Obstetrics & Gynaecology

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From Oxford Handbook of Obstetrics & Gynaecology, Passmedicine, Zero to Finals, Impey, etc (as of 2021)

Normal Pregnancy & Antenatal Care

Obstetric History

Current Pregnancy

- Name
- Age
- Occupation
- Relationship status
- Gravidity
  - Number of pregnancies, including this one
- Parity
  - Number of births
  - a+b, where a is the number of births beyond 24wks gestation and b is the number of miscarriages/terminations before 24wks

Estimated Date of Delivery (EDD)

- Naegle's rule: Add 1 year and 7 days to the LMP and subtract 3 months
- Made less accurate by:
  - Long cycles
  - Irregular periods
  - Recent OCP use
- Dating scans between 8 and 13 weeks are more reliable and should be used to provide definitive EDD

Other enquiries about current pregnancy

- General wellbeing – malaise, fatigue, other non-specific symptoms
- Fetal movement if >20wks
- Previous admissions, current problems
- Results of antenatal blood tests
- If postnatal:
  - Labour and delivery
  - History of postnatal period

Past History

Past Obstetric History

- Details of all previous pregnancies including miscarriages and terminations
- Gestation lengths
- Date and place of delivery
- Onset/induction of labour, mode of delivery
- Sex and birth weights, fetal and neonatal life

Gynae/Medical/Surgical History

- Method of contraception before conception
- Previous gynaecological procedures, cervical smear history
- Medical conditions, any consultation with other physicians, any previous surgery

Drug & Allergy History

- Current & taken at any time during the pregnancy

Family History

- Familial conditions such as haemophilia
- Previously affected pregnancies

Social History

- Smoking, alcohol, drugs
- Plans for breastfeeding

Obstetric Exam

Abdominal Inspection

- Apparent size of distension
- Any asymmetry or fetal movements
- Cutaneous signs of pregnancy
  - Linea nigra (xiphisternum to suprapubic area)
  - Striae gravidarum (recent stretch marks, purplish)
  - Striae albicans (old stretch marks, silver-white)
  - Flattening/eversion of the umbilicus
- Superficial veins (due to pressure on IVC)
- Surgical scars

Abdominal Palpation

Normal uterine size

- Palpable at 12wks
- Umbilicus at 20wks
- Xiphisternum at 36wks

Symphysis Fundal Height (SFH)

- Palpated and measured in cms >20 weeks
- Predicts age in in weeks by SFH in cm ± 2
  - ± 3 from 36 weeks, 4 from 40 weeks

Estimation of number of fetuses

Fetal lie

- Longitudinal: Fetal head or breech palpable over pelvic inlet
- Oblique: Head or breech palpable in iliac fossa, nothing in lower uterus
- Transverse: Fetal poles in flanks

Presentation (part of fetus over pelvic brim)

- Cephalic (vertex/face/brow determined vaginally)
- Breech
- Other (shoulder, compound)

Amniotic fluid volume

- Increased: tense abdomen with fetal parts difficult to palpate
- Decreased: compact abdomen with fetal parts easily palpable

Auscultation of Fetal Heart

- Best heard at anterior shoulder
- Doppler ultrasound from 12wks
- Pinard stethoscope from 24wks
- Breech: heard at/above maternal umbilicus

General Maternal Examination

- BMI
  - Complications more common <18.5/>25
- BP in semi-recumbant position
- Auscultation
  - Flow murmur common
- Thyroid (exclude goitre)
- Breasts (exclude lumps)
- Varicose veins, excess lordosis common

Fetal Head

Anatomy

Bones forming cranium

- 2 frontal
- 2 parietal
- Occipital

Sutures

- Coronal separates frontal from parietal bones
- Sagittal separates two parietal bones
- Labmdoid separates occipital from parietal bones
- Frontal separates two frontal bones

Fontanelles

- Anterior fontanelle/bregma
  - Junction of coronal and sagittal sutures
  - ~3cm in AP and transverse diameters
  - Ossifies by ~18 months
- Posterior fontanelle/lambda
  - Smaller
  - Junction of saggital and lambdoid sutures

Regions

- Occiput
  - Bony prominence behind posterior fontanelle
- Vertex
  - Diamond shaped area between anterior and posterior fontanelles and parietal eminences
- Bregma
  - Area around anterior fontanelle
- Sinciput
  - Brow (bregma to bridge of nose)
  - Face (below root of nose and supraorbital ridges)

Engagement

- Estimated with the number of fingers needed to cover the head above the pelvic brim
  - 5/5: Needs full hand, not engaged
  - 2/5: Palpable with only two fingers, engaged
  - 0/5: Not palpable
- Head normally engages in flexion in transverse diameter of pelvic inlet
- Engagement usually occurs by 37wks in nullips, may not occur until labour in multips

Presenting Parts & Diameters

- Suboccipitobregmatic diameter
  - 9.5cm, well-flexed vertex presentation
- Suboccipitofrontal diameter
  - 10.5cm, partially flexed vertex presentation
- Occipitofrontal diameter
  - 11.5cm, deflexed head presentation
- Mentovertical diameter
  - 13cm (largest), brow presentation
- Submentobregmatic diameter
  - 9.5cm, face presentation

Placenta

Growth

- Thickness & circumference until 16wks
- Circumference only after 16wks

Placenta at Term

- Circular, 15-20cm diameter, ~2.5cm thick at centre
- ~500g (6:1 fetal:placental weight)
- ~30% of uterine wall

Fetal surface

- Covered by amnion with cord attached at/near centre
- Amnion can be peeled off of underlying chorion, except at insertion of cord

Maternal Surface

- Rough and spongy, divided into 15-20 bumps (cotyledons) by septae from maternal tissues
- Numerous greyish spots: calcium deposition in degenerated areas

Umbilical Cord

- 30-90cm long, covered by amniotic epithelium
- Two umbilical arteries and one umbilical vein embedded in Wharton's jelly
- Blood flow in the cord at term in ~350ml/min

Functions

- Anchor fetus and establish fetoplacental unit
- Gaseous exchange
- Endocrine organ
  - Oestrogen
  - Progesterone
  - hCG
    - Detected 6 days after fertilisation
    - Peak at 10-12wks and plateau
- Transfer of substances
- Barrier against infection
  - Syphilis, parvovirus, hep B & C, rubella, HIV & CMV can cross the placenta

Physiological Changes in Pregnancy

Cardiovascular System

- Increase in SV up to 30%, HR up to 15%, cardiac output up to 40%
- Systolic BP does not change (physiologically)
- Diastolic BP decreases in 1st and 2nd trimesters
  - Normal by term
- IVC compression
  - Ankle oedema, supine hypotension and varicose veins

Respiratory System

- Pulmonary ventilation increases by 40% and tidal volume increases from 500ml to 700ml
  - Effect of progesterone on respiratory centre
- Oxygen requirements only increase by 20%
  - Relative hyperventilation leads to fall in pCO2 and sense of dyspnoea
  - May be accentuated by elevation of diaphragm

Endocrine System

Progesterone

- Increased throughout pregnancy
- Promotes SM relaxation and raises body temperature
- Prevents preterm labour

Oestrogens

- Breast and nipple growth, pigmentation of areola
- Promotes uterine blood flow, myometrial growth and cervical softening
- Increases sensitivity and expression of myometrial oxytocin receptors

Human Placental Lactogen

- Structure and function similar to GH
- Modifies metabolism to increase energy supply to fetus
- Increased insulin secretion but decreased peripheral effect

Thyroid

- T3 and T4 levels rise early in pregnancy before returning to normal
- Gland itself enlarges
- BMR increases by 15%
  - Increased temperature and heat intolerance

Urinary System

- Blood flow increased by 30%
- GFR increased by 30-60%
- Salt and water retention increased.by elevated sex steroid levels
- Urinary protein losses increase

Blood

- Volume increases by 30%, mostly in second half
- Plasma increased more than Hb – relative anaemia
- Low grade increase in coagulant activity
  - Fibrinogen, factors VII, VIII, X
  - Fibrinolytic activity decreased
  - Prepares mother for placental delivery but increases VTE risk
- Platelets decreased, WCC and ESR increased

Biochemical Changes

Calcium requirements increase

- Especially during 3rd trimester & continued into lactation
- Calcium transported actively across placenta
- Serum calcium and phosphate levels fall (with fall in protein), ionised levels remain stable
- Gut absorption increases due to increased 1,25 dihydroxyvitamin D

Liver

- Hepatic blood flow doesn't change
- ALP increases by 50%
- Albumin levels fall

Uterus

- 100g → 1100g
- Hyperplasia initially, hypertrophy later
- Increase in cervical ectropion & discharge
- **Braxton-Hicks:** "practice contractions" from 30wks
- Retroversion may lead to retention (12-16wks)
  - Usually corrects

Preparing For Pregnancy

Stopping Contraception

- No delay in stopping the pill or removing the coil
- Several months delay for contraception injection
- Often recommended that women wait three months after stopping the pill to try to conceive

Risk for Older Mothers

- Women >35 have reduced chance of conceiving
  - This decline advances rapidly after 40
- Age carries risk of chromosomal abnormalities, most commonly Down's syndrome
- Older mother are more likely to experience complications of pregnancy
  - Pre-eclampsia
  - GDM

Exercise & Stress

- Moderate exercise should be encouraged
  - Improves CV and muscular fitness
  - Not associated with adverse outcomes
  - Best are low impact aerobics, swimming, walking, jogging
- Contact/high impact sports with risk of abdominal trauma should be avoided
- Relaxation and stress avoidance should be encouraged before & during pregnancy

Diet & Supplementation

Folic Acid

- Recommended before conception and up to 12wks
  - 400µg/day reduces risk of NTD
  - 5mg/day if at higher risk (previous affected child, epilepsy, diabetes, obesity)

Iron

- Not routinely needed, considered in areas where iron-deficiency anaemia levels are high

Calcium

- Supplementation only if intake is low

Iodine

- Supplementation considered if in deficiency endemic parts of the world

Zinc

- Low levels associated with risk of preterm labour and growth restriction
- Increases via milk and dairy products appropriate

Vitamin A

- Potentially teratogenic, supplementation and foods high in vitamin A (liver, pate) should be avoided

Smoking and Alcohol

- Alcohol is associated with malformations
- Smoking increases risk of complications, women should be supported to quit

Diagnosis of Pregnancy

- Cessation of periods most common & obvious

Nausea and Vomiting (Morning Sickness)

- Common in 1st trimester
- Any time of day
- May persist through pregnancy

Frequency of Micturition

- Increased plasma volume and urine production
- Pressure effect
- Make sure frequency is not associated with dysuria (UTI)

Excessive Fatigue

- Common up to 12wks

Breast Tenderness/Heaviness

- Often seen early, particularly in month after first period is missed

Fetal Movements/"Quickening"

- ~20wks in nullipara
- 18wks in multipara

Pica

- Abnormal desire to eat something non-edible
- Occasionally seen

Pregnancy Test

hCG

- Secreted by trophoblastic tissue
- Doubles every second day from ~8 days after ovulation
- Peaks at 8-12wks

Home Tests

- Measure urinary βhCG
- Positive result >50IU/L
- "Early" tests positive at >25IU/L
- Can show pregnancy within 1 week of a missed period

Dating of Pregnancy

LMP & Naegle's Rule

- Not reliable
- Not every woman certain of their LMP
- About 40% of women will deliver within 5 days of this EDD, about 2/3 within 10 days

Dating Ultrasound Scan

- Crown-rump length - most accurate measure if taken between 8 and 13 weeks
- Unreliable before 8 weeks due to small size of gestational sac and fetal pole
- Unreliable after 13 weeks as other factors begin to influence fetal growth

Routine Antenatal Care

Booking Visit

- Performed by community midwife after confirmation of pregnancy, ideally before 12wks
- Full history and exam
  - Identify risk factors, history of obstetric issues, family history, etc
- Calculate BMI
- Measure BP
- Dip urine
- US for GA and gross abnormalities

Routine Bloods

- FBC
  - Lower normal limit of 10.5 in pregnancy
  - Investigate anaemia (IDA commonest)
- Blood grouping & antibody screen
  - Rhesus -ve women are at risk of Rhesus isoimmunisation
- Rubella screen
  - Non-immune women should be immunised post-partum
- Hepatitis B screen
  - In adults, virus is cleared in 6 months in 90%
  - In neonates, 90% become chronic carriers
    - Risk of post-infective cirrhosis and HCC
  - Immunisation for neonates with +ve mother
    - Active for s antigen, active & passive for e antigen
- Hepatitis C screen
  - Baby can be tested & treated after birth
- Syphilis screen
- HIV screen
  - Vertical transmission can be significantly reduced by antiretrovirals in pregnancy, labour, and 6wks post-partum for the infant
  - Transmission risk reduced by Caesarean and avoiding breast-feeding

Specific Blood Tests

- Haemoglobin Electrophoresis
  - Persistent anaemia
  - Ethnic origin (Cyprus, Eastern Mediterranean, Middle Eastern, Indian subcontinent, SE Asia)
- GDM screening based on risk factors:
  - Previous GDM
  - First degree relative with DM
  - Previous macrosomic baby
  - Previous unexplained stillbirth
  - BMI >30
  - Glycosuria on more than one occasion
  - Polyhydramnios
  - Large for GA
- Miscellaneous
  - TFTs in thyroid disease
  - HbA1c in long term diabetes
  - Baseline U+E in renal disease

Ultrasound Assessment of Fetal Growth

- Should be formally performed if any clinical suspicion of small or large for gestational age
- 4 measurements
  - Biparietal diameter
  - Head circumference
  - Abdominal circumference
  - Femur length
- Liquor volume is also assessed

Causes of Uterus Size Abnormalities

- Small for dates:
  - Wrong dates
  - Oligohydramnios
  - IUGR
  - Presenting part deep in pelvis
  - Abnormal lie
- Large for dates:
  - Wrong dates
  - Macrosomia
  - Polyhydramnios
  - Multiple pregnancy
  - Fibroids

Antenatal Appointment Schedule

Second Trimester

- 16wks
  - Discuss screening results
  - Investigate Hb <11
  - Offer info & arrange anomaly scan
- 25wks – nullipara only
  - BP, urine dip, plot SFH
- 28wks
  - Screen for anaemia and atypical red cell allo-antibodies
  - Anti-D prophylaxis to RhD -ve women
  - BP, urine dip, plot SFH

Third Trimester

- 31wks– nullipara only
  - BP, urine dip, plot SFH
- 34wks
  - Discuss labour, pain relief, birth plan
  - Anti-D prophylaxis to RhD -ve women
  - BP, urine dip, plot SFH
- 36wks
  - Discuss breastfeeding, vitamin K prophylaxis, postnatal self-care, baby-blues and post-natal depression
  - BP, urine dip, plot SFH
- 38wks
  - BP, urine dip, plot SFH
- 40wks
  - BP, urine dip, plot SFH
- 41ks – membrane sweep
- 42wks - IOL

Minor Symptoms of Pregnancy

Gastrointestinal

Nausea & Vomiting (Morning Sickness)

- Most common complaint, especially in first trimester
- 80-85% nausea, 52% vomiting
- Related to hormones, especially hCG
  - Increased in multiple/molar pregnancies
- May be severe enough to warrant admission
  - Hyperemesis gravidarum
- Not associated with poor pregnancy outcome
- Resolves by 16-20wks
- **Management**
  - Small meals, increase fluid intake
  - Ginger
  - Acupressure (P6)
  - Antiemetics

Reflux

- Common in all stages
- Progesterone relaxes LOS, worsens with increasing intraabdominal pressure from growing uterus
- **Management**
  - Less spicy foods, sleep propped up
  - Alginate & antacids
  - H2 antagonists if severe

Constipations

- Common, decreases slightly with gestation
- Progesterone decreases bowel smooth muscle tone
- Made worse by iron supplementation
- **Management**
  - Fruit, fibre and water intake
  - Fibre supplements
  - Osmotic laxatives

Haemorrhoids

- Common in third trimester
- **Management**
  - Avoid constipation early in pregnancy
  - Ice packs and digital reduction
  - Suppositories and topical symptomatic relief
  - Surgical referral if thrombosed

Vascular

Varicose Veins

- Common, increases with gestation
- Progesterone relaxation effect plus mass effect of uterus on venous return
- **Management**
  - Regular exercise
  - Compression hosiery
  - Thromboprophylaxis if other risk factors present

Musculoskeletal

Symphysis Pubis Dysfunction (SPD) & Pelvic Girdle Pain (PGP)

- Usually mild but can be severe and debilitating
- **Management**
  - Physiotherapy
  - Simple analgaesia
  - Limit leg abduction at delivery, CS not indicated

Backache & Sciatica

- Common, due to hormonal softening of ligaments and posture altered by weight of uterus
- May produce neurological symptoms (sciatica)
- **Management**
  - Lifestyle (sleeping position)
  - Alternative therapies (relaxation, massage)
  - Physiotherapy
  - Simple analgaesia

Carpal Tunnel Syndrome

- Oedema compresses median nerve in the wrist
- Usually resolves after delivery
- **Management**
  - Sleep with hands over side of bed
  - Wrist splints
  - Surgical referral if evidence of neurological deficit

Genitourinary

Urinary Symptoms

- Frequency increase in 1st trimester (↑GFR & pressure effect)
- Stress incontinence in 3rd trimester (pressure effect)
- UTI common (and serious)
- **Management**
  - Screen for UTI (dip)
  - Avoid caffeine and late night fluid

Vaginal Discharge

- Increased blood flow to vagina and cervix
- Should be white, clear and mucoid
  - Offensive/coloured/itchy may mean infection
  - Profuse and watery may mean ruptured membrane
- **Management**
  - Exclude ruptured membranes
  - Exclude STI and candidiasis

Skin Rashes

- Skin changes & itching common
- Usually not serious
- **Management**
  - Full history & exam to exclude infection, obstetric cholestasis
  - Emollients and OTC anti-itch creams

Early Pregnancy Complications

Termination of Pregnancy

Irish Law: Health (Regulation of Termination of Pregnancy) Act 2018

- (Simpler English wtf is law)
- Termination may be carried out in the following circumstances

Risk to life or health

- Two medical practitioners (one obstetrician + one other appropriate medical practitioner) have examined the pregnant women and agree that:
  - There is a risk to the life/serious risk to the health of the pregnant woman
  - The foetus has not reached viability*
  - It is appropriate to carry out the termination to avert that risk
- The termination will be carried out by the obstetrician in question
- Not before both practitioners have certified their opinions as per these matters

Risk to life or health in an emergency

- A medical practitioner, having examined the pregnant woman, is of the opinion that:
  - There is an immediate risk to the life/serious risk to the health of the pregnant woman
  - It is immediately necessary to carry out the termination to avert that risk
- The practitioner will certify their opinion as per these matters:
  - Before carrying out the termination
  - No more than 3 days after the termination if not practicable before

Condition likely to lead to the death of the fetus

- Two medical practitioners (one obstetrician + one other appropriate medical practitioner) have examined the pregnant women and agree that there is a condition affecting the fetus that will likely lead to the death of the fetus before or within 28 days of birth
- The termination will be carried out by the obstetrician in question
- Not before both practitioners have certified their opinions as per these matters

Early pregnancy

- A medical practitioner, having examined the pregnant woman, is of the opinion that the pregnancy has not exceeded 12 weeks' gestation (as per LMP)
- Not before the practitioner has certified their opinions as per these matters
- Not before 3 days has elapsed since:
  - The certified opinion of the practitioner carrying out the termination
  - The certified opinion of another practitioner

**Viability refers to the stage at which it is agreed the fetus could reasonably survive after birth without extraordinary life support measures*

Methods

Medical

- Preferred method **<9wks**
- Safe alternative to surgery **>9wks**
- Regime of:
  - Mifepristone
    - Antiprogesterone
    - Uterine contractions, placental bleeding, sensitisation to prostaglandins
  - Misoprostol
    - Prostaglandin E2 analogue
    - Stimulates uterine contraindications
  - Dosing, timing and routes depend on gestation
  - Expulsion at home an option after taking misoprostol

Surgical

- **7-13wks**
  - Conventional suction termination is appropriate
  - Medical may be preferred
- **13+wks**
  - Dilatation and evacuation following cervical preparation
  - Risk of bleeding, perforation and incomplete evacuation increase with gestation
  - Cervical preparation
    - Reduces difficulties with cervical dilatation, particularly if <18yrs old/>10wks gestation
    - Mifepristone/misoprostol/gemeprost

Complications

- Failure/retained POC
- Significant bleeding
- Uterine perforation/rupture
- Genital tract infection
- Psychological/long term regret

Other Management

Before TOP

- Counselling/psychiatric support if needed
- Bloods
  - Hb, group & antibodies, more if indicated
- USS for accurate gestation and identification of already non-viable pregnancies

Prophylactic Abx

- Metronidazole PR at time of TOP
- +doxycycline PO 7/7 OR azithromycin PO once

Following TOP

- Anti-D to RhD -ve women
- Written patient information including:
  - Possible symptoms
  - Symptoms requiring further attention
  - Contact numbers
- Follow-up within 2 weeks
- Further counselling
- Ongoing contraception

Miscarriage

- 15-20% of pregnancies
- Up to 40% of all conceptions
- Expulsion of pregnancy, embryo or fetus at a stage when it is incapable of independent survival (before 24wks)
- Presents with bleeding and abdominal pain

Classification

Threatened Miscarriage

- Bleeding ± pain
- Closed cervix
- Intrauterine gestation sac, fetal pole and heart activity seen on USS
- No management required, admission & monitoring if pain/bleeding are severe

Missed/Delayed Miscarriage

- Light bleeding may occur, pain rare
- Closed cervix
- Fetal pole >7mm with no heart activity or gestation sac diameter >25mm with no fetal pole/yolk sac

Inevitable Miscarriage

- Heavy bleeding with clots and pain
- Open cervix
- IU gestation sac, fetal pole and heart activity may be present

Incomplete Miscarriage

- Pain and bleeding
- Open cervix
- Not all products expelled
- Heterogenous tissues on USS

Complete Miscarriage

- Bleeding and pain ceased
- Closed cervix
- Empty uterus with endometrial thickness >15mm
- No management required

Pregnancy of Uncertain Viability

- May be pain, bleeding
- Closed cervix
- Fetal pole <7mm with no heart activity or gestation sac diameter <25mm with no fetal pole/yolk sac
- Rescan after 1 week

Pregnancy of Unknown Location

- May be pain, bleeding
- Closed cervix
- Positive pregnancy test
- Empty uterus, no sign of extrauterine pregnancy
- Serial serum hCG and intial serum progesterone level to exclude ectopic pregnancy/failing PUL

Management

Expectant

- First line, waiting 10-14 days for a spontaneous miscarriage
- Repeat TVUS after 2 weeks, and a further 2 weeks if woman still wishes to manage conservatively
- Surgical evacuation offered if unsuccessful
- **Indications for medical/surgical management:**
  - Increased haemorrhage risk
    - Late in first trimester
    - Coagulopathies
  - Previous adverse/traumatic pregnancy experience
  - Evidence of infection
  - Heavy bleeding
  - Failed expectant management

Medical

- Vaginal misoprostol
  - Mifepristone priming possible but not currently recommended by NICE
- Bleeding may continue for up to 3 weeks
- Success in 80-90% under 9wks gestations
- Passage of POC can be associated with pain and bleeding, telephone advice and emergency admission should be available

Surgical Management of Miscarriage (SMM)

- Suction curettage under LA or ERPC under GA
- ERPC recommended in excessive or persistent bleeding
- Complications
  - Infection
  - Haemorrhage
  - Perforation
  - Retained products of conception
  - Intrauterine adhesions
  - Cervical tears
  - Intra-abdominal trauma

Anti-D Prophylaxis

- All non-sensitised RhD -ve patients in the following circumstances:
  - <12wks
    - Medical/surgical management
    - Ectopic pregnancies
  - >12wks
    - All women with bleeding

Other

- Support, counselling, written information

Ectopic Pregnancy

- Implantation of a conceptus outside of the uterine cavity

Epidemiology

- 1-2:100 pregnancies
- 98% tubal
  - Rest abdominal, ovarian, cervical, in CS scars

Risk Factors

- History of infertility/assisted conception
- History of PID
- Endometriosis
- Pelvic/tubal surgery
- Previous ectopic
- IUD in situ
- Smoking

Presentation

Symptoms

- Often asymptomatic
- Recent amenorrhoea
- Pain
  - Due to tubal spasm
  - Lower abdominal, usually mild, classically unilateral
- PV bleeding
  - Small amount, brown
- Dizziness and light-headed
- Shoulder tip pain
- Nausea & vomiting
- Collapse (if ruptutred)

Signs

- Often none specific
- Uterus usually normal size
- Cervical excitation, adnexal tenderness
- Adnexal mass rare and should not be checked for due to risk of rupture
- Peritonism if ruptured

Investigations

Transvaginal Ultrasound

- Investigation of choice
- Positive identification of EP rather than just lack of IUP in 90%
- Adnexal masses or free fluid

βhCG

- Positive for pregnancy
- Serial (repeat after 48 hours)
  - Rise of >66% suggest an IUP
  - Slower rise is suspicious but not diagnostic

Serum Progesterone

- <20nmol/L suggest failing pregnancy (EP or IUP)

Laparoscopy

- Gold standard for diagnosis but rarely needed since TVS is diagnostic in 90%

Management

- Anti-D prophylaxis if RhD -ve

Expectant

- Indications:
  - <35mm, βhCG <1,000IU (and ideally falling)
  - Unruptured
  - Asymptomatic
  - No fetal heartbeat
  - Compatible with another IUP
- Serum βhCG every 48hrs until repeated fall in level, then weekly until <15IU
- Possible if βhCG is initially plateauing
- Senior decision if βhCG is rising in an asymptomatic patient

Medical

- Indications:
  - <35mm, βhCG <1,500IU
  - Unruptured
  - Minimal pain
  - No fetal heartbeat
  - Not compatible with another IUP
- Methotrexate IM 50mg/m^2 once-off
- Side effects:
  - Conjunctivitis
  - Stomatitis
  - GI upset
- βhCG levels measured at 4 & 7 days
  - Another dose if decrease is <15%
- Contraception for 3 months after methotrexate

Surgical

- Indications
  - >35mm, βhCG >1,500IU
  - May have ruptured
  - Pain
  - Visible fetal heartbeat
  - Compatible with another IUP
- Laparoscopy over laparotomy unless haemodynamically unstable
- Salpingectomy if contralateral tube and ovary appear normal
  - No difference in future IUP rates, lower future EP rates
- Salpingotomy if visible contralateral tube disease

Rupture/Haemodynamic Instability

Resuscitation

- Two wide bore IV and fluids
- Cross match 6 units
- Senior help and anaesthetics

Surgery

- Laparotomy with salpingectomy

Recurrent Miscarriage

- 3+ consecutive spontaneous miscarriages occurring in the first trimester with the same biological father which may or may not follow a successful birth
- ~1% of women

Causes

Antiphospholipid Syndrome

- 15% of women with recurrent miscarriages
- Presence of anti-cardiolipin/lupus anticoagulant antibodies on two separate occasions with any of:
  - 3+ consecutive fetal losses before the 10th week
  - 1 fetal loss 10wks or older
  - 1+ morphologically normal births at <34wks associated with severe pre-eclampsia or placental insufficiency

Genetic

- 3-5% of couples have a partner with balanced reciprocal or Robertsonian translocation
- Phenotypically normal with 50-75% affected gametes

Fetal Chromosomal Abnormalities

- Likelihood decreases with increased number of pregnancy losses

Anatomical Abnormalities

- Congenital uterine abnormalities
  - Bicornate/septate

Fibroids

- Submucosal/intramural may be more causative

Thrombophilic Disorders

- Factor V Leiden/Factor II Prothrombin G20210A

Infection

- Bacterial vaginosis
- Stronger link with 2nd than 1st trimester losses

Cervical Weakness

- Recurrent 2nd trimester loss

Investigations

- Parental karyotyping
- Cytogenetic analysis of products of conception
- Pelvic
- USS
- Thrombophilia screen
- Lupus anticoagulant & anticardiolipin abs
- Further tests for rare/2nd trimester causes inappropriate

Management

- Dedicated clinic care
- Surgical Rx of fibroids/uterine abnormalities/cerclage
  - Very selective
- Aspirin ± heparin for APS

Pregnancy of Unknown Location

- No sign of IUP/EP/retained products of conception with positive pregnancy test/serum hCG >50IU

Causes/Outcomes

- Early IUP
- Failing PUL
- Ectopic (10%)
- Persisting PUL
- Complete miscarriage
- hCG-secreting tumours (very rare)

Presentation

- Asymptomatic
- PV bleeding
- Abdominal pain

Management

- Even if history suggests complete miscarriage, diagnose PUL until evidence of IUP
- Significant pain, tenderness or haemoperitoneum need laparoscopy
- If well and stable, serum progesterone and serial hCG

Interpreting progesterone and hCG in PUL

Progesterone >20nmol/L

- Likely failing pregnancy
- Repeat hCG in 7 days

hCG >66% rise in 48hrs

- Likely IUP
- Rescan in 10-14 days

hCG <66% rise/plateauing

- Possible ectopic
- Close monitoring with serial hCG and TVUS until diagnosis/hCG<15

hCG plateauing/fluctuating

- Persistent PUL after 3 samples with no diagnosis
- Conservative management/methotrexate

Initial hCG >1500

- Probable ectopic
- Manage depending on clinical features

Hyperemesis Gravidarum

- Excessive vomiting, rare (1/1,000)
- Multiple/molar pregnancies at increased risk (↑hCG), but majority are normal singleton pregnancies
- Most common from 8-12wks, may persist up to 20

Diagnosis

- 5% pre-pregnancy weight loss
- Clinical dehydration
- Electrolyte imbalance

Other Features:

- Ptyalism (inability to swallow saliva)
- Haematemesis (Mallory-Weiss)
- Behaviour disorder

Admission Criteria

- Continued N&V and inability to take in food/fluids
- Continued N&V with ketonuria/weight loss (5%), despite oral antiemetic treatment
- Confirmed or suspected comorbidity

Investigations

- Urinalysis for ketones
- MSU to exclude UTI
- FBC (hct), U+E, LFT
- USS for reassurance and exclusion of multiple/molar pregnancy

Management

Supportive

- Fluids (NaCl/Hartmann's, avoid glucose)
- Daily U+E, replace potassium if necessary
- Thiamine

Antiemetic

- Antihistamines 1st line
  - Promethazine, cyclizine
- Prochlorperazine, metoclopramide 2nd line
  - EPS
- Ondansetron/granisetron 3rd line
  - Not licensed for pregnancy but data reassuring

Intractable hyperemesis gravidarum

- TOP may be suitable or even requested

Complications

Maternal

- Wernicke's encephalopathy
- Mallory-Weiss tears
- Central pontine myelinolysis (rapid reversal of hyponatraemia)
- AKI, liver failure

Fetal

- IUGR
- Pre-term birth

Abdominal Pain in Early Pregnancy

Pregnancy Related

- Miscarriage
- Ectopic Pregnancy
- Constipation
  - Common, treated with high fibre diet and osmotic laxatives
- Round ligament pain
  - 20-30% of pregnancies, 1st and 2nd trimesters
  - Bilateral pain radiating to groin and exacerbated by movement
  - Treated with simple analgaesia
- UTI
- Adnexal torsion
- Red degeneration of fibroids
  - Compromised blood supply to fibroids increased in size due to pregnancy
  - Constant pain localising to site of fibroid
  - Possibly associated pyrexia
  - Treated with simple analgaesia

Other Causes

- Intestinal obstruction
- Cholecystitis
- Pancreatitis
- Appendicitis

Gestational Trophoblastic Disease

- Conditions defined by abnormal & aggressive proliferation of the trophoblast (the part of the blastocyst that invades the endometrium)

Risk Factors

- Extremes of reproductive age
- Asian ethnicity

Types

Partial Hydatiform Mole

- Two sperm cells fertilise a normal ovum, leading to a triploid cell
- Divides and multiples to form a tumour which may contain some fetal material

Complete Hydatiform Mole

- Two sperm cells invade an empty ovum/single sperm cell invades an empty ovum and divides, creating a 46YY cell
- Tumour grows with no fetal parts

Choriocarcinoma

- Malignant transformation of a molar pregnancy (occurs in 2-3% of complete moles)

Presentation

- Initially a normal pregnancy
- Exaggerated symptoms of pregnancy (such as hyperemesis)
- PV bleeding in first & second trimester
- Uterus large for dates
- Hypertension & hyperthyroidism may be seen (hCG can mimic TSH)

Investigations

hCG

- Abnormally high

USS

- Snowstorm appearance

Management

- Referral to specialist centre
- ERPC & histology
- hCG monitoring until normalisation
- Contraception for at least 12 months
- Systemic chemotherapy for choriocarcinoma

Late Pregnancy Complications

Antepartum Haemorrhage

- Bleeding from the genital tract after 24wks before the onset of labour
- Majority caused by placenta praevia or placental abruption

Causes

- Placenta praevia
- Placental abruption
- Vasa praevia
- Unexplained
- Others
  - Incidental (cervical erosion/ectropion)
  - Local infection
  - "Show"
  - Genital tract tumours
  - Varicosities
  - Trauma

Assessment

History

- Gestational age & obstetric history
- Amount of bleeding
- Associated/initiating factors
- Abdominal pain
- Fetal movement
- Last smear
- Previous episodes in this pregnancy
- Loss of fluid PV
- Previous intrauterine surgery (including CS)
- Blood group and RhD status
- Placental position if known

Maternal Assessment

- No PV exam until placenta praevia excluded
- BP, pulse, other signs of haemodynamic compromise
- Uterine palpation for size, tenderness, lie, presenting part
  - If engaged, not PP
- Speculum exam if PP excluded

Fetal Assessment

- Fetal heartbeat
- FHR monitoring if fetal heartbeat heard and gestation >26wks

Management of Limited Antepartum Haemorrhage

- Bleeding is minor, settling, and neither mother nor fetus are compromised
- If bleeding is heavy, continuous and mother/fetus is/soon will be compromised → massive obstetric haemorrhage (emergencies)

Maternal Management

- FBC
- Kleihauer testing if known to be RhD -ve
  - All RhD -ve women with PPH require 500IU of anti-D
  - Kleihauer determines if more is needed
- Group and save
- Coagulation screen in cases of suspected abruption

Fetal Management

- Ultrasound to confirm fetal wellbeing (growth/amniotic fluid volume) & to confirm placental location
- Umbilical artery Doppler

Ongoing Antenatal Management

- Admit for 24hrs (highest risk of rebleed)
- Clear plan following discharge including extra fetal surveillance
- Management individualised based on suspected cause, fetal assessment, gestation and maternal risk factors

Placenta Praevia

- When the placenta is inserted, wholly or partially, into the lower segment of the uterus
- Diagnosed on routine scans or cause of APH
- 5% at 16-20wks, 0.5% at term

Risk Factors

- Multiparity
- Multiple pregnancy
- Previous intrauterine surgery (CS)

Features

- Shock in proportion to visible loss
- No pain/tenderness
- Lie and presentation may be abnormal
- Small bleeds before larger bleeds
- If major, cervical effacement/dilatation causes massive haemorrhage

Grading

Grade I (Minor)

- Placenta reaches lower segment but not internal os

Grade II (Minor)

- Placenta reaches internal os but doesn't cover it

Grade III (Major)

- Placenta partially covers internal os

Grade IV (Major)

- Placenta completely covers internal os

Diagnosis

- TVUS safe and most accurate

Management

PP on 16-20wk scan

- Re-scan at 34
- No need to limit intercourse/activity unless bleed
- Still present at 34wks (minor) → rescan every 2 weeks
  - High presenting part/abnormal lie at 37wks → CS
- Major PP at 34wks → admit
  - CS for major at 38wks

PP with bleeding

- Admit, treat shock, cross-match blood
- Keep admitted if > 32 weeks
- CS for major at 38wks

Remaining at home

- Asymptomatic PP
- Close to hospital
- Aware of risk
- Constant companion, telecommunication and transport

Placental Abruption

- Placenta separates partly or completely from uterus, with maternal haemorrhage in intervening space/through cervix
- 0.5% of pregnancies
- Concealed (<20%, no PV bleeding) or revealed

Risk Factors

- Pre-eclampsia
- Cocaine use
- Multiparity
- Maternal trauma
- Increasing maternal age

Features

- Shock out of proportion to visible loss
- Sudden onset, constant, severe abdominal pain
  - Backache from posterior placentas
- Tender, tense, "woody" uterus
- Normal lie & presentation
- Fetal heart absent/distressed
- Coagulation problems (DIC)
- Up to 50% will be in labour on presentation

Diagnosis

- Clinical
- USS confirms fetal wellbeing and excludes PP

Management

- Admit all pregnant women with PV bleeding/abdominal pain
- Assess fetal wellbeing immediately with CTG & USS

Fetus alive & <36wks

- Distress: immediate CS
- No distress:
  - Observe, steroids, no tocolysis
  - Threshold to deliver depends on gestation

Fetus alive & >36wks

- Distress: immediate CS
- No distress: deliver vaginally

Fetus dead

- Induce vaginal delivery

Complications

Maternal

- DIC
- Shock & AKI
- PPH

Fetal

- IUGR
- Hypoxia
- Death

Vasa Praevia

- Fetal vessels run in membranes below presenting part unsupported by placental tissue or umbilical cord
- <1:2,500

Risk Factors

- Low-lying placenta
- Multiple pregnancy
- IVF pregnancy
- Bilobed & succenturiate lobed placentas

Presentation

- PV bleeding after rupture of membranes
- Followed by fetal distress (exsanguination)
- Reported fetal mortality ranges from 33-100%

Hypertension in Pregnancy

Pre-eclampsia

- Next page bby

Pregnancy-Induced Hypertension (PIH)

- BP> 140/90 in second half of pregnancy in absence of proteinuria/other markers of pre-eclampsia
- 6-7% of pregnancies, 15-26% risk of progressing to pre-eclampsia
  - Risk increases with earlier onset of HTN
- Delivery should be aimed for time of EDD
- Usually returns to pre-pregnancy values 6wks post-partum

Pre-existing/Chronic Hypertension

- Complicates 3-5% of pregnancies
  - Getting more common because of older pregnant population
- Borderline high BP at booking are more likely to have chronic hypertension
- Increased risk of pre-eclampsia
- Deliver should be aimed for time of EDD
- Important to exclude 2° cause if very high

Post-partum Hypertension

- New HTN can arise post-partum
- BP peaks from 3rd to 5th day post-partum
- Physiological/pre-existing/post-partum pre-eclampsia

Management of HTN in pregnancy

Principles

- Treatment urgently required for maternal safety if >160/110
  - Escalation until below this
- Treatment should not aim for levels <120/80
- Treatment of BP protects from effects of HTN but does not alter the course of pre-eclampsia
- All listed agents are safe in breastfeeding (ACEi – captopril only)

Medications

1. Labetalol
   - Avoid in asthma
   - IV infusion in refractory HTN
2. Nifedipine
3. Methyldopa
   - Risk of PN depression, change post-partum
4. Hyralazine
5. Atenolol
6. ACEi
   - **Postpartum only**, fetotoxic

Postnatal Management

- GP follow-up in 6 weeks, should be resolved
- Look for 2° causes if still raised

Pre-eclampsia/PET

- Multisystem disorder characterised by hypertension and proteinuria after 20wks gestation thought to arise from the placenta
  - >140/90mmHg or rise by 30/15 if already hypertensive
  - >300mg/24hr proteinuria
- Newer definition says pregnancy induced hypertension + any evidence of organ dysfunction (including placental)

Risks

- Prematurity, IUGR
- Eclampsia
- Haemorrhage
  - Placental abruption
  - Intra-abdominal
  - Intra-cerebral
- Cardiac failure
- Multi-organ failure

Prediction

Major Risk Factors

- Hypertensive disease in previous pregnancy
  - Pre-eclampsia 7x
- CKD
- AI diseases (antiphospholipid)
- DM (T1/T2)
- Chronic hypertension

Minor Risk Factors

- First pregnancy
- Age >40/teenager
- Pregnancy interval >10 years
- BMI >35
- Family history of pre-eclampsia
- Multiple pregnancy

Blood Tests

- Low pregnancy-associated plasma protein-A (PAPP-A)
- Raised uric acid, low platelets, high Hb help differentiate pre-eclampsia from PIH before proteinuria occurs

Ultrasound

- Uterine artery dopplers at 11-13 or 22-24wks are predictive of early-onset or severe pre-eclampsia

Integrated Testing

- Combination of independent risk factors, PAPP-A and uterine artery dopplers at 12wks is the most effective early predictive test

Features

- Symptoms usually only occur with severe disease

Symptoms

- Headache
  - Especially frontal
  - Very common without PET
- Visual disturbance
  - Especially flashing lights
  - Very common without PET
- Epigastric/RUQ pain
- Nausea & vomiting
- Rapid oedema
  - Especially of the face

Signs

- Hypertension
- Proteinuria
- Facial oedema
- Epigastric/RUQ tenderness
- Confusion
- Hyperreflexia/**clonus** (cerebral irritability)
- Uterine tenderness/PV bleeding from a placental abruption
- IUGR on ultrasound

Investigations

FBC

- High Hb (haemoconcentration)
- Thrombocytopenia/anaemia (HELLP)

Coagulation

- Mildly prolonged PT & APTT

Biochemistry

- ↑ Urate, urea, creatinine
- ↑ Transaminases, LDH (HELLP)
- ↑ Proteinuria

Fetal Assessment

- EFW, biophysical profile, AFI, umbilical artery dopplers
- CTG

Prevention

- Low-dose aspirin reduces risk of severe pre-eclampsia
- Indicated by either:
  - 1 major risk factor
  - 2 minor risk factors

Management of Mild-Moderate Pre-eclampsia

- Only cure is delivery of placenta
- Treat BP as per PIH
- Admit every diagnosis for 24hrs minimum
  - Most stay until delivery

Inpatient Management

- 4-hourly BP
- 24hr urine collection
- Daily urinalysis
- Daily CTG
- Bloods every 2-3 days
- Regular USS (growth & doppler)

Outpatient Management

- Only allowed if very mild, stable, & near hospital with transport & safety netting

Labour/Delivery

- Aim for induction at 37 weeks
- Platelets < 70/80 rule out epidural (risk of paraspinal haematoma)

Indications for Caesarean (relative)

- Primiparous
- Low Bishop score
- Growth restriction

Indications for Urgent Delivery

- Any severely poor or deteriorating maternal or fetal investigation
- Clonus

Management of Severe Pre-eclampsia

- BP >160/110 & proteinuria >1g/24hrs (or 2+) or maternal complications
- Senior obstetric, anaesthetic and midwife input

Delivery

- Only definitive management
- Can sometimes be delayed with intensive monitoring if <34wks
- PET often worsens for 24 hours after delivery

Indications for Immediate Delivery

- Worsening thrombocytopenia/coagulopathy
- Worsening liver/renal function
- Severe maternal symptoms, especially clonus, epigastric/RUQ pain with elevated LFTs
- HELLP/eclampsia
- Fetal reasons
  - Abnormal CTG
  - Reversed umbilical artery end diastolic flow

Other Management

- BP stabilised to below 160/110
  - Labetalol/nifedipine PO first
  - IV labetalol infusion if BP stays high
- IV MgSO4
  - Risk of eclampsia
  - Neuroprotective for fetus
  - Lowers BP (vasodilation)
  - 4g loading dose followed by 1g/hr
- Labetalol/nifedipine methyldopa maintenance therapy
- Fluid restrict to 80mls/hr
- CTG, ultrasound and doppler to assess fetus
  - Fetus must be monitored as all interventions are given
- Steroids
  - Especially if <34wks

HELLP Syndrome

- Haemolysis, elevated liver enzymes and low platelets syndrome
- Occurs in 10-20% of severe PET cases but can occur without any preceding PET
- 1% maternal mortality, 10-60% fetal mortality
- Permanent liver/renal damage may occur

Features

Symptoms

- Epigastric/RUQ pain
- Nausea & vomiting, lethargy
- Tea-coloured urine
- Jaundice

Signs

- RUQ tenderness
- HTN and other PET features

Investigations

- HELLP

Management

- Delivery is indicated
- Supportive care
- MgSO4
- Platelet infusion if <40 and bleeding/surgery

Eclampsia

- Tonic-clonic seizures in association with a diagnosis of pre-eclampsia
- Antenatal (38%), intrapartum (18%), or within 48hrs postnatally (44%)

Management

- ABCs and call for help
- CTG
- Delivery once stable

Magnesium Sulphate (MgSO4)

- Drug of choice for control of & prevention of further seizures
- Should be given once a decision to deliver has been made
- 4g loading dose over 5-10 minutes followed by 1g/hour infusion
- Further 2g bolus if not controlled
- Therapeutic range 2-4mmol/L, toxicity:
  - Confusion
  - Loss of reflexes
  - Respiratory depression
    - Treat with calcium gluconate
  - Hypotension
- Monitoring during treatment:
  - Urine output
  - Reflexes
  - Respiratory rate
  - SpO2
- Treatment should continue for 24hrs after delivery/last seizure

Multiple Gestation

Incidence

- Twins: ~15:1,000
- Triplets: ~1:5,000
- Quadruplets: ~1:360,000

Predisposing Factors

- Previous multiple pregnancy
- Increasing maternal age
- Family history
- Increasing parity
- Assisted reproduction
  - Clomiphene: 10%
  - IUI: 10-20%
  - IVF with 2 embryo transfer: 20-30%

Types

Dizygotic

- 2/3 of multiple pregnancies
- Separate ova fertilised by separate sperm simultaneously implanting
- Separate amniotic membranes and placentas (always DCDA)
- May be different sexes
- Most affected by predisposing factors

Monozygotic

- Division of a single, already developing, embryo
- Genetically identical, always same sex
- **Timing of division**
  - <3 days: DCDA (30%)
  - 4-7 days: MCDA (70%)
  - 8-12 days: MCMA (<1%)
  - 12+ days: conjoined (very rare)

Diagnosis

- Vast majority at dating or nuchal translucency scan
- Features
  - Hyperemesis gravidarum
  - Uterus large for dates
  - 3+ fetal poles >24wks
  - 2 fetal hearts on auscultation

Chorionicity

- Determined for risk stratification
- Indicators for dichorionic (DC)
  - Obviously separated sacs/placentae
  - Membrane insertion showing lambda sign
  - Different sexes
- Indicators for monochorionic (MC)
  - Absence of lambda sign at 14wks

Antenatal Care of Multiple Gestation

- High-risk, consultant led care
- Iron & folate supplements
- Detailed anomaly scan
- Aspirin if PET risk factors

Monitoring and growth scans:

- Establish chorionicity (MC higher risk) by 16 weeks
- DCDA: Every 4 weeks from 20-32, every 2 weeks after
- MCDA: Every 4 weeks from 16-28, every 2 weeks after
- MCMA: Every 2 weeks from 16
- Establish presentation of leading twin at 34wks

Maternal Risks

- Hyperemesis gravidarum
- Anaemia
- PET (5x)
- GDM
- Polyhydramnios
- Placenta praevia
- APH/PPH
- Preterm labour
- Operative delivery

Fetal Risks

- All ↑ with MC twins
- ↑ risk of miscarriage
- Congenital abnormalities (↑ only with MC)
  - NTDs
  - Cardiac
  - GI atresia
- IUGR
- Preterm labour (main cause of perinatal morbidity and mortality)
  - 40% before 37wks
  - 10% before 32wks
- Perinatal mortality
- Intrauterine death
- Disability
- ↑ incidence of CP
- Vanishing twin syndrome
  - One twin apparently being reabsorbed at an early gestation (1st trimester)

Multiple Gestation Ctd

Monochorionic Twin Problems

Twin-Twin Transfusion Syndrome

- 5-25% of MC pregnancies
- Unequal redistribution of blood in the placenta due to anastamoses, effectively leading to blood shifting from the "donor" twin to the "recipient" twin
- Acute or chronic
- May lead to fatal compromise at a gestation too early to consider delivery
- **Effects on Donor Twin**
  - Hypovolaemia & anaemia
  - Oligohydramnios
  - IUGR
- **Effects on Recipient Twin**
  - Often more at risk
  - Hypervolaemia and polycythaemia
  - Large bladder & polyhydramnios
  - Cardiac overload and failure
  - Fetal hydrops
- **Management**
  - Intensive monitoring
  - Laser ablation of placental anastomoses
    - Survival of at least one twin in 80%, both in 50%
  - Selective feticide by cord occlusion in severe refractory cases

Selective IUGR

- Growth disconcordance without TTTS
- Variable Doppler signals
- Absent/reversed end diastolic flow (AREDF) indicates high risk of sudden demise
- **Management**
  - Delivery if >28wks
  - Laser ablation/selective termination if <28wks

Twin Reversed Arterial Perfusion

- Rare
- One twin has no/rudimentary heart
- Receives flow (reversed through umbilical artery) from other twin ("pump twin")
- Normal twin may die of cardiac failure without selective termination

Intrauterine Death of a Twin

Dichorionic

- Death of one twin in 1st/early 2nd trimester does not affect remaining fetus
- Death of one twin in late 2nd/3rd trimester usually precipitates labour

Monochorionic

- Death of one twin can cause (25%) subsequent death or neurological damage of the other due to hypovolaemia of the shared circulation
- Delivery does not decrease risk of brain injury

Labour

- DCDA & MCDA can have vaginal delivery if the leading twin is cephalic
- MCMA should have Caesarean section
- Triplets and higher orders should have Caesarean

Timing

- DCDA: 38-39wks
- MCDA: 37-38wks
- MCMA: Admit from 24wks, CS at 32-36wks

Management

- IV access, group and save
- Continuous CTG
  - May be helpful to monitor leading twin with scalp electrode and the other abdominally
- Epidural helpful but not essential
- May help to deliver in theatre
- Leading twin delivered as for a singleton
- Lie of 2nd twin assessed and stabilised, PV exam for presenting part
- Membranes of 2nd twin can be broken once presenting part enters pelvis
- Oxytocin may help if contractions are diminished after 1st twin
- If distressed, instrumental delivery
  - CS/breech extraction if inappropriate
    - Breech extraction is for experienced obstetricians only and is never used for singleton breech presentation
- Syntometrine and prophylactic oxytocin infusion are recommended due to increased risk of uterine atony

Intrapartum Risks

- Malpresentation
- Fetal hypoxia in 2nd twin
  - No matter what's happening to 2nd twin, 1st twin has to be delivered first
- Cord prolapse
- Operative delivery
- PPH
- Rare:
  - Cord entanglement (MCMA)
  - Locked twins (head entrapment with each other)

Breech Presentation

- Buttocks is the presenting part
- Longitudinal lie with head in fundus
- 3-4% at term, more common at earlier gestations

Types

Frank

- 70%, hips flexed, legs extended with feet by head

Complete

- 15%, legs flexed at knees, both buttocks and feet are presenting

Footlong

- 15%, one/both legs extended with buttocks at a higher position

Causes/Risk Factors

- Idiopathic
- Preterm delivery
- Previous breech presentations
- Uterine abnormalities (fibroids, malformations)
- Placenta praevia
- Fetal abnormalities
- Multiple pregnancy

Consequences

Fetal

- Increased risk of cord prolapse, hypoxia, trauma
- Increased risk of neonatal/long term problems
  - Causes common to both: congenital abnormalities and preterm delivery
  - Not affected by mode of birth

Maternal

- CS

Diagnosis

- On examination:
  - Longitudinal lie with head at fundus
  - Presenting part not hard
  - Fetal heart best heard high
- USS confirms diagnosis

External Cephalic Version

- Breech lifted from pelvis & forward roll
- 60% success rate
- Offered from 36wks in nullipara and 37 in multipara

Absolute Contraindications

- CS required
- APH in last 7 days
- Fetal compromise/abnormal CTG
- Ruptured membranes
- Major uterine anomaly
- Oligohydramnios
- Pre-eclampsia
- Rhesus isoimmunisation

Delivery

- If ECV is contraindicated or fails, or breech is undiagnosed until labour:
  - CS reduces neonatal mortality and short term morbidity
  - Does not reduce long-term morbidity
  - Appears to be true even when ideal conditions for vaginal birth are present

Ideal Selection for Vaginal Breech Delivery

- Fetus is not compromised
- Estimated fetal weight <4kg
- Spontaneous onset of labour
- Extended breech presentation
- Non-extended neck

Vaginal Breech Delivery Technique

- Maternal effort delayed until buttocks are visible
- After delivery of buttocks, baby kept back-upright but not otherwise touched until scapulae are visible
- Arms delivered by index finger hooking around fetal elbow
  - Lovset's manoeuvre if this is impossible due to arms above chest
- Baby allowed to hang
- Delivery after nape of neck is visible
  - Flexion of head via fingers on back of head and on maxilla (Mauriceau-Smellie-Veit manouevre)
  - Maternal effort
  - Forceps if this fails
- Delivery of head controlled and gentle to avoid rapid decompression and intracranial bleeding

Abnormal Lie

Types

Transverse/Oblique

- Axis of the fetus is across the axis of the uterus

Unstable

- Lie is still changing several times a day
- May be transverse, oblique, cephalic or breech when checked/at term

Risk Factors

- Multiparity (lax utuerus)
- Polyhydramnios
- Uterine abnormalities
- Placenta praevia/obstructions in the pelvis
- Fetal abnormalities/small fetus
- Multiple pregnancy

Risks

- Labour with non-longitudinal lie will result in obstructed labour and potential uterine rupture
- Membrane rupture risks cord prolapse (in longitudinal lie, presenting part prevents cord prolapse)

Assessment

- Ascertain fetal lie and stability
- Does the presenting part move easily?
- Ultrasound should be performed to ascertain cause

Management

- Admission recommended from 37wks in unstable lie
  - If labour starts/membranes with rupture with non-longitudinal lie → CS
- Can be discharged if lie returns to & stabilised at longitudinal (for 48 hours)
- CS at T+10 if lie does not stabilise
- CS at 39wks considered if lie is stable and transverse/oblique

Abdominal Pain in Late Pregnancy

Pregnancy Related

- Labour
  - Regular painful contractions
  - Preterm labour may have a vague pain history
- Braxton-Hicks contractions
  - Spontaneous benign contractions common in 3rd trimester
  - Can be painless
  - VE reveals closed uneffaced cervix
  - Needs reassurance only
- Placental abruption
- Uterine rupture
  - Needs urgent laparotomy to deliver fetus and repair uterus
- Symptomatic pre-eclampsia/HELLP
- Symphysis pubis dysfunction
- Reflux oesophagitis
- Adnexal torsion

Other Causes

- Intestinal obstruction
- Cholecystitis
- Pancreatitis
- Appendicitis

Preterm Labour

- Labour between 24 and 37wks gestation
- 1/3 medically indicated, 2/3 spontaneous
- May occur due to cervical weakness or infection
- Associated with perinatal morbidity and mortality and long term disability

Risk Factors/Causes

- Cervical insufficiency
  - Idiopathic
  - Iatrogenic
- Previous preterm birth/late miscarriage
- Infection
  - UTI
  - Chorioamnionitis
  - Bacterial vaginosis
- Distended uterus
  - Multiple gestation
  - Polyhydramnios
  - Macrosomia
  - Fibroids/uterine abnormalities
- Placental insufficiency
  - PET
  - IUGR
- Maternal drug abuse/smoking
- Increasing maternal age
- Medical conditions such as renal disease

Assessment

- Assess for any signs of infection (chorioamnionitis)
  - Tender uterus
  - Fever
  - Foul-smelling liquor
- Vaginal exam only when placenta is known to be safe (documented/USS)
- CTG for fetal wellbeing
- Ultrasound (TV if placenta is safe) for cervical length and fetal presentation

Threatened Preterm Labour

- Contractions mild/short & widely spaced
- Cervix posterior, uneffaced & undilated

Established Preterm Labour

- Painful regular contractions with short interval
- Cervix shortened & dilated
- Fetal fibronectin assay positive

Management

Threatened

- Admit for 24hrs observation
  - Discharge with safety netting if pain stops
- Dexamethasone IM x2 given 24hrs apart if expected to deliver within the next week
- Bloods (FBC, CRP)
- Urinalysis & MSU

Established

- Admit to labour ward
- Dexamethasone & MgSO4
- IV antibiotic cover
- Bloods (FBC, CRP)
- Urinalysis & MSU
- High vaginal swab
- Vaginal delivery as long as mother and baby are stable

Prevention

- For women with previous preterm labour or other significant risk

General

- Consider modifiable risk factors
  - Weight, infection, smoking
- Regular urinalysis, MSU & HVS even if not asymptomatic
- Prophylactic antibiotics if prone to recurrent UTIs
- Consider aspirin ± LMWH

Progesterone

- High-risk women & low-risk women with a short cervix before 32wks only
- Cream or pessary
- Not great evidence

Cervical Cerclage

- Indications:
  - Elective (women with previous preterm labour)
  - Ultrasound-indicated (cervix < 1.5cm on TVUS)
  - Rescue (response to cervical dilatation)
- Complications:
  - Rupture of membranes
  - Miscarriage
  - Introduction of infection
  - Failure (needs to be removed if woman goes into labour)
- Removed at 36wks
- Not great evidence

Premature Preterm Rupture of Membranes (PPROM)

- 1/3 of preterm deliveries
- 1/3 associated with infection

Features

- Sudden vaginal loss
  - Gush/constant trickle/dampness
- Liquor pooling in posterior fornix
  - Cough reflex

Features Suggesting Chorioamnionitis

- Fever/malaise
- Abdominal pain (including contractions)
- Purulent/offensive discharge
- Pyrexia & tachycardia
- Uterine tenderness
- Fetal tachycardia

Investigations

- FBC, CRP
- Vaginal swabs
- MSU
- USS for fetal presentation, estimated fetal weight, & amniotic fluid index
  - AFI can be reduced absolutely or relative to a previous measurement

Management

No Chorioamnionitis

- Admit, liaise with neonatologists
- FBC & CRP twice weekly
- No vaginal exam unless having pain
- Steroids
  - Dexamethasone IM x2 given 24hrs apart
- Prophylactic antibiotics
  - Oral erythromycin 250mg QDS x 10 days
  - IV broad spectrum cephalosporin if infection suspected
- Aim for IOL at 36-37wks
  - ARM if membranes partially still intact
  - Oxytocin
  - IV antibiotics
- Outpatient monitoring possible in ideal specific circumstances
  - Erythromycin finished
  - Near hospital with help & transport
  - Good safety netting

Chorioamnionitis

- Delivery ASAP no matter what gestation
- IV broad spectrum antibiotic cover
  - Ceftriaxone
  - Co-amoxiclav risks NEC and should be avoided
- Dexamethasone & MgSO4

Prelabour Rupture of Membranes After 37wks

- Allow 24hrs for spontaneous labour (60-70%) **except:**
  - Infection
  - Fetal distress
  - Planned section
  - Any long standing viral infection (HSV, HIV, Hep B/C, etc)
  - GBS positive
  - Meconium liquor
- IV antibiotics (benzylpenicillin or clindamycin) after 18 hours (prolonged ROM)
  - Immediate if GBS positive

Induction

- Only a single dose of prostin can be given if the membrane have ruptured spontaneously
- Straight to oxytocin if cervix is in any way favourable

Prolonged Pregnancy

- Pregnancy lasting longer than 42wks from LMP in a woman with regular 28 day periods

Risks

Maternal

- Anxiety & psychological morbidity
- IOL
- Operative delivery with risk of genital trauma

Fetal

- Intrapartum deaths 4x more common after 42wks
- Early neonatal deaths 3x more common
- Meconium aspiration
- Oligohydramnios
- Macrosomia, shoulder dystocia, fetal injury
- Cephalhaematoma
- Neonatal morbidity

Management

- Assess for other indications for IOL
  - PET
  - DM
  - APH
  - IUGR associated with placental insufficiency
- Offer stretch and sweep at 41wks
- Offer IOL between 41 and 42wks

Fetal Medicine

Screening for Chromosomal Abnormalities

Combined Test

- Most used test to screen for trisomy 21

Timing

- 11-13+6wks

Measurement

- Ultrasound measurement of nuchal translucency
  - Increased thickness in T21
- PAPP-A
  - Lower levels in T21
- B-hCG
  - Higher levels in T21

Risk of T21

- Calculated from maternal age, gestation-related risk and a score from the test results

Advantages

- ~90% detection of T21 for 5% FPR
- Acceptable detection rate for other trisomies
- May detect other abnormalities such as anencephaly
- Increased NT is also associated with structural defects
- Result available in 1st trimester allowing for TOP

Other Tests

	Serum Integrated Test	Integrated Test	Triple Test	Quadruple Test
Trimester	1st & 2nd	1st & 2nd	2nd	2nd
Type	Two blood tests	Scan & two blood tests	Blood test	Blood test
Detection	85%	85%	71%	75%
FPR	2.7%	1.2%	6%	5%

Screening for Structural Abnormalities

18-21wk Anomaly Scan

- Routinely offered

Detection Rates by System Affected

- CNS 76%
- Urinary tract 67%
- Pulmonary 50%
- Gastrointestinal 42%
- Skeletal 24%
- Cardiac 17%

Measurement

- Skull shape and internal structures
- Spine – longitudinal and transverse views
- Abdominal shape and content at level of:
  - Stomach
  - Kidneys
  - Umbilicus
  - Bladder
- Arms (three bones and hand)
- Legs (three bones and hand)
- Heart
  - Four-chamber view
  - Outflow tracts
  - Lungs
- Face and lips

Diagnostic Fetal Tests

Chorionic Villus Sampling

- 10-13wks
- Aspiration of trophoblastic cells
- Usually transabdominal with ultrasound guidance

Indications

- Karyotyping if high risk for aneuploidy
- DNA analysis if parents are carriers of identifiable gene mutation (eg CF)

Advantages

- Result available in 1st trimester allowing for TOP

Risks

- Miscarriage (1%)
- ↑ vertical transmission of blood-borne viruses
- Misleading results due to contamination with maternal cells, placental mosaicism

Amniocentesis

- 15wks onwards
- Transabdominal aspiration of amniotic fluid

Indications

- Karyotyping if high risk for aneuploidy
- DNA analysis if parents are carriers of identifiable gene mutation (eg CF)
- Enzyme assays for inborn errors of metabolism
- Diagnosis of fetal infections

Advantages

- Less risk of miscarriage & maternal contamination/placental mosaicism

Risks

- Miscarriage (may not be significantly higher than baseline risk)
- Failure to culture cells
- Full karyotyping may take up to 3 weeks

High Risk Fetus

Stages in Fetal Surveillance

Stage I

- Identification of high-risk fetuses

Stage II

- Timing of delivery
  - Preterm deliveries if showing signs of distress
  - Delivery after 36wks for all high-risk fetuses

Identification of the High Risk Fetus

Symphysis Fundal Height

- Detection of small for dates
- Improved with customised fundal height charts

Ultrasound Assessment

- Serial scans assess growth
- Late scans detect:
  - Growth problems
  - Abnormalities in the amount of amniotic fluid
  - Problems with the placenta
  - Problems with the fetal lie/presentation

Uterine Artery Doppler

- Measures resistance in the placenta from the maternal side
- Screening test at 23wks
- High resistance or pulsatility indicates higher risk of PET or IUGR

Fetal Movement

- Very low positive predictive value of maternal perception of reduced fetal movements

Fetal Heart Auscultation

- Only confirms fetus is alive, no predictive information

Monitoring – Doppler Ultrasound

Umbilical Artery Doppler

- Increased resistance/pulsatility is an indicator of placental failure
- Differentiates a small healthy baby from one not reaching its full growth potential
- Precedes CTG changes
- Can be used to time delivery
- Absent/reduced end diastolic flow (AREDF) are indicators of severe placental insufficiency

Middle Cerebral Artery Doppler

- Reduced resistance/pulsatility in compromised baby due to head sparing
- May be more useful at term

Ductus Venosus Doppler

- Waveform is a surrogate for cardiac function
- Used in TTTS
- Can be used to time delivery of severely compromised babies in combination with CTG and umbilical artery

Monitoring – Cardiotocography

- Electronic monitoring of fetal heart rate correlated with uterine contractions
- Abnormal CTG is a late response
  - Short lead time from CTG changes caused by uteroplacental insufficiency to fetal death
- Not useful for antenatal screening, used to assess current compromise in:
  - Acute conditions such as placental abruption or reduced fetal movements
  - Chronic conditions of pregnancy that predispose to compromise such as PET or IUGR

Normal CTG

- Rate – 100-160
- Variability – 5-25
- Accelerations
  - Increase of at least 15bpm for 15 seconds
  - Should be 2 in 20 minutes
- Decelerations – Should be absent

Abnormal CTG

- Baseline bradycardia
  - Increased vagal tone, maternal beta-blocker use
- Baseline tachycardia
  - Maternal pyrexia, chorioamnionitis, hypoxia, prematurity
- Loss of baseline variability
  - Prematurity, hypoxia
- Early decelerations
  - Commences with onset of contraction and returns to normal on completion of contraction
  - Head compression, usually innocuous
- Late decelerations
  - Lags behind onset of contraction and does not return to normal until 30 seconds after the end of the contraction
  - Fetal distress (asphyxia, placental insufficiency)
- Variable decelerations
  - Independent of contractions
  - May indicate cord compression

Fetal Hydrops

- Abnormal accumulation of serous fluid in two or more fetal compartments
- Skin oedema, polyhydramnios, placental oedema, pericardial/pleural effusion
- Heart failure/lymphatic blockage/loss of plasma oncotic pressure

Non-Immune Fetal Hydrops

Causes

- Severe anaemia
  - Congenital parvovirus B19
  - α-thalassaemia major
  - Massive feto-maternal haemorrhage
  - G6PD deficiency
- Cardiac abnormalities
- Chromosomal abnormalities
- Infections
  - Toxoplasmosis
  - Rubella
  - CMV
  - Varicella
- Other structural abnormalities
  - Congenital cystic adenomatoid malformation
  - Diaphragmatic hernia
  - Pleural effusions
- TTTS

Investigations

- Ultrasound
  - Diagnosis and assessment of associated structural abnormalities
  - Middle cerebral artery doppler shows anaemia
- Fetal blood/amniotic fluid sampling
  - Anaemia
  - Chromosomal analysis, virology
- Maternal blood testing
  - Kleihauer test, antibody screen
  - Virology
  - Hb electrophoresis for α-thalassaemia trait

Management

- Fetal anaemia
  - In utero transfusion
- Pleural effusions
  - Percutaneous drainage
- TTTS
  - Laser photocoagulation
- Cardiac
  - Medical treatment of tachyarrhythmias
- If no treatable cause, TOP may be discussed

Immune Hydrops/Rhesus Isoimmunisation

Rhesus Antigens

- C/c, E/e, D/d, Kell antigen
- Non-D antigens account for ~1/2 of cases due to anti-D prophylaxis

Pathophysiology

- RhD -ve mother and RhD +ve fetus
- Fetal cells enter maternal circulation in sensitising events
  - TOP/ERPC/Intrauterine death/Ectopic
  - Vaginal bleeding >12wks
  - ECV/Blunt abdominal trauma
  - Invasive uterine procedure
  - Delivery
- Immune response is with IgM first, which cannot cross the placenta
- Re-exposure in later pregnancies causes an IgG mediated response, which can cross the placenta
- → Haemolytic anaemia
  - Hydrops and death if severe
  - Neonatal anaemia/jaundice in milder cases

Investigation/Screening

- Antibodies checked at booking, 28, & 34wks
- Typing via parents type or fetal cell PCR if paternity uncertain
- Antibody levels below 10IU/L require repeat testing every 4 weeks
- Antibody levels above 10IU/L require assessment for fetal anaemia
  - Peak systolic velocity of MCA, fetal blood sampling if increased

Management

- Transfusion of irradiated, Rh -ve, CMV -ve packed red cells
  - If fetal Hct <30
  - Transfusion into umbilical vein
  - Possible from 18wks
  - Haemolysis continues and repeated transfusions are necessary
- Delivery preferred after 35wks
- Postnatal management
  - Treat anaemia, hyperbilirubinaemia, coagulopathies
  - Haemolysis may persist for a few weeks

Anti-D Prophylaxis

- Given to all Rh -ve women at:
  - 28 & 34wks
  - Within 72 hours of a sensitising event
  - After birth of a Rh +ve neonate
- Kleihauer test is used when the standard dose may not be sufficient
  - Feto-maternal haemorrhage
  - After birth of a Rh +ve neonate

Oligohydramnios

- Single deepest pool <2cm/amniotic fluid index (AFI) <8cm/<5th centile
- <500ml at 32-36wks

Causes

- SROM
- Reduced fetal urine production/output
  - IUGR
  - Fetal renal failure/malformations
  - Fetal urinary tract obstructions (eg posterior urethral valves)
  - Post-dates pregnancy
- PET

Complications

Related to Cause

- Preterm labour/intrauterine infection (SROM)
- IUGR

Related to Reduced Volume

- Lung hypoplasia if before 22wks
  - Oligohydramnios before 22wks has a poor prognosis
- Limb abnormalities (eg talipes)

Investigations

- USS & doppler
- Speculum exam to look for SROM
  - CRP, FBC, vaginal swabs

Management

SROM at >34wks

- Induce labour unless CS indicated

SROM at <34wks

- Prophylactic erythromycin & steroids
- Monitor for signs of infection
- Daily CTG

IUGR

- Manage according to umbilical artery doppler & CTG

Renal Tract Abnormality

- Specialist referral

Isolated Oligohydramnios

- Reconsider cause
- Intervention not needed if umbilical Doppler is normal

Polyhydramnios

- Deepest pool >8cm/AFI >22cm

Causes

Increased Fetal Urine Production

- Maternal diabetes
- TTTS (recipient twin)
- Fetal hydrops

Decreased Fetal Swallowing

- Fetal GI obstruction
- Fetal neurological/muscular abnormalities
- Idiopathic

Complications

- Preterm delivery
- Cause-related (T21 and duodenal atresia)
- Malpresentation
- Maternal discomfort

Investigations

- Oral glucose tolerance test
- USS

Management

- Amnioreduction or NSAIDs if massive (AFI >40)
- Refer fetal abnormalities
- Assess risk of labour and consider steroids if preterm
- If malpresentation or unstable lie, admit in case of CS

Intra-Uterine Growth Restriction (IUGR)

- A fetus that is pathologically small
- Estimated weight below the 10th centile as per US EFW
  - Customisable charts are available which account for maternal height, weight, parity, fetal gender and ethnic origin
  - Not always the case – constitutionally small fetal with normal growth may be below 10th, constitutionally large fetus with restricted growth may be above 10th

Associations/Complications

- 6-10x greater perinatal mortality
- 4x incidence of cerebral palsy
- 30% of stillborn infants are growth restricted
- More likely to have:
  - Intrapartum distress & asphyxia
  - Meconium aspiration
  - Emergency CS
  - Necrotising enterocolitis
  - Hyperglycaemia & hypocalcaemia

Causes

Placental (most common)

- Abnormal trophoblast invasion
  - PET
  - Placenta accreta
- Infarction
- Abruption
- Placenta praevia
- Tumours (chorioangiomas)
- Abnormal cord

Maternal

- Chronic maternal disease
- Substance abuse, smoking
- Autoimmune disease
- Genetic disorders
- Poor nutrition
- Low socio-economic status

Fetal (typically early & severe presentations)

- Genetic abnormalities
- Congenital abnormalities
- Congenital infections - TORCH
- Multiple pregnancy

Symmetry

Symmetric Growth Restriction

- Entire body proportionately small
- Early onset IUGR and chromosomal abnormalities

Asymmetric Growth Restriction

- Brain and heart are preferentially spared
- Malnourished fetus secondary to placental insufficiency
- Increased MCA flow on doppler

Monitoring

Biometry – Every 2 Weeks

- Biparietal diameter, head circumference, abdominal circumference, femur length
- Estimated fetal weight
- Forward growth

Amniotic Fluid Index

- 8-18

Umbilical Artery Doppler

- "Raised" – raised ratio of systolic:diastolic flow
  - Mildest form of placental insufficiency as per doppler
- Absent end diastolic flow (AEDF)
- Reversed end diastolic flow (REDF)
  - Severe placental insufficiency, delivery in the next 1-2 weeks at most
- AREDF warrants increasing frequency of growth scans & BPP – up to 3x/week as outpatient, admission if more is required

Biophysical Profile

- Amniotic fluid measurement, fetal breathing movements, fetal body movements, fetal tone, CTG
- Normal = 2 & abnormal =0 for each (score of 0-10)
- Delivery < 4, close monitoring/delivery < 6
- Typically used if earlier investigations are abnormal due to time consumption

Severe/Early Form

- Majority still due to placenta, significant minority due to fetal factors
- Perform detailed anatomy scan (most malformations are picked up in routine anatomy scan), NIPT (Harmony) & amniocentesis if abnormal, & TORCH screen
- Ductus venosus & umbilical vein dopplers become abnormal at very end stage – useful in decisions re prolonging labour with AREDF

Management

- High risk monitoring as above
- Prolong gestation as much as possible
- Deliver before fetus is compromised as per Doppler and CTG

Medical Disease in Pregnancy

Complications of Diabetes in Pregnancy

	Antenatal	Perinatal	Postnatal
Maternal	• UTI/candidiasis • PIH/PET • Worsening of retinopathy/nephropathy/cardiac disease • Preterm labour	• Instrumental/operative delivery • Wound infection • Failed IOL • Labour dystocia/shoulder dystocia • High grade perineal tears • PPH	• Trauma • Future diabetes – 50% develop T2DM in 20 years – Breastfeeding is protective • Future GDM
Fetal/Neonatal	• Placental insufficiency & IUGR • Macrosomia • Miscarriage/IUD (if uncontrolled) • Congenital abnormalities (if pre-existing)	• Stillbirth	• Hypoglycaemia • HIE • Jaundice • RDS • Birth trauma

Gestational Diabetes

- Affects 4% of pregnancies

Risk Assessment

Risk Factors

- **Previous GDM**
- BMI >30
- Previous macrosomic baby (4.5kg+)
- Maternal age > 45
- First-degree relative with diabetes
- Multiple gestation
- Family origin with a high prevalence of diabetes (South Asian, black Caribbean, Middle Eastern)

Screening

- If previous GDM:
  - Treat empirically or do OGTT at 14-16wks, 18-20wks & 24-28wks
- Any other risk factor present:
  - OGTT at 24-28wks

Diagnosis (OGTT)

- Fasting glucose ≥ 5.1mmol/L
- 2-hour glucose ≥ 8.5mmol/L

Other Investigations

- Baseline bloods
  - HbA1c
  - TFTs, LFTs, U+Es
  - Lipid profile
  - Vitamin D
- Urinalysis
- Ultrasound for fetal wellbeing
  - Scans at 28 & 36 weeks
  - 28, 32 & 36 weeks if insulin is required

Management

- Diet & exercise first line (if fasting < 7mmol/L)
  - Sugars to be checked 7 times daily (Morning, before & after each meal, before bed)
  - OGTT in 2-3wks
    - Targets: Fasting ≤ 5 & post-prandial ≤7
  - Metformin added if fasting target not met
    - Titrated to 500mg TDS
  - Insulin added if both targets not met
    - With endocrinologist supervision
- Insulin if fasting glucose is >7mmol/L
- Insulin if fasting glucose is 6-6.9mmol/L with evidence of complications
- Glibenclamide offered if metformin not tolerated/targets not met and insulin refused

Labour

Timing

- IOL at 37-38wks (better outcomes debatable)
- Expedited if complications occur

Mode

- Vaginal preferred
- Continuous CTG advised
- Elective CS if EFW >4.5kg

Glycaemic Control

- Hourly checks if diet-controlled
  - If >6mmol/L, sliding scale
- Convert SC insulin to sliding scale once in established labour

Post-partum Care

- Encourage breastfeeding
  - Avoid oral hypoglycaemics
  - Metformin and insulin are safe
- Baby needs early feeding and glucose monitoring

Pre-existing Diabetes

Pre-conception Counselling

General

- Advise endocrinologist about plans to get pregnant
- Folic acid 5mg advised from pre-conception until after delivery
- Risks as above

Baseline Investigations

- HbA1c
  - Prefer < 42
  - Advise against pregnancy if > 85
- LFTs, U+Es, urinary PCR, lipid profile, TFTs, vitamin D
- Retinopathy screen

Medication changes

- Oral hypoglycaemics must be changed to metformin
- Insulin requirement will increase up to double during pregnancy
  - Rapidly decreases after delivery, doses must be cut to avoid profound hypoglycaemia

Antenatal Care

- Full bloods as above at booking visit
- Proteinuria must be compared to pre-pregnancy baseline (nephropathy)
- Aspirin 150mg OD from 10-12wks
  - As soon as intrauterine pregnancy confirmed
- Seen every 2-3 wks
- Anatomy scan at 20-24wks
  - 18 if high HbA1c
- Growth scans at 28, 32 & 36wks

Labour

Timing

- IOL at 37-38wks (better outcomes debatable)
- Expedited if complications occur

Mode

- Vaginal preferred
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- Baby needs early feeding and glucose monitoring

Jaundice in Pregnancy

Obstetric Cholestasis

- AKA intrahepatic cholestasis of pregnancy
- ~1% of pregnancies
- Most common liver disease of pregnancy

Features

- Pruritis
  - Palms and soles often first
  - No rash
  - Worse at night
- Anorexia and malaise
- Epigastric discomfort, steatorrhoea, dark urine (less common)

Diagnosis

- Clinical features + abnormal LFTs (including raised bilirubin) + absence of features of other causes
  - LFTs, clotting factors, viral serology, bile tract ultrasound, autoimmune screen

Management

- Ursodeoxycholic acid (symptomatic relief)
- Vitamin K
- Weekly LFTs
- Induction at 37wks typical
- Confirmation of postnatal resolution of symptoms

Complications

- Increased rate of stillbirth

Acute Fatty Liver of Pregnancy

- Rare
- Occurs in 3rd trimester or immediately postnatally

Features

- Abdominal pain
- Nausea & vomiting
- Jaundice
- Headache
- Fever
- Confusion
- Coma

Differentiating from HELLP

- Mild hypertension and proteinuria only
- Early coagulopathy
- Profound persistent hypoglycaemia
- Hyperuricaemia
- Fatty infiltration on liver imaging

Management

- Supportive care (ICU/HDU)
- Delivery once stabilised

Other Causes Specific to Pregnancy (10%)

- Hyperemesis Gravidarum
- HELLP

Infectious Disease in Pregnancy

TORCH Infections

- Infections commonly acquired in utero/during the birth process
- Include similar features
  - Hydrops
  - Microcephaly
  - Rash
  - Ocular findings (eg cataract)
  - Seizures
- Pathogens:
  - Toxoplasmosis
  - Other
    - Syphilis, Varicella, Parvovirus B19
  - Rubella
  - Cytomegalovirus
  - Herpes Simplex

Toxoplasmosis

- Toxoplasma gondii spread by contamination with cat faeces and eating undercooked meat

Risks

Maternal

- Asymptomatic in 80%
- Fever, lymphadenopathy
- Disseminated infection in immunocompromised
  - Encephalitis, chorioretinitis

Fetal

- Spontaneous miscarriage in 1st trimester
- Chorioretinitis, retinopathy, cataracts
- Microcephaly & hydrocephalus
- Intracranial calcification
- Mental disability

Parvovirus B19

- <1/100 primary infection during pregnancy

Fetal Risks

- 30% fetal transmission rate
- Erythropoiesis suppression
- Hydrops fetalis
- Cardiac failure

Management

Exposure

- Serum parvovirus B19 IgG & IgM
  - IgG detected: reassure
  - IgM detected: confirm and refer
  - Neither detected: re-check after 1 month/if symptoms develop

Infection

- Serial USS & MCA PSV as per hydrops fetalis
- In utero transfusion (± platelets) may be necessary

Varicella

Risks

Maternal

- 5x risk of pneumonitis

Fetal Varicella Syndrome

- ~1% risk if exposed before 20wks
- Few cases between 20 and 28wks, virtually none after 28wks
- Features
  - Skin scarring
  - Eye defects (micophthalmia)
  - Limb hypoplasia
  - Microcephaly
  - Learning disabilities

Other Risks to Fetus

- Shingles in infancy
  - 1-2% risk if exposed in 2nd/3rd trimester
- Severe neonatal varicella
  - Risk if mother develops rash between 5 days before birth and 2 days after birth
  - 20% neonatal mortality

Management of Exposure

- If any doubt re having had chickenpox, exposed mothers should have VZ antibodies measured

<20wks Gestation

- VZIG as soon as possible
- Effective up to 10 days post exposure

>20wks Gestation

- VZIG or antivirals (acyclovir/valacyclovir) from days 7-14 post exposure

Within 4 weeks of delivery

- VZIG as soon as possible

Management of Chickenpox

- Oral acyclovir if:
  - >20wks gestation
  - <24hrs since development of rash

Syphilis

- Screened for at booking

Congenital Disease

- 8th nerve deafness
- Hutchinson's teeth
- Saddle nose
- Sabre shins

Treatment

- Penicillin
  - <16wks – prevents virtually all congenital cases
  - >16wks – prevents most congenital cases

Rubella

- Togavirus, spready by respiratory droplets
- 14-21 day incubation
- Infectious from 7 days before & after appearance & diasappearance of rash

Features/Risks

Maternal

- Symptoms present in 50-75%
- Mild, febrile illness
- Maculopapular rash
- Arthralgia
- Lymphadenopathy

Congenital Rubella Syndrome

- 90% risk from 8-10wks
- Rare after 16wks
- Features:
  - Sensorineural deafness
  - Congenital cataracts, glaucoma, microphthalmia
  - "Salt and pepper" chorioretinitis
  - Microcephaly
  - Congenital cardiac defects
    - VSD, PDA
  - Cerebral palsy
  - Growth retardation
  - Hepatosplenomegaly
  - Purpuric skin lesions

Diagnosis

- Rubella IgM and IgG
  - IgM raised in recent infection
- Important to check for parvovirus B19 due to clinical similarity

Management

- Reassure if:
  - Two documented vaccine doses/screening tests demonstrating immunity
  - IgG detected without IgM
- If IgM is detected:
  - Repeat, diagnose and advise based on results
- If non-immune:
  - Vaccinate after delivery (MMR)

Cytomegalovirus

- Herpes virus
- Primary infection is 95% asymptomatic but can causes mononucleosis-like illness in immunocompetent

Fetal Risks

- 40% of fetuses will be infected from primary maternal infection
  - 90% of these will have no problems at birth
  - 10% are symptomatic at birth, can be fatal or leave long-term problems
- Congenital defects:
  - IUGR
  - Microcephaly
  - HSM and thrombocytopenia
  - Jaundice
  - Chorioretinitis
- Later developing sequelae:
  - Psychomotor retardation
  - SNHL

Management

- Close monitoring and paediatric follow-up

Herpes Simplex (HSV-2)

- ~20% (UK) women seropositive
- May be infectious when apparently asymptomatic

Risks

Maternal

- Severe primary infection in pregnancy
  - Flu-like illness, inguinal lymphadenopathy, vulvitis, vulval vesicles
- Meningitis
- Sacral radiculopathy
  - Retention & constipation
- Transverse myelitis
- Disseminated infection

Fetal

- Miscarriage/preterm labour

Neonatal

- Transmission risk high during primary attack, low during recurrent attack
- First 2wks of life
- 25% limited to eyes and mouth
- 75% disseminated
  - 70% fatal
  - Long term mental disabilities

Management

- Acyclovir (symptomatic) within 5 days of onset
- CS if labour is within 6wks of primary infection

Measles

- RNA paramyxovirus

Features

- High fever
- Generalised maculopapular erythematous rash
- Koplik spots
- Cough, coryza, conjunctivitis

Risks

Maternal

- Pneumonia
- Acute encephalitis
- Corneal ulceration & scarring

Fetal

- Fetal loss
- Preterm labour
- No congenital effects

Neonatal

- Subacute sclerosing panencephalitis

Management

- Human normal immunoglobulin (HNIG) immediately after birth/exposure if rash develops between 6 days before & after birth
- Women IgG -ve should be immunised after delivery

HIV

Vertical Transmission

- 25-30%
- Can be reduced to 2% with:
  - Maternal & neonatal antiretroviral therapy
  - CS
  - Infant bottle feeding

Screening

- Standard at booking visit

Management

Maternal Antiretroviral Therapy

- All HIV +ve women during pregnancy, regardless of need before pregnancy

Delivery

- CS unless viral load is <50 copies/ml at 36wks
- Zidovudine infusion started 4 hours before beginning CS

Neonatal Antiretroviral Therapy

- Post-exposure prophylaxis for 4-6wks
  - Zidovudine monotherapy if maternal viral load <50 and zidovudine infusion was given during labour
  - Otherwise, triple therapy

Bottle Feeding

- Mothers advised not to breast feed

Hepatitis B

- All pregnant women screened

Risks

Fetal

- Miscarriage/preterm labour
- No ↑ risk of malformations

Neonatal

- Vertical transmission usually occurs during birth (including CS) but may (<5%) occur in utero
- May be fatal
- Usually results in chronic carrier state with ↑ lifetime risk of cirrhosis/HCC

Management

- Babies to mothers with acute/chronic HBV: HBV vaccine & HBV IgG within 24hrs of delivery

Group B Streptococcus

- *S. agalactiae*
- Carried vaginally by up to 20% of women

Risks

Fetal

- PPROM, preterm labour

Neonatal

- Most frequent cause of severe early onset infection
- Of carrier mothers, 70% of children will be colonised and 1% of these will be infected
- 20% mortality, presents with:
  - Pneumonia
  - Sepsis
  - Meningitis

Management

- Universal screening not indicated & request not an indication for screening

Intra-partum Antibiotics

- Any woman with previous GBS detection/baby with GBS disease
- Any woman in preterm labour
- Any woman with pyrexia >38° during labour
- Benzylpenicillin

Listeria Monocytogenes

- Rare
- Found in soft cheese, pate, undercooked meat, shellfish

Features/Risks

Maternal

- Gastroenteritis with flu-like symptoms

Fetal

- Amnionitis
- Miscarriage
- Preterm labour

Neonatal

- Sepsis
- Pneumonia
- Meningitis

Management

- High dose amoxicillin/erythromycin

Non-Vesicular Rash in Pregnancy

- Causes include:
  - Streptococcal/meningococcal infection
  - Enteroviruses
  - CMV
  - EBV
  - Syphilis
  - Rubella
  - Measles
  - Parvovirus B19

Infections Routinely Screened For

- Rubella
- Hepatitis B
- HIV

Labour & Delivery

Normal Labour

Signs

- Regular & painful uterine contractions
  - Gradual increase in frequency and amplitude
- Show
- Rupture of membranes (not always)
- Shortening & dilatation of the cervix

Sequence of a Normal Vertex Delivery

- Engagement and descent in occipitotransverse position
- Internal rotation to occipitoanterior at level of ischial spines
- Crowning (extension and delivery of head)
- Restitution of the head
- External rotation of the shoulders (→ anteroposterior biacromial diameter)
- Delivery of anterior shoulder
- Delivery of posterior shoulder

1st Stage

- Onset of labour to fully dilated cervix
- 10-16hrs in primigravida
- Latent phase: 0-3cm, ~6 hours
- Active phase: 3-10cm, ~1cm/hour

Failure to Progress

- <2cm dilatation in 4 hours
- Slowing of progress in parous women
- 1° dysfunctional labour if slow from the outset
- 2° arrest if previously adequate
- **Causes**
  - Insufficient uterine activity (power)
  - Malpresentation/macrosomia (passenger)
  - Inadequate pelvis (passage)
- **Management**
  - ARM & reassess in 2hrs
  - Oxytocin infusion
    - Care in multipara/previous CS
  - Lower segment CS if fetal distress

Monitoring

- FHR every 15mins
- Contractions assessed every 30mins
- Maternal heart rate every hour
- BP & temperature 4-hourly
- VE offered 4-hourly to assess progress
- Maternal urine 4-hourly for ketones & protein

2nd Stage

- Full cervical dilatation to birth of baby
- Passive 2nd Stage
  - No pushing
  - Allowed for 1 hour with epidural and reassuring CTG
- Lasts ~1hr
- Episiotomy may be necessary following crowning
- Associated with transient fetal bradycardia

Delay in 2nd Stage

- Nullipara
  - Offer VE and ARM after 1hr of active pushing
  - Consider instrumental delivery/CS after 2hrs
- Multipara
  - Consider instrumental delivery/CS after 1hr

3rd Stage

- Birth of baby to delivery of membranes and placenta

Active Management

- Uterotonics (syntometrine/oxytocin) as anterior shoulder is delivered
  - Multiple pregnancy must be excluded
- Fundal pressure after baby is born
- Cord clamping, cutting and traction
- **Advantages**
  - Decreased PPH, blood loss and postnatal anemia
  - Decreased length of 3rd stage
  - Decreased need for transfusions
- **Adverse effects**
  - Nausea and vomiting, headache

Physiological Management

- No uterotonics
- Cord allowed to stop pulsating before clamped and cut
- Placenta delivered by maternal effort alone
- Changed to active management if:
  - Haemorrhage
  - Failure to deliver placenta in 1hr
  - Maternal desire to shorten 3rd stage

Induction of Labour

- ~20% of pregnancies

Indications

Obstetric

- Uteroplacental insufficiency
  - Abnormal Dopplers/CTG
- Prolonged pregnancy
  - 41-42wks/12 days after EDD
- IUGR
- Oligo/anhydramnios
- PPROM
- Severe PET/eclampsia
- IUD
- Chorioamnionitis

Medical

- Diabetes (at 38wks)
- Severe hypertension
- Renal disease with deteriorating function

Bishop Score

- Assessment of whether IOL will be required

	0	1	2	3
Cervical Position	Posterior	Intermediate	Anterior	-
Cervical Consistency	Firm	Intermediate	Soft	-
Cervical Effacement	0-30%	40-50%	60-70%	80%
Cervical Dilatation	<1cm	1-2cm	3-4cm	>5cm
Fetal Station	-3	-2	-1, 0	+1, +2

- Score of <5 indicates labour unlikely to start without induction
- Score of >9 indicates labour is likely to go ahead spontaneously

Methods

Sweep & Stretch

- Mechanical separation of membranes and cervix causes local prostaglandin release
- 30% will go into spontaneous labour in <7 days, majority will have favourable cervix

Prostaglandins

- Gel/tablet (latter easier to remove) intravaginal to posterior fornix
- Increases vaginal delivery rates within 24hrs with no increase in operative delivery

Oxytocin

- Increases cervical prostaglandins and induces contractions
- Best used after SROM/ARM

ARM/Amniotomy

- Usually combined with oxytocin

Fetal Surveillance

Cardiotocography

Indications

- Maternal
  - Previous CS
  - Pre-eclampsia/prolonged pregnancy/PROM
  - IOL
  - APH
  - Diabetes/cardiac problems/other medical
- Fetal
  - IUGR, Oligohydramnios
  - Prematurity
  - Abnormal dopplers
  - Multiple pregnancy
  - Meconium-stained liquor
  - Breech presentation
- Intrapartum
  - Oxytocin
  - Epidural
  - Bleeding
  - Pyrexia >37.5°
  - Abnormal intermittent auscultation
  - Prolonged labour

Classification

	Baseline	Variability	Decelerations	Accelerations
Reassuring	110-160	>5	None	Present
Non-reassuring	100-109 160-180	<5 for >40 but <90mins	Early	
			Variable, present for 50% for <90mins	
			1 prolonged <3mins	
Pathological	<100 >180	<5 for >90mins	Atypical variable	
			Late, present for >50% for >30mins	
			1 prolonged >3mins	

- **Normal**: all 4 features reassuring
- **Suspicious**: 1 non-reassuring feature
- **Pathological**: 2 non-reassuring/1 abnormal feature
- Pathological trace indicates fetal blood sampling
- Can indicate immediate delivery
  - Eg. Bradycardia <80 for >3 minutes

Fetal Blood Sampling

- Obtained if trace is pathological
- Woman should be in left lateral position

Interpretation

- Normal: pH >7.25
  - Repeat in 1 hour if CTG remains pathological
- Borderline: pH 7.21-7.24
  - Repeat in 30 mins if CTG remains pathological
- Abnormal: pH <7.20
  - Immediate delivery

Meconium-Stained Liquor/MSAF

- Made up of water, bile pigment, mucous and amniotic fluid debris
- MSAF rare in preterm infants, associated with chorioamnionitis
- Incidence increases from 36-42wks

Meconium Aspiration Syndrome

- Respiratory distress in the newborn due to meconium in the trachea
- Up to 44% of babies born after 42wks
- Causes respiratory distress by:
  - Mechanically blocking the trachea
  - Chemical irritation causing pneumonitis and alveolar collapse
  - Predisposing to secondary bacterial infection

Classification

Grade 1/Light

- Meconium lightly stains copious amniotic fluid

Grade 2/Moderate

- Dark green staining of opalescent amniotic fluid

Grade 3/Thick

-

Management

- Immediate IOL if PPROM
- Continuous fetal monitoring
- Advanced neonatal support at birth

Episiotomy

- Use varies globally, evidence recommends restricted use

Indications

- Complicated vaginal delivery
  - Breech
  - Shoulder dystocia
  - Operational
- Extensive perineal scaring
  - FGM/previous tears
- Fetal distress
- Expectation of extensive perineal trauma

Complications

- Pain
- Bleeding/haematoma
- Infection
- Scarring & anatomical disruption
- Dyspareunia
- Fistula formation (very rare)

Perineal Tears

Risk Factors

- Nulliparity
- Forceps
- Shoulder dystocia
- Macrosomia
- 2nd stage >1 hour
- Persistent OP position
- Midline episiotomy
- Epidural
- IOL

Types

1st Degree

- Superficial damage with no muscle involvement

2nd Degree

- Injury to the perineal muscle not involving anal sphincter

3rd Degree

- 3a: <50% of external anal sphincter torn
- 3b: >50% of external anal sphincter torn
- 3c: Internal anal sphincter torn

4th Degree

- Tear involves rectal mucosa

Management

- Rectal examination
- Suture repair ASAP
- Broad spectrum antibiotics
- Stool softener

Prognosis

- Incontinence can commonly last for 6wks
  - Specialist review if ongoing after 6wks
- 60-80% with 3rd/4th degree tears will be asymptomatic at 12 months
- Further repairs in future pregnancies may have worse outcomes

Complications

- Pain
- Bleeding/haematoma
- Infection
- Scarring & anatomical disruption
- Dyspareunia
- Fistula formation (very rare)

Instrumental Delivery

- Avoids perinatal & maternal morbidity & mortality associated with emergency CS

Indications

Maternal

- Exhaustion
- Prolonged 2nd stage
  - >1h of active pushing in multipara
  - >2h in primipara
- Medical indications for avoiding Valsalva
  - Severe cardiac disease
  - Hypertensive crisis
  - Uncorrected cerebrovascular malformations
- Pushing not possible (para/quadriplegia)

Fetal

- Fetal compromise
- Control delivery of head in breech

Types

Forceps

- Curved blades which grasp fetal head and allow traction to be applied along flexion point of head
- More likely to cause maternal perineal trauma
- Fetal injuries rare
  - Facial nerve palsy
  - Skull fractures
  - Orbital injury
  - Intracranial haemorrhage

Ventouse

- Negative pressure sucks scalp tissues into a vacuum cup
  - Creates artificial caput – “chignon”
  - Traction applied
- Not used <34wks
- More likely to fail
- More likely to cause fetal trauma
  - Scalp lacerations
  - Cephalhaematoma
  - Retinal haemorrhage

Failure

Delivery by CS if:

- No evidence of progressive decent with each pull
- Delivery not imminent following 3 pulls (correctly applied, experienced operator)

Risk Factors for Failure

- BMI >30
- Macrosomia
- OP position
- Mid-cavity delivery

Caesarean Section

- Delivery of fetus through direct incision in abdominal wall & uterus

Indications

Category 1 (Immediate)

- Placental abruption with abnormal FHR/uterine irritability
- Cord prolapse
- Scar rupture
- Prolonged bradycardia
- Scalp pH <7.20

Category 2 (Urgent)

- Failure to progress with pathological CTG

Category 3 (Scheduled)

- Severe PET
- IUGR with poor fetal function tests
- Failed IOL

Category 4 (Elective)

- Breech with failed ECV
- Twins with non-cephalic first twin
- Maternal HIV
- Primary genital herpes in 3rd trimester
- Placental praevia
- Previous hysterostomy/classical CS

Types

Lower Uterine Segment (LUSCS)

- 99%
- Pfannensteil (horizontal, 2cm above symphysis pubis) or Joel-Cohen (horizontal, 3cm below ASIS) incisions

Classical

- Vertical incision in upper segment
- Rapid delivery and lower risk of bladder injury
- Higher risk of infection, adhesions, future pregnancy uterine rupture
- Performed in:
  - Uterine structural abnormaility/lower segment fibroids etc
  - Postmortem CS
  - Anterior placenta praevia
  - Very preterm fetus

Complications

Serious

- Maternal
  - Emergency hysterectomy
  - Further surgery/curettage
  - ICU admission
  - Thromboembolism
  - Bladder/ureteric injury
  - Death (1/12,000)
- Future pregnancies
  - Uterine rupture
  - Stillbirth
  - Placenta praevia/accrete

Frequent

- Maternal
  - Wound & abdominal discomfort (months)
  - Repeat CS in future pregnancies
  - Readmission
  - Haemorrhage
  - Infection
- Fetal
  - Lacerations (1-2/100)

Vaginal Birth After Caesarean (VBAC)

- Rupture still rare but risk increased
- Vaginal birth can usually be trialled with continuous fetal monitoring and ready access to theatre for emergency CS
- 70-75% successful

Contraindications

- Previous uterine rupture
- Previous Classical CS

Retained Placenta

- Not delivered by 30mins in actively managed 3rd stage/1 hour in physiologically managed 3rd stage

Management

- IV, FBC, cross match
- Convert to active if physiological
  - Uterotonics & cord traction
- If not effective within 30mins, MROP in theatre

Placenta Accreta

- Attachment of placenta to myometrium due to defective decidua basalis
- Risk of PPH

Risk Factors

- Previous CS
- Placenta praevia
- Repeated surgical TOP

Types

Placenta Accreta

- Chorionic villi attach to myometrium

Placenta Increta

- Chorionic villi invade through >50% of myometrium

Placenta Percreta

- Chorionic villi invade through perimetrium, potentially involving adjacent organs

Management

Heavy Bleeding

- Blood replacement
- Ballon tamponade
- Hysterectomy

Minimal Bleeding

- Can leave placenta in situ with close monitoring

Post-Partum Haemorrhage

Primary PPH

- Occurs within 24hrs
- 5-7% of deliveries

Causes

- Tone
  - Uterine atony
  - 90%
- Trauma
  - Tears, episotomy, rupture
  - 7%
- Tissue
  - Retained placenta
  - Abnormal placental site
- Thrombin (clotting problems)
  - PET, abruption, sepsis

Risk Factors

- Previous PPH
- Prolonged labour
- PET
- Increased maternal age
- Polyhydramnios
- Emergency CS
- Placenta praevia, accreta
- Macrosomia

Management

- ABCs
- Medical
  - IV oxytocin (syntocinon)
  - IM carboprost
- Surgical
  - Balloon tamponade
  - B-Lynch suture
  - Uterine/internal iliac artery ligation
  - Hysterectomy

Secondary PPH

- 24hrs to 12wks post-partum
  - Previously to 6wks
- Due to retained placental tissue or endometritis

Postnatal Care

Normal Postnatal Changes

Hormonal

- βhCG and Human Placental Lactogen should be undetectable by day 10
- Oestrogen and progesterone levels normal by day 7

Genital Tract

Uterus

- Weight 1000g post-delivery
- 500g after 1wk
- Returned to pelvis & not palpable by 2wks

Vagina

- Fragile for 1-2wks
- Oedematous for up to 4wks

Cervix

- ~1cm by day 10-14

Perineum

- Oedema persists for a few days
  - Longer with prolonged 2nd stage/instrumental delivery/tears

Lochia

- Necrotic decidual layer mixed with blood
- Lasts until 3-6wks
- Red (lochia rubra) → paler (lochia serosa) → yellow/white (lochia alba)

Breasts

- Larger & more vascular from day 2-4

Cardiovascular System

- Plasma volume (↑40% in pregnancy) decreases by diuresis, normal by 2-3wks

Major Postnatal Problems

- Three major causes of morbidity in the postnatal period

Secondary PPH

- 24hrs to 12wks post-partum
  - Previously to 6wks
- Due to retained placental tissue or endometritis
- Management depends on cause

VTE

- Puereral period is a significant risk factor
- High level of suspicion for symptoms of DVT or PE

Puerperal Pyrexia

- Temperature >38° in 14 days following delivery

Causes

- Endometritis (most common)
- Wound infection (perineal/CS)
- UTI
- Mastitis/breast abscess
- VTE/thrombophlebitis

Management

- Depends on cause
- Supportive
  - Analgaesics & anti-inflammatories
  - Wound care
  - Ice packs for perineum/mastitis
- Medical
  - IV antibiotics if endometritis suspected
    - Clindamycin & gentamycin until fever-free for 24hrs
  - Avoid tetracyclines if breastfeeding
- Surgical
  - Incision & drainage of breast abscess
  - Secondary repair of wound dehiscence
  - Drainage of pelvic haematoma/abscess

Breast Feeding

Colostrum

- Thick yellow fluid produced from 20wks gestation
- Rich in proteins, important for gut maturation and immunity
- Produced in small quantities after birth

Initiation

- Skin-skin contact should be started ASAP after delivery
- Early contact increases breast feeding within first two hours and frequency of breast feeding

Frequency

- Demand feeding should be encouraged
  - Less weight loss in immediate post-partum period
  - Increased duration subsequently
- Frequent feeding associated with less neonatal hyperbilirubinaemia
- Median 8 times/day
- Infrequent in first 24-48hrs
- Frequency peaks after ~5 days
- WHO recommends exclusive breast feeding for first 4-6 months

Benefits

For the infant

- Less GI illness
- Less infection risk (UTI, respiratory)
- Less atopic illness
- Less risk of childhood leukaemia/Hodgkin's disease/neuroblastoma

For the mother

- Helps uterine involution & decreases PPH risk
- Lactational amenorrhoea
  - 99% effective as contraception for 6 months
  - 97% at 12 months
- Protective against premenopausal breast cancer, ovarian cancer, osteoporosis

Problems

Inadequate Milk Supply

- <1% of women
- Management:
  - Adequate fluids, nutrition, secure and private environment
  - Dopamine agonists, thyrotropin-releasing hormone, oxytocin

Mastitis

- May be caused by obstruction & accumulation of milk (non-infective) or bacteria (infective, most commonly S. aureus)
- Presents with:
  - Unilateral breast pain & tenderness
  - Focal erythema
  - Local warmth & inflammation
  - Nipple discharge
  - Fever
- Conservative management:
  - Continued breastfeeding, expression, massage
  - Heat packs, warm showers, simple analgesia
- Antibiotic management
  - Flucloxacillin 1st line
  - Erythromycin if allergic
- Breast abscess is a rare complication & may require surgical incision & drainage

Candida of the Nipple

- Can occur after antibiotic use & lead to recurrent mastitis
- Associated with oral candidiasis & nappy rash in the infant
- Presents with:
  - Bilateral sore nipples after feeding
  - Tenderness & itching
  - Cracked/flaky/shiny areola
- Management
  - Topical miconazole after each feed
  - Miconazole/nystatin for the infant

Post-Partum Endometritis

- More common after caesarean section
- Caused by a wide range of organisms including sexually transmitted infection

Presentation

- Shortly after birth up to several weeks post-partum

Features

- Foul-smelling discharge/lochia
- Bleeding that gets heavier/does not improve
- Lower abdominal/pelvic pain
- Fever
- Sepsis

Investigations

- Vaginal swabs
- Urine culture & sensitivities
- USS to rule out retained products of conception

Management

- Oral broad spectrum antibiotics if mild
- Sepsis 6 if septic

Post-Partum Anaemia

- Haemoglobin < 100 g/L in the post-partum period
- Common due to perinatal blood loss

Investigation

- FBC if:
  - PPH over 500ml
  - Caesarean section
  - Antenatal anaemia
  - Symptoms of anaemia

Management

Oral Iron

- Hb < 100g/L

Iron Infusion

- Considered in addition to oral iron if Hb < 90g/L
- Also if:
  - Oral iron not adhered to/tolerated
  - Failure to respond to oral iron
  - Inability to absorb oral iron
- Caution in allergy/asthma
- Cannot be given during acute infection

Blood Transfusion

- Consider in addition to oral iron if Hb < 70g/L

Post-Partum Thyroiditis

- Changes to thyroid function (hypo/hyper) within 12 months of delivery
- Majority of women will regain normal thyroid function, but high recurrence rate in future pregnancies
- Anti-TPO antibodies in 90%

Typical Stages

1. Thyrotoxicosis in first 3 months
2. Hypothyroid from 3-6 months
3. Function gradually returns to normal

Investigations

- Low threshold if symptomatic
- TFTs 6-8wks after delivery

Management

- Abnormal TFTs warrant referral to an endocrinologist

Thyrotoxicosis

- Symptomatic control only (propranolol)

Hypothyroidism

- Levothyroxine

Monitoring

- Treatment stopped when TFTs return to normal
- Annual monitoring of TFTs

Sheehan's Syndrome

- Avascular necrosis of the anterior pituitary due to reduced circulating volume following a PPH
  - Hypothalamo-hypophyseal portal system which supplies the anterior pituitary is low-pressure and susceptible to sudden drops in blood pressure

Presentation (loss of hormones)

Prolactin

- Reduced lactation

FSH & LH

- Amenorrhoea

ACTH

- Adrenal insufficiency/crisis

TSH

- Hypothyroidism

Management

Hormone Replacement

- Oestrogen & progesterone
- Hydrocortisone
- Levothyroxine
- Growth hormone

Post-Natal Depression

Baby Blues

- Affects 50% of women, particularly first-time mothers
- Evident by 3rd day, peaks at 5th day, resolves by 10th day

Causes

- Significant hormonal changes
- Recovery from birth
- Fatigue & sleep deprivation
- New responsibility
- Establishing feeding
- Associated major life changes

Features

- Mood swings & low mood
- Irritability
- Anxiety
- Tearfulness

Management

- Reassurance only

Post-Natal Depression

- Occurs in 5-10% & can last months if not treated
- Typically ~ 3 months after birth

Features

- Typical features of depression
  - Low mood
  - Anhedonia
  - Low energy
- Fears about babies health & maternal shortcomings
- Marital tension & loss of sexual interest

Edinburgh Post-Natal Depression Scale

- 10 questions for a score out of 30
- Score 10 or more indicates post-natal depression

Management

- Mild cases: support & self-help
- Moderate cases: antidepressants (SSRIs) & CBT
- Severe cases: Specialist input & rarely inpatient care

Puerperal Psychosis

- 1/1,000 births
- Typically presents within 2 weeks

Features

- Delusions
- Hallucinations
- Depression
- Thought disorder
- Mania
- Confusion

Management

- Specialist input & admission
- CBT
- Antipsychotics/antidepressants/mood stabilisers

Obstetric Emergencies

Sudden Maternal Collapse

Causes

Obstetric

- Massive obstetric haemorrhage
- Severe PET with intracranial bleeding
- Eclampsia
- Amniotic fluid embolism
- Neurogenic shock due to uterine inversion
- Severe sepsis (eg from chorioamnionitis)

Medical/Surgical

- Massive PE
- Cardiac failure
  - Pre-existing
  - MI
- Shock
  - Anaphylactic
  - Septic
- Seizure
- Intra-abdominal bleeding
- Overdose/substance abuse
- Intracerebral pathology

Management

- ABC & CPR as appropriate
- If CPR is required > 20 wks, immediate CS is indicated
- If CPR is not required/there is immediate reversal, fetal wellbeing is assessed once mother is stable

Specific Investigations

- ECG, CXR, ABG if cardiorespiratory cause suspected
- V/Q scan and calf vein doppler if PE suspected
- CT/MRI if intracranial pathology suspected

Shoulder Dystocia

- A delivery in which additional manoeuvres are required to deliver the fetus after normal gentle downward traction has failed, after successful delivery of the head
- Impaction of anterior shoulder against symphysis pubis due to failure of internal rotation of the shoulders
- Rapid fetal deterioration due to cord compression & trauma

Complications

- Fetal hypoxia & cerebral palsy
- Brachial plexus injury & Erb's palsy
- Fracture of clavicle/humerous
- Intracranial haemorrhage
- Cervical spine injury
- Fetal death (rare)
- PPH

Risk Factors

- Previous history
- Fetal macrosomia & maternal diabetes mellitus
- Post-term pregnancy
- BMI > 30/excessive weight gain in pregnancy

Management

Call For Help

- Senior obstetrics, paediatrics, anaesthetics

Episiotomy

- Not always necessary

McRoberts' Manoeuvre

- Hyperflexion of maternal hips with thigh abduction & external rotation
- Provides posterior pelvic tilt

Suprapubic Pressure

- Puts pressure on the babies anterior shoulder to push it under the symphysis pubis
- 80% will deliver with McRoberts' manoeuvre & suprapubic pressure

Rubin II Manoeuvre

- Internal manoeuvre – pressure on posterior aspect of anterior shoulder

Woods' Screw

- In combination with Rubin II
- Pressure on anterior aspect of posterior shoulder to rotate baby into larger oblique diameter
- May be tired in the other direction if unsuccessful

Delivery of Posterior Arm

- Flexing elbow & sweeping arm across fetal face & chest

Gaskin Manoeuvre

- Rolling onto "all 4s"

Zanvalleni Manoeuvre

- Pushing head back in for emergency caesarean

Massive Obstetric Haemorrhage

- Loss of 40% of circulating volume
- Due to hypovolaemia or (rarely) direct coagulopathy

Consequences

- Acute hypovolaemia & shock
- DIC
- Pulmonary oedema (iatrogenic from fluid replacement)
- Transfusion reaction
- ARDS
- Sheehan's Syndrome

Causes

Antepartum

- Placental abruption
- Placenta praevia
- Severe chorioamnionitis/sepsis
- Severe pre-eclampsia
- Retained dead fetus

Intrapartum

- Intrapartum abruption
- Uterine rupture
- Amniotic fluid embolism
- Adherent placenta

Postpartum

- Primary
  - Atony
  - Trauma
  - Coagulopathy
  - Retained products of conception
- Secondary
  - Infection
  - Rarely GTD

Disseminated Intravascular Coagulopathy

- Main obstetric cause is massive blood loss but can also be caused by amniotic fluid embolism
- Due to loss of coagulation factors & platelets, further dilution by fluid resuscitation, & triggering by hypotension-mediated endothelial cell injury

Investigation

- D-dimers, fibrinogen, PT, APTT

Management

- FFP – 1 unit with each unit of rapidly transfused blood
- Cryoprecipitate
- Platelet concentrate (may be required if surgical intervention required)

Management

- Resuscitation, ABC, transfusion & clotting factors, transfer to theatre
  - Left lateral tilt position if antepartum
- Empty uterus
  - Deliver fetus
  - Remove placenta/retained tissue
- Massage uterus
- Uterotonics
  - Oxytocin
  - Ergometrine
  - Misoprostol
  - Carboprost
- Bimanual compression
- Repair any genital tract trauma
- Uterine balloon tamponade
- Laparotomy
  - B-Lynch/vertical compression suture
  - Internal iliac/uterine artery ligation
  - Embolization helpful but not always available in emergencies
  - Total/subtotal hysterectomy

VTE in Pregnancy

Risk Factors

- **Previous VTE**
- Age > 35
- BMI > 30
- Parity > 3
- Smoker
- Gross varicose veins
- Current PET
- Immobility
- Family history of unprovoked VTE
- Low risk thrombophilia
- Multiple pregnancy
- IVF pregnancy

Thromboprophylaxis

Previous VTE/Hospitalisation/Surgery/High-Risk Thrombophilia

- LMWH antenatal & 6wks postpartum

4+ Other Risk Factors

- LMWH antenatally & 6wks postpartum

3+ Other Risk Factors

- LMWH from 28wks until 6wks postpartum

Presentation

Deep Vein Thrombosis

- Calf/leg swelling
  - Circumference difference of > 3cm below tibial tuberosities is significant
- Dilated superficial veins
- Calf tenderness
- Oedema
- Colour changes

Pulmonary Embolism

- Dyspnoea
- Haemoptysis
- Pleuritic pain
- Fever
- Hypoxia
- Tachycardia
- Raised respiratory rate
- Raised JVP
- Haemodynamic instability

Investigation

- Wells score & D-dimers not useful in pregnancy
- CXR & ECG if PE suspected

Doppler Ultrasound

- If suspected DVT/DVT & PE
- Repeat negative tests at day 3 & 7
- If positive, no confirmation of PE is needed as the treatment is the same

V/Q Scan

- Can be preferred in pregnancy due to decreased radiation dose to sensitive breast tissue
- Increased radiation dose to fetus

CTPA

- Investigation of choice if CXR is abnormal

Management

- LMWH started immediately on clinical basis & can be stopped if tests are negative
- LMWH continued until 6wks postpartum
  - Option to switch to oral anticoagulation after delivery

Massive PE/Haemodynamically Unstable

- Unfractionated heparin
- Thrombolysis
- Surgical embolectomy

Amniotic Fluid Embolism

- Rare & unpredictable but severe & life threatening
- Amniotic fluid passes into maternal circulation & causes massive immune reaction (to fetal material)

Risk Factors

- Multiple pregnancy
- Increasing maternal age
- Caesarean/instrumental delivery
- Induction of labour
- Eclampsia
- Polyhydramnios

Timing

- With spontaneous/artificial membrane rupture (70%)
- At CS (19%)
- During/within 48hrs of delivery (11%)

Presentation

- Hypoxia, dyspnoea, respiratory arrest
- Hypotension
- Tachycardia
- Haemorrhage
- DIC
  - 12% at presentation but virtually all within 4hrs
- Seizures
- Confusion
- Cardiac arrest

Management

- Supportive with senior help from obstetrics, medics, anaesthetics, intensive care & haematologists
- CPR if necessary
- Oxygen
- Fluid resuscitation
- Vasopressors
- Manage DIC
- Continuous fetal monitoring if not already delivered

Uterine Inversion

- Fundus drops through uterine cavity & cervix
- **Incomplete:** Fundus drops to above introitus of vagina
- **Complete:** Fundus drops to below introitus of vagina

Risk Factors

- Excessive cord traction & fundal pressure during active management of the 3rd stage
- Adherent placenta
- Fundal implantation of the placenta
- Previous uterine inversion

Presentation

- PPH
- Shock out of proportion to visible loss (neurogenic)
- Inverted uterus may be seen/felt

Management

- ABC resuscitation

Johnson Manoeuvre

- Fundus pushed up with palm of hand
  - Will need to be held for several minutes
  - Uterotonics may be used once in place

Hydrostatic Method (O' Sullivan's Manoeuvre)

- Warm saline infused with vaginal introitus sealed with hand/ventouse cup
- Seal can be challenging
- Requires exclusion of uterine rupture

Surgery

- Laparotomy & repair

Uterine Rupture

- **Uterine Dehiscence:** Perimetrium remains intact
- **Uterine Rupture:** All layers torn & uterine contents expelled into peritoneal cavity

Risk Factors

- **Previous CS/Uterine Surgery**
- VBAC
- Increased BMI, increased age, high parity
- IOL & use of uterotonics

Presentation

- Abdominal pain
- PV bleeding
- Ceasing of contractions
- Hypotension, tachycardia, collapse

Management

- ABC resuscitation
- Emergency CS & surgical repair/removal of uterus

Cord Prolapse

- Umbilical cord descends ahead of the presenting part, resulting in compression/vasospasm & fetal hypoxia

Risk Factors

- **Unstable/transverse/oblique lie at 37wks**
- High fetal station
- Polyhydramnios
- Multiple pregnancy
- High parity
- Prematurity

Diagnosis

- CTG signs of fetal distress & prolapsed cord visualised on vaginal exam

Management

- Emergency Caesarean
- While waiting:
  - Cord should not be pushed back in/handled at all due to risk of vasospasm
    - Should be kept as warm & wet as possible
  - Presenting part can be pushed up to prevent compression
  - Maternal left lateral or knee-chest position to use gravity to draw fetus away from pelvis
  - Tocolytics can be used

Contraception

Basics

Efficacy

- 99% effective means that if an average person uses a method of contraception regularly with a single partner for 1 year, they have a 1% chance of becoming pregnant

Method	Perfect Use	Typical Use
Natural Family Planning	95 – 99.6%	76%
Condoms	98%	82%
Combined oral contraceptive pill	> 99%	91%
Progestogen-only pill	> 99%	91%
Progestogen-only injection	> 99%	94%
Progestogen-only implant	> 99%	> 99%
Coils (i.e. copper coil or Mirena)	> 99%	> 99%
Surgery (i.e. sterilisation or vasectomy)	> 99%	> 99%

Older Women

- After the last period, contraception is required for 2 years in women under 50 and for 1 year in women over 50
- HRT does not prevent pregnancy & contraception is required
- COCP can be used up to 50 years & can treat perimenopausal symptoms
- Progesterone injections should be stopped before 50 due to risk of osteoporosis
- Women who are amenorrhoeic & taking progesterone-only contraception should continue until:
  - 1 year after 2 FSH blood levels > 30IU/L 6 weeks apart OR
  - 55 years of age

Contraception After Childbirth

- Women are considered fertile & need contraception from 21 days postpartum
- Lactational breastfeeding is 98% effective
  - Must be fully breastfeeding & amenorrhoeic
- Progesterone-only pill & implant are safe in breastfeeding
- COCP should be avoided in breastfeeding and until 6wks postpartum
- Coils can be inserted either 48hrs or 6wks postpartum, not between

Barrier Contraception

- Physical barrier to semen entering the uterus
- Only methods which prevent STIs (not 100% effective)

Condoms

- 98% effective with perfect use
- Generally made of latex
  - Susceptible to tearing if used with oil-based lubricants
- Polyurethane condoms available in latex allergy

Diaphragms/Cervical Caps

- Fit in place before sex & left for 6 hours after
- Used with spermicide gel for optimal efficacy
  - 95% with perfect use
- No protection against STIs

Dental Dams

- Barrier to prevent STI transmission during oral sex
- Prevent transmission of:
  - Gonorrhoea
  - Chlamydia
  - HSV-1 & -2
  - HPV
  - E. coli
  - Pubic lice
  - Syphilis
  - HIV

Combined Oral Contraceptive Pill

- Can be used by women up to 50
- Should be stopped 4 weeks before major operation/any procedure requiring lower limb immobilisation

Contraceptive Mechanism

- **Prevents ovulation** via negative feedback of FSH & LH
- Progesterone thickens cervical mucous
- Progesterone inhibits endometrial proliferation

Menstruation/Bleeding

- Endometrium is maintained in a steady state & sheds when pill is withdrawn – withdrawal bleed
- Bleeding can occur with extended use without a pill-free period – breakthrough bleed

Types

- **Monophasic:** same amount of each hormone in each pill
- **Multiphasic:** varying amounts of hormones to match normal cycle

Formulations

- Each contain **ethinylestradiol** (oestrogen) and a synthetic progestogen:

Pill	Progestogen	Notes
Microlite	Levonorgestrel	1st Line due to lower VTE risk
Yasmin	Drospirenone	1st line to treat premenstrual symptoms
Dianette	Cyproterone acetate	Used for 3 month periods to treat acne/hirsutism (anti-androgenic)

Regimes

- 21 days on/7 days off
- 63 days on/7 days off (tricycling)
- Continuous use with no pill-free period

Benefits

- Effective contraception
- Rapid return of fertility after stopping
- Improvement in premenstrual symptoms, menorrhagia, & dysmenorrhoea
- Reduced risk of endometrial, oviarian, & colon cancer
- Reduced risk of benign ovarian cysts

Side Effects/Risks

- Unscheduled bleeding in first 3 months
- Breast pain & tenderness
- Mood changes & depression
- Headaches
- Hypertension
- VTE risk (lower than pregnancy)
- Small risk of breast & cervical cancer
- Small risk of MI & stroke

Contraindications

- Uncontrolled hypertension
- Migraine with aura
- History of VTE
- Aged < 35 & smoking < 15 cigarettes per day
- BMI > 35
- Major surgery with prolonged immobility
- Vascular disease/stroke
- IHD/cardiomyopathy/atrial fibrillation
- Liver cirrhosis/liver tumours
- SLE/antiphospholipid syndrome

Starting

- No additional contraception required if started before day 5 of menstrual cycle
- 7 days of additional contraception required if starting after day 5

Switching

- To another COCP: start new pack immediately on finishing the previous pack
- From POP: 7 days of additional contraception are required
- From desogestrel: no additional contraception is required

Missed Pill

- A day of vomiting is also counted as a missed pill

Missed 1 Pill (< 72hrs since last pill)

- Take missed pill immediately, even if this means 2 in one day
- No extra protection required

Missed > 1 Pill (> 72hrs since last pill)

- Take most recent missed pill immediately, even if this means 2 in one day
- Additional contraception needed until 7 days of no missed pills
- **If day 1-7:** Emergency contraception needed if they have had unprotected sex
- **If day 8-14:** No emergency contraception required
- **If day 14-21:** No emergency contraception required & skip pill-free period

Progesterone Only Pill

Types/Regime

- **Traditional:** Noriday
- **Desogestrel-only:** Cerazette
- Taken continuously with no pill-free period

Contraceptive Mechanism

Traditional

- Thickens cervical mucous
- Alters endometrium (less suited for implantation)
- Reduces ciliary action in fallopian tubes

Desogestrel

- **Inhibits ovulation**
- Thickens cervical mucous
- Alters endometrium (less suited for implantation)
- Reduces ciliary action in fallopian tubes

Side Effects/Risks

- Unscheduled bleeding common in first 3 months
  - Amenorrhoea 20%
  - Normal bleeding 40%
  - Irregular/prolonged/troublesome bleeding (40%)
- Breast tenderness
- Headaches
- Acne
- Ectopic pregnancy (traditional only)
- Small increased risk of breast cancer

Contraindication

- Active breast cancer

Starting

- No additional protection required if started before day 5
- Additional contraception required for 48hrs if started after day 5

Switching

- From another POP: no additional protection required
- From COCP:
  - No additional protection in pill free period
  - 48hrs additional protection if outside pill-free period & no sex since completing last pack
  - If outside pill-free period & they have had sex since completing last pack, 7 consecutive days of COCP or emergency contraception before changing (+48hrs additional protection)

Missed Pill

- Traditional: > 3hrs late
- Desogestrel: > 12hrs late
- Take missed pill & additional protection for 48hrs
  - Emergency contraception if they have had unprotected sex in this period

Progesterone Only Injection

- Depo-provera (depot medroxyprogesterone actate – DMPA)
- 12-13 weekly IM injection
- May take 12 months for fertility to returns

Contraceptive Mechanism

- Inhibits ovulation via FSH release inhibition
- Thickens cervical mucous
- Alters endometrium (less suited for implantation)

Benefits

- Improves dysmenorrhoea
- Improves endometriosis symptoms
- Reduces risk of endometrial & ovarian cancer

Side Effects/Risks

Problematic Bleeding

- Irregular, particularly in first 6 months
  - COCP can be taken for 3 months until bleeding settles
- Amenorrhoea typically occurs with time, prolonged irregular bleeding may need investigation

Others

- Osteoporosis
- Weight gain
- Acne
- Reduced libido
- Mood changes
- Headache
- Flushing
- Alopecia
- Skin reactions at injection sites
- Slightly increased risk of breast & cervical cancer

Contraindications

- Active breast cancer
- IHD/stroke
- Unexplained PV bleeding
- Cirrhosis/liver cancer

Timing

- Starting on day 1-5 gives immediate protection
- Starting after day 5 requires 7 days of additional protection
- Injections every 12-13 weeks – any longer risks pregnancy

Progesterone Only Implant

- Plastic rod placed between skin & subcutaneous fat
- Lasts 3 years – 99% effective once implanted
- Implanon – contains etonogestrel

Contraceptive Mechanism

- Inhibits ovulation
- Thickens cervical mucous
- Alters endometrium (less suited for implantation)

Benefits

- Reliable once implanted
- Improves dysmenorrhoea
  - Can make periods lighter/stop
- No weight gain (unlike depo injection)
- No effect on bone density (unlike depo injection)
- No increased thrombosis risk (unlike COCP)
- No restrictions for use in obese patients (unlike COCP)

Drawbacks

- Requires operation with local anaesthetic
- Can worsen acne
- Can cause problematic bleeding
- Implants can be bent/fractures
- Implants can become impalpable leading to investigations & additional management

Bleeding Pattern

- 1/3 have infrequent bleeding
- 1/4 have frequent/prolonged bleeding
- 1/5 have no bleeding
- Remainder have normal bleeds

Insertion/Removal

- Insertion before day 5 requires no additional protection
- Insertion after day 5 requires 7 days of additional protections
- Inserted & removed under local anaesthetic
- Should be immediately palpable under skin after insertion
- Additional protection required immediately after removal

Coils

- Forms of long acting reversible contraception (LARC)

Contraindications

- PID/infection
- Immunosuppression
- Pregnancy
- Unexplained bleeding
- Pelvic cancer
- Uterine cavity abnormality (eg fibroids)

Insertion

- STI screening is performed first in those at risk (eg under 25)
- Bimanual exam performed for size & position of uterus
- Specialised insertion equipment is used
- BP & HR measured before & after

Risks

- Crampy pain
  - NSAIDs help
- Non-visible threads
  - Need follow up to check threads after 3-6 weeks
- Bleeding
- Vasovagal reactions
- Uterine perforation (1/1,000)
- PID

Removal

- Abstinence from sex/additional protection needed for 7 days prior to removal

Non-Visible Threads

- Three things need excluding:
  - Perforation
  - Pregnancy
  - Expulsion
- Additional protection required until coil is located

Investigation

- Ultrasound is 1st line
- Abdominal & pelvic x-ray to locate coil in peritoneum if uterus has perforated

Management

- Hysteroscopy/laparoscopic surgery depending on location

Copper Coil (IUD)

Mechanism

- Copper is toxic to sperm & ova
- Alters endometrium (less suited for implantation)

Benefits/Uses

- Reliable & long lasting (5-10 years)
- Can be used as emergency contraception (up to 5 days after unprotected sex)
- Effective when inserted at any time of cycle
- No hormone effects (VTE, cancer risks, etc)
- May reduce risk of endometrial/cervical cancer

Drawbacks/Contraindications

- Contraindicated in Wilson's disease
- Procedure required for insertion & removal
- Can cause heavy/intermenstrual bleeding (usually settles)
- May cause pelvic pain
- Increased risk of ectopic pregnancy
- Can occasionally fall out (5%)

Levonorgestrel IUS (Mirena)

Mechanism

- Local levonorgestrel release
  - Thickens cervical mucous
  - Alters endometrium (less suited for implantation)
  - Inhibits ovulation in some women
- No additional protection needed if inserted before day 7
- Additional protection for 7 days if inserted after day 7

Benefits

- Reliable contraception for 5 years
- Can make periods lighter/stop
- May improve pelvic pain/dysmenorrhoea related to endometriosis
- No effect on bone density (unlike depo injection)
- No increased thrombosis risk (unlike COCP)
- No restrictions for use in obese patients (unlike COCP)
- Additional uses (HRT, menorrhagia)

Drawbacks

- Procedure required for insertion & removal
- Can cause heavy/intermenstrual bleeding (usually settles)
- May cause pelvic pain
- Increased risk of ectopic pregnancy, ovarian cysts
- Systemic absorption can cause acne, headaches, breast tenderness
- Can occasionally fall out (5%)

Problematic Bleeding

- Common, especially in first 6 months
- May need investigation if persistent
- COCP can be prescribed for 3 months

Emergency Contraception

Copper IUD

- Most effective emergency contraception
- Can be inserted up to 5 days after unprotected sex/5 days after earliest estimated ovulation date

Benefits

- 99% effective
- Not affected by BMI, enzyme inducing drugs or malabsorption
- Can be left in as long term contraception (or removed after next period at the earliest)

Drawbacks

- Risk of PID, especially in those at high risk of STIs
  - Empirical treatment may be given

Levonorgestrel

- Can be taken up to 72hrs after unprotected sex
- 1.5mg single dose (or 3mg single dose in women > 70kg/BMI > 26)

Benefits

- Not harmful to pregnancy if it does occur
- COCP/POP can be started immediately after taking

Side Effects

- Vomiting
  - Repeat dose is recommended if vomiting within 3 hours of firt dose
- Spotting & changes to next period
- Diarrhoea
- Breast tenderness
- Dizziness
- Mood changes

Ulipristal (EllaOne)

- Selective progesterone receptor modulator
- Can be taken up to 120hrs after unprotected sex
- 30mg single dose
- Must wait 5 days before starting COCP/POP

Benefits

- More effective than levonorgestrel
- Not harmful to pregnancy if it does occur (limited data)

Side Effects

- Vomiting
  - Repeat dose is recommended if vomiting within 3 hours of firt dose
- Spotting & changes to next period
- Abdominal/pelvic pain
- Back pain
- Headache
- Breast tenderness
- Dizziness
- Mood changes

Sterilisation

Tubal Occlusion

- Performed laparoscopically under general anaesthetic (elective) or during caesarean section
- Tubes are tied with Filshie clips
- 1/200 failure rate
- Additional protection required until next period

Vasectomy

- Cutting of vas deferens under local anaesthetic (takes 15-20 minutes)
- 1/2,000 failure rate
- Less invasive than female sterilisation & may be preferable to couple
- Alternative contraception required for 2 months after procedure & semen analysis required before procedure can be relied on
  - Typically done after 12 weeks

Fertility

Infertility

- Investigation & referral if a couple has been trying to conceive without success for 12 months
  - 6 months if the woman is over 35

Causes

- Male factor/sperm problems 30%
- Ovulation problems 25%
  - **Primary Ovarian Failure:**
    - Menopause
    - Premature ovarian failure
    - Turner's
    - Autoimmune
    - Surgery/chemotherapy
  - **Secondary Ovarian Failure:**
    - PCOS
    - Excessive weight loss/exercise
    - Hypopituitarism
    - Kallman's
    - Hyperprolactinaemia
- Tubal problems 15%
- Uterine problems 10%
- Unexplained 20%

General Advice

- Woman should be taking 400mcg folic acid daily
- Aim for healthy BMI
- Avoid smoking & excess alcohol
- Reduce stress as much as possible
- Aim for intercourse every 2-3 days
- Avoid timing intercourse
  - Leads to increased stress & pressure

Initial Investigations

- BMI
  - High may indicate PCOS
  - Low may indicate anovulation
- Chlamydia screening
- Semen analysis
- Female hormone testing
- Rubella immunity in the woman

Female Hormone Testing

- Serum LH & FSH on day 2-5
  - High FSH may indicate ovarian failure
  - High LH may indicate PCOS
- Serum progesterone 7 days before end of cycle
  - > 30 nmol/L indicates ovulation
- Anti-Mullerian hormone
  - High levels indicate good ovarian reserve & vice-versa
- TFTs if symptoms are suggestive
- Prolactin if symptoms of galactorrhoea or amenorrhoea

Hysterosalpingogram

- Investigation with apparent therapeutic benefit
- Contrast is injected into uterine cavity & fallopian tubes
- Tubal obstruction can be seen on x-ray
- Tubal cannulation can be performed to dilate tube
- Risk of infection
  - Screening for chlamydia & gonorrhoea
  - Prophylactic antibiotics

Laparoscopy & Dye Test

- Dye injected into uterus – if not seen entering & spilling out of tubes, indicated tubal obstruction
- Other pathology can also be treated (endometriosis, adhesions)

Management of Female Factor Infertility

Anovulation

- Weight loss can restore ovulation in overweight patients with PCOS
- Clomifene can stimulate ovulation
  - SERM
  - Given on days 2-6
  - Stops negative feedback of GnRH release by oestrogen
  - Letrozole is alternative
- Metformin can be used to stimulate ovulation, particularly if there obesity/PCOS/insulin insensitivity
- Gonadotropins may be used in women resistant to clomifene
- Ovarian drilling may be used in PCOS

Tubal Factors

- Cannulation during hysterosalpingogram
- Laparoscopy to remove adhesions/endometriosis
- IVF

Uterine Factors

- Surgical correction of polyps/adhesions/structural abnormalities

Male Factor Infertility

Semen Analysis

Sample Collection

- Abstain from ejaculation for at least 3 and no more than 7 days
- Avoid hot baths/saunas and tight underwear in lead up to providing sample
- Delivery to lab within 1 hour
- Keep warm

Results

Factor	Normal Results
Semen volume	> 1.5ml
Semen pH	> 7.2
Sperm concentration	> 15 million/ml
Total sperm count	> 39 million/sample
Motility	> 40% mobile
Vitality	> 58% active
Percentage of normal sperm	> 4%

- Oligospermia
  - Mild: 10-15 million/ml
  - Moderate: 5-10 million/ml
  - Severe: < 5 million/ml
  - Cryptozoospermia: < 1 million/ml
  - Azoospermia: absence

Causes of Reduced Sperm Number/Quality

Lifestyle

- Hot baths
- Tight underwear
- Smoking
- Alcohol
- Raised BMI
- Cafefine

Pre-Testicular (hypogonadotropic hypogonadism)

- Suppression of pituitary/hypothalamus
  - Stress
  - Chronic conditions
  - Hyperprolactinaemia
- Kallman's syndrome

Testicular

- Damage
  - Mumps
  - Undescended testes
  - Trauma
  - Cancer/chemotherapy/radiotherapy
- Congenital
  - Klinefelter syndrome
  - Y chromosome disorders
  - Sertoli-cell only syndrome
  - Anorchia

Post-Testicular

- Absence of vas deferens (CF)
- Damage from trauma/surgery/cancer/infection
- Retrograde ejaculation

Further Investigations

- Hormonal analysis
- Genetic testing
- Imaging
  - Transscrotal ultrasound
  - MRI
- Vasography
- Testicular biopsy

Management

- Surgical sperm retrieval
- Surgical correction of vas deferens obstruction
- Intrauterine insemination
- Intracytoplasmic sperm injection
  - Useful in motility issues & low sperm count
- Donor insemination

In-Vitro Fertilisation

Indications

- Tubal disease
- Male factor infertility
- Endometriosis
- Anovulation
- Unexplained infertility for > 2 years

Prognostic Factors

Good

- Age 25-35
- Previous pregnancy

Bad

- Long duration of infertility
- Previous failed IVF cycles
- Presence of hydrosalpinx/intramural fibroid
- Smoking
- Increased BMI

Process

Suppression of Ovulation

- GnRH agonist (goserelin) given in luteal phase (7 days before end of cycle)
  - Causes FSH & LH surge, negative feedback, & GnRH suppression
- OR GnRH antagonist (cetrorelix) given SC

Ovarian Stimulation

- SC FSH injections for 10-14 days (usually starting from day 2 of cycle)
- Development of follicles monitored with TVUS
- FSH stopped when follicles are ~18mm
- Follicle maturation induced with hCG injection ("trigger injection") 36 hours before collection

Oocyte Collection

- Follicular fluid & oocytes aspirated by transvaginal needle with TVUS guidance
- Under sedation

Oocyte Insemination

- Sperm sample & eggs mixed in culture medium
- Intracytoplasmic sperm injection used here if there is a component of male factor infertility

Embryo Culture

- Fertilised eggs are incubated for 2-5 days & monitored until blastocyst stage (day 5)

Embryo Transfer

- Highest quality embryos selected
- Catheter insertion through cervix to uterus
- Single embryo is injected (2 in women > 35)
- Remaining embryos can be frozen for future attempts

Pregnancy

- Test around 16 days after egg collection
  - +ve test indicated implantation but miscarriage/ectopic pregnancy is still possible
- Progesterone suppositories until 8-1wks

Ovarian Hyperstimulation Syndrome

- Affects up to 1/3 of women undergoing IVF
- Complication of hCG trigger injection in IVF ovarian stimulation step
- hCG stimulates VEGF release from granulosa cells of the multiple large follicles that have already been stimulated to grow
- VEGF increases vascular permeability & causes fluid shift from intra to extravascular space
  - Oedema
  - Ascites
  - Hypovolaemia
  - RAAS activation
    - Renin level corresponds with severity of condition

Risk Factors

- Younger age
- Low BMI
- Raised anti-Mullerian hormone
- Higher antral follicle count
- PCOS
- Raised oestrogen levels during ovarian stimulation

Prevention

- Monitoring of serum oestrogen & number of follicles on ultrasound
- High-risk women:
  - Use of GnRH antagonist protocol
  - Lower doses (of gonadotropins & hCG)
  - Alternative to hCG (GnRH agonist/LH)

Features/Classification

Mild

- Abdominal pain & bloating

Moderate

- Nausea & vomiting with ascites on ultrasound

Severe

- Visible ascites
- Oliguria
- Low serum albumin
- High potassium
- Raised haematocrit (> 45%)

Critical

- Tense ascites
- Anuria
- Thromboembolism
- ARDS

Management

- Supportive (fluids, monitoring of UO)
- LMWH
- Ascitic fluid removal
- IV colloid if needed

Disorders of Gynaecological Anatomy/Development

Female Genital Mutilation

- Partial or total removal of part/all of the female external genitalia or other injury to the female genitalia for non-medical reasons
- Illegal in Ireland – also illegal to take a girl to another country to perform FGM
- Typically occurs before 14
- Women in Ireland who have received FGM are most commonly from:
  - Egypt
  - Somalia
  - Sudan
  - Ethiopia
  - Kenya
  - Nigeria

Classification (WHO)

I: Partial/total removal of clitoris (clitoridectomy)
II: Partial/total removal of clitoris & labia minora, with or without excision of labia majora
III: Narrowing of vaginal orifice by cutting/apposition of labia minora/majora (infibulation)
IV: All other harmful procedures

Complications

Immediate

- Death
- Shock & pain
- Haemorrhage
- Infection including sepsis
- Adjacent organ damage
- Acute urinary retention

Long Term

- Failure of healing
- Recurrent UTI & renal/bladder calculi
- Pelvic infections & abscess formation
- Sexual dysfunction
- Urethral obstruction & difficulty passing urine
- Menstrual abnormalities & associated infertility

Management

- All cases in girls under 18 need to be reported (Gardaí)
- Suspicion of risk of FGM to a child (including those not yet born) should be reported (Gardaí/Tusla)
- De-infundibulation may be performed electively or during labour

Congenital Structural Abnormalities

- Caused by failure of the paramesonephric/Mullerian ducts (which give rise to upper vagina, cervix, uterus & fallopian tubes) to form, fuse together in the midline, or fuse with the urogenital sinus
- Anti-Mullerian hormone is produced in the male fetus causing the Mullerian ducts to disappear
- Up to 3% incidence
- 40% co-existence with renal or urinary tract anomalies

Aetiologies

Failure of Mullerian ducts to form

- Rokitansky Syndrome

Failure to fuse together properly

- Longitudinal vaginal septae
- Bicornate uterus
- Uterus didelphys

Failure to fuse with urogenital sinus

- Transverse vaginal septae

Presentation

Rokitansky

- Normal secondary sexual characteristics
- Primary amenorrhoea
- Blind-ending or absent vagina

Transverse Vaginal Septum

- Primary amenorrhoea with cyclical pain
- Possible abdominal mass
- Endometriosis due to retrograde menstruation

Longitudinal Vaginal Septum

- Dyspareunia alone if no obstruction
- Increasing cyclical pain, possible abdominal mass & endometriosis if one hemi-vagina is blocked

Uterine Abnormalities

- Often asymptomatic & noted during CS
- Primary infertility/recurrent miscarriage/preterm labour/abnormal lie

Management

Imperforate Hymen

- Cruciate incision

Vaginal Septae

- Surgical removal

Rokitansky

- Vaginal dilatation 1st line
- Surgical vaginoplasty

Obstructive Uterine Anomalies

- Surgical removal

Disorders of Sex Development Classified By Karyotype

46XX

- Congenital adrenal hyperplasia
- Ovo-testicular DSD
  - Previously called true hermaphrodism
  - Can also be 46XXY
- Female pseudohermaphrodism
  - Individual has ovaries but external genitalia are male (virilised) or ambiguous
  - May be secondary to CAH
- Placental aromatase deficiency

46XY

- Androgen insensitivity syndrome
- 5α-reductase deficiency
- Male pseudohermaphrodism
  - Individual has testes but external genitalia are female or ambiguous
  - May be secondary to AIS
- Swyer syndrome (pure gonadal dysgenesis)
- Partial gonadal dysgenesis
- Leydig cell hypoplasia

Abnormal Karyotype

- Turner syndrome (45XO)
  - Aneuploidy or mosaicism
  - XO/XY mixed gonadal dysgenesis

Androgen Insensitivity Syndrome

- Failure of end-tissues to respond to testosterone in genetically male embryo (complete)
  - Testes develop but Wolffian structures do not (female external genitalia remain)
  - AMH is secreted by testes causing regression of Mullerian ducts (female internal genitalia are absent)
  - Normal breast & secondary characteristic development in puberty due to conversion of testosterone to oestrogen by peripheral aromatase
- Most common cause of under-masculinisation of genetic males
- Can be complete or partial
  - Partial can range from ambiguous genitalia to simple hypospadias

Features/Presentation

- Fetal karyotype not matching ultrasound findings
- Labial swellings/inguinal hernias containing testes
- Primary amenorrhoea
- High voice and gynaecomastia at puberty in males with very mild partial cases

Management

- Family counselling
- If diagnosed before puberty, testes should be left to allow puberty to occur without HRT
- Gonadectomy after puberty due to higher lifetime risk (2%) of testicular cancer
- HRT with oestrogens following HRT
  - Some may require testosterone to feel their best
  - Bone mineral density monitoring
- Vaginal lengthening with dilators once sexual activity is anticipated
  - Surgical vaginoplasty if dilators fail

Congenital Adrenal Hyperplasia

- Autosomal recessive disorders affecting adrenal steroid biosynthesis
- High levels of ACTH secretion in response to low cortisol levels can caused androgen overproduction, virilising young females
- Responsible for up to 50% of cases of ambiguous genitalia at birth

Types & Features

21-hydroxylase Deficiency (90%)

- Neonatal salt losing crisis & hypoglycaemia
- Female virilisation
- Male precocious puberty
- Late onset: hirsutism, oligo/amenorrhoea

11-beta-hydroxylase Deficiency (5%)

- Female virilisation
- Male precocious puberty
- Hypertension
- Hypokalaemia

17-hydroxylase Deficiency (Rare)

- Non-virilising in females
- Intersex in boys
- Hypertension

Management

- Multidisciplinary approach
- Glucocorticoid replacement to suppress ACTH (balanced against compliance and risk of iatrogenic Cushing's
- Fludrocortisone in salt-losing cases
- Dosing increases in pregnancy due to placental aromatase

Gynaecology

Differentials in Gynaecology

Amenorrhoea

Primary

- Hypogonadotropic hypogonadism
- Hypergonadotropic hypogonadism
- Structural (eg imperforate hymen)

Secondary

- Pregnancy
- Menopause
- Physiological stress (exercise, low weight, chronic disease, psychosocial)
- PCOS
- Medications (eg hormonal contraceptives)
- Premature ovarian failure
- Hormonal (thyroid, prolactin, Cushing's)

Irregular Menstruation

- Extremes of reproductive age
- PCOS
- Physiological stress
- Medications (progesterone-only contraceptives, antidepressants, antipsychotics)
- Hormonal imbalances

Intermenstrual Bleeding (Red Flag)

- Hormonal contraception
- Cervical pathology
- STIs
- Endometrial pathology
- Vaginal pathology
- Pregnancy
- Ovulation
- Medications (SSRIs, anticoagulants)

Dysmenorrhoea

- Primary
- Endometriosis/adenomyosis
- Fibroids
- PID
- Copper coil
- Cervical/ovarian cancer

Menorrhagia

- Dysfunctional uterine bleeding (primary)
- Extremes of reproductive age
- Endometriosis/adenomyosis
- Fibroids
- PID
- Contraceptives (particularly copper coil)
- Anticoagulants/bleeding disoders
- Endocrine disorders
- Connective tissue disorders
- Endometrial hyperplasia/cancer
- PCOS

Postcoital Bleeding (Red Flag)

- No cause identified > 50%
- Cervical Ectropion
- Trauma
- Atrophic vaginitis
- Polyps
- Cervical cancer
- Endometrial cancer
- Vaginal cancer

Pelvic Pain

- UTI
- Dysmenorrhoea
- IBS
- Ovarian cysts
- Endometriosis
- PID
- Ectopic pregnancy
- Appendicitis
- Mittelschmerz
- Pelvic adhesions
- Ovarian torsion
- IBD

Vaginal Discharge

- Bacterial vaginosis
- Candidiasis
- Chlamydia
- Gonorrhoea
- Trichomonas vaginalis
- Foreign body
- Cervical ectropion
- Polyps
- Malignancy
- Pregnancy
- Ovulation
- Hormonal contraception

Pruritis Vulvae

- Irritants (soap, detergents, barrier contraception)
- Atrophic vaginitis
- Infections (candidiasis, pubic lice)
- Skin conditions (eczema)
- Vulval malignancy
- Pregnancy-related vaginal discharge
- Urinary/faecal incontinence
- Stress

Primary Amenorrhoea

- Not starting menstruation by 14 or by 16 in the presence of secondary sexual characteristics

Causes

Hypogonadotropic Hypogonadism

- Non-functional
  - Hypopituitarism/damage to pituitary/hypothalamus
  - Disorders of other hormones
  - Chronic diseases
  - Constitutional delay
- Functional
  - Excessive exercise/dieting
  - Stress

Hypergonadotropic Hypogonadism

- Damage to gonads
- Congenital absence of ovaries
- Turner's syndrome

Kallman Syndrome

- Genetic syndrome consisting of hypogonadotropic hypogonadism & anosmia

Congenital Adrenal Hyperplasia

- Underproduction of cortisol & aldosterone & overproduction of androgens
- Presents early with hypoglycaemia & electrolyte disturbance or late in females with:
  - Tall for age
  - Hirsutism
  - Deep voice
  - Early puberty
  - Primary amenorrhoea

Androgen Insensitivity Syndrome

- X-linked recessive failure of end-organs to respond to androgens
  - Male genotype & superficially female phenotype
  - Undescended testes & absence of upper vagina, cervix, uterus & ovaries
  - Breast tissue develops due to peripheral conversion of testosterone to oestrogen
- Typically presents with primary amenorrhoea

Structural Defects

- No passage for menses to exit
  - Secondary sexual characteristics & cyclical menstrual pain without bleeding
- Imperforate hymen
- Transverse vaginal septae
- Vaginal agenesis
- Absent uterus
- Female genital mutilation

Investigation

- Threshold for investigating:
  - No signs of puberty at 14
  - Some signs of puberty but no progression in 2 years

Investigating for underlying medical illness

- FBC & ferritin (anaemia)
- U+E (kidney disease)
- Anti-TTG & anti-EMA (coeliac)

Hormonal tests

- FSH & LH (hyper/hypogonadotropism)
- TFTs
- IGF-1 (GH deficiency)
- Prolactin
- Testosterone (androgen insensitivity)

Microarray

- Turner Syndrome

Imaging

- X-ray of the wrist for bone age & possible constitutional delay
- Pelvic ultrasound
- MRI of the brain (pituitary pathology/Kallman)

Management

- Manage underlying condition/psychosocial contributors
- Pulsatile GnRH (can allow fertility) or COCP can treat hypogonadotropic causes
- COCP can induce regular menstruation & prevent symptoms of oestrogen deficiency in ovarian causes

Secondary Amenorrhoea

- No periods for at least 3 months after previous regular menstrual periods
- Investigate after 3-6 months/6-12 in those with previously irregular periods

Causes

- Pregnancy (most common)
- PCOS
- Menopause/premature ovarian failure
- Hypothalamic/pituitary pathology
  - Hyperprolactinaemia
  - Pituitary failure
- Thyrotoxicosis
- Sheehan's syndrome
- Asherman's syndrome
- Physiological stress
  - Excessive exercise
  - Low weight/anorexia
  - Chronic disease
  - Psychosocial stress

Investigations

Hormone tests

- B-hCG to rule out pregnancy
- LH & FSH
  - High FSG: ovarian failure
  - High LH:FSH ratio: PCOS
- Prolactin
- TFTs
- Testosterone

Imaging

- MRI for pituitary tumour if blood results suggestive (hyperprolactinaemia)

Management

- Establishing & treating underlying cause
- Osteoporosis prophylaxis in oestrogen deficiency
  - Calcium & vitamin D
  - HRT/COCP

Premenstrual Syndrome

- Symptoms felt in the luteal phase of the menstrual cycle, especially in the days leading up to menstruation
- Do not occur before menarche, during pregnancy, or after menopause
- Referred to as premenstrual disorder if symptoms have a significant impact on quality of life

Presentation

Emotional

- Anxiety
- Stress
- Fatigue
- Irritability
- Mood wings

Physical

- Bloating
- Breast pain
- Headaches
- Clumsiness

Diagnosis

- Clinical
- Symptom diary for two menstrual cycles can demonstrate clear association with premenstrual period

Management

General

- Improving diet, exercise, alcohol, smoking, sleep
- CBT

Medical

- Drospirenone-containing COCPs (eg Yasmin) are first line
  - May benefit from skipping pill-free period
- SSRIs

Specialist (Severe Cases)

- Continuous dermal oestrogen
  - Requires progestogens fro endometrial protection (eg cyclical progestogens/Mirena)
- GnRH analogues can induce menopausal state
- Hysterectomy & bilateral oophorectomy to induce menopause in severe cases where medical management has failed

Dysmenorrhoea

- Excessively painful periods

Diagnosis

History

- Timing & severity (pain usually peaks after 1-2 days of bleeding)
- Pelvic pain/deep dyspareunia
- Previous history of STIs/PID
- Previous abdominal/genital tract surgery

Examination

- Abdominal & pelvic exam

Investigations

- STI screen
- USS
  - Laparoscopy reserved for failures of USS to detect abnormalities, medical treatment failure, or coexisting subfertility

Causes

Primary

- Theories include abnormal hormone ratios or sensitivity, neuropathic dysregulation, etc

Secondary

- Endometriosis
- Adenomyosis
- PID
- Adhesions
- Fibroids
- Copper IUD
- Cervical stenosis (iatrogenic – eg LLETZ)
- Asherman's syndrome
- Congenital abnormalities with obstruction

Management

- Treat underlying cause if secondary

Symptom control

- Mefenamic acid 500mg tds
- Paracetamol
- COCP to abolish ovulation
- Mirena IUS
- Hot-water bottles

Menorrhagia

- Defined as loss > 80ml, rarely used in practice
- Self-reported excessive bleeding, flooding, changing pads every 1-2 hours, passing clots, etc

Causes

Dysfunctional Uterine Bleeding (DUB)

- Menorrhagia in the absence of a secondary cause
- 50-60% of cases

Secondary

- Anovulatory cycles at extremes of reproductive age
- Fibroids
- Hypothyroidism
- Endometriosis
- Endometrial
- Adenomyosis
- Copper IUD
- PID
- Bleeding disorders – eg von Willebrands
- PCOS
- Endometrial hyperplasia/cancer

Investigations

- FBC, TFT, coagulation screen
- TVUS
  - Fibroids, endometrial thickness, polyps, adnexal cysts, etc
  - Pelvic MRI can further image any abnormalities found on ultrasound
- Hysteroscopy mandatory for women > 40 years of age with new onset menorrhagia

Management

1st line/If contraception is not wanted (non-hormonal)

- Tranexamic acid – especially if no dysmenorrhoea
- Mefenamic acid – especially if dysmenorrhoea

If contraception is wanted/acceptable

- Mirena IUS 1st line
- COCP
- Long acting progestogens

Failed response to medical management

- Endometrial ablation
  - Family must be complete
  - Contraindicated by multiple C-sections with thin scar
  - Required contraception as conception is possible with placenta accreta likely
- Hysterectomy
  - Last resort
  - GnRH analogues given in advance to shrink uterus

Uterine Fibroids

- Benign tumours (leiomyomata) of the myometrium
- More common in Afro-Caribbean women
- Rare before puberty

Types

- **Submucous**: >50% of mass projects into uterine cavity
- **Intramural**: located within myometrium
- **Subserous**: >50% of mass projects outside contours of uterus
- **Cervical**: relatively rare, causes surgical difficulty
- **Pedunculated**: mobile & prone to torsion
- **Parasitic**: detached from uterus & attached to other structures
- **IV leiomyomatosis**: very rare, spread through pelvic veins to involve heart

Presentation

- May be asymptomatic

Symptoms

- Menorrhagia & IDA
- Prolonged menstruation > 7 days
- Abdominal pain worse during menstruation
- Bloating
- Urinary/bowel symptoms
- Deep dyspareunia
- Subfertility
- Polycythaemia secondary to autonomous EPO production (very rare)

Signs

- Palpable mass/enlarged firm non-tender uterus

Diagnosis

- By history & exam alone, or with TVUS

Complications

- Menorrhagia, dysmenorrhoea
- Subfertility & pregnancy complications
  - Miscarriage
  - Premature labour
  - Obstructed delivery
- Constipation
- Urinary outflow obstruction & UTIs
- Red degeneration
- Torsion of a pedunculated fibroid
- Malignant transformation (very rare)

Management (NICE 2018)

- Symptomatic fibroids > 3cm require referral to gynaecology

Asymptomatic

- No treatment, periodic review of size/growth

Symptomatic Management

- Mirena IUS 1st line unless there is distortion of uterine cavity
- Symptomatic management – mefenamic acid/tranexamic acid
- COCP
- Cyclic oral/injectable progestogens

Shrinking/Removing Fibroids

- **Medical**
  - GnRH agonists for short term control
  - Ulipristal acetate no longer used due to rare but serious liver toxicity
- **Surgical/Radiological**
  - Uterine artery embolization
  - Myomectomy (abdominal/laparoscopic/hysteroscopic)
  - Endometrial ablation
  - Hysterectomy

Red Degeneration of Fibroids

- Ischaemia & infarction of large (usually > 5cm) fibroids
- Usually during 2nd/3rd trimester of pregnancy due to fibroid outgrowing its blood supply in response to oestrogen/kinking of blood vessels during growth of uterus

Presentation

- Typically pregnant woman with history of fibroids
- Severe abdominal pain
- Low grade fever
- Tachycardia
- Vomiting

Management

- Rest, fluid & analgaesia
- Resolves in 4-7 days

Endometriosis

- Ectopic endometrial tissue outside uterine cavity
- 10% of women of reproductive age

Pathophysiology

- Aetiology unknown, theories include:
  - Retrograde menstruation via fallopian tubes
  - Embryonic pre-endometrial cells remaining outside uterine cavity
  - Metaplasia
  - Spread of endometrial cells through lymphatics
- Shedding of ectopic endometrial tissue during menstruation causes irritation of surrounding tissue
- May form adhesions causing non-cyclical pain & infertility

Presentation

Symptoms

- Dysmenorrhoea, often starting before bleeding
- Chronic pelvic pain
- Deep dyspareunia
- Subfertility
- Urinary/bowel symptoms

Signs

- Endometrial tissue seen in vagina, particularly posterior fornix
- Tender nodularity in posterior fornix
- Fixed cervix/reduced organ motility
- Tender adnexae

Investigation

Laparoscopy w/ biopsies

- Gold standard

US

- Little role, often no changes
- May show endometriomas/chocolate cysts

ASRM Staging

1. Small superficial lesions
2. Mild lesions deeper than stage 1
3. Deeper lesions affecting ovaries & small adhesions
4. Deep & large lesions affecting ovaries & large adhesions

Management

Symptomatic

- NSAIDs + paracetamol

Hormonal

- COCP/progestogens
- GnRH analogues (induce pseudomenopause)

Surgical

- Laparoscopic excision/adhesiolysis
  - Can improve fertility
- Hysterectomy

Adenomyosis

- Endometrial tissue within myometrium
- Common in later reproductive years of multiparous women

Presentation

Symptoms

- Dysmenorrhoea
- Menorrhagia
- Dyspareunia

Signs

- Enlarged, tender, boggy uterus

Investigations

- TVUS is first line
- MRI/TAUS are alternatives
- Histological analysis after hysterectomy is gold standard but obviously impractical

Management

Medical

- Manage as per menorrhagia/dysmenorrhoea initially
- GnRH analogues

Surgical/Radiological

- Endometrial ablation
- Uterine artery embolization
- Hysterectomy

Complications in Pregnancy

- Infertility
- Miscarriage
- Preterm delivery
- SGA
- PPROM
- Malpresentation
- Need for CS
- PPH

Menopause

- Retrospective diagnosis after a woman has had no period for 12 months
- Average age is 51
- Perimenopause is the time leading up to menopause (usually from 45) until 12 months after the last period. This time is when women experience the most symptoms

Physiology

- Reduced follicular function leading to low oestrogen & progesterone and high FSH & LH

Features

Menstrual

- Irregular periods
- Dysmenorrhoea

Vasomotor

- Hot flushes
- Night swears

Urogenital

- Vaginal dryness & atrophy
- Urinary frequency

Psychological

- Anxiety/depression in 10%
- Short-term memory impairment

Other

- Joint pains
- Reduced libido

Long-term complications

- Osteoporosis
- Increased IHD risk
- Pelvic organ prolapse
- Urinary incontinence

Diagnosis

- No investigations needed if over 45 with typical features
- NICE recommend FSH level for:
  - Suspected premature menopause < 40 years
  - Change in periods at 40-45 years

Premature Ovarian Failure

- Features of menopause & raised FSH before the age of 40
- 1% of women
- FSH > 40iu/L, oestrogen < 100 pmol/L

Causes

- Idiopathic
  - Most common, may be a family history
- Bilateral oophorectomy
- Hysterectomy without oophorectomy
- Chemotherapy/radiotherapy
- Infection (eg mumps)
- Autoimmune disorders
- Resistant ovary syndrome (FSH receptor abnormalities, inhibin B mutation)

Lifestyle Modifications

- Good sleep hygiene
- Exercise & weight loss
- Relaxation
- Reduced stress

Hormone Replacement Therapy

- Oral/transdermal patch
- Oestrogen can be given alone to women without a uterus
- Combined HRT must be used by women with a uterus

Contraindications

- Past or active breast cancer
- Any oestrogen-sensitive cancer
- Undiagnosed vaginal bleeding
- Untreated endometrial hyperplasia
- Uncontrolled hypertension
- VTE
- Active angina
- Liver disease
- Pregnancy

Risks

- VTE: oral HRT only
- Stroke: slightly increased risk with oral oestrogen HRT
- IHD: slightly increased risk with combined HRT
- Breast cancer: increased risk with combined HRT but risk of dying from breast cancer is not raised
- Ovarian cancer: increased risk with all HRT

Non-HRT Management

Vasomotor Symptoms

- Fluoxetine/citalopram/venlafaxine
- Clonidine

Urogenital Symptoms/Atrophic Vaginitis

- Vaginal oestrogen (can be given alongside HRT)
- Vaginal moisturisers/lubricants

Psychological Symptoms

- Self-help groups
- CBT
- Antidepressants
- Testosterone gel/cream for reduced libido

Polycystic Ovarian Syndrome

- Affects 5-10% of women of reproductive age
- Up to 30% have multiple ovarian cysts on ultrasound
- Aetiology not understood, involves high levels of LH & hyperinsulinaemia & has overlap with metabolic syndrome

Features

Rotterdam Criteria (diagnosis requires 2 or more)

1. Oligoovulation/anovulation (presenting as irregular/absent periods)
2. Hyperandrogenism (biochemically or presenting as hirsutism/acne/alopecia)
3. Polycystic ovaries (12+)/ovarian volume > 10ml on ultrasound

Others

- Obesity
- Infertility
- Acanthosis nigricans

Complications

- Insulin resistance & diabetes
- Cardiovascular disease
- Hyperlipidaemia
- Endometrial hyperplasia/cancer
  - Due to unopposed oestrogen resulting from anovulation

Investigations

- TVUS gold standard for visualising ovaries
  - "String of pearls" appearance of cysts
- Raised LH/LH:FSH ratio
- Raised testosterone
- Raised or normal oestrogen level
- Raised insulin
- Impaired OGTT

Management

General

- Weight loss
- Smoking cessation
- Low glycaemic index diet
- Statins based on QRISK

Hirsutism & Acne

- COCP 1st line – co-cyprindiol (Diannette)
  - Risk of VTE, used for maximum 3 months
- Topical eflornithine
- Spironolactone/finasteride/flutamide under specialist supervision

Infertility

- Weight loss if appropriate
- Clomifene (anti-oestrogen) is 1st line to induce ovulation
  - Blocks hypothalamic oestrogen receptors preventing negative feedback of FSH
  - Risk of multiple pregnancies
- Metformin can be added/used alone, particular for obese patients
- Laparoscopic ovarian drilling
- IVF
- Screen pregnant women for gestational diabetes

Endometrial Cancer Risk

- TVUS if gap of more than 3 months between periods
- Mirena coil
- COCP/cyclical progestogens with withdrawal bleeds every 3-4 months

Ovarian Torsion

- Partial or complete twisting of ovary on its supporting ligaments
- May involve fallopian tube (then referred to as adnexal torsion)

Risk Factors

- Ovarian mass (90%)
- Reproductive age
- Pregnancy
- Ovarian hyperstimulation syndrome

Features

- Sudden onset progressive unilateral lower abdominal pain
  - Can have a slower course
  - Can come and go if ovary twists/untwists intermittently
- Nausea & vomiting
- Localised tenderness ± palpable mass on examination
- Fever associated with adnexal necrosis

Complications

- Infertility (if both/only ovary)
- Rupture
  - Peritonitis & adhesions
- Infection
  - Abscess/sepsis

Investigation

- TV/TAUS
  - Free fluid & whirlpool sign
  - Ovarian oedema
  - Lack of blood flow on doppler studies
- Laparoscopy for definitive diagnosis

Management

- Laparoscopy
  - Detorsion ± oophorectomy based on laparoscopic appearance
- Laparotomy may be necessary with large mass

Asherman's Syndrome

- Symptomatic adhesions/synechiae within uterus
- Results from dilatation & curettage/myomectomy/severe pelvic infection etc

Presentation

- Secondary amenorrhoea
- Significantly lighter periods
- Dysmenorrhoea
- Infertility

Diagnosis

- Hysteroscopy
- Hystersalpingography
- Sonohysterography
- MRI

Management

- Dissection of adhesions during hysteroscopy

Cervical Ectropion

- Presence of columnar epithelium on the ectocervix
- Associated with high oestrogen levels
  - Younger women
  - Ovulatory phase
  - Pregnancy
  - COCP
- No relation to cervical cancer

Features

- Vaginal discharge/bleeding
- Deep dyspareunia
- Post-coital bleeding

Diagnosis

- Visible transformation zone from red columnar epithelium to pink squamous epithelium on speculum examination

Management

- Cauterisation/cold coagulation for troublesome cases only

Nabothian Cysts

- Fluid-filled cysts on surface of cervix
- No relation to cervical cancer
- Occurs after childbirth/minor trauma/cervicitis etc

Features

- Rarely large enough to be symptomatic
  - Feeling of fullness

Diagnosis

- Found incidentally on speculum exam
- Visible smooth round bumps near cervical os

Management

- None needed if diagnosis is certain
- Colposcopy/excision & biopsy if diagnosis is uncertain

Bartholin's Cyst

- Blockage of duct draining Bartholin's gland in vaginal introitus
- May become infected (Bartholin's abscess)

Features

Cyst

- Unilateral tender fluid-filled cyst 1-4cm in size

Abscess

- Hot, tender, red
- May be draining pus

Management

Cyst

- Good hygiene, analgaesia, warm compress
- Biopsy to rule out vulval malignancy in women > 40

Abscess

- Antiobiotics
- Swab for culture
  - Most commonly E. coli
  - Specific swabs for chlamydia/gonorrhoea
- Surgical intervention
  - Word catheter
  - Marsupialisation

Lichen Sclerosus

- Autoimmune condition typically affecting older females
- 5% risk of developing SCC of the vulva

Features

- Itching
- Pain & superficial dyspareunia
- Erosions & fissures
- Fusion of labia
- Koebner phenomenon – symptoms made worse by friction to the skin
- "Porcelain-white" skin changes to vulva, perineum & perianal area
- Thin, shiny, slightly raised skin
- Papules/plaques

Management

- Potent topical steroids
  - Clobetasol propionate 0.05% (dermovate)
  - Once a day for 4 weeks, reducing to alternate days and twice weekly every 4 weeks
- Emollients

Urogenital Prolapse

- Descent of pelvic organs into vagina

Types

Uterine Prolapse

- Descent of uterus into vagina

Vault Prolapse

- Descent of top of vagina (vault) into vagina in women who have had a hysterectomy

Rectocele

- Rectum protrudes anteriorly into defect of posterior vaginal wall
- Associated with constipation
- May cause faecal loading, urinary retention & palpable lump in vagina
- Lump can be compressed to allow emptying of bowels

Cystocele/Urethrocele/Cysturethrocele

- Prolapse of bladder/urethra/both posteriorly into defect of anterior vaginal wall

Enterocele

- Herniation of pouch of Douglas including small intestine

Risk Factors

- Multiparity of vaginal deliveries
- Instrumental/prolonged/traumatic deliveries
- Increasing age past menopause
- Obesity
- Chronic constipation/coughing etc
- Spina bifida

Presentation

- Sensation of pressure/heaviness/dragging
- Urinary symptoms
- Bowel symptoms
- Sexual dysfunction

Grading (POP-Q)

1. Lowest part > 1cm above introitus
2. Lowest part within 1cm of introitus (above/below)
3. Lowest part > 1cm below introitus
4. Fully descended with eversion of vagina

Management

Conservative

- Appropriate for mild symptoms or if pessaries/surgery are not tolerated/suitable
- Pelvic floor exercises
- Weight loss
- Treatment of related stress incontinence
- Vaginal oestrogen

Pessaries

- Number of types can be tried: ring, doughnut, shelf, cube, etc
- May cause vaginal irritation and erosion, oestrogen cream can be given

Surgery

- Definitive management
- Different options for different types
  - Cysto/urethrocele: anterior colporrhaphy, colposuspension
  - Uterine prolapse: hysterectomy, sacrohysteropexy
  - Rectocele: posterior colporrhaphy
- Complications:
  - Pain, bleeding, infection, DVT, etc
  - Damage to bladder/bowel
  - Recurrence of prolapse
  - Altered experience of sex

Urinary Incontinence

Stress Incontinence

- Involuntary leakage of urine on effort/exertion/coughing/sneezing etc
- 1 in 10 women during their lifetime
- 50% of incontinent women have pure stress incontinence
- 30-40% of incontinent women have mixed stress and urge incontinence

Aetiology/risk factors:

- Childbirth
- Increasing age past menopause
- Urogenital prolapse
- Weakness of bladder neck (congenital/trauma/surgery/radiation)

Urge Incontinence/Overactive Bladder

- Sudden urge to pass urine, with leakage on way to toilet
- Overactivity of detrusor muscle
- Can be triggered by increased IAP, sound of running water, unlocking front door etc

Aetiology/risk factors:

- Mostly idiopathic
- Neurogenic (spina bifida, MS, UMN lesions)
- Pelvic/incontinence surgery

Investigation

- Bladder diary
- Urine dipstick testing for other pathologies
- Post-void residual bladder volume scan to assess for incomplete emptying
- Urodynamic testing

Management of Stress Incontinence

Conservative

- Avoid caffeine, diuretics, excessive/restricted fluid intake fluid intake
- Supervised pelvic floor exercises

Medical

- Duloxetine (used when surgery is less preferred)

Surgery

- Tension-free vaginal tape
- Colposuspension
- Intramural urethral bulking
- Artificial urinary sphincter
  - Inflates & deflates allowing manual control
  - Used where stress is caused by neurological disorder or other options have failed

Management of Urge Incontinence

Conservative

- Lifestyle changes
  - 1-1.5L of fluid per day
  - Avoid caffeine
  - Review diuretics/antipsychotics etc
- Bladder retraining
  - Based on supressing urge to void and increasing time between voidings
  - Successful in 45-90% of cases

Medical (antimuscarinics)

- Eg oxybutynin
- Block parasympathetic transmission and relax detrusor muscle
- Adverse effects:
  - Dry mouth
  - Constipation/nausea/dyspepsia/flatulence
  - Blurred vision/dizziness
  - Palpitations/arrhythmias
- **Mirabegron** (a beta-3 agonist) can be used alternatively
  - No anticholinergic effects, but raises blood pressure

Surgical/Invasive

- Botulinum toxin A injections into bladder wall
- Percutaneous sacral nerve stimulation
- Augmentation cystoplasty
  - Uses bowel tissue to enlarge bladder
- Urinary diversion (to urostomy)

Pelvic Infections & STIs

Vaginal Discharge Differential

Common Causes

Physiological

- White/clear
- Inoffensive
- Varies with cycle – usually thick/sticky, clearer & thinner around ovulation

Candida

- "Cottage cheese" discharge
- Vulvitis
- Itch

Trichomonas

- Offensive, yellow/green, frothy discharge
- Vulvovaginitis
- Strawberry cervix

Bacterial Vaginosis

- Offensive, thin, white/grey, "fishy" discharge

Less Common Causes

- Gonorrhoea
- Chlamydia
- Ectropion
- Cervical cancer
- Foreign body

Bacterial Vaginosis

- Healthy bacterial flora consists of lactobacilli, which produce lactic acid keeping the vaginal pH below 4.5
- Reduced numbers of lactobacilli and overgrowth of anaerobic bacteria leads to a raised pH
  - Gardnerella vaginalis
  - Mycoplasma hominis
  - Prevotella
- Conveys an increased risk of contracting STIs

Risk Factors

- Multiple sexual partners
  - Not sexually transmitted but almost exclusively seen in sexually active women
- Excessive vaginal cleaning
- Recent antibiotics
- Smoking
- Copper coil

Features

- Offensive, thin, white/grey, "fishy" discharge
- 50% asymptomatic
- Does not present alone with any pain/itch

Amsel's Criteria (3 of 4 should be present)

- Thin, white homogenous discharge
- Clue cells on microscopy
  - Stippled vaginal epithelial cells
- Vaginal pH > 4.5
- Positive whiff test
  - Addition of potassium hydroxide results in fishy odour

Management

- Not needed if asymptomatic
- Metronidazole
  - Orally for 5-7 days
    - 70-80% initial cure rate
    - Relapse rate > 50% in 3 months
  - Vaginal metronidazole or clindamycin are alternatives

Complications in Pregnancy

- Increased risk of preterm labour, late miscarriage, chorioamnionitis, low birth weight
- Low dose oral metronidazole now recommended

Vaginal Candidiasis

- AKA thrush
- Colonisation and infection of the vagina with Candida, most commonly Candida albicans (80%)

Risk Factors

- Diabetes mellitus
- Drugs: antipsychotics, steroids
- Immunosuppression
- Broad spectrum antibiotic use
- Pregnancy

Presentation

- "Cottage cheese" discharge
- Vulval & vaginal itching/irritation/discomfort
  - Superficial dyspareunia
  - Fissuring
  - Satellite lesions
  - Excoriations

Investigation

- Usually not needed, treated empirically
- Charcoal swab & microscopy can confirm diagnosis

Management Options

- Single dose intravaginal clotrimazole cream (5g of 10%) at night
- Single dose 500mg clotrimazole pessary at night
- 200mg clotrimazole pessaries for 3 nights
- Single 150mg dose of fluconazole

Recurrent Candidiasis

- Defined as 4 or more infections in a year
- Compliance with previous treatments should be checked
- Confirm diagnosis
  - High vaginal swab
  - Blood glucose level to exclude diabetes
- Exclude differentials
  - Lichen sclerosus
- Induction-maintenance regime
  - Induction: Oral fluconazole every 3 days for 3 doses
  - Maintenance: weekly oral fluconazole for 6 months

Trichomoniasis

- Trichomonas vaginalis is a highly motile flagellated protozoan parasite
- Spread through sexual transmission
- Lies in urethra of males and vagina of females
- Increases risk of:
  - Contracting HIV
  - Pelvic inflammatory disease
  - Cervical cancer
  - Bacterial vaginosis
  - Pregnancy complications

Presentation

- 50% asymptomatic
- Offensive, yellow/green, frothy discharge
- Vulvovaginitis
- Strawberry cervix/colpitis macularis
- Vaginal pH > 4.5
- Urethritis/balanitis in men

Investigation

- Charcoal swab from posterior vaginal fornix
  - Motile trophozoites on microscopy
  - Low vaginal self-swab also acceptable
- Urethral swab or first catch urine in men

Management

- Oral metronidazole for 5-7 days/one-off dose of 2g
- Referral to GUM for contact tracing

Mycoplasma Genitalium

- STI cause of non-gonococcal urethritis
- Similar presentation to Chlamydia, patients may have both infections

Presentation

- Cervicitis
- Endometritis
- Pelvic inflammatory disease
- Reactive arthritis
- Urethritis & epididymitis in males

Complications

- Tubal infertility
- Preterm delivery in pregnancy

Investigation

- NAAT: First morning urine sample for men, vaginal self-swabs for women
- Test for macrolide resistance

Management

- Doxycycline 100mg BD x 7 days followed by azithromycin 1g stat the 500mg OD x 2 days (if macrolide sensitive)

Chlamydia

- Chlamydia trachomatis is a sexually transmitted obligate intracellular pathogen present in ~ 10% of young women
- 7-21 day incubation period

Presentation

- Asymptomatic in 75% of women and 50% of men

Symptoms

- Cervicitis
  - Abnormal vaginal bleeding/discharge
  - Dyspareunia
- Dysuria
- Pelvic pain

Signs

- Pelvic/abdominal tenderness
- Cervical excitation
- Inflamed cervix
- Purulent discharge

In Males

- Urethral discharge & dysuria

Investigation

- Nuclear acid amplification test (NAAT)
  - Vulvovaginal swab (first line for women)
  - Endocervical swab
  - First-catch urine sample (first line in men)
  - Rectal swab (after anal sex)
  - Oropharyngeal swab (after oral sex)
- Should be performed 2 weeks after first exposure

Management

- Doxycycline 100mg BD 7 day course is first line
  - Now recommended ahead of azithromycin due to resistance of Mycoplasma genitalium which often co-exists
- Options in pregnancy:
  - Azithromycin 1mg stat followed by 500mg OD x 2 days
  - Erythromycin 500mg QDS x 7 days
  - Erythromycin 500mg BD x 14 days
  - Amoxicillin 500mg TDS x 7 days
- Test of cure only in rectal chlamydia, pregnancy, and where symptoms persist

Complications

- Pelvic inflammatory disease
- Chronic pelvic pain
- Infertility
- Ectopic pregnancies
- Reactive arthritis

Gonorrhoea

- STI caused be Neisseria gonorrhoeae, a Gram-negative diplococcus
- Can infect any mucous membrane surface, typically genital tract, rectum, or oropharynx
- 2-5 day incubation period
- High levels of antibiotic resistance
- Immunisation impossible & reinfection common due to antigen variation

Presentation

- Asymptomatic in 50% of women and 10% of men

Female Genital Infection

- Cervicitis
  - Odourless purulent discharge, green/yellow
- Pelvic pain
- Dysuria

Male Genital Infection

- Odourless purulent discharge, green/yellow
- Testicular pain/swelling
- Dysuria

Other Infection Locations

- Rectal: Anorectal discomfort/discharge
- Pharyngitis
- Prostatitis
- Conjunctivitis

Investigation

- Nuclear acid amplification test (NAAT)
  - Endocervical swab (first line for women)
  - Vulvovaginal swab
  - First-catch urine sample (first line in men)
  - Rectal swab (after anal sex)
  - Oropharyngeal swab (after oral sex)
- Endocervical swab should be sent for culture & sensitivity before starting antibiotics

Management

- IM ceftriaxone 1g single dose if sensitivities are not known/not sensitive to ciprofloxacin
- Oral ciprofloxacin 500mg single dose if sensitive

Disseminated Gonococcal Infection

Classic Triad

- Migratory polyarthritis
- Tenosynovitis
- Dermatitis

Later Features

- Septic arthritis
- Endocarditis
- Perihepatitis

Pelvic Inflammatory Disease

- Infection & inflammation of female pelvic organs, typically ascending from the endocervix
- Can result from asymptomatic STI as first presentation
- Different names for specific organs infected
  - Endometritis
  - Salpingitis
  - Oophoritis
  - Parametritis

Causes

Sexually Transmitted (Most Common)

- Chlamydia trachomatis (most common)
- Neisseria gonorrhoeae (typically more severe)
- Mycoplasma genitalium
- Mycoplasma hominis

Non-Sexually Transmitted (Less Common)

- Gardnerella vaginalis
- Haemophilus influenzae
- Escherichia coli

Risk Factors

- Not using barrier protection
- Multiple sexual partners/partners with multiple sexual partners
- Younger age
- Existing STIs/previous PID
- IUD

Presentation

Symptoms

- Lower abdominal/pelvic pain
- Deep dyspareunia
- Fever
- Abnormal bleeding/discharge/menstrual irregularities
- Dysuria
- Cervical excitation

Signs

- Cervical excitation
- Pelvic tenderness
- Cervicitis
- Purulent discharge

Complications

Fitz-Hugh-Curtis Syndrome

- Perihepatitis
- 10% of cases
- RUQ pain mimicking cholecystitis
- Laparoscopy & adhesiolysis

Infertility

- 10-20% risk after single episode

Others

- Chronic pelvic pain
- Ectopic pregnancies
- Abscess formation/sepsis

Investigation

- NAAT swabs for gonorrhoea, chlamydia, mycoplasma genitalium
- High vaginal swabs for bacterial vaginosis, candidiasis, trichomonas
- HIV, syphilis
- Vaginal/endocervix swab microscopy – pus cells
  - Absence has good NPV
- Pregnancy test to exclude ectopic pregnancy
- Inflammatory markers

Management

- Low threshold for treatment due to varying presentation & potential complications
- Various inpatient & outpatient regimes depending on severity & causative organs
- Example:
  - IM ceftriaxone 1g single dose
  - Doxycycline 100mg BD x 14 days
  - Metronidazole 400mg BD x 14 days
- Sepsis/pregnancy warrants hospital admission
- Pelvic abscess may need surgical or radiological drainage

Syphilis

- STI caused by spirochete Treponema pallidum
- 21-90 day incubation periods

Transmission

- Sexual (most common)
- Vertical transmission
- IV drug use

Stages & Features

Primary

- Chancre (painless lesion at site of infection)
- Local lymphadenopathy
- Often not seen in women as the lesion may be on the cervix
- Typically disappears in 6-8 weeks

Secondary (6-10 weeks after primary infection)

- Systemic symptoms: fever, lymphadenopathy
- Rash on trunk, palms, & soles
- Buccal "snail track" ulcers
- Condylomata lata (painless warty lesions on genitalia)

Latent

- Symptoms disappear
- Early latent syphilis (first 2 years) and late latent syphilis (greater than 2 years)

Tertiary

- Gummas: granulomatous lesions of skin & bone
- Ascending aortic aneurysms (mycotic)

Neurosyphilis

- Occurs at any stage if infection reaches CNS
- Headache
- Altered behaviour
- Dementia
- Tabes dorsalis
- Paralysis ("general paralysis of the insane")

Diagnosis

Cardiolipin Tests

- VDRL (Veneral Disease Research Laboratory) & RPR (rapid plasma reagin)
- Sensitive but not specific
  - Insensitive in late disease
- False positive in:
  - Pregnancy
  - SLE/anti-phospholipid syndrome
  - TB
  - Malaria
  - HIV
  - Leprosy

Specific Antigen Tests

- Treponema pallidum HaemAgglutination (TPHA)

Management

- Intramuscular benzylpenicillin single dose is first line
- Doxycycline is an alternative

Jarisch-Herchsheimer Reaction

- Sometimes seen following treatment of syphilis
- Fever, rash & tachycardia following first dose
- No wheeze or hypotension
- Caused by release of endotoxins after bacterial cell death
- Antipyretics are only treatment needed

Genital Herpes

- Typically thought to be caused by HSV-2, now known that there is overlap between HSV-1 & HSV-2 in causing oral and genital herpes respectively
- Virus becomes latent in sacral nerve ganglia following initial infection and relapses over time
- Spread through direct contact with mucous membranes or viral shedding in mucous secretions
- Initial infection occurs within 2 weeks of contact and is usually the most severe

Presentation

- Painful genital ulceration
  - Associated with dysuria & pruritis
- Neuropathic pain (tingling, burning, shooting)
- Tender inguinal lymphadenopathy
- Dysuria may occur
- Systemic flu-like symptoms (headache, fever, malaise, fatigue)
  - More common in primary infection

Diagnosis

- Clinical
- NAAT of swab from infected lesion

Management

General Measures

- Saline bathing
- Analgaesia
- Topical anaesthetics
- Topical Vaseline
- Loose clothing
- Avoid intercourse

Antivirals

- Oral acyclovir
- Patients with recurrence may benefit from long term acyclovir

Gynaecological Neoplasia

Ovarian Cysts/Benign Ovarian Tumours

- Common & often asymptomatic, found on pelvic ultrasounds
- Complex (multiloculated) cysts should be biopsied

Presentation

- Pelvic pain
- Bloating/fullness in abdomen
- Urinary/bowel symptoms
- Palpable mass
- Acute pelvic pain: torsion/haemorrhage/rupture

Types

Functional Cysts

- **Follicular cyst**
  - Commonest
  - Non-rupture of dominant follicle/failure of atresia of non-dominant follicle
  - Usually regress after a few menstrual cycles
- **Corpus luteum cyst**
  - Corpus luteum fills with blood/fluid instead of breaking down when pregnancy does not occur
  - More likely to cause intraperitoneal bleeding

Non-neoplastic Pathological Cysts

- **Endometriotic/"chocolate" cyst**
  - Lined with endometriotic tissue & filled with altered blood
- **PCOS**
  - Bulky ovaries with numerous cysts
  - "String of pearls" on TVUS
- **Theca Lutein Cysts**
  - Multiple cysts occurring in response to increased hCG (GTD, multiple pregnancy)
  - Resolve when hCG normalises

Benign Germ Cell Tumours

- **Dermoid cyst/mature cystic teratoma**
  - Lined with epithelial tissue, may contain skin/hair/teeth
  - Most common benign ovarian tumour < 30
  - Bilateral in 10-20%
  - More likely to cause torsion than other tumours

Benign epithelial tumours

- **Serous cystadenoma**
  - Most common benign epithelial tumour
  - 20% bilateral
- **Mucinous cystadenoma**
  - Typically large and may be aggressive
  - Can rupture causing pseudomyxoma peritonei

Sex-cord Stromal Tumours

- **Fibroma**
  - 40% present with Meig's syndrome: triad of ovarian fibroma, ascites, pleural effusion
- **Sertoli-Leydig cell tumour**
  - 1% of ovarian tumours, produce androgens
- **Thecoma**
  - Produce oestrogens, cause abnormal bleeding

Investigation

- TVUS
- Premenopausal women with simple cyst < 5cm need no further investigation
- CA125
- Women < 40 with a complex mass need markers for germ cell tumours
  - LDH
  - αFP
  - hCG

Risk of Malignancy Index (RMI)

- (Ultrasound score) x (menopausal status) x (CA125)

Ultrasound score

- 0 if no features, 1 if 1 feature, 3 if 2+ features:
  - Multilocular cyst
  - Evidence of solid areas
  - Evidence of metastases
  - Ascites
  - Bilateral lesions

Menopausal status

- 1 if premenopausal
- 3 if postmenopausal

RMI Score	Risk Category	Risk %
< 25	Low	<3%
25-250	Moderate	20%
> 250	High	75%

Management

- If presenting with acute abdomen or systemic upset (due to haemorrhage, rupture, or torsion), diagnostic laparoscopy or laparotomy may be needed

Adolescent/Premenopausal Women

- < 5cm: usually resolve and can have follow up only
  - Cysts that grow or fail to resolve can be evaluated surgically
- 5-7cm: routine referral to gynaecology
- > 7cm: may require MRI/surgical evaluation
- Calculate RMI for large/non-resolving cysts

Postmenopausal Women

- Calculate RMI
- Low RMI: Follow up for 1 year with USS every 4 months
- Moderate RMI: Bilateral oophorectomy for histopathology
- High RMI: Full staging laparotomy

Ovarian Cancer

- Peak age 60 years
- Poor prognosis due to late presentation

Aetiology

Risk Factors

- Increased number of ovulations
  - Nulliparity
  - Early menarche
  - Late menopause
  - Increasing age
- BRCA1/BRCA2/HNPCC genes (consider family history)
  - 10% of cases are genetic in origin
  - 1 in 800 women carry BRCA1/2
  - BRCA1 gene mutation conveys a 50% lifetime risk
- Obesity
- Ebdometriosis
- HRT
- Smoking

Protective Factors

- COCP use (>5 years)
- Breastfeeding
- Multiparity
- Oopherectomy/salpingectomy

Types

Epithelial Cell Tumours (>90%)

- Serous adenocarcinoma (75%)
  - Develops from tubal pathway, most serious
- Endometrioid carcinoma (10%)
  - Develops from endometrial pathway
- Clear cell carcinoma (10%)
- Mucinous adenocarcinoma (<3%)
  - Develops from endocervical pathway
- Undifferentiated tumours

Dermoid Cyst/Germ Cell Tumours

- Raised βHCG & αFP

Sex-cord Stromal Tumours

- Sertoli-Leydig cell tumour
- Granulosa cell tumour

Metastases

- Kruckenburg Tumour: ovarian metastasis from GI (typically gastric) cancer containing signet-ring cells

Features

- Abdominal bloating/distension
- Early satiety/loss of appetite
- Pelvic pain
- Urinary symptoms
- Weight loss/gain
- Abdominal/pelvic mass
- Ascites
- Shortness breath (pressure/pleural effusion)

Referral

2-week wait urgent referral :

- Ascites
- Pelvic mass not clearly due to fibroids
- Abdominal mass

Investigations

Initial

- CA125
  - If raised (< 35), urgent ultrasound is needed
  - Used to calculate RMI
  - Also raised by endometriosis, menstruation, benign ovarian cysts, etc
- TVUS
  - Used to calculate RMI

Secondary Care

- CT scan for diagnosis & staging
- Histology from CT-guided biopsy/laparotomy/laparoscopy
- Paracentesis for ascitic cancer cells

Other

- Women under 40 with a complex ovarian mass need markers for possible germ cell tumours
  - βHCG & αFP

FIGO Staging

1a	One ovary affected, capsule intact
1b	Both ovaries affected, capsules intact
1c	Tumour on surface/ruptured capsule/cytologically positive ascites/positive peritoneal washings
2	Disease spreading into pelvis
3	Abdominal disease and/or affected lymph nodes
4	Distant disease beyond abdomen

Management

- MDT input from gynaecology, radiology, pathology, & oncology

Surgical (Early Stage)

- Oopherectomy ± hysterectomy & omentectomy
- Biopsies of peritoneal deposits + random peritoneal biopsies + evaluation of retroperitoneal lymph nodes

Late Stage

- Carboplatin/cisplatin + paclitaxel chemotherapy
- Debulking surgery
- CA125 can be used to monitor response to treatment

Prognosis

- 80% of women have advanced disease at presentation
- 30% 5YSR

Endometrial Cancer

- Now the most common gynaecological cancer, with 1% risk of development by age 75
- 75% of cases are postmenopausal women
- **Smoking is a protective factor**

Endometrial Hyperplasia

- Precancerous, 5% develop to endometrial cancer
- Abnormal proliferation of endometrial tissue
- Oestrogen sensitive

Presentation

- Abnormal vaginal bleeding (eg intermenstrual)

Types

- Without atypia
- With atypia

Management

- Simple endometrial hyperplasia without atypia: High-dose progestogens with repeat sampling in 3-4 months (LNG-IUS may be used)
- Endometrial hyperplasia with atypia: hysterectomy

Types

Type 1 (80%)

- Low grade endometrioid adenocarcinoma
- Oestrogen sensitive
- Associated with obesity
- Typically less aggressive

Type 2

- High grade endometrioid carcinoma
- Clear cell carcinoma
- Carcinosarcoma
- More aggressive
- Not oestrogen sensitive, related to obesity

Risk Factors

Endogenous Oestrogen

- PCOS
  - Women with PCOS should have endometrial protection with COCP, LNG-IUS, or progestogens
- Obesity (adipose tissue contains aromatase)
- Nulliparity
- Early menarche
- Late menopause

Exogenous Oestrogen

- Unopposed oestrogen therapy
- Tamoxifen

Others

- Diabetes mellitus
- HNPCC

Features

- Postmenopausal bleeding (classic)
- Changed/intermenstrual bleeding in premenopausal women
- Pain and discharge (unusual)

Referral

2-week wait urgent referral:

- Postmenopausal bleeding

TVUS referral:

- Women over 55 with:
  - Unexplained vaginal discharge
  - Visible haematuria + raised platelets/anaemia/raised glucose

Investigation

- TVUS
  - Endometrial thickness < 4mm is normal and has high NPV
- Pipelle biopsy
  - Highly sensitive
- Hysteroscopy with biopsy

FIGO Staging

1a	< 50% myometrial invasion
1b	> 50% myometrial invasion
2	Cervical invasion but not beyond uterus
3a	Invades uterine serosa/adnexae
3b	Vaginal/parametrial involvement
3ci	Pelvic node involvement
3cii	Para-aortic node involvement
4a	In bowel/bladder
4b	Distant metastases

Management

Surgical

- TAH-BSO unless patient is unfit or disease is widely disseminated

Adjuvant

- External beam radiotherapy
  - Patients with risk factors for lymph node involvement from histology
    - Deep myometrial invasion
    - High grade
    - Cervical stromal invasion
- Chemotherapy
- Progestogens may be used to slow disease progression in elderly patients unfit for surgery

Prognosis

- Stage dependent, 75% overall 5YSR

HPV & Cancer

- HPV types 16, 18, & 33 are particularly associated with cancer development
  - **Cervical cancer**
  - Anal cancer & penile cancer
  - Vaginal & vulval cancer
  - Oropharyngeal cancer
- Other serotypes are associated with genital (6, 11) or other warts
- 90% will be infected with a HPV virus during their lifetime
- Mainly sexually transmitted
- Can be cleared from the body, but the time this takes varies hugely
  - Quitting smoking aids clearance

Mechanism

- HPV 16 produces the oncogene E6, which inhibits the tumour suppression gene p53
- HPV 18 produces the oncogene E7, which inhibits the tumour suppressor gene pRB

Vaccination

- Gardasil 9 (6, 11, 16, 18, 31, 33, 45, 52, 58) used in Ireland
- Given to first years in secondary school
  - Previously only girls, now including boys

Cervical Screening

- Testing for cervical cancer/precancerous cells via regular smears fulfils Wilson's & Junger's criteria for a valid screening program
- Changed to first line HPV testing of cells as of March 2020

Schedule

Aged 25-29 Years

- Every 3 years
- This was previously from age 25-45, changed due to the higher reliability of first line HPV testing

Aged 30-65 Years

- Every 5 years

Results

- 6-8 weeks later via post

HPV Not Detected

- Repeat test in 3/5 years depending on age

HPV Detected & No Abnormal Cells Found

- Repeat test in 12 months
  - If clear, return to normal schedule
  - If not cleared, refer to colposcopy

HPV Detected & Abnormal Cells Found

- Refer to colposcopy

Inadequate Sample

- Repeat test in 3 months

Cervical Cancer

- Affects 260 women in Ireland each year
- Median age at diagnosis is 47, highest incidence 25-29
- 80-90% SCC, 10-20% adenocarcinoma, HPV 16 & 18 responsible for 70% of cases

Risk Factors

Increased Risk of Catching HPV

- Early sexual activity
- Increased sexual partners
- Sexual partners with increased sexual partners
- Not using condoms
- Being unvaccinated

Increased Risk of Cancer Developing Undetected

- Non-engagement with screening program

Other

- Smoking
- HIV
- COCP use > 5 years
- Increased number of full-term pregnancies
- Family history

Presentation

Screening

- CIN & Stage I cancer may be asymptomatic

Symptoms

- Abnormal vaginal bleeding
  - Intermenstrual
  - Postcoital
  - Postmenopausal

Cervical Appearance

- Ulceration
- Inflammation
- Bleeding
- Visible tumour

Cervical Intraepithelial Neoplasia

- Grading system for level of dysplasia found at colposcopy

CIN I

- Mild dysplasia affecting 1/3 thickness of epithelium
- Likely to return to normal

CIN II

- Moderate dysplasia affecting 2/3 thickness of epithelium
- Likely to progress to cancer if untreated

CIN III/Cervical Carcinoma in Situ

- Severe dysplasia, very likely to progress to cancer if untreated

FIGO Staging

IA	Confined to cervix, visible only by microscopy, < 7mm wide	**IA1**	< 3mm deep
		IA2	3-5mm deep
IB	Confined to cervix, clinically visible/> 7 mm wide	**IB1**	< 4cm diameter
		IB2	> 4cm diameter
II	Extension beyond cervix but not to pelvic wall	**IIA**	Upper 2/3 of vagina
		IIB	Parametrium
III	Extension beyond cervix & to pelvic wall/causing hydronephrosis/non-functioning kidney	**IIIA**	Lower 1/3 of vagina
		IIIB	Pelvic side wall
IV	Extension beyond pelvis/involvement of other organs	**IVA**	Involving bladder/rectum
		IVB	Involving distant organs

LLETZ

- Large loop excision of transformation zone
- Diathermy loop removes tissue for histology from around the os while cauterising
- Performed during colposcopy under local anaesthetic
- Used to biopsy or treat CIN

Complications

- Abnormal bleeding/discharge
- Infection (tampon use/intercourse shortly after procedure increase risk)
- Increased risk of preterm labour

Cone Biopsy

- Cone-shaped area of tissue is removed around the os and sent for histology
- Performed under general anaesthetic
- Suitable for treatment of CIN, or stage IA1 tumours to preserve fertility

Complications

- Pain
- Bleeding
- Infection
- Cervical stenosis
- Increased risk of preterm labour

Management of Cervical Cancer

Stage IA
- Cone biopsy/LLETZ/simple hysterectomy

Stage IB-IIA
- Radical hysterectomy
- Trachelectomy
- Plus pelvic lymphadenectomy/chemoradiotherapy

Stage IIB to IV
- Radiotherapy
  - External beam x25
  - Brachytherapy x3
- Chemotherapy
  - Cisplatin x5 cycles
- Surgical correction of fistulae
  - Before chemoradiotherapy, delays

Prognosis

FIGO Stage	1YSR	5YSR %
I	99%	96%
II	85%	54%
III	74%	38%
IV	35%	5%

Treatment Complications

Surgery
- Standard complications
  - Bleeding
  - Infection
  - Local structure damage
  - Anaesthetic reactions
- Cone biopsy/LLETZ/radical trachelectomy increase risk of preterm labour in future pregnancies
- Radical hysterectomy increases risk of fistula formation
  - Colovaginal
  - Ureteric

Radiotherapy
- Short term
  - Diarrhoea
  - PV bleeding
  - Radiation burns
  - Dysuria/urinary frequency/haematuria
  - Tiredness/weakness
- Long term
  - Ovarian failure
  - Fibrosis of bowel/skin/bladder/vagina
  - Lymphoedema

Vulval Carcinoma

- >90% squamous cell carcinoma
  - Also melanomas, BCCs, adenocarcinomas, sarcomas
- Occurs mainly after age 65

Risk Factors

- Lichen sclerosus
- HPV infection
- Vulval intraepithelial neoplasia
  - Carcinoma may arise from VIN or occur de novo
- Immunosuppression
- Smoking

Presentation

- Mass/ulceration
  - Usually on labia majora or clitoris
- Pruritis
- Inguinal lymphadenopathy

Staging

1	Confined to vulva/perineum, no node invasion	**1a**	<2cm with stromal invasion <1mm
		1b	>2cm or stromal invasion >1mm
2	Tumour of any size with adjacent spread (lower urethra/vagina/anus) & negative nodes		
3	Tumour of any size with positive inguinofemoral nodes		
4	Tumour invades:	**4a**	Upper urethra/vagina, rectum, bladder, bone
		4b	Distant metastases

Management

Stage 1

- Wide local excision

More Advanced Stages

- Wide local excision and sentinel lymph node biopsy or inguinofemoral lymphadenectomy
  - Skin sparing incision now used more than butterfly incisions of the area