|  |
| --- |
| **Maternal physiological changes – Under hormonal control:** |

***Endocrine changes:***

Placental hormone production:

* Protein hormones:
  + Human placental lactogen – produced by placenta; complimentary to HCG:
    - Prep. & initiation of lactation – effect blocked by placental oestrogen (pregnancy)
    - Mobilizes free fatty-acids → ↑ S-glucose
    - ↑ Central insulin synthesis BUT ↑ peripheral insulin resistance
    - Facilitates amino-acid transport to fetus
    - Blocks reduction of progesterone to less active metabolite i.e. maintains progesterone levels
  + Human chorionic gonadotrophin – produced by trophoblast:
    - Stimulates corpus luteum to produce oestrogen & progesterone until placenta takes over this function
* Steroid hormones:
  + Progesterone – produced first by C. luteum, then syncitiotrophoblast (placenta):
    - Myometrium relaxation
    - Ureteric smooth muscle relaxation → dilated ureter
    - Stomach relaxation → delayed gastric emptying
    - Ileum & colon relaxation → ↓ peristalsis & constipation
    - Fat-deposition regulation
    - Physiological hyperthermia → ↑ 0.5-1.0˚C
    - Suppressing effect on brain cells → tiredness, calmness & ↑ need for rest
    - Hyperventilation → ↓ PaCO2
    - Precursor for fetal corticosteroid production (only a small amount enters fetal circulation)
  + Oestrogen – produce by placenta; oestriol:oestradiol:oestrone = 3:2:1:
    - Polymerization of acid-mucopolysaccharides → swelling & softening of body esp:
      * Cervix
      * Breasts
      * Fluid retention
* Prolactin – produced by endometrial dicidua (after dicidua has been prepared by progesterone:
  + Regulates amniotic fluid osmolarity
  + Involved in chorio-amniotic PG synthesis, which is important in the initiation of labour
  + Stimulates type II pulmonary aloveoli → surfactant production → mature fetal lungs
  + Partakes in lactation preparation
* Human chorionic thyrotrophin
* Relaxin – produced in corpus luteum & placenta:
  + Relaxation of pelvic ligaments
  + Plays part in ripening of the cervix & ROM

Other endocrine changes:

* ↑ Thyroid size & activity AND ↑ TBG → Euthyroid state (T4 may be ↑ in 20% of patients)
* Gradual ↑ ACTH (pituitary) → ↑ corticosteroids (adrenal gland) → ± Cushingoid state
* ↑ Oestrogen → ↑ Prolactin → prep. for lactation – effect blocked by progesterone (in pregnancy)

***Changes in reproductive system:***

* Ovaries & fallopian tubes: ↑ HCG → “persisting corpus luteus” → ↑ progesterone & ↑ oestrogen for ≈ 10wk
  + Ovaries remain large (due to congestion) despite shrinking of C. luteum at 10wk (due to ↓ HCG)
  + Fallopian tubes enlarged (due to slight hypertrophy – if any – & due to congestion)
* Uterus:
  + Corpus: Hypertrophy & hyperplasia of myometrium until ≈ 20wk
  + Isthmus: Widens from 5mm → 25mm until 12wk, then dilated by growing fetus → lower segment forms
  + Lower segment: Formed by passive stretching; Placental implantation here can → APH &/or PPH (due to poor contractility & 160˚ arrangement of muscle fibres vs. 90˚ at fundus)
  + Blood vessels lengthen → spiral arteries, which supply placenta (≈600ml/min)
* Vulva, vagina & pelvic floor:
  + ↑ Oestrogen → lengthening & stretching of muscle & connective tissue, which → ↑ vascularity & ↑ congestion → thickened vaginal epithelium & wider & longer vagina
  + ↑ Oestrogen → ↓ mucous secretion & ↑ epithelial exfoliation → thick lactobicillary discharge → ↓ pH (lactabillus converts glycogen – in secretions - into lactic acid) → ↓ bacterial infections

***General organ & physiological changes:***

* Haematological system:
  + ↑ Plasma volume → dilution (& ↓ viscosity) & ↓ HcT
  + ↑ Red cell volume
  + MCHC, MCV & MCH stay ≈ same (pre-pregnant values)
  + ↑ Leucocytes (progressive)
  + ↑ ESR (due to ↑ fibrinogen & S-globulin)
  + ↑ Blood coagulation (complex) – important in puerperal DVT formation.
    - ↑ Fibrinogen
    - ↑ Factor VII & X (progressive)
    - ↓ Factor XI & XIII
    - ± ↓ Platelets (still within normal limits)
    - BT, PT & PTT unaffected
* CVS – hyperdynamic circulation (due to increased peripheral circulation in uterus):
  + ↑ Cardiac output (due to ↑ HR & ↑ stroke volume)
  + ↓ Venous return if supine → ↓output & hypotension = “supine hypotension syndrome”
  + ABP higher in upper arm if in lateral tilt position; higher if sitting
  + ↓ Peripheral vascular resistance (due to smooth muscle relaxation of progesterone)
  + ↑ Venous pressure → lower leg oedema; varicose veins; haemorrhoid aggravation
* Metabolic changes:
  + ↑ Iron requirements → iron deficiency anaemia if not supplemented prophylactically
  + ↓ Ca2+ & ↓Mg2+ (both slight)
  + PO4- unaffected
  + ↓ PaCO2 & slight respiratory alkalosis due to hyperventilation
  + ↓ HCO3- (compensatory) → slight ↑ pH → ODC shifts to left → ↑ Hb’s affinity for O2
  + ↑ S-protein (due to anabolic state during pregnancy)
  + ↑ HPL (± ↑ oestroge/progesterone/cortisol) → “diabetogenic state” because it opposes insulin activity BUT ↓ s-glucose i.e. insulin resistance
  + ↑ GFR & ↓tubular reabsorption → glucouria
  + ↑ Plasma lipids in 2nd ½ of pregnancy
  + ↓ Cholesterol, triglycerides & lipoproteins postpartum (partly due to loss in breastfeeding)
* Kidney & renal function:
  + Kidneys enlarge (slight)
  + ↑ Progesterone → Ureter dilatation
  + ± Mechanical obstruction of ureter at pelvic inlet (≈ 16wk – due to uterine fundus compression)
  + ↑ Renal plasma flow (RPF)
  + ↑ GFR
  + ↓ GFR:RPF → ↓ Filtration fraction
  + ↑↑ Creatinine clearance
* Salt, water & nitrogen:
  + Water retension
  + Salt retension (complex)
  + ↓ BUN, ↓ Creatinine & ↓ Urate (all due to ↑ GFR)
* Respiratory changes:
  + Hyperventilation & deeper respiration (due to progesterone) → ↑ tidal volume (with ↑ gas exchange & O2 absorption) & ↑ minute volume
* Digestive system:
  + Swollen gums (due to fluid retention) → ↑ risk of food collection (in softer gums) & caries
  + ↓ Stomach emptying (see above); ↓ Intestinal peristalsis → ↑ nutrient absorption BUT ↑ constipation
  + Oesophageal reflux
* Hepatobiliary system:
  + Liver:
    - Relatively unchanged (incl. size, histology & blood circulation)
    - Some physiological function changes → predisposes to pregnancy induced liver disease:
      * Spider angiomata
      * Palmar erythema
      * ↓ S-albumin
      * ↑ S-ALP
      * ↑ S-cholesterol
  + Bile:
    - ↑ Gallbladder residual volume
    - ↓ Emptying
    - ↑ Biliary cholesterol concentration
    - ↓ Chenodeoxycholin acid
    - The latter 2 → ↑ risk for gall-stone formation
  + Skin (see above): Spider agiomata; palmar erythema; striae; ↑ sweat; ↑ sebum; ↑ pigmentation (due to ↑ MSH from posterior pituitary → chloasma & linea nigra
  + Breasts: ↑ Size; ↑ Volume; ↑ Nipple size & mobility; ↑ Areolae; ↑ in no. Montgomery’s tubercles
  + Skeletal: Lubar lordosis; ↑ General ligament laxity (due to relaxin) →low backache & pelvic pain
  + Body weight: ↑

|  |
| --- |
| **Antenatal Care:** |

***Goals:***

* Evaluate mother & fetus risk factors & health
* Determine gestation
* Develop plan for rest of pregnancy

***Procedure:***

* Registration & administration
* Good Hx – previous, current obstetric, gynaecological, medical, surgical & social Hx
* Good Ex – full systemic examination: “Big 5; Forgotten 4; Core 1”
* Specific investigations
* Patient counseling

***Hx – Pregnancy risk factors (see below for evaluation):***

* **General**: Unmarried; Recent divorce; ≥ 35yr; < 18yr; primip; grand-multip; poor socio-economics; Rh-isoimmunization
* **Physique**: Under-/overweight; ≤ 1.5m tall
* **Habits**: Smoking; alcohol; drugs
* **Disease profile**: DM; Heart pathology; HT; Hx of DVT/PTE
* **Uterine considerations**: Previous C/S; Myomectomy; Uteroplasty; Leiomyomata
* **Placental considerations**: Hx of APH (esp. abruption)
* **Fetal factors**: Hx of IUD/NND; Hx of congenital malformations; Hx of SGA/LGA; Hx of multiple pregnancy
* **Labour**: Hx of preterm labour; Hx of PPH; Hx of 3˚ tear; Hx of PID/STD’s
* **Family Hx**: DM; HT; Hereditary disease

**Note: Daily requirements**

**(Supplement if not in diet)**

* **Energy 10000kJ**
* **Protein 65mg**
* **Ca2+ 1000mg**
* **Fe2+ 25mg**
* **Vitamin A 5000IU**
* **Vitamin C 50mg**
* **Vitamin D 400-600IU**
* **Thiamine 1mg**
* **Riboflavin 1.5mg**
* **Niacin 15mg**
* **Folic acid 1mg**

***Special investigations:***

* Side-room:
  + Body mass, height & BMI
  + Urinalysis
  + Hb or FBC
  + RPR
  + Blood group – ABO & Rh status
  + PAP smear
  + US (if available esp. at 18-24wk)
* Special:
  + HIV VCT
  + Rubella (not routinely done in the state)
  + DM
  + Endocervical swabs – screening for N. Gonorrhoea; C. Trachomatis; Group B haemolytic streptococci

***Counseling*** – to report any of the following if positive danger Sx or abnormal:

* **Danger signs – report ASAP:**
  + **PVB**
  + **Severe facial oedema**
  + **Headache (sever/constant)**
  + **Visual disturbances**
  + **Abdominal pain(esp. RUQ)**
  + **Persistent/recurrent vomiting**
  + **Rigors/fever**
  + **Fluid per vagina**
* Weight gain: 1st TM – 1-2kg; 2nd TM – 5kg; 3rd TM – 5kg
* Diet – recommended daily requirements: See note above
* General considerations:
  + Iron & folate supplementation
  + Vitamins (if indicated)
  + Paracetamol for pain
  + No alcohol; No smoking;
  + Moderate exercise (avoid exhausting exercises); Moderate/normal work (avoid exhausting work)
  + Regular movement of legs (prevents congestion & DVT)
  + Comfortable, practical & loose-fitting clothing; Good quality, well-fitting bra
  + Avoid coitus in last 2wk (adapt position before that) & avoid if indicated
  + Avoid vaginal douches
  + Avoid travelling to malaria endemic area
* Signs of onset of labour – report to clinic/hospital: Painful contractions, show or ROM

***Procedure at 2nd (1-3wk after 1st) & return visits:***

**Note: Problems requiring referral**

* **Anaemia**
* **Uterus large e.g. multiple pregnancy**
* **Small for dates e.g. IUGR**
* **Malpresentation at 34wk**
* **Rh negative moth with antibodies**
* **No weight gain (in mother who was 60kg at booking)**
* **Pregnancy reaching 42 weeks**
* **↓ Fetal movements after 28 weeks**
* **Hypertension or PET**
* **APH**
* BP
* Body weight
* Urinalysis
* SF
* Fetal lie/position
* FHR
* Fetal movements
* AFV (clinically)
* Oedema (if excessive)
* Discuss results of previous visits
* Modify plan for pregnancy
* Classify according to risk profile

***Risk evaluation & follow-up dates:***

* **Low risk:** q8wk until 34wk THEN 1 visit 4 weeks later (see also “Gauteng antenatal care policy”)

|  |
| --- |
| * **Normal 1st pregnancy** * **Normal current pregnancy** * **1x previous C/S or breech (≤36wk)** |

* **Medium risk:** q4wk unti 30wk THEN q2wk until 36-38wk THEN weekly until term

|  |
| --- |
| * **Maternal age ≤ 15yr** * **Previous PPH requiring blood transfusion** * **Last pregnancy had forceps/vacuum delivery** * **Grand-multipara** * **Previous C/S/breech (> 36wk)** |

* **High risk:** q2-4wk until 30wk THEN q1-2wk until 34-36wk THEN q3-7d until labour

|  |
| --- |
| * **Primigravida aged ≥ 35yr** * **Previous infertility treatment** * **Previous myomectomy** * **Previous cervical/vaginal Ø (incl. cerclage)** * **Previous hysterotomy** * **Prevenious perinatal death** * **Previous baby with congenital abnormalities** * **Last pregnancy with preterm deliver (≤ 7months)** * **Last pregnancy with PET (≤7months)** * **3/more previous miscarriages** * **DM** * **Symptomatic asthma** * **Epilepsy** * **Active TB** * **Heart disease** * **Autoimmune disease** * **History of DVT/PTE** * **Psychiatric illness (incl. previous puerperal psychosis)** * **Thyroid disease/thyroidectomy** * **Serious disease/deformity of spine, pelvis or hip** * **Any other serious medical illness** |

***Gauteng antenatal care policy* –** routine low-risk/medium risk ANC visit schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| **Gestation (weeks)** | **Multip – objectives** | **Primip – objectives** | |
| **6-20** | Risk assessment; gestational age; blood tests | | |
| **24-28** | Exclude multiple pregnancy; HT; Risk for preterm labour | | |
| **28-30** |  | HT | |
| **32-34** | Fetal growth; HT | | |
| **34-36** |  | HT | |
| **36-38** | Fetal growth; Lie; Presentation; HT; Anaemia | | |
| **38-40** |  | HT | |
| **40-42** | Fetal growth; Lie; Presentation; HT; Post-dates | | |
| **Total # visits** | 5 | | 8 |

***Problems in pregnancy, which require referral: See note above***

|  |
| --- |
| **Congenital abnormalities:** |

***Increased incidence:***

* Oligohydramnios & polyhydramnios
* Diabetes Mellitus
* Advanced maternal age
* Multiple pregnancy
* Family history & previous personal history of congenital abnormalities
* Breech presentation
* IUGR
* Fetal distress

***Special investigations –*** gestation dependant:

|  |  |  |  |
| --- | --- | --- | --- |
| **9 ½ -12 weeks** | **11-14 weeks** | **16-20** | **> 20weeks** |
|  | US – Nuchal translucency (10-13wk) | US   * Anencephaly (14-16wk) * Hydrocephalus | US – Gestation (18-24wk) |
| Chorionic villi sampling:   * Kayotyping * DNA Analysis | PAPP-A & Free β-hCG:   * PAPP-A ↓ in Tr. 21 * Free β-hCG ↑ in Tr. 21 | Amniocentesis (16wk) if:   * Mother > 37yr * Previous congenital abnormality * Family Hx of congenital abnormality | Chordocentesis - indications:   * Chromosomal analysis * Virus specific IgM studies * Genetic disorders * Dx & Rx of Rh disease * Exclusion of haemoglobinopathies |
| Maternal & amniotic fluid α-FP; β-hCG & S-Oestriol:   * ↑ α-FP:   + Spina bifida   + Anencephaly   + Omphalocele   + Gastroschisis   + Multiple pregnancy   + Congenital nephrosis   + Turner’s syndrome   + Tr. 13   + Teratomas * ↓ α-FP:   + Tr. 21 |

* Other tests for congenital abnormalities:
  + X-ray – Demonstrates anencephaly
  + Fetoscopy – Refer to specialist centre
  + Council patient and risk assessment – Give options regarding prognosis and TOP

|  |
| --- |
| **NOTE: Amniocentesis carries a risk for:** |
| * Micarriage * Premature labour * Rhesus iso-immunization – Give 100μg Anti-D Ig if mother rhesus neg. |

***Indications for TOP (Termination of pregnancy)***

* **< 13 weeks**
  + Upon request
* **13-20 weeks (if doctor in consultation with mother is of the opinion that-)**
  + Continuation of pregnancy a risk to mother’s physical/mental health
  + Fetus would suffer severe physical/mental abnormality
  + **> 20 weeks (if a doctor in consultation with another doctor/midwife is of the opinion that-)**
  + Pregnancy would endanger mother’s life
  + Result in sever malformation of fetus
  + Pose a risk of injury to the fetus

***Genetic counseling***– Allow for 5 stages of grieving:

* Shock
* Denial
* Anger
* Depression
* Acceptance
* Remember to counsel on contraceptive use while in grieving process

|  |
| --- |
| **Antenatal surveillance – Maternal factors & Fetal welfare, growth, age and maturity:** |

***Maternal factors:***

* Uterine enlargement – only an approximation
* SF measurement – reliable (< 24wk) if read off a Belizan curve ELSE only reliable ≥ 24wk
* Abdominal circumference – inaccurate i.e. not repeatable; important in monitoring AFV
* Maternal weight gain:
  + 1st ½ of pregnancy: 2-4kg
  + 2nd ½ of pregnancy: 8kg
  + Note: From 20-30wks weight gain rate ≈ 0.5kg/week

***Fetal welfare:***

* Fetal movements
  + Assessed for 1 hour mane or time taken to reach 10
  + Abnormal if <4/hr OR >12hr/10 movements
* Fetal heart rate
  + <100 bpm
    - CTG & US to rule out congenital abnormalities
  + >160 bpm
    - Maternal fever
    - Intrauterine infections
    - β-Stimulants
    - Parasympatholytics
    - Smoking
    - Thyrotoxicosis
    - Maternal anxiety
  + >180 bpm
    - CTG & US
* Ultrasound
  + Oligihydramnios **IF** <1cm fluid in largest pocket
  + Demonstrate decreased breathing movements
  + Demonstrate decreased body movements
  + Demonstrate abnormal tone:
    - Extension
    - Fetal movements without returning to flexion
    - Open hand
* Biophysical profile = US (see below) + Non-stress test = 10

|  |  |  |  |
| --- | --- | --- | --- |
| **Testing method** | **Biophysical variable** | **Normal (2 points)** | **Abnormal (0 points)** |
| **US** | General body movements | ≥ 3 distinct body/limb movements/30min | ≤ 2movements/30min |
| Fetal muscles tone | ≥ 1 episode of active extension & return to flexed position limb or trunk (opening & closing of hands = normal) | Absence of movement or slow extension with only partial flexion |
| Fetal breathing movements | ≥ 30 sec of sustained breathing/30min | Absence of breathing movements or < 30 sec of breathing movements/30min |
| Qualitative AFV | ≥ 1 pool, 1 cm in 2 dimensions – measured at right angles to each other | Non or a pool smaller than 1cm |
| **Non-stress test** | Reactive fetal heart rate pattern | ≥ 2 accelerations or ≥ 15 bpm & ≥ 15 sec following fetal movements (in 30min) | < 2 accelerations of < 15bpm – per 30min |

* Interpretation & management:

|  |  |  |
| --- | --- | --- |
| **Score:** | **Interpretation:** | **Management:** |
| **10** | Normal fetus; low risk for chronic asphyxia | Repeat weekly; 2x/week in DM; at ≥ 42wk gestation |
| **8** | Normal fetus; low risk for chronic asphyxia | Repeat weekly; 2x/week in DM; at ≥ 42wk gestation; if oligohydramnios → TOP |
| **6** | Indicative of chronic asphyxia | Repeat within 24hr; if oligohydramnios → deliver |
| **4** | Indicative of chronic asphyxia | ≥ 36wk & if circumstancea are favourable → deliver; if < 36wk & L:S<2.0 → repeat test on same day & if profile still ≤ 4 → deliver |
| **0-2** | Probable chronic asphyxia | Extend test period to 120min; if profile < 2 → deliver regardless of gestation |

* uE3 and HPL – indicate impaired welfare IF:

**Note:**

**Indications for CTG:**

* Abnormal fetal movements
* Abnormal fetal heart rate
* Antepartum haemorrhage
* Diabetes mellitus
* Post-maturity
* Impaired fetal growth

**Contra-indications to stress test:**

* Impending premature labour
* PROM
* Incompetent cervix
* Grade III/IV placenta praevia
  + Decreased E3 OR
  + Decreased E3/24hrs OR
  + Decreased HPL
* Amnioscopy if cervix sufficiently dilated:
  + Look for meconium staining
* Doppler US
  + Look for absent end diastolic velocity in cord (EDV absent)
* Fetal blood gas & acid-base values

***Fetal growth:***

* Gain in maternal weight
* SF measurements (NOTE: Patient’s bladder must be emptied)
* Oligohydramnios
* Ultrasound measurements – F/U measurement important:
  + Biparietal diameter
  + Trunk diameter
  + Skull:Trunk ratio
  + EFW
  + Uterine volume
    - MRI – Not cost effective

***Fetal age:***

* Pregnancy calculator; Naegele’s rule; 1st fetal movements felt (20weeks in primip; 16 weeks in multip)
* SF measurements > 24 weeks
* Ultrasound (<24 weeks esp. 20 weeks) – range:
  + Gestational sac volume: ± 9 days
  + Crown-Rump length (Before 14 weeks): ± 3-5 days
  + Femur length (12-24wk): ± 8-14 days
  + BPD (12-24wk): ± 8-14 days
  + Other methods: Length of humerus, ulna, radius, tibia, fibula; Circumference of head, abdomen
* Ossification centres on X-ray
  + Lower femur = 36 weeks
  + Upper tibia = 38 weeks
  + Os Cuboidum in foot = 40 weeks

***Fetal maturity (see also “post-maturity”):***

* Skull hardness
* Ballard score @ birth
* L/S Ratio (Note: unreliable if blood/meconium stained)
  + 2:1 = lungs are mature
  + If rhesus iso-immunization the ≥ 2.5:1 = lungs are mature
* Phosphotidylglycerol presence
  + Used in DM: If L/S > 2.5 and PTG present = mature lungs
* Tap/Shake test (only if there is no meconium/blood and mother is HIV negative)
* Ultrasound – Demonstrates calcification in placenta
* Liver maturity: No bilirubin present at 36 weeks
* Renal maturity: Creatinine > 0.17 @ 37 weeks
* Skin maturity: Fetal cells present @ 36 weeks

***Note: Uses for diagnostic ultrasound in obstetrics:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1st Trimester:**  **Determination of -** | **2nd Trimester:**  **Determination of -** | **3rd Trimester:**  **Determination of -** | **Puerperium & neonatal** | **Other** |
| * Pregnancy incl. multiple – * Gestation age * Fetal life * Ectopic pregnancy (only aids Dx) * Mola pregnancy * Adnexal masses | * Fetal age (≤ 24wk) * Congenital abnormalities * Cervical incompetetence | * Placental examination * Fetal lies; presentation; attitude * AFV * Aids in Rh incompaitibility & preterm labour * Fetal well-being * Doppler | * Uterus; adnexal masses (hematoma) * Neonatal complications (congenital abnormalities & intracranial haemorrhages) | * Aids in amniocentesis; cordocentesis; chorion-villus biopsy * Doppler – FHR; blood flow studies |

|  |
| --- |
| **Important aspects of normal labour:** |

***Normal mechanism:***

* Engagement
* Descent and flexion
* Internal rotation – has the following pre-requisites:
  + Good flexion
  + Effective contractions
  + Satisfactory pelvic floor muscle tone
  + Adequate pelvic dimension to allow rotation
  + Gynecoid pelvic shape
* Extension
* Restitution
* External rotation

***Differences in various positions – Normal L/R-OA vs. “abnormal” positions:***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **LOA** | **LOP** | **LOP** | **Crown (Vertex)** | **Brow** | **Mento-Anterior** | **Mento-Posterior** | **Mento-Poterior** | **Breech** |
| **Descent** | Yes | Yes | Slow | Yes | No | Slow | Slow | No | See below |
| **↑ Flexion** | Yes | Poor | Yes | No | No | No | No | No | See below |
| **Internal Rotation** | 45˚ Ant. | 45˚ Post. | 135˚ Ant. | 45˚ | T-arrest | 45˚ Ant. | 135˚ Ant. | 45˚ Post | See below |
| **Extension** | Yes | Yes | No | Yes | - | No | No | - | See below |
| **Restitution** | 45˚ | 45˚ | 45˚ | 45˚ | - | 45˚ | 45˚ | - | See below |
| **External Rotation** | 45˚ | 45˚ | 45˚ | 45˚ | - | 45˚ | 45˚ | - | See below |
| **Progress** | Normal | Prolonged | Prolonged | Prolonged | - | Prolonged | Prolonged | Prolonged | Usually prolonged |
| **Delivery** | Normal | Difficult | Difficult | Difficult esp. if military position | - | Difficult | Difficult | Impossible | Difficult |
| **Relevant Diameter** | Suboccipto-bregmatic |  |  | Occipito-Frontal (11.5cm) | Mento-vertical (13.5cm) | Submento-bregmatic (9.5cm) – If complete extension occurs | Submento-bregmatic (as for mento-anterior) | - | Bi-trochanteric → Bis-acromial → Sagittal suture |
| **Pelvic Diameter of Descent** | AP | Oblique/ AP\* | Oblique/ AP\* | AP | - | AP | AP | - | Oblique |
| **Abdominal Signs** | Head well engaged | Head high; Flattening below umbilicus | Head high; Flattening below umbilicus | Either undergoes complete flexion → OP/OA OR ucomplete extension → face pres. (Mento) | As for face presentation (Mento) | Head high; Soft parts ↑ anteriorly | Head high; Distinct neck-back groove | Head high; Distinct neck-back groove | Fetal movements felt low; Head high; Soft parts at pelvic inlet |
| **Vaginal Signs** | Posterior fontanelle; Station progressing well | Both fontanelles palpable; Post. Font. in post. quadrant. | Both fontanelles palpable; Post. Font. in post. quadrant. | Anterior & posterior fontanelles in pelvis at same level → change with attitude change | Glabella on one side and andterior fontanelle on other side. | Orbital ridges; Chin; Bridge of nose & mouth; Triangle of mouth and 2 maxillae | Orbital ridges; Chin; Bridge of nose & mouth; Triangle of mouth and 2 maxillae | Orbital ridges; Chin; Bridge of nose & mouth; Triangle of mouth and 2 maxillae | Presenting part situated very high; Absence of fontanelles and sutures; Anus & 2 iachial tuberosities form straight line |

***Active labour*** = Regular contractions (6-8/hr) AND cervical dilatation/effacement AND show

***Pelvic shapes***

* Gynaecoid
* Android
* Anthrapoid
* Platypelloid

***10 important things on pelvic examination:***

* PROM; **ROM**
* Bishop’s Score:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Score** | **0** | **1** | **2** | **3** |
| Cervix **dilatation** (cm) | <1 | 1-2 | 2-4 | >4 |
| Cervix **length** (cm) | >4 | 2-4 | 1-2 | <1 |
| **Station** | -3 | -2 | -1/0 | +1/+2 |
| **Consistency** | Firm | Average | Soft | - |
| **Position** | Posterior | Mid/Anterior | - | - |

* **Presentation**
* **Engagement**
* **Moulding** (I-III) &/or **Caput** succedaneum
* **Pelvimetry**:

|  |  |  |
| --- | --- | --- |
| **Inlet:** | **Mid-pelvis:** | **Outlet:** |
| Shape  AP diameter  Retropubic angle | Curve of sacrum  Spinae ischii (present or not)  Sacrospinous ligament length | Mobility of coccyx (? Forward)  Subpubic angle  Intertuberous diameter |

***Pelvic measurements:***

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Anteroposterior** | **Oblique** | **Transverse** |
| **Brim** | **11-11.5** | **12** | **12.5** |
| **Cavity** | **12** | **12** | **12** |
| **Outlet** | **12.5** | **12** | **11-115** |

***Phases & stages of labour:***

* **1st stage:**
  + Latent phase – mainly effacement (cervical dilatation < 4cm):
    - ≈ 8hr long in primip
    - ≈ 6hr long in multip
  + Acceleration phase (minor phase): Not of any clinical importance
  + Active phase – mainly dilatation:
    - ≈ 1cm/hr in primip
    - ≈ 1.5cm/hr in mutip
  + Deceleration phase (just before 2nd stage): ≈ 1-2cm of cervix remains; DON”T MISTAKE FOR SLOW PROGRESS!!!
  + Mx:
    - Ambulant before 6-7cm dilatation; Lie down after 7cm dilatation (on side)
    - Psychological support → relieve anxiety; reassure patient esp. primips
    - IV fluids if poor progress
    - CTG – if indicated
    - Pain relief
    - Sterility measures – limit PV’s & use aseptic lubricant
    - Plot partogram correctly (see community obstetrics):
      * Latent phase – only record on left of partogram with each examination 1 space apart:
        + Everything q4hr
      * Active phase:
        + PV q2hr
        + BP q1hr (q½h if high risk)
        + Contractions & FHR q½hr (CTG if high risk)
        + Urinalysis q2h or prn
        + Temperature q2-4hr
* **2nd stage** (from full dilatation to delivery): ≈ 1hr in primip; ≈ ½hr in multip
  + Phase 1: Decent under uterine action until head reaches pelvic floor
  + Phase 2: From pelvic floor to delivery - Bearing down-urge develops (Ferguson reflex); no HAB; risk for fetal distress (decelerations common); increased pain on contractions; mother restless ± anxious
    - Prepare for delivery: Swab; sterile draping
    - Bimanual PV: Determine descent
    - Local anaesthetic infiltration of perineum (prophylactically for tear/cut)
    - Empty bladder
    - If urge to bear down – encourage patient (“as if defecating”)
    - Relax between contractions
    - Support perineum during contractions → controlled stretching of perineum/descent of head
    - Listen to FHR after contractions
    - When crowning → inspect perineum for tearing risk → if yes → EPISIOTOMY!
    - Head is born, then exclude CORD AROUND NECK → if around neck → clamp & cut
    - Suction mouth gently just before delivery
    - Anterior shoulder delivered – avoid too much traction → brachial plexus injuries
    - Posterior shoulder delivered & then rest of baby
    - Clean mouth and pharynx; clamp & cut cord; wrap baby in warm towel & hand to paediatrician/sister for further care
* **3rd stage** (from delivery of baby to delivery of whole placenta): ≈ 5-10min
  + Mx:
    - PV – exclude twin – Oxytocin 10IU IMI
    - Pressure on bleeding episiotomy
    - Collect umbilical cord blood if needed
    - Examine vulva for abnormal bleeding
    - Wait for signs of placental separation – lengthening; slight bleeding; globular uterus
    - Brandt-Andrews delivery of placenta
    - Rub up uterus
    - Examine membranes and placenta for completeness
    - Suture episiotomy
    - Monitor maternal vitals
    - Clean vulva and apply sanitary pad
    - Monitor mother for 1hr actively to exclude PPH

***Slow progress*** – ensure following have been addressed:

* Delayed first stage:
  + < 1cm/hr dilatation in nullipara
  + < 1.5cm/hr in multipara
* Factors, which could speed up delivery (if delayed):
  + Analgesia
  + Positioning of patient
  + Empty bladder (Test urine dip-sticks as well)
  + Oral energy – Sugar water
  + IV energy – 5%Dextrose in 0.9% NaCl

***Episiotomy – indications:***

* Delay in 2nd stage with tight perineum
* Risk of perineal tear with or without tight perineum
* Fetal distress
* Forceps delivery
* Vantouse
* Breech presentation and NVD
* 1/more previous episiotomies
* Exhaustion of mother

***APGAR score:*** Do at 1min; 5min & 10min

|  |  |  |  |
| --- | --- | --- | --- |
|  | **0** | **1** | **2** |
| **HR**  **RR**  **Muscle tone**  **Reflexes (Pain response)**  **Colour** | -  -  Limp  No response  Pale | <100  Weak cry/hypoventilation  Some flexion  Grimace  Blue | >100  Good/strong cry  Active motion/ ++ Flexion  Cry  Completely pink |

***Neonatal resuscitation:*** See paediatrics

***Neonatal evaluation:*** See paediatrics

***Stage 4 (1hr post delivery):***

* Vitals
* General examination
* Systemic examination (if indicated with appropriate special investigations)
* Exclude PPH

|  |
| --- |
| **Abnormalities of labour:** |

|  |
| --- |
| **Abnormal labour – 4P’s: Patient; Powers; Passenger; Passage** |

***Ax:***

* Delayed latent phase:
  + False labour
  + Excessive sedation; anaesthesia; paracervical or epidural analgesia
  + Abnormal myometrial function:
* Delayed active phase:
  + CPD
  + Abnormal position of fetal head e.g. OP
  + Abnormal myometrial function
  + Excessive sedation
  + Over-distention of uterus
  + Pathology of cervix → inhibits dilatation e.g. stenosis
* Arrest of labour – NB. Vaginal delivery unlikely if arrest of labour accurs → C/S:
  + CPD
  + Malpresentation (crown; persistent OP; OT with deflection; face; brow)
  + Abnormal lie e.g. transverse
  + Pelvic tumors
  + Inability to bear down (can be corrected)
  + Increased perineal resistance (can be corrected)

***Cx:***

* Maternal:
  + Mortality ↑
    - Infection
    - Birth-related trauma
    - Shock
  + Morbidity ↑
    - Dehydration
    - Keto-acidosis
    - Hypokalemia → myometrial hypotonia → atonic uterus → PPH
    - Colon dilatation
    - Puerperal infection (see puerperal sepsis)
    - UTI
* Fetal:
  + Perinatal mortality ↑
    - Pneumonia due to intra-uterine infection
    - Hypoxia with fetal distress → acidosis
    - Birth trauma

1. **Identify cause(s) of poor progress – Rule of 4 P’s. Under optimal management labour is allowed to continue for another 4hrs. If progress still poor → C/S**
2. **Evaluate mother and fetus for complications of prolongued labour → attend to them before C/S since a C/S can aggravate these problems.**
   1. **Fluid and electrolyte status**
   2. **Hb concentration – anaemia → post-partum infection**
   3. **Psychological support**
   4. **Early recognition of fetal distress with adequate intra-uterine resuscitation**
   5. **Recognition of meconium → Infection risk ↑ and asphyxia risk ↑**
   6. **Empty full bladder**
   7. **Anti-biotic treatment:**
      1. **In labour limited to patients with signs of infection**
      2. **Prophylactic antibiotics for emergency C/S**
      3. **Prophylactic antibiotics for numerous PV, meconium in amniotic fluid & fetal tachycardia**
      4. **If C/S while infection → broad spectrum antibiotics for 5 days**
   8. **Address PPH**
   9. **Address common complications of prolonged labour:**
      1. **Post-partum myometritis**
      2. **Peritonitis**
      3. **Post-partum endometritis**

***Mx:***

***The rule of 4 P’s of prolonged labour:***

**Patient:**

* Pain
* Full bladder
* Dehydration
* Position (supine hypotensive syndrome)
* Fear (psychological condition)

**Powers:**

* Normal labour requires 3-4 contractions/min each lasting at least 45s
* Uterus dysfunction/Abnormal uterine action
  + Inefficiency – hypoactive; un-coordinated; cervical dystocia
  + Overefficiency – Precipitate labour; titanic contractions (>90sec duration)
* Uterine rupture – Sx:
  + Continuous pain between contractions – suddenly stop
  + Tenderness
  + Haematuria
  + Shock
  + PVB
  + Acute abdomen
  + No contractions following rupture +/- fibrillating
  + NB. Examine with 4 fingers to assess previous scar
  + Rx: Resus; CVP; Emergency laparotomy; suture if small ELSE emergency C/S

**Passenger:**

* Size of fetus → CPD
* Amount of fetal head above brim is important
* Persistent OP position
  + Long rotation 135˚ or 65˚ > OA > normal progress
  + Short 20˚ > OT > C/S
  + Intermediate 45˚ or 15˚ > Direct OP – if action line crossed do C/S; if in 2nd stage - forceps
* Asynclitism – C/S (sagital suture to posterior or anterior)
* Breech – Mostly C/S
* Face/brow presentation
* Median vertex presentation (military)
* Compound presentation
* Shoulder presentation
* Transverse lie/Oblique lie
* Shoulder dystocia
* Cord prolapse

**Passage:**

* Considerations:
  + Cervix – true labour vs. false labour
  + Membranes – not artificially ruptured in normal labour but AROM can accelerate poor progress
  + Application – poor application is caused by:
    - False labour
    - Latent phase
    - Inadequate contractions
    - CPD or obstruction or descent
  + Pelvimetry (see above)
* Placenta Praevia
* CPD – assess also passenger

***Other abnormalities of 3rd stage:***

* PPH
* Uterine inversion
* Placenta accrete – abnormal tight attachment
* Placenta increta – chorionic villi penetrate myometrium –tight attachment
* Placenta percreta – through myometrium up to serosa – part of uterus
  + Rx: Family complete – hysterectomy
  + Else left in situ – Give antibiotics and observe for PPH

|  |
| --- |
| **Abnormal lie, presentation & position:** |

***Ax:***

* Maternal factors:
  + Pelvic abnormalities (see pelvimetry)
  + Pelvic tumors
  + Placenta praevia
  + Uterus abnormalities e.g. bicornuate
  + Pendulous abdomen
* Fetal factors:
  + Large baby
  + Multiple pregnancies
  + Congenital abnormalities of fetus e.g. hydrocephaly
  + Polyhydramnios
  + Preterm labour (esp. in breech)
  + IUD → prevents spontaneous version

***Sequelae:***

* Effect on labour – CPD; Abnormal myometrial function; Delayed/incomplete cervix dilatation; Persisten high presenting part; Early ROM with prolapse; Bandl’s retraction ring; Uterine rupture
* Effect on mother – Maternal exhaustion; Tears; PPH; Infection; Labour discomfort; Urine retention; Paralytic ileus
* Effect on fetus - ↑↑ Caput succedaneum & moulding; Anoxia; Asphyxia; Trauma; Cord prolapse

***Specific positions:***

|  |
| --- |
| **Occipito-Posterior:**   * **Background:** Associated with android/anthropoid pelves; CPD; Incomplete flexion of fetal head; Poor progress in labour * **First stage:** Often poor progress due to CPD → C/S; Abnormal uterine function → Oxytocin; Sever pain → Analgesia; Risk of fetal distress → Good monitoring * **Second stage:** Often prolonged with risk of fetal distress; Poor maternal bearing-down efforts; C/S for CPD * **Outcomes:** Long anterior rotation → spontaneous vertex delivery; Short posterior rotation → persistent OP → exclude CPD, ensure adequate contractions & consider forceps delivery; No rotation or short anterior rotation; right or left occipito position or deep transverse arrest   ***Manage as above, but delivery with ventouse (allows rotation)***   * **Third stage:** Usually normal; Continue oxytocin if it was used before delivery * **Cx**: Slow cervical dilatation; Severe backache; myometrial dysfunction (often CPD); Early ROM; ↑↑ Perineal tears (Persistent OP); Early distension of perineum → dilatation of anus; * **Signs against long anterior rotation**: Late engagement; Early ROM; Poor flexion of fetal head; Laterally displaced anterior shoulder; Anthropoid pelvis; Poor contractions * **Specific management**: Exhaustion; Fetal distress; No progress (≥ 4 hours in 1st stage OR ≥ 1 hour in 2nd); Coincidental complications e.g. cord prolapse * **Pre-requisites of possible vaginal delivery**: Head engaged; No CPD; Full dilatation of cervix * **Methods for vaginal delivery**: Forceps; Manual rotation; Rotation-forceps delivery; Ventouse delivery; Destructive operation (if fetus dead); C/S if pre-requisites not met. |
| **Face-Presentation:**   * **First stage:** Frequent variable deceleraitions – Rule out fetal distress; High fetal head; Prolonged labour common; Vaginal examination:   + Triangle of face   + Gingivae in mouth   + Determine position: If anterioir → expectant; Lateral → Wait for rotation & ensure good contractions; Posterior → C/S if long ant. rotation doesn’t occur   + Evaluate pelvis: If contracted → C/S * **Vaginal delivery:** Only for mento-anterior or those having undergone change in position to mento-anterior; Ensure good contractions; Monitor FHR meticulously; Wide episiotomy; Forceps delivery if poor progress occurs * **Neonatal course:** Active resuscitation often necessary; Oedema of face (subsides within days); Fetal abnormalities in15%; Perinatal loss in 6% * **Ax:** CPD; Anencephaly/hydrocephaly/large thyroid tumor; Cord around neck → prevents flexion; Prematurity; Multiple pregnancy; Hydramnios; Placenta Praevia; Pelvic tumors; Grand multipara; 1˚ Hypertonus of fetal neck extensors; Very large baby; Idiopathic * **Mx:** Find cause first and manage if accordingly if determined → else: Evaluate size of pelvis; Size of fetus; Precise position; Exclude fetal abnormalities → If mento-anterior do wide episiotomy. If delay in second stage → forceps delivery. If MP → Might rotate anteriorly ELSE can rotate manually, rotate with Kielland’s forceps, rotate by Thorn’s manoeuvre; Craniotomy (if fetus is dead); If persistent MP → C/S!!! |

|  |
| --- |
| **Breech-presentation:**   * **First stage:** Hard at fundus and soft at pelvic inlet on abdominal examination; Bi-trochanteric line passes through anus on PV; No sutures or fontanelles felt on PV. * **Radiological examination:** Usually do abdominal & lateral X-rays (one of the few remaining indications for X-rays). Show the following: **Confirms diagnosis; Pelvis size (lateral); Congenital abnormalities; Attitude** * Sonar: Confrims diagnosis and BPD shows fetal head size. * Vaginal delivery – 3 phases:   + **Mechanism of breech**: Descent & engagement (bi-trochanteric diameter in oblique diameter of pelvis) – Slower than vertex pres. → Lateral flexion of anterior hip → Internal rotation (45˚) and BTD enters AP diameter of pelvis → Lateral flexion (anterior hip delivered first → second delivered)   + **Mech. Of shoulders/arms:** Engagement in oblique diameter (bis-acromial diameter) → 45˚ internal rotation to AP →Anterior shoulder/arm → Posterior shoulderarm.   + **Mech. of head:** Descent and engagement (sagittal in AP) → Flexion → Internal rotation (45˚) to AP → Flexion as neck under symphysis → deliver chin, mouth, nose, brow, begma & occiput in that order. * **Ax:**  **Uterine shape changes** – Uterine abnormalities; PP; Cornual placenta; Polyhyramnios; Multiple pregnancy; Pelvic tumors; Contracted pelvis; Previous breech. **Fetal shape changes:** Congenital abnormalities. **Factors preventing rotation:**  Prematurity; Nuliiparity; Extended legs; Very large fetus; Oligohydramnios; Short umbilical cord; IUGR; Fetal death. * **Mx:** See Breech for further management |

***Other abnormalities of presentation/lie:***

* **Transverse or oblique lies:** 
  + Ax:
    - **Maternal** – Contracted pelvis; Placenta praevia; Fundal placenta; Pendulous abdomen; Cogenital abnormalities of uterus; Temporary oblique lies (when full bladder displaces fetal head); Extra-uterin pregnancies;
    - **Fetal** – Multiple pregnancies; Fetal abnormalities which prevent engagement; Hydramnios; Very large fetus; IUD; Hypertonus of fetal extensor muscles (rare condition known as “flying fetus”); Prematuriy
  + Head situated in maternal flank (transverse) or in iliac fossa (oblique); Scapula is denominator
  + Shoulder usually presents
  + Look for uterine, placental and fetal abnormalities
  + Spontaneous version prior to/shortyly after commencement of labour is common
  + Delivery of persistent transverse lies: External version in early labour or immediately before IOL Or by C/S
* **Vertex presentation:**
  + Head in deflexion with anterior and posterior fontanelles situated in pelvis at same level
  + Usually temporary as either flexion (or rarely extension → face presentation) follows
  + Military position (variation) is where deflexion to the degree where anterior fontanelle presents
  + More prone to CPD as descent without internal rotation, flexion or deflexion occurs
* **Brow**
  + Partial extension of head
  + Area between the orbital ridges and bregma presents
  + Spontaneous delivery if flexion or extension occurs, if fetus is small or pelvis is very large
  + If labour progresses poorly, or mentovertical AP diameter (13.5cm) persists → C/S
  + If fetal death occurs → Craniotomy

|  |
| --- |
| **Breech presentation:** |

***Management options:***

* Expectant (<37 weeks duration)
* ECV (at 37 weeks)
* C/S
* Vaginal delivery (seldom done in modern practice)

***ECV Contra-indications:***

* Absolute
  + Fetal distress
  + Vaginal bleeding of unknown origin
  + Rupture membranes
  + Previous uterus surgery
  + Anhydramnios
  + Non-viable fetus
  + Other obstetric indications for C/S
  + HIV
* Relative
  + Severe oligohydramnios
  + Severe maternal HT
  + Premature fetus
  + Uterine abnormalities
  + Advanced labour

**Management of breech:**

**1st Stage:**

1. **IV Line**
2. **Keep membranes intact for as long as possible**
3. **PV immediately after ROM to exclude cord prolapse**
4. **Epidural is preferable: No adverse fetal effects; Facilitates vaginal manipulations; Inhibits urge to bear down befor cervix is fully dilated**
5. **Meticulous monitoring using partogram: 1cm/hr → @ 6cm breech should be on ischial spines’ level → @ 10cm should be on perineum → failure in any of the above → C/S**

**2nd Stage:**

1. **Lithotomy & 15˚ lateral tilt**
2. **Empty bladder**
3. **Regular FHR monitoring**
4. **Bear sown in contraction ONLY. No traction!!!**
5. **Episiotomy always done as soon as posterior buttock bulges beneath perineum**
6. **Delivered SPONTANEOUSLY as far as umbilicus**
7. **Pull cord PARTLY downwards as soon as it appears – YOU NOW HAVE 5 MINUTES!!!**
8. **Cover fetus with warm towel to prevent spontaneous breathing (due to exposure to cold)**
9. **Assistant maintains gentle suprapubic pressure**
10. **With appearance of anterior scapula → do PV → Feel for arms (usually folded) infront of chest → sweep them downwards**
11. **Ensure back remains anterior or anterolateral**
12. **Let body hang to improve flexion**
13. **Deliver head actively as soon as posterior hairline appears. Several methods:**
    1. **Forceps (Pijper’s or Wrigley’s)**
    2. **Wigand-Martins method**
    3. **Mauriceau-Smellie-Veit’s method**
    4. **Burns-Marchall’s method**
14. **Treatment of delay:**
    1. **Gentle groin traction**
    2. **Pinard’s manoeuvre to deliver legs**
    3. **Lovset’s/Classical method (shoulders)**
    4. **Forceps (see 18.)**

**External cephalic version – method:**

1. **Monitor fetus – fetoscope; CTG; movements etc.**
2. **Hexoplrenaline 10μg IVI slowly OR Nifedipine 10mg IMI/IVI**
3. **Lift breech out of pelvis on either side**
4. **Each attempt < 5min**
5. **Monitor FHR before and after each attempt**
6. **Turn in direction of flexion of head**
7. **If FHR decreases return to original position**
8. **If it still doesn’t improve then C/S indicated**
9. **Maximum attempts allowed = 3x**
10. **Warn mother about signs of ruptured membranes/abruption before discharge**

***C/S***

* Indications – Term breach (according to Hannah et al. & Obstetrics in Southern Africa):
  + >2500g (some texts say >3700g)
  + 1000-1500g
  + Fooltling breech
  + Obstetric indications
  + Contraction of pelvis to any degree
  + “Star-gazing” attitude
  + Additional medical problems e.g. HT, DM
  + Uterine dysfunction – NB!!! Don’t use oxytocin to improve function.
  + Foot or knee presentations
  + Previous baby with birth injury
  + Previous difficult vagainal delivery
  + Fetal distress or IUGR
  + Breech in primigravida (relative C/I)
* Contra-indications:
  + Non-viable fetus (<28 weeks)
  + Patient declines
  + Patient already bearing down

|  |
| --- |
| **Abnormal myometrial function:** |

***Classification & summary:***

* **Uterine hyperactivity:**
  + **Precipitate labour** – strong contractions and full dilatation within 1 hr
    - Ax: Weakness of pelvic floor; Spinal injuries with neurological lesions
    - Cx: Uterine rupture; Lower genital tract injuries; Fetal intracranial bleeds
    - If diagnosed before full dilatation → can try and use β2-stimulants
  + **Tonic contractions** – Usually iatrogenic owing to Oxytocin use with 3 presentations:
    - Multiple contractions in rapid succession; ↑ resting tone; contraction ≥ 90s (tonic)
    - Cx: Fetal distress → STOP oxytocin; β2-stimulants; if tonic without oxytocin consider abruptio placentae as diagnosis
    - Note: Braxton-Hicks contractions may be ≥ 90s; significance unknown
  + **Irritable myometrium** – uncoordinated uterin contractions; Have following traits:
    - Amplitude & frequency ↑; Resting tone ↑; Uteroplacental blood flow may be impaired if excessive contractions; Pain ↑↑ in duration and severity; Slow cervix dilatation despite strong contractions; Other signs of CPD usually absent; Ketosis common; Primigravidas predominantly
    - Three types:
      * Hyperactive lower segment – starts here → spreads to fundus and down → fetus can’t descend → cervix doesn’t dilate; Mx consists of eliminating pain, psychological support; sedation, IV fluids, side position, empty bladder & no oxytocin.
      * Colicky uterus – uncoordinated contractions – different parts contract independently → ineffective fetal descent; Mx as for hyperactive lower segment
      * Constriction ring dystocia – Ax: Result from colicky uterus OR iatrogenic oxytocin use OR following intra-uterine manipulations; Dx only usually made at C/S
* **Uterine hypoactivity:**
  + **Primary** – primips mainly; ↑ with age; ↑ in post term pregnancies; doesn’t recur;
    - Following aspects may play a role:
      * CPD/OP → poor Fergusson’s cervical-oxytocin-pituitary reflex
      * Psychological factors
    - Charcterised by:
      * Insufficient contractions with ↓ amplitude & ↓ frequency; ↓ resting tone; good uteroplacental circulation; ↓↓ pain and backache; Occurs anytime during labour (continuing or transitory)
    - Mx: No active treatment needed in latent phase except if complications arise; morphine 15-20mg IM for sedation & pain relief; In active phase creat optimal conditions for labour
  + **Secondary inertia** – atonia due to exhaustion e.g. CPD
* **Cervical dystocia** – full effacement without dilatation = thin cervix preventing descent
  + - Ax: Idiopathic (especially in primips); 2˚ e.g. cervical fibrosis
    - Mx: Digital dilatation of cervix under adequate analgesia (preferable epidural or GA)

|  |
| --- |
| **CPD – The great common mistake: See above for ‘PELVIMETRY’** |

***Factors influencing CPD:***

* Fetal factors:
  + Absolute size of head
  + Largest effective diameter depending on attitude
  + Extent of moulding – post-term < term/preterm
* Pelvis:
  + Absolute size of pelvis
  + Shape
  + Ligaments → become lax due to relaxin (released by corpus luteum in 1st TM and by placenta and dicidua basalis in 2nd TM) → Joint widening. Teenager mothers > older mothers.

***Risk factors*** – NB!!! Need to be weary in the following conditions:

* Maternal:
  + < 150 cm tall i.e. short
  + < size 4 shoe i.e. small feet
  + Primip with 5/5th HAB at 37wk gestation – exclude wrong dates and OP first.
  + Multip with previous C/S esp. where CPD was diagnosed (relative)
  + Old primip
  + Dystrophia-dystocia – short; plump; thick neck; wide shoulders; hirsutism; relative infertility; short/thick extremities & android pelvis
  + Pendulous abdomen esp. multips
  + Abnormal pelvis i.e. contracted; pronounced android
  + Rare abnormalities:
    - Naegele’s pelvis – 1 sacral alae missing
    - Robert’s – both sacral alae missing
    - Rickets, osteomalacia, kyphosis, scoliosis & spondylolisthesis
    - Tumours
    - Assimilation pelvis: High = L6 & S1 fused; Low = Sacrum only 4 vertebrae
    - Pelvic fractures
    - Poliomyelitis
  + Previous surgery e.g. spinal fusion
* Fetal:
  + > 4000g
  + Malpositions (e.g. OP with deflexion); Abnormal lie
  + Fetal abnormalities e.g. hydrocephaly
  + Unexplained preterm ROM or umbilical cord prolapse
  + High fetal head at term i.e. > 5/5th HAB

***Dx:***

* During pregnancy:
  + High-risk factors
  + Routine pelvimetry at 36wk (not routinely done); May be given trial of labour
* During labour – adequate contractions PLUS 1 of following:
  + 2˚ delay of cervical dilatation
  + Delay of descent during deceleration phase (1st stage) or 2nd stage.
  + Caput succedaneum – NB!!! Cervical caput is not CPD
  + Moulding = grade III
  + Poor application during contractions (also occurs in uterin hypo- and hyperactive dysfunction)
  + Overlapping with presenting part higher than symphysis pubis when patient on back with upper body supported at 45˚
  + Fixed cranium with Muller-Munroe-Kerr manoeuvre – Left hand pushes head down via abdomen and movement is felt with right hand via vagina. NO MOVEMENT = CPD
  + Asynclitism – sagittal suture transverse but not equidistant between symphysis and sacrum
    - Normally: Slightly posterior at inlet (i.e. sagital suture anterior displaced with posterior parietal bone presenting); synclitism at mid-pelvis; anterior asymnclitism at outlet.
    - CDP if excessive in right direction or if in opposite direction
  + Small or abnormal pelvis – pelvimetry assessment needed.
  + Deflexion of fetal head
  + Late signs: Fetal distress, maternal exhaustion & ketosis

***Mx***: Trial of labour if - ?CPD in primip with large baby or small pelvis; trial-of-scar (VBAC) → C/S if poor progress

***Cx***: 2˚ hypoactive atonia; uterus rupture (multip); Ix esp. with meconium and repeated PV; pressure necrosis → vesicovaginal fistula; maternal exhaustion, ketosis; Injuries; fetal distress; asphyxia; cord prolapse; abnomal lie & presentation

|  |
| --- |
| **Common drug regimens & information – also see gynaecological problems in pregnancy:** |

***Induction of labour:***

**Note:**

**Side-effects of prostaglandins:**

* **N&V; diarrhea**
* **Uterine overstimulation → severe pain & fetal distress**
* **Uterine rupture**
* **Severe ↑ BP (esp. PGF2α)**

**Contra-indications:**

* **Asthma (esp. PGF2α)**
* **Ruptured membranes (vaginal/cervical)**
* **Previous C/S**
* **Grand-multipara (relative) – can give BUT STOP AS SOON AS SHE GETS CONTRACTIONS!!!**
* **Absolute contra-indications:**
  + 2/more previous C/S
  + 2˚ to metroplastic operations
  + Previous myomectomy
  + Fetal distress
  + CPD
  + Malpresentation/abnormal lie
  + Placenta praevia (grade II posterior, III & IV)
  + Invasive CA of cervix
  + Active genital HSV Ix
  + Transverse lie following failed ECV
* **Relative contra-indications:**
  + 1 previous C/S
  + Grand-multiparity
  + Uterine overdistension
  + Placental dysfunction
  + Breech presentation
* **Methods:**
  + Misoprostal (PGE2) 1 tab. in 200ml Water (see notes above)
    - 20 ml x3 PO q30min
    - 40 ml x2 PO q30min
    - 60 ml x1 PO
    - Repeat whole regimen once THEN do extended course 60ml x3 PO q30min
    - Failure – do C/S
  + Oxytocin after cervix has been ripened with prostaglandins
  + Vigorous PV examination
  + Balloon catheter through cervix → inflate & apply light traction
  + ROM

***Augmentation of labour – with abnormalities excluded @ action line:***

**Pitocin (Oxytocin) – General information:**

* **Indications**:
  + IOL (prostaglandins are preferable)
  + Inadequate uterine contractions during 1st and 2nd stages
  + Post-partum atonic uterus
  + Stimulation of milk ejection during breastfeeding
  + Induction of uterine contractions during oxytocin stress test (NB. Now replaced by nipple stimulation)
* **Contra-indications**:
  + Absolute: Fetal distress; upper segment uterine scar; evident CPD
  + Relative: Placenta praevia; ? CPD; lower segment uterine scar; grande multiparity; uterine overdistension
* IV administration – **15 dropper**:
  + Dilutent: 5% Dextrose in H­2O
  + Dosage:
    - Multips: 1 IU In 1l 5DW; start at 15dpm → double rate q15min; Max=60dpm
    - Primips: 5 or 10IU/l; start at 3dpm or 1.5dpm respectively → double rate q15min; Max=60 & 54dpm respectively
    - Post-partum: 20-40 IU at rate of 20-25dpm
  + Drop chamber: 15dpm → double rate q15min until 3-4contractions/10min
  + Prevention of water intoxication: Give balanced electrolyte solution
* IV administration – **60 dropper** set:
  + As above BUT
  + Oxytocin 10IU in 200mL Saline with 60 dropper IV set; change dose q30min by 6dpm (start with 6dpm; Max=60dp
* If failure to augment labour → C/S

***Prevention of PPH*** – Oxytocin 10mg IMI Stat

***Preoperative medication***:

* Maxalon 10mg stat PO
* Sodium Citrate 30ml stat PO
* Urinary catheter
* Cefzol 1g q8h

***Rhesus-isoimmunization***:

* + Prophylaxis:

|  |  |
| --- | --- |
| **Time** | **Anti-D globulin** |
| 28 wk | 100μg |
| 32-34 wk | 100μg |
| Procedures/complications in 1st/2nd/3rd trimester | 100μg |
| Postpartum:   * + Minimize possible transplacental bleeding   + Determine fetal Rh status   + Do maternal indirect Coomb’s test (for anti-bodies)   + Fetus Rh negative   + Fetus Rh positive and maternal antibodies absent   + Fetus Rh positive and maternal antibodies present   Administer anti-D globulin within a.s.a.p. (preferably within 72hr)  If massive transplacental bleeding is suspected, a Kleihauer-Betke test should be done. The anti-D dose should be adjusted (20μg per ml fetal erythrocytes).  Remember: Patient with anti-bodies>1:8 should be referred to tertiary institution for further tests, management and delivery. | None  300μg  None (unless titre below 1:8) |

|  |
| --- |
| **Caesarean section & external cephalic version:** |

***Aetiology*** – abnormal lie and presentation (To be excluded by US if still abnormal at 32 weeks) – see also below:

|  |  |
| --- | --- |
| * Multiple pregnancy * Multiparity * Premature labour * Polyhydramnios * Contracted pelvis | * IUCD * Congenital uterine abnormalities * Congenital fetal abnormalities * Pelvic tumors e.g. leiomyomata * Extra-uterine pregnancy |

If all of the above excluded (at 32 weeks), proceed with conservative management until 37 weeks, then attempt ECV:

* External version:
  + Assess FHR (if distresses C/S)

**Note:**

**Contra-indications to ECV:**

* **APH**
* **Multiple pregnancy**
* **Severe PET**
* **Fetal distress**
* **Classical C/S**
* **Premature labour**
* **PROM**
* **<32 weeks**
* **Oligohydramnios**
* **2 previous C/S**
  + Empty bladder
  + >36 weeks give nifedipine
  + Mother in 45˚ oblique position
  + Powder on abdomen, use 2 hands and direct fetus in direction of FLEXION
  + ? Vaginal bleeding – if yes do emergency C/S
  + ? Abnormal FHR – if yes – return to original position – if still abnormal do emergency C/S
* Internal version ONLY IF:
  + Small non-viable fetus AND
  + Fetal distress OR cord prolapse AND
  + Fully dilated cervix AND
  + No available C/S facilities

***Indications for C/S:***

* Fetal distress
* CPD
* Malpresentation incl. breech
* Placenta praevia
* Previous C/S or uterine surgery
* Failure to progress despite optimal control
* Failed IOL
* Cord prolapse/Prolapsed arm
* Multi-fetal pregnancy
* Cervical cancer
* Previous surgery for incontinence
* HIV positive mothers

***Classical C/S indications:***

* Transverse lie
* Breech presentation
* Small baby
* Previous classical C/S

|  |
| --- |
| **Abnormalities of pregnancy:** |

|  |
| --- |
| **Placental, umbilical cord, membrane & amniotic fluid abnormalities and their interpretation:** |

|  |  |  |
| --- | --- | --- |
| **Abnormality** | **Pathology** | **Clinical significance** |
| **Bilobata** | 2 or more lobes of equal size | None |
| **Bi-, tripartite** | Lobes separated by membranes | Associated with vilamentous implantation of umbilical cord → haemorrhage |
| **Fenestrata** | Focal absence of placental tissue | None |
| **Membranacea** | Thin stretched placenta with villi over whole endometrial surface | APH; PPH; Pretrm labour; Placental insufficiency |
| **Succenturiata** | Additional small lobe joined by blood vessels via membranes | PPH |
| **Monochorial twins** | 1 Amnion | High perinatal mortality rate |
| **Monochorial twins** | 2 Amnions | As for twins |
| **Dichorial twins** | 2 Chorions and amnions | As for twins |
| **Circummarginata** | Membranes implant just inside the edge of placenta | Usually none |
| **Circumvallata** | Membranes folded back and implanted onto themselves to form a ring | Usually none |
| **Large placenta** | Weight > 600g | DM; Maternal syphilis (untreated); Multiple pregnancy; Hydrops foetalis |
| **Small placenta** | Weight < 400g | Prematurity; Placental insufficiency; Nutritional deficiency (low protein intake); Cigarette smoking; Heroin addiction; Alcoholism; Chronic UTI; Chronic systemic maternal disease. |
| **Abruptio placentae (maternal surface)** | Retroplacental clot causes a depression in placental surface | Abruptio placentae → APH |
| **Pale surface (maternal surface)** |  | Immaturity; Anaemia due to haemorrhage; Erythroblastosis fetalis; syphilis |
| **Infarctions (maternal surface)** | Dark red (fresh infarct) to yellow-white (old infarct) | Pre-eclampsia; DM; May be normal |
| **Placenta accrete (maternal surface)** | Portion or whole placenta abnormally attached to uterine surface. Dicidua baslis partially or totally absent → chorionic villi attached directly to myometrium | Mx:  If manual removal fails → Hysterectomy (family complete) OR left in situ (wants more children) → Risk of necrosis.infection, therefore |
| **Placenta increta (maternal surface)** | Penetration of villi into but not through myometrial wall | give antibiotics → if infection insues → consider hysterectomy (septic shock |
| **Placenta percreta** | Penetration through myometrium up to serosal surface of uterus → baldder penetration or uterus rupture | risk) esp. if in lower segment. Ligation of internal iliac arteries ineffective in these haemorrhages. |
| **Battledore placenta** | Umbilical cord inserts on edge of placenta | No obstetric/fetal associations |
| **Vilamentous insertion** | Umbilical cord inserts into membranes instead of chorionic plate | Exposed blood vessels at risk for haemorrhage during amniotomy, intrauterine catheter insertion or spontaneous rupture of membranes esp. if vasa praevia. Pressure of presenting part on vessels → placental insufficiency. C/S if bleeding causes fetal distress ELSE do Apt Test |
| **Congenital absence of umbilical cord** | Fetus joined directly to placenta | IUD is common |
| **Short umbilical cord (<30cm)** |  | May lead to AP; malpresentation; delay in 2nd stage; uterine inversion; haemorrhage |
| **Long cord (≥70cm)** |  | May lead to prolapse; knows; limb amputations |
| **Only 1 umbilical artery** |  | Associated with ventricular septal defects; Oesophageal atresia; Renal abnormalities; Double ureter; Anus imperforatum; Meckel’s diverticulum |
| **Varicose veins** |  | May rupture → hematoma (harmless) |
| **True knots** | Fetus moves in loop in early pregnancy | Tighten during descent → occlusion |
| **False knots** | Kink or loop in small portion of an umbilical blood vessel | Of no clinical significance |
| **Torsion** |  | Often occurs in polyhydramnios or ↓ in Wharton’s jelly e.g. IUGR |
| **Abnormal thickness of cord** |  | Depends on Wharton’s jelly. Too thin associated with IUGR or oligohydramnios. Too thick is not abnormal (must be well clamped at birth) |
| **Red/rust colour membranes** |  | Due to haemorhage |
| **Green membranes** |  | Meconium (fresh meconium can be wiped off but old meconium cannor due to phagocytosis i.e. tattooing of membranes) |
| **Amnion nodosum** | Yellow, opaque nodules on amnion on fetal side – mixture of vernix, fibrin, desquamated epithelial cells and lanugo hair | Often seen in oligohydramnios |
| **Placental cysts** | Subchorionically but occasionally on fetal side. Vary from 0.5-10cm. Watery or bloody fluid. Occur singly but may multiply | No clinical significance |
| **Segmental constriction of arteries and veins** | On fetal surface of placenta | Associated with hypertensive disease |
| **Thrombosis of chorionic vessels** | Due to inflammatory thrombosis as seen in meconium exposure or underlying placental infarct | Prevalent in mothers with DM |
| **Amnion bands** | Thin thread or bands run across amniotic cavity | May lead to congenital amputations |

***Abnormalities of amniotic fluid:***

* **Polyhydramnios** (≥2000ml) – Conditions associated with:
  + Maternal disease
    - Iso-immunization; DM; Any cause of anasarca e.g. heart failure
  + Placental and umbilical cord abnormalities
    - Chorioangioma; Placenta circumvallata; Umbilical cord stenosis
  + Fetal conditions
    - Mutiple pregnancy – especially twin to twin transfusion
    - Gastrointestinal obstruction – EA; diaphragmatic HH; DA; JA; Annular pancreas; omphalocele; mid-intestinal volvulus; gastroschisis
    - Central nervous system – anencephaly; hydrocephaly; spina bifida; encephalocele; microcephaly; hyrancephaly
    - Skeletal – Arthrogryposis multiplex; osteogenesis imperfecta
    - Fetal tumors – Cystic adenomatoid abnormalities of lungs; sacro-coccygeal teratoma; malignant cervical teratoma
    - Cardiac disease – VSD; arrythmias
    - Fetal renal/endocrine abnormalities – ADH deficiency; partial/complete urinary tract obstruction
    - Haematologic – Thalassaemia major; feto-maternal haemorrhage
    - Intra-uterine infections – Rubella; syphilis; toxoplasmosis
    - Other – Fetal retroperitoneal fibrosis; non-immunologic hydrops foetalis
  + Idiopathic
* **Oligohydramnios** (<600ml) – Conditions associated with:
  + Placental insufficiency
  + Post-term pregnancy esp. post maturity
  + Chronic drainage of amniotic fluid (preterm rupture of membranes)
  + Congenital fetal abnormalities esp. renal agenesis and urinary outflow obstruction
* **Abnormal colour**:
  + Green meconium – Fetal distress
  + Brown meconium – Previous fetal distress
  + Yellow – Bilirubin due to haemolysis e.g. Rh-isoimmunization (amniotic fluid should contain no bilirubin after 36wk)

|  |
| --- |
| **Twins:** |

***Types:***

* Monozygotic
  + Same sex
  + <4 membranes in septum between 2 sacs
  + Share same chorion
  + Share amnion/separate amnion
  + Not always identical – the earlier the division the more dissimilar the fetuses can be
  + The earlier the embryo divides the more similar the placentas and membranes are to those of dizygotic twin:
    - Early – 2 chorions & 2 amnions
    - Intermediate – 1 chorion & 2 amnions
    - Late – 1 chorion & 1 amnion
  + Can be discordant e.g. twin-to-twin transfusions due to vascular connections
    - Diagnosed Hb difference of >5g/dl between to fetuses)
    - Note donor, although small and pale has better chance of survival out of uterus.
    - Receiver often dies of cardiac failure
    - In sever cases donor dies in-utero and becomes amorphous & papery = “fetus papyraceus”
* Dizygotic
  + Fertilization of 2 separate ova
  + Can be different sexes
  + Own chorion/amnion
  + Own placenta each, sometime partially fused but no vascular connections in monochorionic placenta

***Dx:***

* Hx: Family history; ↑ Minor complaints; ↑ Fetal movements
* Sx: Large-for-date uterus; ↑ SF measurements; Wide transverse uterus measurements; ↑ Maternal weight gain; Polyhydramnios; Multiple fetal parts; Fetal head feels smaller when related to uterus
* Clinical: 2 Heads palpated; 3 Fetal poles palpated; 3 Fetal hearts heard
* US: See ANC
* X-ray: Only if US not available

***ANC:***

* Early diagnosis
* Determination of gestational age – dates vs. early US
* ANC Care:
  + Increased rest
  + More frequent visits
  + Hb repeated at 20, 28 and 36 weeks
  + Cautious interpretation of routine observations
  + US @ diagnosis, 20wk
  + PV from 28wk
  + Antenatal fetal monitoring from 32-34wk
  + SF above 90th centile
* Prompt hospitalization when complications occur
* Prevention of preterm labour

***Cx:***

|  |  |
| --- | --- |
| **Antepartum:** | **Intra-partum:** |
| * Prematurity * PET * IUGR (Twin-twin T/F; Unequal placental function) * Spontaneous miscarriage * Polyhydramnios & Congenital abnormalities * Anaemia * APH * Cord prolapse * Conjoint twins | * Abnormal lies & malpresentations * Uterine dysfunction * Fetal distress * Cord prolapse * Intrapartum haemorrhage * Complicated deliveries * Locked twins |
| **Post-partum:** |
| * PPH * Perinatal mortality & morbidity |

***Mx:***

* Do amniocentesis before C/S to test lung maturity
* C/S Mostly if:
  + Either twin’s lie is transverse
  + EFW of 1/both 1000-1500 or >3500g
  + Associated obstetrical complication or indication
  + 1st baby is a breech
  + 1st and 2nd are breech with extension of the head
  + Previous C/S
  + Triplet 1/more abnormalities present
  + Siamese twins
  + Poor progress
  + Fetal distress

***1st Stage of labour:***

1. **Patient should lie on her side**
2. **IV with 2nd IV ready with 5-10IU oxytocin**
3. **NPO**
4. **CTG – Monitor 1st fetus internally and 2nd externally**
5. **Analgesia & sedation**
6. **Hospitalize**
7. **PV with ROM to exclude cord prolapse**
8. **Monitor progress according to 4 P’s → If can’t be corrected → C/S!!!**

***2nd Stage of labour***

1. **In theatre**
2. **In lithotomy with 15˚ lateral tilt to left**
3. **Paediatrician present**
4. **2x Resuscitation sets/incubators ready**
5. **Deliver 1st baby like singleton (since they’re often preterm/small for dates → forceps assistance)**
6. **Clamp 1st cord immediately**
7. **Examine lie of 2nd baby - As soon as in longitudinal lie → cautious oxytocin infusion may be used to restart contractions – Not done at Kalafong/PAH**
8. **Transverse – Try ECV and if it fails, do emergency C/S (if ECV results in breech, you can deliver vaginally BUT with difficulty)**
9. **Examine FHR**
10. **If Fetal distress/prolapse → emergency C/S**
11. **If both above are normal – Wait for engagement and ROM**

***3rd Stage of labour***

1. **Look for triplet first**
2. **Deliver placenta by active method**
3. **Keep bladder empty**
4. **Mx PPH & episiotomy**
5. **Rub-up uterus**
6. **Oxytocin 20-40IU/litre over 8-12hrs**
7. **Oxytocin 10IU IMI STAT**
8. **Look for complete membranes/placenta**
9. **Check both babies’ haemoglobin levels**
10. **Note which baby was born first**
11. **If locked twins → C/S!!!**

|  |
| --- |
| **Intrauterine growth restriction**: |

***Definition***: LBW<2.5kg; SGA<10th Centile; IUGR <10th centile and clinical signs

***Risk factors***:

|  |  |  |
| --- | --- | --- |
| **Fetal factors** | **Placental factors** | **Maternal factors** |
| * Multiple pregnancy * Congenital abnormalities * Chromosomal abnormalities * Inborn errors of metabolism * Extra-uterine pregnancy | * Decreased blood flow * Decreased exchange area * Placenta praevia * Twin to twin transfusion * Post-maturity * Abnormal placental morphology * Placenta accrete * Chromosomal mosaicism of placenta | * PET * Malnutrition/Undernutrition * Decrease socio-economic status * Intra-uterine infection * Systemic disease * Smoking or alcohol use * Chronic infection or cancer * Increased altitude * Very young/old patients |

***2 Types occur:***

* Symmetrical: SGA (small for dates) for all dimensions – Indicates aetiology before 20wk
* Asymmetrical: Skull normal, body is long and emaciated – Aetiology after 20wk

|  |  |
| --- | --- |
| **Symmetrical causes** | **Asymmetrical causes** |
| * Congenital infection * Congenital abnormality * Maternal drug abuse * Maternal smoking * Alcohol abuse | * Maternal vascular disease * Placental insufficiency:   + PET & chronic HT   + Smoking   + Excessive physical excersize   + Severe emotional stress   + Drugs such as adrenalin, noradrenalin or high levels of ATII |

***Dx:***

* Identify IUGR risk factors
* Clinical parameters:
  + SF below 10th centile (poor fundal growth)
  + Advanced ripening process
  + High-risk patient – see Wennergren’s risk score system (≥4 indicates IUGR)
  + Poor maternal mass gain
  + Inadequate uterine growth; small for dates
  + ↓ Amniotic fluid; ↑ basal tone and more Braxton-Hicks contractions
  + Fetus has large head and is hyperflexed
  + ↑ Myometrial irritability → ↑ contractions during palpation
  + FHR abnormalities; ↓ Fetal movements
  + Meconium stained liquor with ROM
* US measurements and findings:
  + ↓ BPD (relevant only in symmetrical IUGR)
  + ↑ FL:AC or ↑ BPD:AC (asymmetrical IUGR)
  + Advanced placental maturity grading
  + EFW below 10th centile, calculated from abdominal circumference and BPD
* Post-natal:
  + Assess maturity: Ballard score

***Cx:***

**Wennergren Risk Score System:**

Previous IUGR or NND 1

BP≥140/90mmHg after 34wk 1

Hx of renal disease or UTI in this preg. 1

Smoking 2

APH or preterm labour 1

Insufficient mass gain 1

↓ or no ↑ in mother’s abdominal girth 1

↓ or no ↑ in fundal height 1

* Fetal hypoxia
* Polycythaemia
* Hypothermia
* Hypoglycaemia
* Hypocalcaemia
* Decreased gastric motility
* Decreased growth and development
* Increased risk of cardiomyopathy in adult life
* Mental retardation and congenital abnormalities

***Mx:***

* Detection
  + High-risk factors (Wennergren)
  + SF measurement
  + US and accurate determination of pregnancy duration
* Antenatal
  + Determine aetiology; treatment; timing and method of delivery
    - Placental functions: Kick chart and NST
    - Fetal lung maturity
    - Cervical status (modified Bishop’s score)
    - Fetal mass (C/S if <1500g)
    - Maternal condition that necessitates C/S
* Delivery
  + Meticulous fetal heart monitoring (look for variable/late decelerations)
  + Active resuscitation of neonate
* Postnatally
  + Adequate paediatric care of neonate and associated risk factors
    - Determine duration of pregnancy (reliable dates; early US; Ballard score)
    - Confirm growth restriction (Birth weight < 10th centile)

***Delivery timing:***

* Assess cervix according to modified Bishop’s score
  + If favourable; hard fetal head and ≥34wk → Deliver
  + If not favourable; no fetal distress → Can wait until 37-38wk– Ask 4 questions:
    - What is aetiology
    - Is effective treatment available and can deterioration be prevented?
    - What is most feasible method of determining intra-uterine fetal well being?
    - What is optimal timing and method of delivery?
* If fetal distress → Deliver
* If fetal heart absent → Determine cause and treat as for IUD

|  |
| --- |
| **Intrauterine demise:** |

***Definition***: Fetal death after viability has been reached i.e. ≥ 22wk and/or ≥500g

***Risk factors & Ax***:

|  |  |
| --- | --- |
| * Previous stillbirth * Placental dysfunction →IUGR * Maternal age: <18 or ≥35yr * Maternal disease e.g. HT or DM * Infections e.g. STORCH, AFIS, Chorioamnionitis * Rhesus iso-immunization * Poor socio-economic circumstances * Cigarette smoking, alcohol, drug abuse * Use of certain medications * Multiple pregnancy * Chromosomal abnormalities | * Non-chromosomal abnormalities * Poor ANC and labour care * APH (placenta praevia AND abruption placentae) * Placental infarction * Trauma & Uterine rupture * Cord prolapse * Post-maturity * Fetal distress associated with distocia of labour * Transplacental haemorrhage * Feto-fetal transfusion |

***Dx:***

|  |  |  |
| --- | --- | --- |
| **History:** | **Examination:** | **Special investigations:** |
| * No fetal movements * 20 weeks with no fetal movements * Decreased maternal weight * Decreased symptoms of pregnancy * Decreased tenderness of breasts * Brown/watery discharge * Decreased uterine size or not ↑ | * Small uterus or not ↑ * Feels firmer and dough-like * Abnormal position i.e. hyperflexed * No fetal movements felt * Difficult to identify 2 poles and limbs * No fetal heart-beat audible with * Stethoscope or Doppler | * β-HCG decreased or negative * CTG – No FHR * US – No movement/FHR/Double ring sign/Skull collapse and over-riding/Gas accumulation/Sever oligohydramnios * AXR – Gas in fetal heart; Spalding sign; Ball sign; Halo sign; Abnormal fetal limb position |

***Cx:***

* Infection OR sepsis
* Defibrination syndrome (DFS)
* Psychological problems

***Mx:***

* Confirm diagnosis → Tell patient result immediately → Allow her to mourn
* 3 Important steps:
  + Thorough examination to look for cause
  + Look for complications and act accordingly
  + Assess relevant obstetric factor in Mx e.g. cervix condition, duration of pregnancy, nature of presenting part, possible uterine scars etc.
* General measures in vaginal delivery:
  + Adequate emotional support
  + Adequate pain relief e.g. Omnopon 10-20mg IM q4h
  + Friends/Relatives welcome in ward should patient wish it
  + Treat baby with same sensitivity as live infant
* Conservative (if patient finds active Mx unacceptable)
  + Delivery within 3 weeks
  + Psychological follow-up
  + Platelet and fibrinogen tests at follow-up
* Active (if conservative Mx unacceptable; Ix; DFS; ROM; >3 weeks)
  + Cervix favourable: Administer oxytocin without amniotomy
  + Cervix unfavourable:
    - PGE2 tab. intracervically or vaginal gel
    - PGF2α intra-amniotically or transcervically (extra-amniotically)
    - Progesterone antagonist, Mifepristone
* C/S if:
  + Absolute indications:
    - Major degree of placenta praevia
    - Severe CPD
    - Rupture or imminent rupture of uterus
    - 2 or more previous C/S
    - Previous classical C/S
  + Relative indications:
    - One previous C/S – NB factors: Degree of disproportion and maceration
    - Transverse lie or shoulder presentation in advanced labour with rupture membranes
    - Fetal tumour or severe abdominal distension (e.g. hydrops foetalis)
* Post-partum care:
  + Counseling for patient and her husband
  + Suppression of lactation
  + Rh prophylaxis if indicated
  + Contraception
  + Consider post mortem examination of baby
  + Advise parents regarding births registration, burial etc.
  + Future pregnancy planning
  + Complete births-deaths notification and J88

|  |
| --- |
| **Teenage pregnancy**: |

***Definition***: If mother <19 years (some texts say only 16 is of significance) – need more frequent ANC

***Cx:***

* Hypertension of pregnancy
* Anaemia
* SGA
* PROM
* Premature labour

|  |
| --- |
| **Old primigravida vs. Grand-multipara** |

***Cx:***

|  |  |
| --- | --- |
| **Old primigravida** | **Grand multipara** |
| * Miscarriage * Hypertension of pregnancy * Diabetes mellitus * Trophoblastic neoplasia * Congenital abnormalities * APH and PPH * Hyperemesis gravidarum * Leiomyomata * PROM * Premature labour * Uterine dysfunction * Malpostion (OP) * LBW * HBW (>4000g) * Vaginal/Perineal tears * Retained placenta * Decrease breastfeeding capability * Increase maternal mortality * Increased perinatal mortality | * Obesity * Malnutrition * Anaemia * Increased minor complications * Spondylolisthesis → CPD * Progressively larger babies → CPD * Multiple pregnancy * Uterine rupture (labour) * Premature and preterm labour * Increase maternal mortality * Increase perinatal mortality * Congenital abnormalities * Abortion * Abruptio placentae * Abnormal lie, positions and presentations * Umbilical cord prolapse (labour) * Rh-isoimmunization risk ↑ with each pregnancy * Cervical CA * PPH |

***Mx:***

* NB!!! Both are high-risk patients
* 1st ½ of pregnancy:
  + Amniocentesis (>37years)
  + Early US
  + Look especially for trisomy 21
  + Look for malpresentations or abnormal fetal lie
* 2nd ½ of pregnancy:
  + Early ANC examination
  + Glucose tolerance @ 28 & 36 weeks
  + Fetal welfare & growth assessment
* Labour:
  + CTG
  + Avoid oxytocin
  + Manage PPH actively
* Pueperium:
  + Breastfeeding advice
  + Post-partum sterilization counseling

|  |
| --- |
| **Prolonged pregnancy/Post-maturity:** |

|  |
| --- |
| ***Post-maturity*:** |

***Dx*** – made neonatally with following signs:

* No/decreased lanugo
* No/decreased vernix
* Dry, wrinkled, cracked or desquamated skin
* Decreased sub-cutaneous fat
* Increased scalp hair
* Long and thing limbs
* Long fingers
* Larger/Harder head
* Alert/Apprehensive faces
* Meconium staining

***Mx:***

* Dx: Sure dates or early US
* Exclude medical/obstetrical risk – if present assess cervix
* Assess fetal welfare/growth – if normal, manage expectantly and re-evaluate q3-4 days until 44 weeks or FD, else assess cervix
* Cervix assessment: If favourable → IOL if no C/I; If unfavourable/IOL C/I → C/S

|  |
| --- |
| **Prolonged pregnancy:** |

***Definitions:***

* **Post-mature:** Neonatal diagnosis with the above signs
* **Post-term:** Gestation ≥ 40wk as diagnosed on early US
* **Post-dates:** Gestation ≥ 42wk according to dates given by patient

***Cx:***

* Congenital abnormalities
* Anencephaly
* CPD
* Shoulder dystocia

***Post-mature syndrome*** – post-mature babies are prone to the following:

* Fetal distress
* Meconium aspiration
* Asphyxia
* Metabolic acidosis
* Hypoglycaemia
* Dehydration
* Increased perinatal mortality
* Neonatal feeding problems
* Neonatal sleep disturbances
* Decreased mental development

|  |
| --- |
| **Pregnancy-related sepsis & shock:** |

|  |
| --- |
| **Puerperal sepsis:** |

***Definition*** - sepsis: Pyrexia ≥ 38˚C on 2 separate occasions within the first 14 days post delivery, excluding the first 24hr, if observations are taken on a 4-6 hourly basis.

***Sx*** – puerperal sepsis:

* Malaise; anorexia; headaches
* Fever
* Tachycardia
* Offensive lochia/discharge
* Lower abdominal discomfort
* Uterus not well contracted (sub-involution = endometritis)
* Dilated cervix at > 1wk post-partum
* If puerperal sepisis is associated with pelvic cellulitis:
  + Excitation tenderness
  + Unresponsive but tender parametria
  + ± Abscess in pouch of Douglas
  + ± Peritonitis & septic shock
  + Distended abdomen (late sign) ± rebound tenderness (rare) – indicates intra-abdominal involvement
  + Ileus & fever → search for intra-abdominal free puss/abscess

***Assessment and evaluation of severity of sepsis complicating an abortion and/or other condition:***

|  |  |  |
| --- | --- | --- |
| **Low risk abortion** | **Moderate risk unsafe abortion** | **High risk unsafe abortion** |
| Temperaure ≤ 37.2˚C | 37.3-37.9˚C | ≥ 38˚C |
| SBP unaffected | SBP unaffected | SBP < 90 mmHg |
| Pulse < 90 bpm | 91-119 bpm | ≥ 120 bpm |
| Respiratory rate < 20 breaths/min | 20-24 breaths/min | >24 breaths/min |
| Ward haemoglobin > 10g/dl |  |  |
| No clinical signs of infection | Offensive products of conception; Localized peritonitis | Peritonitis |
| No system or organ failure | - | Organ failure |
| No suspicious findings on evacuation of uterus | - | Presence of foreign body or mechanical injury, on evacuation of uterus |
| Uterus size < 12 weeks | 12-16 weeks | > 16 weeks |

***Ax*** – pathogens:

|  |  |  |
| --- | --- | --- |
| **Gram-positive organisms:** | | |
| **Aerobic cocci** | **Anaerobic cocci** | **Bacilli** |
| Group-A streptococci  Group-B streptococci  Group-D streptococci (S. Faecalis)  Staphylococcus aureus | Peptococci  Streptococci | Clostridium perfringens  Literia monocytogenes |
| **Gram-negative organisms:** | | |
| **Cocci** | **Aerobic bacilli** | **Anaerobic bacilli** |
| Neisseria gonorrhoea | Enterobacteriaceae e.g. E. Coli; Klebsiella; Enterobacter; Proteus; Citrobacter; Gardnerella vaginalis (rare) | Bacteroides e.g. B. Fragilis; B. Melaninogenicus |

***Prevention:***

* General measures:
  + Strict aseptic technique during deliveries
  + Prophylactic antibiotics (Cefoxitin) in conditions with ↑ risk for sepsis e.g.
    - Prolonged rupture of membranes
    - Prolonged labour
    - Severe tissue trauma
    - Haematoma
    - Intra-uterine manipulations
  + Prevent OR Rx anaemia (decreased incidence of Ix)
  + Early diagnosis & Rx of puerperal Ix
* Specific measures:
  + Abortion:
    - Antibiotic prophylaxis (Doxycycline)
    - Suction curettage under local anaesthesia
    - Evacuation within 6 hours
    - Ensure Hb > 10 g/dl
  + Preterm prelabour ROM/Prolongued ROM
    - Antibiotics in therapeutic dosages, covering Gr. B Streptococcus, Mycoplasma and Ureaplasma
    - Sterile speculum to confirm diagnosis
    - PV only when in active labour
    - VCT and if HIV positive → more aggressive treatment (signs may be ↓)
    - Antiseptic cream for PV
  + C/S for Puerperal sepsis
    - Antibiotic prophylaxis (single dose) before all C/S
    - Antibiotic therapeutic dose x3d IV for all emergency C/S if patient at high risk for sepsis
    - Work-up of every case of puerperal pyrexia – exclude:
      * Respiratory tract infection
      * UTI
      * Mastitis
      * Wound infection
      * Pelvic infection
    - Manage the following promptly:
      * Sub-involution of uterus
      * Lower abdominal tenderness
      * Foul smelling discharge
      * Open cervix, coupled with signs of sepsis
    - Early mobilization
    - Prophylactic anticoagulation
    - VCT and if HIV positive → more aggressive treatment

1. **Systematic evaluation of organ systems → if abnormal → prompt special investigations. If they can’t be done → refer.**
2. **Systems evaluated – as for PET**
3. **Resuscitate patient**
4. **Prophlactic antibiotics**
5. **Empty uterus**
   1. **MVA under local anaesthesia (level 1 hospital) with if safe abortion**
   2. **MVA or evacuation in theatre if needed (level 1 with theatre or level 2) if moderate unsafe**
   3. **Laparotomy (level 2/3 hospital with expertise) if 2 or more organ systems failed OR considering changing antibiotic cover**
   4. **Evacuation in theatre and evaluation for hysterectomy in high risk unsafe abortions (level 3)**
   5. **At level 3 must have high care or ICU facilities**
6. **Observations:**
   1. **Post NVD:**
      1. **Directly post delivery – BP, PR, Respiratory rate, T˚, abd. Exam., PVB**
      2. **Hb checked within 24hr**
      3. **T˚, BP, PR, RR & vaginal pads q30min for 2hr then q6h until D/C**
      4. **Education on warning signs**
   2. **Post-uncomplicated evacuation of uterus/MVA:**
      1. **BP, PR, RR, T˚ and PVB STAT**
      2. **Hb within 24hr**
      3. **Vitals & vaginal pad q1h for 2 hr then q6h until D/C**
   3. **Post-C/S or theatre evacuation**
      1. **Hb within 24hr**
      2. **Vitals, urinary output & vaginal pads q30min x1hr, then q1h x4hr, then q6h x24hr, then q12h until D/C**
   4. **Abortion or puerperal sepsis complicated by single – or multi-organ dysfunction**
      1. **Vitals q15-30min**
      2. **T˚, urinary output & CVP hourly**

***Mx*** – see also septic shock:

|  |
| --- |
| **Septic shock:** |

***Ax*** – release of endotoxins by Gram-negatives (e.g. E.Coli) &/or Gram-positives (e.g. streptococci)

***Sx*** – 3 phases:

|  |  |
| --- | --- |
| **Early (warm) phase:** | * Rigors * Temperature ≥ 38˚C * Warm skin (vasodilatation) * Glowing cheeks (vasodilatation) * SBP ≈ 90mmHg * CNS = Normal (± anxious; ± restlessness; ± confusion) * CVS: ↑ Cardiac output; ↓ peripheral resistance * RS: Tachypnoea * GUT: Sx of genital tract Ix; Urine output still normal |
| **Late (cold) phase:** | * Cold & clammy (vasoconstriction) * Hypothermia * Peripheral cyanosis * SBP ≈ 70mmHg * CNS: Mental function deteriorates * CVS: Rapid, weak & thready pulse; ↓ Cardiac output * RS: tachypnoea becomes inconspicuous * GUT: Oliguria |
| **2˚ Irreversible shock:** | * Cold & clammy * Pale/cyanotic * CNS: ± Coma * CVS: Progressive ↓ in cardiac output & peripheral resistance * RS: ARDS * GUT: Anuria * Hepatic: Hepatic failure (rare) * Adrenal gland: Failure (rare) * Haematological: DIC; Metabolic acidosis (due to cellular hypoxia) |

***Special investigations:***

* FBC, differential & platelet count:
  + HcT ↓ with severe sepsis
  + WCC ↑ with severe sepsis
  + Platelets ↓ with DIC
* Blood/lochia culture M, C & S – before antibiotics given & during fever peaks
* ESR
* UKE, LFTs
* S-Proteins (↓ progressively with sepsis)
* S-Fibrinogen,S-FDP’s &PTT
* ABG & Acid-base balance
* Urine M, C & S
* Discharge, pus, abscess &/or infected tissue M, C & S
* CXR – to assess chest involvement; diagnose a sub-phrenic abscess
* AXR – to look for sever abdominal signs
* US/CT/MRI – of abdomen & pelvic cavity to look for abscesses; perinephric abscess (due to ureteric injury during C/S)

1. **Intravenous antibiotics empirically:**
   1. **Regime 1:**
      1. **Ampicillin 1g q6h**
      2. **Metronidazole 500mg q8h**
      3. **Gentamycin 80mg q8h**
   2. **Regime 2:**
      1. **Clindamycin 300-600mg q6h**
      2. **Gentamycin 80mg q8h**
2. **Adjust antibiotics according to M, C & S results**
3. **If there is an improvement in 24-48hr → give antibiotics PO for 10days**
4. **If there is no improvement or deterioration → Re-evaluate:**
   1. **Check dosage (is it efficient?)**
   2. **Not reaching infective nidus e.g. Retained products & severe endometritis → Consider hysterectomy**
   3. **Peritonitis ± abscess OR**
   4. **Abscess ± peritonitis**
   5. **Wound Ix**
   6. **Extragenital Ix**
   7. **Septic pelvic thrombophlebitis**
   8. **Septic shock**
   9. **Retained placenta (suspect if cervic internal os open > 1wk ± sub-involution)**
5. **If an abscess → Ø drainage**
6. **Retained products/placenta → Remove under GA**
7. **If no source found & if no response to maximal conservative Rx within 24-48hr → laparotomy:**
   1. **Vertical incision**
   2. **Explore all organs & peritoneum**
   3. **Obtain samples for microbial investigations**
   4. **Drain abscesses & removed with capsule intact if possible**
   5. **Open broad ligament**
   6. **If uterus is pale, discoloured (yellow/purple) or distinct necrosis → DO HYSTERECTOMY!!**
   7. **If no source of infection & septicaemia continues despite maximal Rx → DO HYSTERECTOMY!!!**
      1. **Retain ovaries in young patient if they appear normal & aren’t part of an abscess**
   8. **If septic-thrombophlebitis of ovarian veins → remove septic focus & ligate veins proximally to prevent septic-embolism**
   9. **Rinse thoroughly before closure**

***Mx:***

|  |
| --- |
| **Preterm rupture of membranes vs. premature rupture of membranes:** |

***Definitions:***

* **Preterm ROM = ROM < 37 weeks**
* **Premature ROM = ROM > 1hr before labour onset**

***Ax:***

* Chorioamnionitis
* AFIS
* Multiple pregnancy
* Polyhydramnios
* Cervical incompetence
* Congenital abnormalities of uterus e.g. bicornuate
* Placenta praevia
* Asymptomatic bacteriuria

***Dx:***

* Hx
* Litmus test
* Ferning test
* Nile-blue sulphate test – fetal cells present at 36 weeks stain orange
* Pooling
* Cough test

***Indications for active management or preterm ROM:***

* 34wk gestation or more
* Fetal pulmonary maturity, irrespective of age
* Pregancy of ≤ 26 wk (outcome with conservative management is poor)
* Intra-uterine infection
* IUD or severe congenital abnormalities
* Fetal distress
* Cord prolapse
* High risk of infection
* Maternal DM; Cardiac valvular lesions; PET
* Significant IUGR
* APH, excluding placenta praevia

***Mx:***

1. **After diagnosis → Confirm FHR (CTG)**
2. **Determine duration of pregnancy as accurately as possible**
3. **If obstetric indication for C/S → Do it!!!**
4. **>34 weeks – TOP by IOL (max. 36 weeks expectantcy)**
5. **L/S <2 – postpone until fetus mature (give steroids) – deliver if FD or Ix develops**
6. **L/S >2 with no other problems – deliver at 34-36 weeks unless FD/Ix**
7. **Ix present: TOP – Symptoms:**
   1. **Fetal tachycardia**
   2. **Maternal fever**
   3. **Maternal tachycardia**
   4. **Uterine tenderness**
   5. **Foul-smelling amniotic fluid**
   6. **Pus draining through cervical os**
8. **Fetal distress present: TOP**
9. **Spontaneous sealing of membranes (with no FD/Ix) – await spontaneous labour**
10. **Remember:**
    1. **Steroids**
    2. **Bedrest**
    3. **No PV examination until onset of labour**
    4. **Actively search for signs of intra-uterine infection – monitor maternal pulse rate, T˚ and FHR q4h**
    5. **Do FHR monitoring daily**
    6. **No coitus**
    7. **Controversy: Tocolysis; Anti-biotics**
11. **If there no drainage for 2 consecutive days with no signs of fetal jeopardy or intra-uterine infection → D/C**

|  |
| --- |
| **Preterm labour:** |

***Definition:*** Regular contractions (6-8/hr) AND cervical dilatation/effacement < 37weeks

***Risk factors/Ax:***

|  |  |
| --- | --- |
| * Low socio-economic status * < 18yr or >35yr * Maternal mass < 50.8kg * Smoking in pregnancy * Exhausting work and long work hours * ↑ Emotional stress during 3rd TM * ↓ Maternal zinc levels * History of preterm labour * Previous 2nd TM abortion * Congenital uterine abnormalities * Pregnancy complications e.g. APH * Infection of maternal genital tract esp. group β-haemolitic streptococcus, STIx * Maternal systemic infection associated with pyrexia | * Aspymptomatic bacteriuria * Chronica infections e.g. TB & hepatitis * Chorioamnionitis * Polyhydramnios * Multiple pregnancy * Cervical incompetence * PROM * IUGR * Retained IUCD * Leiomyomata * Asherman syndrome * Fetal congenital abnormalities * Handling of uterus intra-operatively |

***Mx:***

1. **Suppression of labour – C/I:**
   1. **IUCD**
   2. **Cong. Abnormalities of fetus**
   3. **>35 weeks or <20 weeks**
   4. **Intra-uterine Ix**
   5. **Cardiac disease with increased cardiac output**
   6. **Cardiomyopathies**
   7. **Fetal distress**
   8. **Maternal/fetal complications requiring delivery e.g. abruption**
   9. **Uncontrolled DM**
   10. **Severe IUGR**
   11. **Proven lung maturity**
   12. **Relative C/I:**
       1. **PROM without Ix**
       2. **Cervix > 4cm dilated**
       3. **Patient on MAO**
       4. **Patient on β-Stimulants**
       5. **Well controlled DM**
2. **Bed rest in lateral (left) position**
3. **IV Water – decreases ADH and subsequently oxytocin**
4. **Tocolysis using Nifedipine**
5. **Determine if there are maternal/fetal abnormalities which make continuation of pregnancy undesirable**
6. **Monitor maternal fluid balance; PR; Potassium; Blood-glucose**
7. **Steroids given for lung maturity – Celestone 12mg q24hr x2**
8. **Prophylactic anti-biotics e.g. Erythromycin 500mg qid x5-7 q1-2 months**

***If delivery inevitable, decide best route of delivery:***

1. **Prevent intracranial haemorrhage in fetus:**
   1. **Address hypoxia → monitor FHR**
   2. **No bearing down before full cervical dilatation**
   3. **Wide episiotomy**
   4. **? Forceps delivery**
   5. **Elective C/S for SGA/Breech (1000-1500g)**
   6. **Phenobarbitone**
2. **Epidural analgesia – relaxes pelvic floor and prevents premature bearing down**
3. **Routine wide episiotomy and ? forceps delivery (not < 32wk or 2500g)**
4. **Anti-biotics to prevent AFIS/Choriamnionitis**
5. **C/S – Indications: <1500g; Elective if <33wk; IUGR; Suspect abruptio placentae; All other obstetric indications for C/S**

|  |
| --- |
| **Amniotic fluid infection syndrome:** |

***Predisposing factors:*** Poor antibacterial activity of amniotic fluid is race related; Coitus during pregnancy (if patients at high risk for infection); Factors which may lead to exposure of membranes e.g. cervical dilatation or over-distension of uterus

***Cx:***

* Preterm labour
* Preterm ROM
* Neonatal pneumonia &/or speticaemia
* APH of unknown origin
* IUGR
* IUD

***Dx:***

* Retrospectively
* Amniotic fluid: Serum glucose >2:1
* Smear from fetal side of membranes within 20min of delivery, then chorionic and amniotic membranes are separated and another smear smear taken of fetal side of chorionic membrane → Sent for gram staining – Polymorph leucocytes confirm diagnosis
* Placental histology

***Mx:***

* Adequate, balanced diet to improve maternal nutrition
* Advice against coitus, or condom use in high risk individuals (for infection), poor obstetric history e.g. multiple pregnancy, preterm cervical dilatation, incompetent cervical os
* Prophylactic anti-biotic use during surgery
* If confirmed postpartum → antibiotics to mother and neonate

|  |
| --- |
| **Antepartum haemorrhage**: |

***Definition:*** PV Bleeding after 28 weeks gestation (+/- 3%):

***Differential Dx:***

* Placenta Praevia – ass. with multigravidity; previous C/S; advanced maternal age – majority after 36 weeks
* Abruptio placenta – ass with HT & PET; Poor socio-economic status; IUGR; Smoking; Coitus in late preg.
* Vasa praeviae
* Uterus rupture
* Local lesions
* Show

***Grade of placenta praevia:***

|  |  |
| --- | --- |
| **I.** | Implanted in lower segment; doesn’t reach os (also known as PP lateralis) |
| **II.** | Reaches internal os; does not cover os (also known as PP marginalis) |
| **III.** | Covers the internal os, but not to such an extent that the whole os would be covered at full dilatation |
| **IV.** | Placenta covers the whole internal os even at full dilatation; (also known as PP centralis) |

***Sx:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Placenta Praevia** | **Small abruption** | **Large Abruption** | **Local lesions** |
| **External bleeding** | Slight to so severe that it may be life threatening; painless | Usually none | None to slight or moderate. In some cases the external bleeding may be more than the retroplacental bleeding | Usually relatively little; often history of intermenstrual or intercoital bleeding |
| **Internal bleeding** | Little or none | Little | Severe (retroplacental); with/without coagulation defects – if ass. with IUD | None |
| **Colour of blood** | Bright red | Dark red | Dark red with clots | Bright red |
| **Abdominal pain** | Absent except in labour | Absent or slight | Sever and sudden onset | Absent |
| **Backache** | Absent | Sometimes esp. posterior placenta | Often present | Absent |
| **Pulse rate and BP** | Proportionate | Normal | Disproportionate to blood loss | Usually normal |
| **Clinical signs of PET** | Incidence not increased | Incidence increased | Incidence increased | No increased |
| **Abdominal examination** | High presenting part/oblique lie; abnormal lie; non-tender; uterine tone normal | Local tenderness; often no clinical signs | Hard, tender, blue uterus (Couvelaire uterus) or atonic uterus ass. with PPH; signs of fetal distress or IUD; frequent, fibrillary contractions |  |

***Dx:***

* Placenta praevia:
  + Clinical picture (see above)
  + Careful speculum and cervical smear when bleeding has stopped – assess local lesions
  + US – placenta praevia and grade (C/I in life-threatening/active haemorrhage); can’t Dx location before 30 wk
  + PV – Examination in theatre – if no US and patient **already in labour** OR when **delivery planned**
  + Apt test for fetal Hb
* Abruptio Placenta – 2 or more of following: Note – Abruptio is clinical diagnosis; No role for US
  + Significant, unexplained PV bleeding after 20 weeks gestation
  + Irritability of uterus (Contractions > 5/10min OR hypertonic uterus)
  + Tenderness of uterus OR abdominal pain

***Classification of abruption:***

* APH of unknown origin – diagnosis by exclusion; consider IOL if ≥ 38wk; C/S if indicated
* Abruptio placentae with live fetus
* Abruptio placentae with IUD

***Mx:***

|  |
| --- |
| **Placenta Praevia** |
| ***>38 Weeks***   1. **Resus (gr. III/IV)**   **Severe bleeding:**   1. **Emergency C/S on sever bleeding**   **Mild to moderate bleeding, already in labour; with or without US**   1. **PV in theatre READY FOR E-C/S (sterile; trays & packs open); Anaesthetist ready for induction/intubation – 1 finger → no thickening between presenting part and finger (bogginess) → feel for placenta (360˚ sweep) – If placental edge felt do E-C/S** 2. **11. Can be omitted if previous US done BUT only if:**    1. **Examined by experienced ultrasonographer**    2. **Major degree (III or IV) diagnosed on US**    3. **Pt. Complies clinically with major degree of PP** 3. **If no placenta felt & Cx favourable → ROM & IOL** 4. **If no placenta felt & Cx unfavourable → intracervical prostaglandins until ripe THEN repeat examination (low amniotomy can be done)**   **Not life threatening gr. I or II anterior – Dx on US (not in labour)**   1. **Bed rest (hospital)** 2. **Home if fetal welfare/growth and maternal Hct/Hb normal** 3. **Rest at home/no coitus & F/U (as for high risk)** 4. **Mother informed about warning signs** 5. **NVD (no severe bleeding or FD) else C/S** 6. **If abnormal lie → C/S @38weeks**   **Not life threatening gr. II posterior, III or IV – Dx on US (not in labour)**   1. **As above but blood cross-match & hold** 2. **Steroids administered** 3. **Elective C/S @ 38weeks or with lung maturity; test for lung maturity can be done earlier if recurrent bleeding occurs** 4. **Emergency C/S if severe bleeding occurs or FD AND do baby’s Hb after delivery**   ***34-38 weeks***  **Risks – Immature baby**  **Don’t hesitate to deliver if:**   1. **Preterm labour** 2. **Recurrent slight haemorrhage** 3. **Moderate haemorrhage needing delivery**   **Else:**   1. **Bed Rest & Hopitalization with:**    1. **Fetal lung maturity – do amniocentesis – if mature and major degree of PP then C/S. Amniocentesis not needed in minor degrees**    2. **Placental insufficiency with FD – Do regular kick charts; CTG; fundal growth; amniotic fluid volume – if any abnormality hospitalize with bed rest**   **Note: Any PV bleeding needs hospitalization**  **Note: >3 pads/hr = Severe bleeding and need active intervention**  ***28-34 weeks***  **Risks – Immature baby**   1. **Postpone delivery** 2. **Betamathasone 12mg q12h x2** 3. **Strict bed rest** 4. **D/C if grade I or II and bleeding stopped if:**    1. **Communication & transport available**    2. **No coitus** 5. **Severe haemorrhage after 28wk do C/S**   ***Before 28 weeks***  **Conservative Mx unless life-threatening risk to mother; THEN do E-C/S unless near fully dilated; low amniotomy or continuous traction on presenting part may temporarily control bleeding.** |

|  |
| --- |
| **Abruptio Placenta** |
| **Prevention – None except slow release of amniotic fluid in polyhydramnios**  **Warning signs:**   * **Fetal movements decrease – precedes IUD more than 24hr before** * **IOL – Admit if pt. gets contractions** * **Abdominal pain – late sign > hospitalize** * **Haemorrhage – late sign** * **Antepartum CTG – if suspected abruptio with late deceleration > DELIVER!!!**   ***The 4 important questions:***   * **Is the fetus alive? – if not see 13: Confirmed only by Doppler or US. Auscultation may be impeded by thick layer of blood between anterior placenta or abdominal wall or bradycardia – if so then do resus and repeat auscultation** * **Can fetus survive (mass and gest.)? – 28wk (1000g) – 32wk (1600g). US very important for assessment. Also cut-off is dependant on NN Care – if good can do C/S for 750-1500g.** * **What is maternal condition? – Take Hb; HcT and clinical signs into consideration.** * **What is the quickest way to deliver baby? – See 11. and 12.**   ***Abruptio if fetus alive:***   1. **Vaginal delivery only if cervical dilatation and engagement indicate delivery faster than C/S. If so do the following:**    1. **ROM**    2. **Oxytocin**    3. **Monitor fetal heart**    4. **Assisted delivery**    5. **Maintain optimum fluid balance**    6. **CVP** 2. **C/S – poor progress; indication; imminent renal failure; worsening clot. Profile. If planned then:**    1. **O2 to mother**    2. **Side lying position until induction**    3. **15˚ Left lateral tilt after induction**   ***Abruptio if fetus dead:***   1. **IUD indicates blood loss of ~ 1000ml, therefore:**    1. **Correct hypovolaemia**    2. **Beware clotting defect** 2. **Correct hypovolaemia (2l then according to UO/CVP and clotting profile)** 3. **Analgesia (↓ Dose – Poor peripheral tissue perfusion → decreased delayed absorption)** 4. **Amniotomy** 5. **Monitor urinary output > 50ml/hr. If poor or none – CVP to be kept at 10mmH2O. With continuing poor output give Furosemide 20mg IV q10min (max = 160mg/4hr)** 6. **CVP/PWP measured** 7. **Determine coagulation profile – at admission and regularly afterwards**    1. **Fresh blood if available – contains all elements needed for clotting. ELSE:**    2. **Fibrinogen low (<2g/l) & Hb normal → FFP**    3. **Fibrinogen low & Hb low → Placked cells and plasma**    4. **Platelet count low (<50 000/dl) → Packed platelets**    5. **Coagulation factors normal & Hb low → Packed cells** 8. **UCE and ABG** 9. **Oxytocin to augment poor uterine contractions with accurate IU pressure monitoring** 10. **Atraumatic delivery – episiotomy; C/S only for obstetric cause of where clotting profile deteriorates quickly despite adequate treatment.** 11. **Normal labour if progress and recovering or normal coagulation profile.** 12. **Dilatation of unfavourable cervix can be delayed by 6-8hrs** 13. **Be careful of uterine rupture, renal failure, ARDS and DIC** 14. **PPH managed actively – FDP → inhibit uterine contractions → atonic uterus → PPH** 15. **Heparin** 16. **Apotinine → ↓ FDPs → Better uterine contractions** 17. **Epidural anaesthesia – Only if no coagulation defects** |

**Things to remember:**

* Counseling of parents
* Future pregnancies
* Recurrence & preventative measures – No smoking; Avoid late pregnancy coitus; Rx of HT; Hospitalize high risk patients after 36 weeks; Induce labour not later than 38 weeks; Deliver if lungs mature (& 2/more prior AP)

|  |
| --- |
| **Postpartum haemorrhage:** |

***Definition:*** Blood loss in 3rd stage ≥ 500ml OR Hb ↓ ≥ 3g/dl OR any bleeding that appears more than normal and following the 3rd stage of labour:

***Preventative measures:***

* Permanent contraception in grand-multipara or ≥35yr
* Routine iron supplementation
* Deliver at level 2 hospital
  + Hb < 8 g/dl
  + Multiple pregnancies
  + Polyhydramnios
  + Grand-multiparas
  + Previous PPH that required blood transfusion
* Education about:
  + Rubbing-up uterus after placenta delivery
  + To call for help if bleeding ↑
* Active management of 3rd stage; Oxytocin 5IU IM
* Don’t augment labour in multigravid patients if in active phase
* Stop oxytocin following IOL once in established labour
* Don’t discharge patients early
* Examine for well contracted uterus before D/C
* Iron supplementation x1 month if Hb <10 g/dl

***Mx:***

1. **Rub up uterus and call for help**
2. **Oxytocin 20IU in 1l IV run in rapidly (2 lines if patient is, or becomes shocked)**
3. **Empty bladder**
4. **Look for retained products**
5. **If uterus atonic → bimanual compression while patient is transferred to next level of care**

***Majority will be contracted by now:***

1. **Observations every 15 min and check if uterus contracted continuously**

***If still bleeding:***

1. **Refer to next level of care if unable to manage further OR no 24hr theatre facilities AND patient is stable**
2. **Venesection for cross-match and hold**
3. **Oxytocin 30-40IU IV (1l 5%DW) over 8 hrs**
4. **Misoprostal 5 tab. PR**
5. **F2α 1amp (5mg) in 20ml sterile water IJ 4ml directly into myometrium (repeat with 1-2mg)**
6. **Bimanual compression until further steps can be taken**
7. **Operative – clear products ELSE evacuation**
8. **Uterus packing with warm, sterile swabs**
9. **Still no control – Systemic devascularisation**
   1. **Uterine arteries**
   2. **Ovarian arteries**
   3. **Internal iliac arteries**
10. **Still no control – B-Lynch**
11. **Still no control – Hysterectomy (remember to get consent)**

|  |
| --- |
| **Cord prolapse:** |

***Definition:*** Cord closer to cervical os than presenting fetal part

***Ax:***

* Presenting part doesn’t fit pelvis e.g. CPD
* Fetal (Abnormal lie/presentation):
  + Prematurity
  + Multiple pregnancy
  + Polihydramnios
  + PROM
* Maternal:
  + CPD
  + Pelvic tumors
* Cord/Placenta:
  + Long cord
  + Placenta praevia
  + Battledore placenta
* Iatrogenic:

***Dx:***

* Index of suspicion
* Clinical examination
* CTG changes i.e. early decelerations
* US findings

***Mx:***

1. **GET HELP!!!**
2. **Stop the contractions with Nifedipine 10mg IMI/IVI**
3. **Mother:**
   1. **O2**
   2. **Informed consent for C/S AND need for co-operation**
4. **Relieve pressure on the cord:**
   1. **Manually – flat hand or fist**
   2. **Fit bladder with 500ml 0.9% NaCl & clamp catheter**
   3. **Mother in knee-chest position (actually chest to bed)**
5. **Book C/S A.S.A.P.**
6. **If cord outside vagaina – cover with damp cloth (don’t replace into uterus)**
7. **Take extra assistant to theatre to remove clamp from catheter when abdomen is opened (Not before)**
8. **Post-partum:**
   1. **Prophylactic oxytocin 10IU IMI stat**
   2. **Antibiotics (triple therapy)**

|  |
| --- |
| **Shoulder dystocia** |

***Definition:*** Inability to deliver fetal shoulder with normal obstetric maneuvers

***Mechanism:*** Shoulders don’t descend in oblique diameter of pelvis but instead it descends in AP and the anterior shoulder gets caught behind the symphysis pubis.

***Predisposing factors:***

* Macrosomia
* Previous SD
* Prolongued first stage of labour (i.e. > 5-6 hours)
* Maternal obesity
* Increased weight gain in pregnancy
* Gestational DM (or uncontrolled DM)
* Anencephaly

***Cx:***

* Fetal:
  + Death
  + HIE
  + Erb’s palsy (C5-6)
  + Kumpke paralysis
  + Fractures
* Maternal:
  + Lacerations
  + PPH
  + Post-partum endometritis

***Mx:***

1. **Anticipation**
2. **Bladder empty**
3. **Suction baby’s airways**
4. **Make sure no cord around the neck**
5. **“HELPER” approach**
   1. **H – HELP**
   2. **E – EPISIOTOMY**
   3. **L – LEGS (MacRobert’s maneuver – knees to chest while on back)**
   4. **P – PRESSURE (Suprapubic pressure on anterior shoulder)**
   5. **E – ENTER PELVIS (Rotation of posterior shoulder through 180˚**
      1. **Wood=posterior direction**
      2. **Rubin=anterior direction**
   6. **R – REMOVE POSTERIOR ARM (Hand in curve of sacrum; flex elbow; grasp wrist & fold outside)**
6. **All-fours maneuvre**
7. **Zavanelli maneuver – Fetal head pushed back into uterus followed by C/S**
8. **Symphysiotomy**

|  |
| --- |
| **Hypertension in pregnancy:** |

***Definition:***

* 140/90mmHg X2 (q6h)
* DBP increased by 15mmHg compared to DBP before pregnancy
* SBP increased by 30mmHg compared to SBP before pregnancy
* According to Australasian classification:
  + Gestational HT (>20weeks gestation – majority in 3rd TM; resolves in 6-12wk postpartum; No signs of PET)
  + PET (HT with proteinuria and/or oedema > 20wk gestation) divided into mild and severe (see below)
  + Chronic HT (<20weeks gestation; doesn’t resolve within 3mo)
    - Essential
    - Secordary (see below for causes)
  + Chronic HT with superimposed PET (Can develop < 20wk gestation)
    - Causes of chronic HT upon which PET may be superimposed:
      * Essential HT
      * Renal causes:
        + Acute glomerulonephritis
        + Chronic nephritis
        + Lupus nephritis
        + Diabetic nephropathy
      * Endocrine
        + Cushing’s syndrome
        + 1˚ Aldosteronism
        + Phaeochromocytoma
        + Thyrotoxicosis
      * Neurogenic
        + Quadriplegia
    - If developing < 20wk gestation MUST EXCLUDE:
      * Hydatiform mole
      * Triploidy of fetus
    - Associated with following complications if mid-trimester:
      * Abruptio placentae
      * Thrombocytopenia with or without HELLP syndrome
      * Eclampsia
      * DIC
      * Acute renal failure
* Complications of HT in pregnancy:
  + Maternal: Renal failure; Stroke; Eclampsia; Left ventricular failure; Liver failure; Abruptio Placentae
  + Fetal: Placental insufficiency; Placental infarctions; IUGR; IUD

***Differences between chronic HT, pre-eclampsia and superimposed PET:***

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Chronic hypertension** | **Pre-eclampsia** | **Superimposed PET** |
| **Age** | Usually > 30yr | Young or >35 | Usually > 30yr |
| **Gravidity** | Multigravida | Primigravida | MUltigravida |
| **Signs (in order):** | Falls pregnant while HT | Mass gain → HT → Oedema → Proteinuria | Already HT → Develops severe HT → Proteinuria → Eclampsia |
| **Gestational age:** | Throughout pregnancy | After 20wk gestation esp. 3rd TM | Late 2nd and 3rd TM |
| **Risk:** | Low to mild | Mild to high | High |
| **Recurrence risk (other pregnancies):** | High | Small | High |
| **Renal functions:** | Relatively unaffected | Early ↑ urea, creatinine and urate | ↑ Urea & creatinine but urate can rise disproportionately due to pre-eclapmsia |
| **Retina:** | Hypertensive changes | Segmental spasm | Hypertensive changes |
| **Hospitalisation:** | In severe cases | Necessary | Necessary |
| **Cure:** | Delivery will not affect cure | Delivery of fetus and placenta | Delivery of fetus and placenta |

|  |
| --- |
| **Pre-eclampsia (PET):** |

***Definition:***

* BP >140/90 mmHg after 20 weeks gestation with 1/more of the following:
  + Risk factors:
    - Previous underlying HT
    - Primigravidae (vs. primip and multip in super-imposed PET)
    - Patient < 16yr or > 35yr
    - Multiple pregnancies; Hydrops foetalis; Diabetes Mellitus
    - Linked to males (sometimes)
  + Proteinuria
    - ≥300mg/24hr or >0.3g/l
    - Spot protein:creatinine ≥30mg/mmol
      * Note: An index of 300 or more correlates well with 24hr protein excretion
    - Approximate urine concentrations in urine if using dipstix:
      * 1+ 0.1g/l
      * 2+ 0.3g/l
      * 3+ 1.0g/l
      * 4+ >20.0g/l
      * False positive if specific gravity > 1030 OR Contaminated
      * False negative if specific gravity < 1010
  + Criteria for severe pre-eclampsia:
    - With patient at bed rest, BP readings of atleast 160mmHg SBP or 110mmHg DBP, on 2 occasions at least 6 hours apart
    - Proteinuria ≥ 5g/24hr urine collection
    - Oliguria (≤ 400ml/24hr); Cerebral or visual disturbances e.g. altered consciousness, headache, scotoma, or blurred vision
    - Pulmonary oedema or cyanosis
    - Epigastric or right upper quadrant pain
    - Impaired liver function of unclear aetiology
    - Thrombocytopenia
  + Renal insufficiency
    - Serum:plasma creatinine ≥0.09mmol/L
    - Oliguria
  + Liver disease
    - AST increased
    - Epigastric/RUQ pain (subcapsular hepatic haematoma)
  + Neurological problems
    - Convulsions (PET + Convulsions = Eclampsia)
    - Hyperreflexia/Clonus
    - Severe headache with hyperreflexia
    - Persistent visual disturbances
  + Haematological disturbances
    - Thrombocytopenia
    - DIC
    - Haemolysis
  + Fetal growth restriction

***PET Work-up:***

* Maternal:
  + BP
  + Urine output
  + 24hr protein
  + UCE (Urea, Creatinine & uric acid)
    - Uric acid (Early indicator of PET – tissue breakdown and necrosis)
  + LFT (AST)
  + FBC & Peripheral blood smear (HcT; Platelets)
  + Coagulation profile (PTT)
* Fetal:
  + Gestational age
  + Fetal activity
  + Non-stress test
  + Ultrasound for fetal size and amniotic fluid volume

***Mx overview (See protocol for detailed management):***

1. **Prevention of PET (High risk patients)**
   1. **Aspirin 75mg/day after 12 weeks gestation**
   2. **Calcium supplementation 2g after 12 weeks gestation**
   3. **Vitamin C & E supplementation**
2. **Admit to hospital**
3. **Control BP**
   1. **Start active treatment if DBP>110mmHg (earlier treatment has risk of more SGA babies)**
   2. **Ringer’s lactate bolus 300mL (“opens placental perfusion”)**
   3. **To keep DBP<110mmHg**
      1. **Alpha methyldopa**
      2. **Nifedipine**
      3. **Prozosine**
4. **Control hyper-reflexia:**
   1. **MgSO4 if indicated (signs of neurological involvement)**
5. **Evaluate mother AND fetus**
6. **Delivery (based on gestation and maternal/fetal evaluation)**
   1. **Gestational HT @ 38weeks expectantly**
   2. **PET @ 34weeks OR Fetal weight>2kg**

***Management according to clinical group (overview):***

* Prevention:
  + Timely (planned) delivery
  + Improving socio-economic status
  + Adequate ANC at appropriate sites
  + Providing sufficient number of beds for bed rest and special investigation to be done
  + Promoting health education and appropriate family size
  + Aspirin 75mg/d after 12 weeks gestation
  + Calcium supplementation 2g after 12 weeks gestation
  + Vitamin C & E supplementation
* Before 36 weeks
  + Continuous bed rest
  + Aldomet if DBP > 100mmHg
  + Monitoring of maternal and fetal conditions
  + Termination of pregnancy if:
    - Maternal condition deteriorates
    - Fetal distress develops
    - Fetus is mature (determined clinically or by special investigation)
* After 36 weeks
  + Bed rest for 6 or more hours
  + Nifedipine (or Nepresol if not available) if DBP remain > 100mmHg
  + Evaluate Cx:
    - Favourable → IOL
    - Unfavourable → FHR monitoring and evaluation of maternal condition
      * Fetal distress → C/S
      * Maternal deterioration → Usually C/S
      * No immediate and/or maternal risk → Wait until cervix becomes favourable or induce labour prior to ripening of cervix, depending on circumstances e.g. oligohydraminios
* Hypertensive emergencies:
  + Imminent eclampsia:
    - Evaluate mother and fetus – both clinically and by special investigations
      * Headache
      * Nausea
      * Vomiting
      * Epigastric pain
      * Mental confusion
    - Do C/S if fetal distress is diagnosed
    - Nifedipine (or Neprosol if not available) if DBP > 100mmHg
    - Evaluate cervix:
      * Favourable → IOL
      * Unfavourable → C/S
    - Postpartum: Avoid Ergots – Use only Oxytocin 5IU IM and 5IU slow IV
  + Eclampsia: See Eclampsia
* Post partum management:
  + Contraception (avoid in older patient – stroke/atherosclerosis)
  + Assess in medical clinic 2-6 weeks after delivery
  + If DBP ≥ 90mmHg → Full HT work-up and urography
  + If DBP < 90mmHg with no treatment → No action BUT:
    - Supervise next pregnancy carefully
    - Consider using low dose aspirin in next pregnancy

|  |
| --- |
| **PET Protocol (PAH & Kalafong):** |

1. ***Stabilization (admit to High Care Obstetrics Unit)***
   1. Ringer’s lactate 100ml IVI over 20min
   2. MgSO4 
      1. 4g in 200ml 0.9% NaCl over 20min IVI
      2. 5g with 1ml lignocaine in each buttock
      3. Maintenance:

**If any of these abnormal delay next dose by 4hrs or half of dose given.**

**If signs of overdose give Calcium gluconate**

* + - * 5g q4h BUT check the following before each new dose:
      * Urine output>30ml/hr
      * Tendon reflexes present
      * Respiratory rate>16/min

1. ***Fluid management***
   1. Insert urinary catheter
   2. Ringer’s lactate 125ml/hr IVI
   3. Start fluid balance sheet
   4. If urine output <30ml/hr give 200ml Ringer’s bolus
   5. If urine output still <30ml/hr check fluid balance
   6. If in positive fluid balance give Dopamine (low dose infusion)
      1. 200mg in 200ml 5% Dextrose
      2. Start at 1μg/kg
      3. Increase hourly until max. of 5μg/kg
      4. If urine output >30ml/hr continue dopamine at that dosage
      5. Taper after 2 hours
2. ***Blood pressure control***
   1. Repeat BP after 20min
   2. If DBP>110mmHg OR SBP>160mmHg
      1. Nifedipine - Check BP after 20min
         * 10mg PO
         * Contra-indications – Use labetalol:
           + HR>120bpm
           + Cardiac lesion
           + Unable to swallow
      2. Labetalol – Check BP after 20min
         * Start with 1x20mg; 2x40mg; 3x80mg (max. 300mg)
         * Give bolus q10min until BP<160/110mmHg
         * Contra-indications:
           + Asthma
           + IHD
   3. If DBP<110mmHg AND SBP<16mmHg continue with Neurological evaluation
3. ***Neurological status evaluation*** – Check ABG (or saturation) AND BP if confused:
   1. Abnormal – Correct abnormality
   2. Normal – Give Haloperidol
4. ***Full clinical evaluation***
   1. **CNS** – if abnormal consider CT scan
      1. GCS
      2. Lateralizing signs
      3. Reflexes
      4. Pupil reflexes
   2. **Respiratory system** – if abnormal do ABG and CXR
      1. RR
      2. Saturation
      3. Dullness on percussion
      4. Crepitations or wheezes
   3. **CVS**
      1. HR
      2. BP
      3. Heart sounds
      4. Heart size
      5. R-F delay
   4. **GIT** – Check AST (and s-glucose q4h if AST abnormal)
      1. Epigastric tenderness
      2. Hepatomegaly
      3. Jaundice
   5. **Renal** – Check creatinine and fluid balance (include kidney function if signs of dysfunction)
      1. Renal angle tenderness
      2. Murmurs over renal artery
      3. Macroscopic haematuria
   6. **Haematological** – Check haematocrit and platelets)
      1. Anaemia
      2. Purpura
      3. Bleeding tendency
   7. **Immune** **system**
      1. Temperature
      2. Generalized lymphadenopathy
      3. Splenomegaly
      4. HIV status
   8. **Musculoskeletal** **system**
      1. Signs of DVT
      2. Spinal problems that might influence anaesthesia
   9. **Gynaecological** **system**
      1. As usual
5. ***Special investigations:***
   1. Routine (as above)
      1. Hct
      2. Platelets
      3. Creatinine
      4. AST
      5. 24 Protein clearance
   2. Special circumstance
      1. ABG
      2. 4 Hourly s-Glucose if AST raised
      3. CT
6. ***Fetal monitoring***
   1. US
      1. EFW
      2. Abnormalities
      3. AFI
      4. Doppler of umbilical artery
      5. Transcerebellar diameter
      6. Mid cerebral artery Doppler
      7. Ductus venosus waveform
   2. CTG – q6h if fetus deemed viable
7. ***Decision of delivery:***
   1. Delivery:
      1. Fetal distress
      2. IUD
      3. Weight>2kg or sure gestations >34weeks
      4. Signs of maternal organ involvement
         * Platelets<100
         * AST>80
         * Creatinine>100
      5. Uncontrollable HT
      6. Eclampsia
      7. Proven fetal lung maturity
      8. Fetal abnormality
   2. Expectant management:
      1. Mother and fetus stable
      2. High care/high risk
      3. Silver white firm (at hospital)
      4. Daily full clinical evaluation
      5. CTG q6h
      6. Bloods 2x/week
      7. Aspirin 75mg/d
      8. Calcium 2g/day

|  |
| --- |
| **Eclampsia (the end result of PET):** |

***Definition:*** PET + Convulsions

***Prediction - usually by signs of imminent eclampsia:***

* Sever headaches
* Visual disturbances
* Epigastric/RUQ pain

**Note: Complications of eclampsia:**

* **Cerebral haemorrhage**
* **Paresis**
* **Temporary blindness**
* **Aspiration pneumonia**
* **Cardiac failure**
* **Subcapsular liver haematoma**
* **Renal failure**
* **Coagulation defect – DIC**
* **Puerperal psychosis**
* **Abruptio placentae**
* **IUD**
* Hyperreflexia/agitation
* Grand-mal type convulsions (eclampsia)

Differential diagnosis and important differences (NB):

* Epilepsy
  + History
  + Normotensive
  + No proteinuria
  + Uric acid normal
* Thrombotic thrombocytopenia purpura
  + Thrombocytopenia
  + Hemolysis ++
  + Acute neurologaical events
  + Fever
  + BP Normal
  + Renal involvement
* Cerebral haemorrhage
  + Severe headache
  + Localising signs
  + May be hypertensive
  + Normal uric acid
  + No proteinuria
  + Rigid neck
* Cerebral vein thrombosis
  + Headache
  + Normotensive
  + Rapid papilloedema
  + Paresis
* Menigitis
* Acute porphyria
* Cerebral aneurysms/malformations
* Hysteria

***Mx:***

1. **ABCs**
2. **Prevent maternal injury**
3. **MgSO4 – as above**
4. **Assess GCS**
5. **Ringer’s lactate IVI and 2nd IV line**
6. **CVP – keep at 5mmH­2O**
7. **Catheter – monitor urine output**
8. **If convulsions recur:**
   1. **As above – give 2g repeat doses stat x2**
   2. **If not controlled – Phenobarbitone 200mg IVI slowly**
   3. **Reconsider diagnosis**
9. **Correct maternal acidosis**
10. **Stablize BP and airways**
    1. **If DBP ≥ 95-100mmHg give 10mg Nifedipine STAT sublingually**
11. **Determine maternal organ involvement**
12. **Determine fetal viability (only if mother stable)**
13. **Deliver (by C/S if unlikely to deliver in 6-8hr)**
14. **MgSO4 maintenance for at least 24hrs PP**
    1. **As above**
15. **Intensive monitoring of mother**
16. **Consider ICU ventilation if:**
    1. **Poor blood gases**
    2. **Aspiration**
    3. **Pulmonary oedema**
    4. **Extremely restless**
    5. **Laryngeal or excessive oedema of tongue**
17. **GCS (score ≤ 4 has poor progress)**

|  |
| --- |
| **General medical problems in pregnancy:** |

|  |
| --- |
| **Diabetes in pregnancy:** |

***Pathphysiology:***

* 1st trimester
  + Estrogen and progesterone casue β-cell hyperplasia with insulin increase
  + Decreased glucose and hypoglycaemia
  + Decreased liver glucose
  + Decreased glconeogenesis
  + Increased triglycerides, FFAs and ketones
* 2nd trimester
  + Increased HPL, prolactin and cortisol
  + Increase lipolysis with increased FFAs, TGs and ketone bodies
  + Decreased insulin sensitivity
  + Increased fat production
  + Increased glucose

***Suspect if:***

* Positive signs and symptoms
* 2x Glucosuria (random) OR 1 x Glucosuria (fasting)
* Previous baby > 4000g
* History of gestational DM
* Family history of DM or gestational DM
* >20% Ideal maternal body weight
* Previous unexplained congenital abnormalities of fetus
* Previous unexplained neonatal death
* Polyhydramnios
* US – Macrosomia
* Positive screening test i.e. S-Glucose > 8 1hr after 50g Dextrose PO

***Fetal problems:***

* Macrosomia
  + Shoulder dystocia and associated complications
  + CPD
* Congenital abnormalities
  + CNS: Microcephaly; anencephaly; spina bifida
  + CVS: ASD; VSD; cardiac agenesis; hydrops fetalis
  + Hepatic: Immature liver THUS hyperbilirubinaemia
  + Renal: Agenesis; polycystic; double kidney
  + Bone: Sacral agenesis
  + GIT: Duodenal atresia; GIT fistula; anus imperforatum
* Sudden fetal death
  + Poor heart conduction (glycogen deposits; electrolyte imbalances)
  + Chronic hypoxia
  + Increase metabolism, O2 requirements, hypoxia and THUS IUD
  + Microvascular disease THUS IUGR and ultimately DEATH
* RDS
  + Decreased surfactant production due to increased cortisol production
* Hypoglycaemia post delivery – due to increased insulin production without constant placental blood glucose
* General
  + Feeding problems
  + Hypocalcaemia
  + Polycythaemia due to osmotic diuresis

***Maternal problems:***

* Nephropathy
  + Worse with HT/PET and kidney disease
  + Increased risk of UTIx
* Retinopathy
  + Worse with HT/Atherosclerosis
* Vascular
  + Increased risk of PET; IUGR and coronary heart disease
* Neuropathy
  + Can lead to ileus formation
  + Delayed gastric emptying
  + Mendelson syndrome – anaesthetic risk

***ANC surveillance***

* Maternal
  + BP
  + Glusose
  + Urine dipsticks
* Fetal
  + Kick chart
  + CTG (false reassuring)
  + BPP
* Uterine artery doppler
  + Normal or low with IUGR has poor prognosis
* US
  + @20-24 weeks for anatomical evaluation
  + Every 4 weeks for signs of macrosomia (AC)

***When to deliver*** – At 38 weeks WITH confirmed lung maturity (PG not LS)

***Dx:***

* Screening:
  + Test for gycosuria – if positive:
    - Random blood glucose
      * <6 = Normal
      * <8
        + If <28weeks – 4 weekly blood glucose
        + If >28 weeks – 2 weekly blood glucose
      * 8.1-10.9
        + Fasting blood glucose

<8 = Diet modification (Glucose intolerance)

>8 = Diabetes

* + - * >11 = Diabetes Mellitus
* Glucose control evaluation:
  + Ideal: 5.6-6.7
  + Practical:
    - <6 before a meal
    - <8 2hrs post prandially

***ANC Mx:***

* Diet
* Oral hypogycaemics – controversial:
  + Glibenclamide
  + Metformin
* SC Insulin at home (see insulin sliding scale)

***NOTE: Do not use glucose tolerance test for diagnosis – it is not standardized and non-reproducible.***

***Diabetic work-up*** – at delivery OR admission criteria:

* Hospital admission criteria:
  + Poor control
  + Excessive weight gain
  + PET
  + Abnormal renal function
  + Abnormal fetal growth
  + Abnormal fetal welfare
* Take full history to identify problems relating to DM
* Clinical examination
* Do glucose profile and manage accordingly – Insulin sliding scale
* Diabetic diet
* Special investigations
  + Glucose control
    - HbA1c >8.5 indicates poor control
    - UCE
    - S-Glucose
  + Organ involvement
    - CXR
    - 24hr protein/creatinine clearance
    - Fundoscopy
    - U-MCS
  + Fetal assessment
    - US
      * EFW
      * RI
      * AFI
      * Anatomy
      * Nuchal translucency

***Glucose-insulin regimes:***

* Insulin dosage according to a sliding scale(s)

|  |  |  |
| --- | --- | --- |
| **Finger-prick glucose** | **IV Soluble insulin** | **SC insulin** |
| **<2** | None (50% Dextrose IVI) | None (50% Dextrose IVI) |
| **2-5** | No insulin | No insulin |
| **5-10** | 1u/h | 2u/h |
| **10-15** | 2u/h | 5u/h |
| **15-20** | 3u/h | 7u/h |
| **>20** | 6u/h – consult diabetologist | Admit on IVI insulin |

|  |  |
| --- | --- |
| **Finger-prick glucose (30min before meal)** | **SC insulin** |
| **6.1-8** | 4u short-acting insulin |
| **8.1-10** | 8u short-acting insulin |
| **10.1-12** | 12u short-acting insulin |
| **12.1 and higher** | 16u short acting insulin |

* 1/3 Short-acting insulin & 2/3 long-acting insulin (=”Actraphane”)
* 1/3 of Actraphane mane according to total dose required per day
* 2/3 of Actraphane nocte according to total dose required per day
* Monitor blood glucose 2 hours before and after each meal
  + Fasting <4-5.5; Post-prandial (after 2 hrs) <6

***Delivery Mx:***

1. **5% Dextrose IV**
2. **Short insulin infusion pump @ 1U/hr**
3. **Hourly blood-glucose (4-6.5) and urinary ketones (neg.)**
4. **If BG increased give more insulin, if ketones present give dextrose**
5. **Monitor FHR (CTG)**
6. **Lithotomy position (decreases risk of shoulder dystocia)**

***Contraception and DM*** – due to significant risk to mother and poor pregnancy outcome, consider:

* Tubal ligation
* IUCD
* POP – Do lipogram as progesterone can alter cholesterol profile
* Contraceptive injection
* Hysterectomy (elective)

|  |
| --- |
| **Hyperemesis** **gravidarum**: |

***Definition:*** Severe vomiting usually before 16wk – A more severe for of emesis gravidarum. If after 16wk think of surgical causes:

***Ax:***

* Thiamine deficiency
* GIT causes and liver pathology:
  + Hepatitis
  + Gastroenteritis
  + Volvulus
  + Intestinal obstruction
  + Drug reaction
* Thyrotoxicosis
* Cerebral tumor
* Less severe recurrent vomiting:
  + Torsion of ovarian cyst
  + Acute hydramnios
  + PET
  + Sever anaemia
  + Hiatus hernia
  + Peptic ulcer
  + Pyelonephritis
  + Multiple pregnancy
  + Hydatiform mole

***Dx:***

* Signs of dehydration
* ↑ HR
* Rachades
* Intra-ocular pressure ↓ → Impaired vision
* Episgastric discomfort & pain
* Blood stained vomiting (later)
* Insomnia & muscle cramps
* THE ABOVE MAY PROGRESS TO “TERMINAL TOXIC PHASE:
  + Jaundice
  + Tachycardia
  + Hypertension or hypotension
  + Retinal haemorrhage
  + Blindness
  + Apathy/Drowsiness
  + Amnesia
  + Convulsions
  + Coma

***Mx:***

1. **Exclude other aetiology**
2. **Vitamin B1**
3. **Address fluid/electrolyte/nutrition:**
   1. **Hospitalize → No fluids/solids PO for 48hr → then try re-introducing fluids/food → if vomiting recurs → stop for another 24hr.**
   2. **Monitor intake/output (remember insensible losses)**
   3. **If obvious dehydration is present → CVP**
   4. **Daily urine examination: Ketones & Chloride (better indicator of pre-renal failure than sodium); Use 3g/l Potchlor in normal saline to correct chloride to 10-15mmol/l and to ↑ urine output**
4. **Drugs**
   1. **Hydoxizine 50mg q3h x8 IVI**
   2. **Buscopan 20mg q3h x8**
   3. **Metochlopramide 10mg after 30min if still vomiting after Hydroxizine and buscopan**
   4. **Droperidol 5mg q4h IVI if still vomiting after 30min**
5. **Special investigations: UKE; LFT; FBC; Hct every day**
6. **Parenteral alimentation if unable to feed**
7. **Psychological support**
8. **TOP if all else fails (radical approach)**
9. **Resumption of oral feeding can occur 48-72hrs after admission – small portions, dry carbohydrates**
10. **Danger signs NB!!!:**
    1. **No improvement after 1 week**
    2. **Jaundice**
    3. **Persistent tachycardia > 100bpm**
    4. **Persistent proteinuria**
    5. **Persistent hyperthermia > 38.5˚C**
    6. **Persistent hypotension**
    7. **Retinal haemorrhages/Optic neuritis**

|  |
| --- |
| **Asymptomatic bacteriuria:** |

***Definition:*** >100000 org/mL in MSU with no Sx

***Cx:***

* Pyelonephritis
* Cystitis
* PROM
* Premature labour
* AFIS

Mx:

* Antibiotics:
  + Ampicillin
  + Cepalosporin
  + Nitrofurantoin (not inlate pregnancy – can lead to neonatal haemolysis)
  + Sulphonamides (can lead to neonatal hyperbilirubinaemia)
* Excretory urogram 6 weeks post-delivery if:
  + Difficult eradication
  + Acute UTIx before/during pregnancy
  + Asymptomatic bacteriuria in puerperium i.e. up to 6 weeks post-delivery

|  |
| --- |
| **Pyelonephritis:** |

***Ax:*** Mostly due to E. Coli

***Dx:***

* Fever & flushing
* Patient ill, rigors, vomiting
* Tachycardia
* Urinary frequency & dysuria
* Renal angle tenderness
* Pyuria
* >100000org/mL in MSU

***Mx:***

* Admit to hospital
* Address dehydration
* Address premature labour
* Address septic shockl
* IV FLUIDS
* IV antibiotics e.g. ampicillin/cephalosporins empirically
* MSU MC&S and adapt antibiotic cover accordingly
* Anti-pyretics Rx and tepid-sponging
* Monitor BP, PR, fluid intake and urinary output
* Once stable for 48hrs d/c F/U MSU-MC&S @ ANC until 3 negative results in a row
* If recurrent give bactrim for remainder of pregnancy – 100mg bd
* If recurrent after pregnancy → refer for urological assessment

|  |
| --- |
| **Epilpesy:** |

***Cx:*** Increased risk of APH; PET; Still birth; Premature labour; Congenital abnormalities; NN-epilepsy

1. **Phenytoin & barbiturates – add 1mg Vit. K IM to NN to prevent bleeding (may need FFP)**
2. **Benzodiazepines – Withdrawal in NN**
3. **Status epilepticus:**
   1. **Open airway, O2 if needed and insert urinary catheter**
   2. **IV Infusion: 0.9% NaCl. Bolus 50ml 50% Dextrose + 100mg thiamine IM**
   3. **Diazepam (DZP) 2mg/min IV until conulsions stop (max = 20mg)**
   4. **Simultaneously, phenytoin 50mg/min (total 18mg/kg) IV in 100ml 0.9% NaCl**
   5. **If convulsions continue, 2 options:**
      1. **Phenobarbitone 100mg/min (total 20mg/kg)**
      2. **Diazepam infusion 100mg in 500ml 5% dextrose @ 40ml/hr. NB. Don’t give both as there is a risk of respiratory suppression**
   6. **If convulsions continue:**
      1. **ICU**
      2. **GA with Na-thiopentone/Propofol induction with halothane maintenance plus ventilation**

***Mx*** – Smallest effective dose of 1 drug:

***NOTE: Don’t use DZP, phenytoin or glucose in same IV line***

|  |
| --- |
| **Malaria:** |

***Prophyllaxis:***

|  |  |  |
| --- | --- | --- |
| **Area visiting** | **Drug recommended** | **Dosage** |
| Kruger Park; Swaziland | Chloroquine + Folic acid 5mg/d | 2 tab. q1wk 1 week before, every week there and for 6 weeks after |
| Zimbabwe; Madagascar | Maloprim + Folic acid 5mg/d | As for chloroquine BUT only 1 tab. instead of 2. |
| Mauritius; Seychelles; Reunion; Northern KwaZulu Natal; Malawi; Mozambique; Northern Namibia; Botswana | Maloprim + Chloroquine + Folic acid 5mg/d | As above |

|  |
| --- |
| **Immunizations in pregnancy:** |

|  |  |  |
| --- | --- | --- |
| **No contra-indications** | **With caution** | **Contra-indicated** |
| * Influenza * Tetanus-diptheria * Tetanus Ig & toxoid * Rabies * VZV | * Yellow fever * Typhoid * Polio * Cholera * Pasturella | * Rubella * Measles * Mumps * BCG * Smallpox |

|  |
| --- |
| **Thromboembolism & PTE esp. 7 days postpartum** |

***Risk-factors:***

* Previous TE/PTE
* C/S
* Overweighht
* >35yrs
* Cardiac lesions
* Prolonged bed rest
* Positive lupus anticoagulant
* Hereditary thrombotic disease e.g. AT III deficiency
* Oestrogen Rx to suppress lactation

***Dx:***

* Calf pain and classical signs
* PTE: Dyspnoea; Haemoptysis; Pleuritic pain; Bronchospasm; Fever; Tachycardia; Shock

***Special investigations:***

* Clotting profile and D-dimers
* Doppler
* Venography
* Lung scintigram

***Mx:***

1. **If PTE: 100% O2**
2. **Heparin 5000-20000IU (i.e. ≈70IU/KG) stat and PTT @ 6 hrs**
3. **Heparin 18-20IU/kg/hr with 6hrly PTT**
4. **Start Warfarin 3 days later and monitor INR**
5. **If INR 2-3 stop heparin**
6. **Can also consider thrombolectomy – solid clots**
7. **Thrombolyics – Contraversial**
8. **Pressure stockings**
9. **Bed rest with raised feet**

|  |
| --- |
| **Gynaecological problems in pregnancy:** |

|  |
| --- |
| **Candida & sexually transmitted diseases:** |

***Canidida:***

* Dx: Hypae & yeast cells on K­­-OH smear
* Rx: Nistatin/Coltrimazole cream 10-14days

***Trichomonas:***

* Associated with PROM
* Dx: Seen on 0.9% NaCl smear
* Rx: Metronidazole 400mg bd for 5 days AND 2g STAT for partner

***Gardenerella:***

* Associated with PROM
* Whiff test on K-OH smear
* Rx: Ampicillin 500mg q6h PC x5d (1st TM); 2nd TM can use Metronidazole (see above)

***Condylomata* *accuminata*** (HPV 11 & 16) – C/S if very large to obstruct NVD

* Rx: 50% Trichloacetic acid/lazer OR
* Small warts left until after pregnancy
* Larger ones may be excised under GA

***Rule of 500’s in obstetric and gynaecology antibiotics – by George Bennie***

|  |  |  |  |
| --- | --- | --- | --- |
| **Condition:** | **Drug name:** | **Dose:** | **Route** |
| **Candidiasis** | Gentian Violet | 500mg (in 100ml) H2O | PV |
|  | Clotrimazole | 500mg tab. stat | PV |
|  | Clotrimazole | 500mg(5g) cream stat | PV |
|  | Econazole | 500mg cream stat | PV |
| **STDs (& other infections)** | Amoxicillin | 500mg q6h x #days | PO |
|  | Erythromycin | 500mg q6h x #days | PO |
|  | Ceftriaxone | 500-2000mg/d stat or dd(125mg in pregnancy) | IM |
|  | Metronidazole | 500mg q8h (200mg bd in pregnancy) | IV (PO) |
|  | Tetracycline | 500mg q6h x #days | PO |
|  | Ciprofloxacin | 500mg stat | IM |
|  | Vancomycin | 500mg q6h x #days | IM/IV |
| **Anti-helminthic** | Mebendazole | 500mg stat | PO |

***Varicosities of vulva*** – Avoid episiotomy

|  |
| --- |
| **Myomata – Increase because of oedema and hypertrophy:** |

***Cx:***

* Spontaneous miscarriage
* Malpresentaions
* Abnormal uterine muscle contractions
* Obstructed labour
* Retained placenta
* Risk of abortion, preterm labour or IUGR ↑ when placenta planted over or adjacent myoma
* Red degeneration – Rx: Bed rest, sedation & analgesia
* Resist myomectomy in pregnancy – ONLY do one at C/S if it is pedunculated and can be easily clamped and ligated ELSE could have severe haemorrhage

|  |
| --- |
| **CIN & Cervix CA:** |

***CIN lesions:***

* All pregnant woman should have PAP smear
* If abnormal → Colposcopy for localization and biopsy (punch) – if abnormal → REFER!!!
* If invasion is histologically inconclusive → Consider cone biopsy (only early pregnancy) or do if:
  + Suspicious micro-infiltration or infiltration
* A CIN lesion is followed-up with a smear in every trimester and treated 3 months after delivery
* Laser evaporation or cryotherapy used in exceptional cases (progression) but limited to 1st or early 2nd TM

***Cervix CA:***

* Speculum mandatory in all patients with vaginal bleeding (exclude p. praevia first by US)
* C/S indicated primarily to prevent haemorrhage
* REFER!!!
  + Stages Ib and IIa can be treated surgically/radiotherapy
    - 1st & early 2nd TM: Radical hysterectomy & bilateral pelvic lymphadenectomy with fetus in-utero
    - Late 2nd TM: After proven fetal maturity → classical C/S → and then as above. If fetus is only reaching maturity, patient’s wishes need to be respected with regards to waiting for the fetus to mature.
    - 3rd TM with fetal maturity: C/S → and then as above.
    - Post-partum: As above
  + Stages IIb, IIIa, IIIb, IV – Radiotherapy:
    - 1st and 2nd TM & non-viable fetus: External X-ray → spontaneous abortion → then do local X-ray. Risk of intra-uterine infection is high.
    - 3rd TM & fetal maturity: Classical C/S → external X-ray → local X-ray
    - Post-partum: External X-ray → local X-ray
  + If infiltrating and already in labour:
    - Emergency C/S → treatment as above
    - If cervix fully dilated → surgery or radiotherapy
    - If uncontrollable bleeding → might need radical hysterectomy.
  + Cx - refer if:
    - Haemorrhage
    - Miscarriage
    - Premature labour
    - Infection
    - Stenosis of cervix
    - Cervical tears