocaval compression caused by the pregnant uterus. This improves the mother's chances of return of spontaneous circulation, and may potentially also deliver a viable neonate - we use midline/classical incision because it gives more rapid access - 4 minute rule (resuscitate for 4 minutes if still failed do C/S) - perimortem C/S is mainly to save the mother than the fetus, the gravid uterus impairs venous return and thus reduces cardiac output by approximately 60% secondary to aortocaval compression ! - *Delivery of the fetus and placenta (Patient response after)*: a) reduces oxygen consumption b) improve VR & CO c) Facilitates chest compressions d) make ventilation easier e) allows for internal chest compressions

- *PMCS*: you only need a scalpel + 2 clamps for the umbilical cord (if only scalpel is found then cut the umbilical cord and manually compress until a clamp is found) in the OR, no circulation, minimal blood loss and no anesthesia required

Physiological changes affecting resuscitation

System	Changes in pregnancy	Impact on resuscitation
Cardiovascular system		
Plasma Volume	Increased by up to 50%	Dilutional anaemia Reduced oxygen carrying capacity
Heart rate	Increased by 15–20 bpm	Increased CPR circulation demands
Cardiac output	Increased by 40% Significantly reduced by pressure of gravid uterus on IVC	Increased CPR circulation demands
Uterine blood flow	10% of cardiac output at term	Potential for rapid massive haemorrhage
Systemic vascular resistance	Decreased	Sequesters blood during CPR
Arterial blood pressure	Decreased by 10–15 mmHg	Decreased reserve
Venous return	Decreased by pressure of gravid uterus on IVC	Increased CPR circulation demands Decreased reserve
Respiratory system		
Respiratory rate	Increased	Decreased buffering capacity, acidosis more likely
Oxygen consumption	Increased by 20%	Hypoxia develops more quickly
Residual capacity	Decreased by 25%	Hypoxia develops more quickly when apnoeic
Arterial pCO_2	Decreased	Decreased buffering capacity, acidosis more likely
Laryngeal oedema	Increased	Difficult intubation
Other changes		
Gastric motility	Decreased	Increased risk of aspiration
Lower oesophageal sphincter	Relaxed	Increased risk of aspiration
Uterus	Enlarged	Diaphragmatic splinting reduces residual capacity and makes ventilation more difficult Aortocaval compression causes supine hypotension, reduces venous return and significantly impairs CPR
Weight	Increases	Large breasts may interfere with intubation, makes ventilation more difficult

- **Difficult to intubate, why?**

1) Laryngeal edema,
2) Weight gain,
3) Increase breast size

- Tolerance to hypoxia in pregnancy is reduces so she will collapse at the same O2 concentration

- *Causes of aspiration*: delay gastric emptying, relax sphincter

- ↑ Uric acid indicate worse fetal and maternal outcome it will elevate before other markers so it will give you an alarm that this patient with chronic HTN will have severe PET

Gestational Trophoblastic Disease (GTD – Moral Pregnancy)

Types	o **Pre-malignant**: Hydatidiform mole (complete/partial) o **GTN – malignant GTD**: • persistent/invasive GTN • Choriocarcinoma • Placental site trophoblastic tumors (rare)
Hydatiform mole	
Definition	• abnormal pregnancy by varying degrees of trophoblastic proliferation and vesicular swelling of villi + absent or an abnormal fetus/embryo
RF	• Asian • Age extremes • Previous molar • COCPs use in ↑ β-HCG: ↑ malignant transformation • Familial/sporadic clusters of CHM (AR): chromosomes
Clinical S/Sx	• Vaginal bleeding in early pregnancy (common) • excessive uterine size (50%) • Theca lutein cysts (50%) • Hyperemesis gravidum (25%) • early PET (25%) • Hyperthyroidism (<10%) • Pulmonary emboli (respiratory distress - <2%) • Vaginal hydropic vesicles passage
Postpartum non-molar	• GTN can occur after non-molar pregnancies • AUB after non-molar: do a pregnancy test to R/O GTN • GTN considered in women having acute respiratory, abdominal, neurological Sx after any pregnancy

PE	• enlarged uterus • bilateral ovarian cysts • vaginal METS 30% (vascularized & infection prone)
Investigate	• **β-HCG** (>100K in CHM): mostly associated with: - Ovarian enlargement due to theca lutein cysts - Hyperemesis gravidarum - Early PET (<20w) - Hyperthyrodism • CBC, LFT, KFT, Thyroid FT • Blood type, antibody screening, confirm Rh(D) state • CXR • Pelvic US • Histopathology analysis • Registration of confirm molar (for β-HCG surveillance)
Dx	• By histological examination, enhanced by flow cytometry to determine karyotype • all POC after miscarriages be sent for analysis to R/O
Treatment	• **Surgical evacuation**: suction curettage • **Medical termination** (we try to avoid it: RISKY) • **Anti-D**: at time of surgical evacuation • **Hysterectomy**: rarely (elective/ER: life-threatening) • **2nd Uterine Evacuation**: rarely, in: - plateauing or raising β-HCG (1500) - abnormal intra-uterine tissue on US - heavy vaginal bleeding
Follow up	• monitor weekly β-HCG until 3 normal values in row • 50% reach normal β-HCG 6-14 w after evacuation • rise/plateau of β-HCG indicate chemo treatment • Register with specialist center to check β-HCG • 2 weekly serum & urine samples until β-HCG is normal • Avoid pregnancy (Avoid for 6 month) • use non-hormonal barrier contraceptives / No COCPs • check for β-HCG after every future pregnancy delivery

	Complete (CHM)	Partial (PHM)
Origin	Monospermic or dispermic fertilization of empty ovum	Dispermic fertilization of ovum, often misdiagnosed as incomplete or missed
S/Sx	More frequent	Less frequent
Karyotype	Diploid (paternal: 46 XX, 46 XY)	Triploid 90%: 69 XXY, 69 XYY, 69 XXX
Prevalence	1/1000	3/1000
Fetal tissue	Absent	+ (abnormal – high IUFD)
Histopath-ology	Diffused, the cystic villi show (cluster of grapes)	Focal
P57	not expressed	expressed
FISH	Diploid	Triploid
GTN Risk	15%	0.5%
US features	• Embryo absence • No amniotic fluid • Central heterogeneous mass with anechoic spaces (**diffused: snowstorm**) • Theca lutein cysts	• Fetus + (maybe viable) • Amniotic fluid + • Focal anechoic spaces (**Swiss cheese pattern**) • ↑ transverse diameter of gestational sac • Absent theca lutein cysts
Persistent GTD risk	15-20%	3-5%
GTN / Persistent GTD		
Persistent	• 90% of GTN cases are persistent • MC Sx is vaginal bleeding • Uterine rupture is rare • 15% localized (invasive GTN) & 4% METS (chorio-Ca)	
Suggestive S/Sx	• enlarged irregular uterus • bilateral ovarian enlargement • ↑ β-HCG • S/Sx of METS	

RF	• pre-evacuation β-HCG > 100K • pre-evacuation: uterine growth & theca lutein cysts • Age > 40 • Recurrent molar • Aneuploidy mole • Molar medical complications (PET, hyperthyroidism) • Evidence of distant trophoblastic embolization	
Dx of persistent	• plateau in β-HCG for atleast 4 values over 3 weeks • β-HCG rises (by 10% for 3 values over 2 weeks) • Detectable β-HCG for > 6months post-evacuation • Histology of Choriocarcinoma	
Chemo indications for GTD	• Plateau or rising β-HCG • Heavy vaginal bleeding or GI/intraperitoneal hemorr. • Choriocarcinoma Histology • METS: brain, liver, GI, lung • β-HCG of 20K, 4 weeks post-evacuation • β-HCG raised for 6 m post-evacuation (even if ↓)	
FIGO anatomical GTN staging	I GTN confined to uterus	
	II GTN outside uterus but limited to genital structures	
	III GTN extends to lungs	
	IV GTN extends to all site (METS everywhere)	
FIGO chemo system	• 0-6 score: low risk of mono-chemotherapy resistance • >7: high risk of mono-chemotherapy resistance • mono-chemo with methotrexate (or dactinomycin)	
	Low risk (95%)	**High risk**
	• stage I, maybe II-III • Methotrexate + Calcium folinate (folic acid) • Survival rate 100%!	• Etoposide, methotrexate, dactinomycin (EMA), cyclophosphamide, vincristine (CO)
Response Assessment	• monitored weekly • Remission: 3 consecutive normal β-HCG over 14-21 d • after remission, β-HCG is monitored monthly until 1 y	

Principles of Chemo-therapy	• Inpatient • measure β-HCG • Adequate response: 50% reduction in weekly β-HCG • Chemo is remained till β-HCG is normal and for further 6 weeks to eliminate any residual cells • low-risk GTN presents soon after CHM/PHM Dx, while the high-risk GTN presents months or years • S/Sx depend on site of METS
In Chemo long-term	• **High risk**: ↑ 2nd tumors, fastens menopause by 3 yrs • **Low risk**: no 2nd tumors, fastens menopause by 1 year • neither high/low affects fertility or congenital abnor.
Future Con-traception	• GTN requiring chemo should not conceive for 12 m • GTD not requiring chemo (6 m after β-HCG is normal)
Choriocarcinoma	
Info	• Highly malignant, β-HCG secreting • most aggressive GTN • **Macroscopically**: - soft, purple, large, hemorrhagic mass • **Microscopically**: - abnormal trophoblastic hyperplasia & anaplasia with absence of chorionic villi, hemorrhage and necrosis with direct invasion into myometrium and venous sinuses • METS occur by vascular spread
S/Sx	• Similar to HM: vaginal bleeding, abdominal pain, pelvic mass, high β-HCG Sx • 1/3 no gyne features, only METS features • PPH • AUB a year or more after an antecedent pregnancy • severe hemorrhage if tumor erodes
Mx	• Excision biopsy (for Dx & Genetic analysis) • Biopsy (often impossible – so clinical Dx mainly) • Classified in FIGO and treated as GTN

Placental Site Trophoblastic Disease (PSTT)

Info	• uncommon • consists predominantly of mononuclear intermediate trophoblast & syncytial elements, without chorionic villi, Infiltrating in sheets between myometrial fibres. • **Most PSTTs arise following non-molar pregnancies** • Generally present months to years after a gestation • Produce **few hCG & human placental lactogen** (hPL) • **confined to the uterus mostly, and late metastasis**
PSTT Vs ChorioCa	• Compared to choriocarcinoma, PSTT is associated with less vascular invasion and necrosis and greater tendency for lymphatic spread. • PSTT are relatively insensitive to chemo & **hysterectomy and pelvic lymphadenectomy remains the mainstay of ttt if there is residual disease confined to the uterus.** • Long-term (>5 y) clinical follow-up is recommended (hCG is not a reliable)
PSTT, Chorio US Features	• mass enlarging the uterus (heterogeneous appearance: necrosis & hemorrhage) • Hyper-vascularity on color Doppler • Tumor extends into parametrium

Invasive Mole

Info	• Arises from myometrial invasion of CHM or PHM via direct extension through tissue or venous channels • 10% of HM • clinical: 15% show METS to lung/vagina • diagnosed clinically • responds to chemotherapy.

Summary

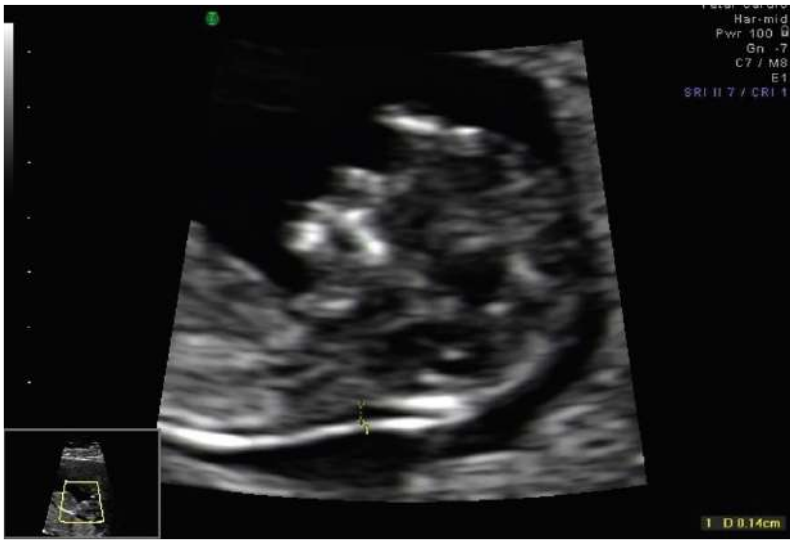
- GTDs are curable with the preservation of fertility
- HM usually present with vaginal bleeding in pregnancy
- Suction by an experienced gynaecologist; oxytocics try to avoid it
- Registration with a specialised centre is mandatory
- hCG is an excellent marker for monitoring / the rare PSTT
- CHM or PHM not requiring chemo, hCG should be monitored for at least 6/12 following uterine evacuation & pregnancy is avoided
- Persisting GTD or GTN requiring CT, hCG should be monitored for at least 5 years to lifetime &pregnancy avoided for 12 months after completion of chemotherapy
- In women with a history of molar pregnancy, serum or urine hCG should be checked 6 w and 10 w after every future pregnancy
- COCPs should not be used until hCG become normal (undetectable)
- 15% of CHM and 0.5% of PHM will ultimately require CT for persistent GTD/GTN
- CT regimen is based on a prognostic scoring system
- The majority of women will conceive again following GTD/GTN with no increased rate of congenital fetal malformations.

Screening for Fetal Anomalies

Maternal US & Serum Mother Screening

1st trimester screening

1) ***Maternal age***: alone has 30% detection rate
2) ***Fetal nuchal translucency*** (***NT***) ***thickness***: ↑ risk
- done between 10-14 weeks GA



3) ***Maternal serum βHCG***: ↑ risk or down
4) ***PPAP-A***: pregnancy associated plasma protein A (↓) – ↑ risk for Down syndrome
- if abnormal between 10-14 weeks then it's associated with chromosomal abnormalities
• *If we use all 4 together*: the detection rate for down is ***79%*** with positive screening rate of ***5%***
• US: visualization of nasal bone: ↓ risk of down and vise-versa
• if we use *all 4 + nasal bone* assessment the detection rate ↑ to ***93%*** with +ve screening rate of ***5%***

2nd trimester screening

• ***Serum triple screening test***: αFP, βHCG, Unconjugated estriol (UE3) at *16-20 weeks*
• **αFP** (maternal serum – **MSAFP**): ↑ in:
a) it detect 80-85% of all open '*neural tube defects*'
b) *ventral wall defect*: gastroschisis + omphalocele

• if MSAFP ↑ you must R/O these by using US:
a) Multiple gestation
b) Fetal demise → False +ve results
c) Inaccurate GA
- if none of these present: do amniocentesis to determine amniotic fluid AFP level and to measure AchE (which is present only in neural tube defects)
• if MSAFP ↓: Down syndrome
• if MSAFP ↓, uE3 ↓, βHCG ↑ (triple test): then it's likely to be down (detection rate for down is 70%, +ve screen rate is 5%)
• if MSAFP ↓, UE3 ↓, βHCG ↓: trisomy 13 (Patau syndrome)
• Triple test + Inhibin A (Quadruple test):
- Inhibin A is ↑ in Down
- Detection rate for Down is 81%

Combined 1st & 2nd trimester screening

1) Integrated screening:
- 1st & 2nd trimester results combined into a single risk calculation & repeated after 2nd trimester
- most cost effective with highest sensitivity
- Disadvantage: late detection 17-18 weeks

2) Sequential Screening:
↑ βHCG, ↑ αFP
↓ PPAP-A
↓ UE3
→ Associated with complications PTB, IUGR, PET then you should do follow up.

• **Non-invasive prenatal testing** (**NIPT**): using cell free fetal DNA from maternal plasma (ffDNA – Maternal blood sampling):
- Done at 9-10 weeks GA
- High sensitivity (99%) but expensive
- Early definitive diagnostic test
- Source of ffDNA: apoptosis or trophoblast cells that have entered the maternal circulation
- Comprise 3% of total maternal plasma DNA at the end of 1st trimester

- *Detection rate for*:		*False rate of NIPT*:
a) Trisomy 21: 99.4%	>>>	7%
b) Trisomy 18: 99.1%	>>>	36%
c) Trisomy 13: 91.7%	>>>	56%
d) Sex chromosome abnormalities: 96.2%	>>>	60%

- due to the false rate: a +ve NIPT must be confirmed by a diagnostic test as:
a) Amniocentesis or CVS
b) Provide full karyotyping analysis
- note: there is risk of pregnancy loss
- NIPT is offered to woman at risk for fetal aneuploidy, after pretest counseling

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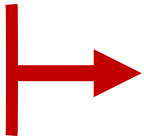
• **Methods**: US, Amniocentesis, CVS, Cardiocentesis, Percutaneous umbilical blood sampling (PUBS)
- If high risk by screening do diagnostic test

• **Soft tissue marker**: **Fetal anomaly scan**:
- Calcification on heart
- Short femur length
- Echogenic fetal bowel



↑ risk for aneuploidy, but it has low sensitivity

Diagnostic Procedures

• **Fetal anomaly scan** 18-22 weeks:
1) Anencephaly
2) Ventriculomegaly
3) VSD, ASD, TOF, TGA
4) Gastroschisis, Omphalocele
5) Cleft lip
6) Absent limbs

- if you discover a defect *incompatible of life* (anencephaly, dextrocardia): *terminate the pregnancy*

- if you discover an *isolated defect* look for other "*detailed scan*" if normal offer amniocentesis, CVS because it might be associated with *chromosomal abnormality*, also do *TORCH* screening, if all (-ve), refer her for *genetic counseling*

Important

NIPT: done at 10 weeks
Nuchal Translucency: done at 11 – 13 weeks + 6 days
BPP: done at 16-19 week
Fetal anomaly US scan: done at 18-22 week

Rh alloimmunization (Rh-ai)

immunologic (Rh antibody mediated) disorder that occurs in a pregnant, *Rh (-) woman who is carrying an Rh (+) fetus*

General Information

• the majority of Rh-ai are due to *antibodies to D antigen 90%* (*also it is the only preventable type*) (other types: C, E, c, d, e, partial D antigens)
• A person who lacks the D antigen on the surface of RBCs is "***RhD-negative***," and an individual with the D antigen is "***RhD-positive***."
• in general, *two exposures* to the RhD antigen are required to produce any *significant sensitization* (unless the 1st exposure is massive) so with the 2nd pregnancy if the fetus (+) the antibodies attack the Rh antigens of the baby causing hemolysis > anemia > heart failure > baby death.
• The initial response to exposure to the RhD antigen is the production of (**IgM** -which cannot cross the placenta) for a short period of time, followed by the production of **IgG** (that can cross). If the fetus has the RhD antigen, these antibodies will coat the fetal RBC.
• Mild, moderate, severe (*usually the same or more severe in next pregnancies*)
• If a woman has a hx of fetal hydrops the risk of hydrops is 90% with a subsequent pregnancy (*usually at the same time as the previous one or earlier*)

Identifying high risk woman

• Blood sample is taken in the 1st prenatal visit: check blood group, RhD type & antibody screening
- if (-) RhD with (+) antibody titer (RhD sensitized), check father RhD
- if father is RhD (-), then the baby is (-) also and hemolysis won't occur
- if father is RhD (+), check Rh genotype by PCR, if *homozygous* for D antigen, the baby will be RhD (+) and monitoring is required, if the father is *heterozygous*, the baby has a 50% of being RhD (+) so we need to check the fetal RhD genotyping, which is done by:
a) *Testing cell free fetal DNA*: from the maternal plasma (as early as the end of 1st trimester)
b) *Amniocentesis*: at 2nd trimester, RhD done using amniocytes, but risk is fetomaternal hemorrhage and worsening of hemolysis
c) *Chrorionic villus sampling*: greater risk of hemolysis if baby RhD (+)

Hydrops Fetalis	• form of in utero heart failure • characterized by: fetal ascites, pericardial effusion, pleural effusion, subcutaneous edema, polyhydramnios

RF	• *Ethnicity*: - 15% White Americans are RhD (-), 8% African Americans, 1-2% Native Americans, 1-2% Asians • *Advanced GA* • *Previous history*
Incidence	• Fetomaternal hemorrhage is very common, yet incidence of RhD immunization within 6 months of the delivery of the 1st RhD (+), ABO-compatible infant is 8%. In addition, the incidence of sensitization with the development of a 2ry immune response before the next RhD (+) pregnancy is 8%.
Complications	• Severe extramedullary hematopoiesis • Portal HTN • Hypoalbuminemia • Hyperbilirubinemia: damage the CNS leading to *neonatal encephalopathy and kernicterus (cerebral palsy, sensorineural deafness)*, Rh_o(D) immune globulin (RhIG – Anti-D) prevent this • Heart failure • Hydrops fetalis • IUFD ** Note: if hemolysis is mild the fetus might compensate
Hydrops Fetalis	• form of in utero heart failure • characterized by: fetal ascites, pericardial effusion, pleural effusion, subcutaneous edema, polyhydramnios
Kleihauer-Betke test	• used to detect fetomaternal hemorrhage

How to Diagnose / Screen

Maternal Anti-D Antibody Titer

• Used as a screening tool to estimate the severity of hemolysis
• For women with a previous history, follow them up despite the titer
• Fetus in the first immunized pregnancy is not in serious jeopardy;
1) when the titer remains **below 1:16**. >> repeat titers every 2-4 weeks.
2) If the titer rises to **1:16 or greater**:
a) Detailed US to detect hydrops
b) Doppler studies of the MCA are indicated

US Detection of Fetal Hemolytic Disease

1) Serial Doppler assessments of peak systolic velocity in the fetal MCA:

- it have proven to be the most valuable tools for detecting fetal anemia.
- One of the earliest signs of *fetal anemia* is an elevated doppler peak velocity.
- In at-risk pregnancies, test is performed *every 1-2 weeks from 18-35 GA*.
- A fetal MCA peak systolic velocity value *above 1.5 multiples of the median* for GA is predictive of moderate to severe fetal anemia and is an indication for percutaneous umbilical blood sampling (PUBS) for determination of fetal hemoglobin concentration. Followed by Intrauterine fetal transfusion if needed.
- After 35 weeks' gestation, this test may produce a higher false-positive rate.

2) Detailed fetal assessment + placental size and thickness and hepatic size.

• Fetal hydrops is easily diagnosed on US (everything is enlarged, fluids)

Percutaneous Umbilical Blood Sampling (PUBS)

- most accurate method for the Dx of hemolysis.
- it measures fetal hemoglobin, hematocrit, blood gases, pH, and bilirubin levels.
- If the *fetal hematocrit is < 30*, or *more than two standard deviations (SD) below the mean* for GA, intrauterine transfusion is indicated.
- there is higher risk of fetomaternal hemorrhage so it should not be a first-line.

- PUBS indications:

1- US evidence of fetal hydrops.
2- MCA peak systolic velocity is greater than 1.5 multiples of the median for GA.
3- fetus is at <35 weeks GA.
4- moderate to severe fetal anemia

Mx of the at risk pregnancy

A) Intrauterine Transfusion

- The goal is to transfuse fresh group O, Rh-negative PRBCs.
- Cannot be done until 18-20 weeks', because fetal size limits vascular access.
- Repeat transfusions are generally scheduled at 1 to 3-week intervals, and the final transfusion performed at 32-35 weeks' gestation, then delivery when it reaches 37 weeks, or if antepartum testing indicates severe fetal compromise.
- overall survival rate following intrauterine transfusion is about 90%, unless hydrops occurred before transfusion then it's lower
- 90% of survivors are reported to have normal neurologic outcomes
- this technique is done under US guidance

- In nonhydropic fetuses, the blood should be absorbed within 7 to 9 days.
- IV transfusion is the method of choice for correcting fetal anemia, and if we can't do it (e.g. GA <20 weeks) then we do intraperitoneal transfusion.
- IV Transfusion: preferred method, why?
1- Fetal survival is better especially if there is no evidence of hydrops.
2- transfusion into the peritoneal cavity can result in fetal bradycardia or a pseudo sinusoidal fetal heart rate pattern following the procedure due to compression at the site of insertion of the umbilical cord.
- The volume of transfused blood is based on the estimated fetal body weight, as determined by, the initial fetal hematocrit, the target fetal hematocrit, and the hematocrit of the packed red cells to be transfused.

B) Maternal plasmapheresis

combined with IVIG may be helpful in cases of severe erythroblastosis when intrauterine transfusions have not been successful

C) Phenobarbital

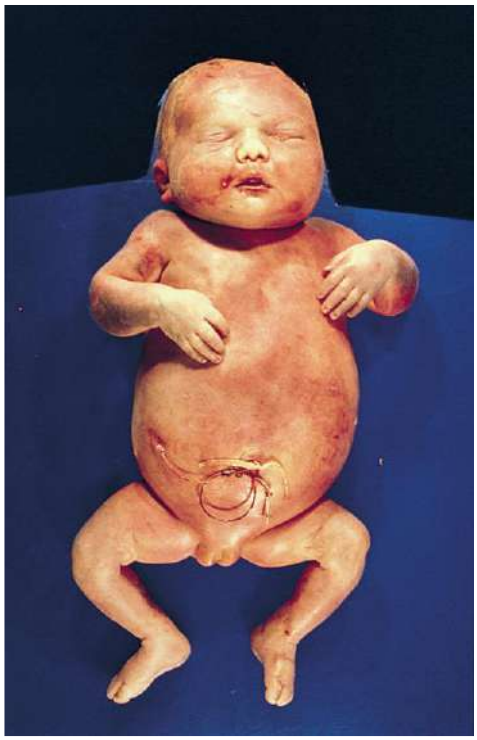
used to induce fetal hepatic enzyme maturation, thereby increasing uptake and excretion of bilirubin by the liver. should be initiated 1 week before delivery

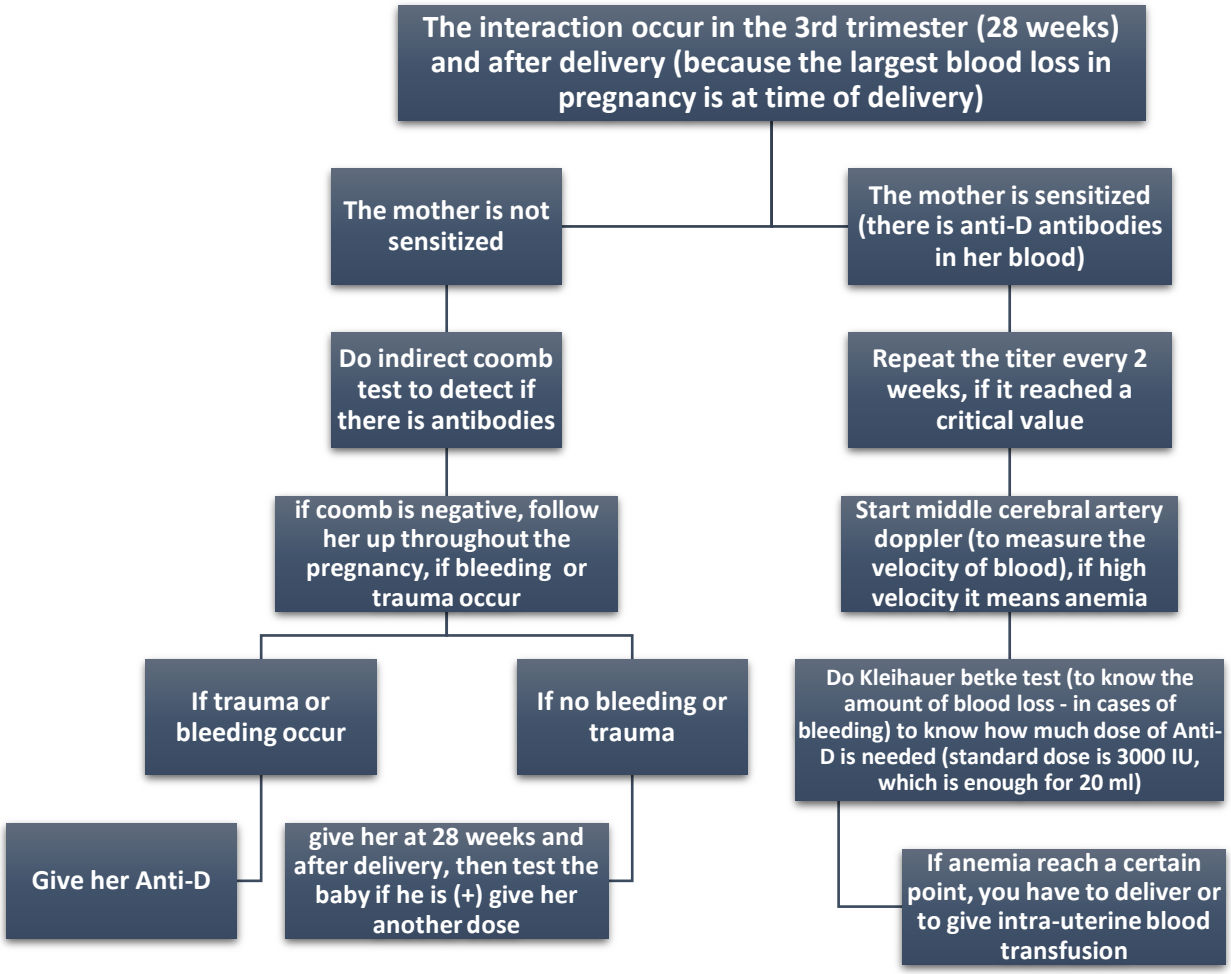
Time of Delivery	- *evaluation twice weekly from at least 32 weeks until delivery* for fetal well-being (NST, BPP) & every 3 weeks for fetal growth. - ***Goal is term*** delivery unless there are complications - There is no absolute GA cutoff for transfusions, but after 35 weeks the risk of an intrauterine loss greater than neonatal death risk. It may be prudent in this setting to deliver the fetus - if delivery is expected to occur < 34 w (or if amniocentesis suggests an immature lung), *betamethasone* is given at least 48 hr before delivery to *enhance lung maturation*
When to give Anti-D (Rh immune globulin) **" Prevention"**	• at 28 weeks (3rd Trimester) – the routine prophylaxis • During labor or immediately postpartum (time of the greatest risk for fetomaternal hemorrhage – greatest blood loss) • Within 72 hours of delivery of a RhD + baby • if any complication due to fetomaternal hemorrhage is recognized (at any antepartum event such as amniocentesis that may increase the risk of trans-placental hemorrhage) ** 300 micrograms (or 1 U) of Anti-D can neutralize 30 mL of fetal RhD (+) blood in the maternal circulation. ** Anti-D this will decrease the problem by 91%

BOX 15-1

INDICATIONS AND DOSING FOR RH IMMUNE GLOBULIN

- Blood type and antibody screen are performed for all pregnant women at their first prenatal visit.
- Women who are RhD-negative with a negative initial screen should have a repeat screen at 28 weeks.
- Those women with a negative screen at 28 weeks should receive 300 µg of Rh immune globulin (prophylactically).
- Those women with a positive screen should have their antibodies identified. If RhD-negative, they should also receive 300 µg of Rh immune globulin.
- All pregnant women who are RhD-negative and who are not sensitized (anti-D–negative) and who experience (1) spontaneous or induced abortion, (2) ectopic pregnancy, (3) significant vaginal bleeding, (4) amniocentesis, (5) abdominal trauma, or (6) cephalic version should receive 50-100 µg of Rh immune globulin before 12 weeks' gestation and be administered 300 µg if later than 12 weeks.
- Rh immune globulin is not necessary for complete molar pregnancies, but it is necessary for partial molar pregnancies, where fetal tissue may be present. Because this is not always clear at the time of evacuation, 300 µg of the immune globulin should be given.
- The greatest risk of fetomaternal hemorrhage is at the time of delivery. Rh immune globulin (300 µg) should be given routinely within 72 hours of delivery to all Rh-negative, anti-D–negative women who deliver an Rh-positive child.
- Additional Rh immune globulin is indicated if the delivery is complicated by excessive hemorrhage (>30 mL of fetal blood suspected or documented by Kleihauer-Betke testing).





Instrumental Delivery
" Assisted Vaginal Delivery "

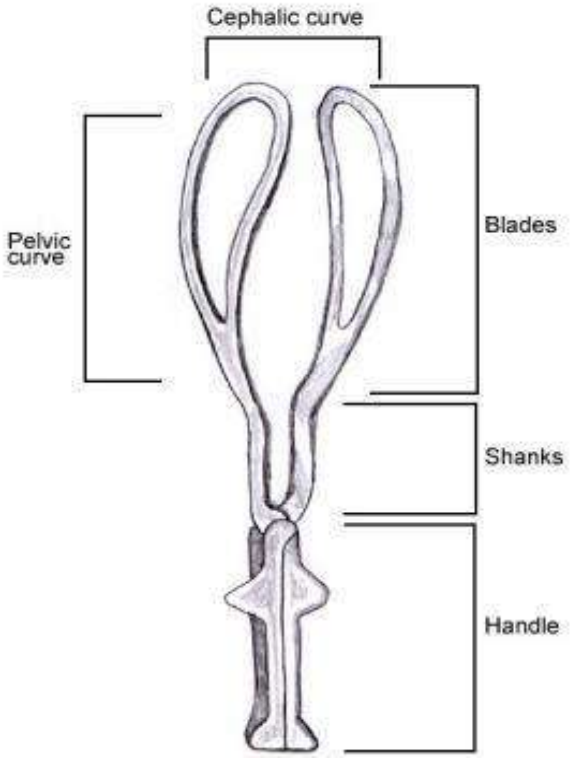
Tools	• Obstetric Forceps	• Vacuum Extractor
Pre-requisite for it	• Know presenting part • Know Position • No Cephalopelvic Disproportion (No true obstruction) • Expert Obstetrician • Fully dilated cervix • Enlarged head • Adequate analgesia • Presence of uterine contractions • Empty bladder • Presence of an indication • Ruptured membranes	Most important requisites are the 1st four points!)

Indications for Instrumental Delivery	
Fetal	**Mother**
• ***Fetal distress***	• ***Failure of progress in 2nd stage of labor***
• ***After coming head during a breech delivery***	*- in **nulliparous** it is defined as lack of continuing progress for 2 hr without regional anesthesia (RA) or 3 hr with RA*
• ***Premature baby***	*- in **multiparous** it is defined as lack of continuing progress for 1 hr without RA or 2 hr with RA*
• ***Face mento anterior***	• ***To Shorten the 2nd stage of labor for maternal benefit (Exhausted mother)***: HTN, Cardiac disorder, pulmonary disease, Duchenne dystrophy, neurological, & in these conditions there is an indication for RA to lower the strenuous pushing

Risks of Instrumental Delivery	
Fetal	**Mother**
• Scalp injury (cephalohematoma, large caput, subglueal hemorrhage) • Erb's palsy, more NICU's • Skull fracture, ICH • Facial palsy (foreceps) • Neonatal jaundice (hemolysis)	• Maternal laceration of the genital tract (from vaginal tear to cervical to even uterine rupture) • Uterine Atony (PPH) • Infection (Endometritis) needs Abx! • Pain, Psychological, urine retention

Mechanism of Foreceps

• Blade of the forceps:
- Cephalic curve
- Pelvic curve
- Shrank
- Lock
- Handle



• Technique:
- insert the forceps left to the patient then right to the patient then it should lock easily (no forceful application – easily applied and easily locked), then do traction downward and upward according to the anatomy of the pelvic canal
- it is allowed for 2 traction, if the head isn't coming out go for C/S

Mechanism of

• Technique:
- put the vacuum on the vertex between the posterior and the anterior fontanelle (median, paramedian) to enhance the flexion (that's why you have to know the position of the fetus, and if you

Vacuum Extraction	can't determine the position go for C/S) - with occipito-posterior: the traction should be upward, you can also use it with occipito-transverse - it is allowed for 2 "pop-offs" if the progress down the birth canal it is not obtained with appropriate traction go for C/S
Failure of the instrument	• Issue with the position (malposition) • CPD • True Obs (Caput, Moulding)
Types of the instrument	• Vacuum: Rigid (metallic), elastic (Kiwi) • Forceps: a. High (Kielland): it has no pelvic curve to allow rotation and it is not use anymore b. Mid-cavity c. Outlet (Wrigley;s forceps): most commonly used d. Piper foreceps: used with after coming head during breech
Episiotomy	• used to provide more space for manipulation • in vacuum delivery it is not an absolute contraindication • usually we do episiotomy at first to avoid more injury
General Questions	• The usage of the 2 instruments (sequential instrumentation) is not allowed! • Vacuum extractor cannot be used if premature <34 w ! • Can we use foreceps in C/S? Yes!, when the head is high, and not well applied to cervix • Vacuum delivery should be controlled you have to apply well support on the perineum to avoid rapid detachment of flexion • Usually the injury occur with extension of the head coming out, however it was a flexion state

• You can apply vacuum on dilatation of 8-9 cm(nearly dilated cervix) when there is a fetal distress (cord prolapse)

• When you apply the cup of vacuum, you have to make sure that there is no tissue (maternal) in between the cup and the head if there was it will lead to severe laceration!

• the application of traction weather with forceps of vacuum, it have to be with uterine contractions and stop when the contraction stops

• if you are unhappy with the ongoing process go for C/S

Flash-cards for these topics:
https://quizlet.com/480026976/dr-firas-gyne-flash-cards/?x=1jqU&i=2fgxb8&fbclid=IwAR1HbPECNRDN0oNeST_4Vh6BticYMK78zGhBB5fFppjVFoXPbrtG9tilRp0

Best Wishes

DONE BY: YAZAN ALAWNEH