Obstetrics

Cardiac disease in pregnancy
Management of post-partum haemorrhage for EUA
Management of 160kg female for Caesarean section
Justify an epidural test dose in obstetrics and contraindications to epidural for LUSCS
Outline management of a 32 week pregnant woman who fits at home
Outline differences between spinal and epidural for LUSCS
Management of a term female with moderate aortic stenosis for elective Caesarean section
Anaesthesia for LUSCS
Perinatal and Maternal Mortality 1997
Analgesia in Labour
Tocolysis
Antenatal class
Foetal monitoring
Trauma in pregnancy
Doses
Case scenarios
Cardiac disease in pregnancy

Cardiac stresses
  pregnancy, labour, surgery (LUSCS), blood loss
cardiac disease may worsen in pregnancy

Anaesthetic interventions
  Major regional blockade
    Objective is to minimize physiological disturbance
      Choice of drug: opioid vs local anaesthetic
      Titration of drug to minimize high block
      Volume loading to maintain preload
      Posturing to maintain preload
      Use of vasopressors
  Degree of concern
    Normal patient
    Disease will improve with block e.g. AR
    Disease will worsen with block e.g. AS
  Monitoring
    Routine
    HDU
    ICU
  Blockade for analgesia is safer than for anaesthesia

General anaesthesia
  Objective is to minimize physiological disturbance
  Modified RSI
    e.g. more fentanyl, less thiopentone
  Cardiac induction
    may compromise safe airway

General management of cardiac disease in pregnancy
  Workup
    Nature of defect
    Severity e.g. NYHA grading
    Optimization e.g. valve replacement, medical therapy
    Assessment of likely outcome
    Counselling patient re termination

Objectives
  Survive to viability and early Caesarean (e.g. 32/40)
  Aim for normal labour with monitoring

Anaesthetic plan
  Regional suitable for analgesia or anaesthesia?
  GA preferred?
  Technique, level of care pre- and post-op
Management of post-partum haemorrhage for EUA.

Post-partum haemorrhage
>600 ml blood loss from birth canal from third stage to 24 h post-delivery

Surgery
High risk, emergency surgery
Causes: uterine atony, retained products, vaginal or uterine laceration

Preop
Assessment
Determine reason for EUA
Define risk of procedure
Patient
Concurrent disease e.g. PE
Resuscitation status
Bloods, crossmatch, Hb
Anaesthesia
Epidural in situ?
IV access
Fluid management
Regional versus GA
Determined by urgency, haemodynamic stability, patient preference

Premedication
Effervescent ranitidine
\( \text{O}_2 \) by mask
Syntocinon infusion to continue

Induction
Rapid Sequence for GA
Equipment, suction, drugs
Preoxygenation
Cricoid, thiopentone, suxamethonium
ETT
Spinal or epidural or CSE

Maintenance
Reduced MAC requirement, volatiles cause uterine relaxation
Low volatile use unless uterine relaxation required
Physiological hypocapnia
Surgical issues
Haemorrhage, coagulopathy, warming of infusions
Oxytocic agents
Uterine relaxants: volatiles, GTN

Extubation
When awake and protecting airway
Postop
Ward/HDU/ICU as indicated
Management of 160kg female for Caesarean section.

Surgery
  Elective, urgent or emergency
  Determines opportunity for optimization

Risk factors
  Term pregnancy
    Airway: oedema, vascularity, risk of difficult intubation, risk of aspiration
    Ventilation: ↓ FRC, ↑ O₂ requirement
    Circulatory: ↑ CO, ↑ blood volume, ACC
  Surgery
    Haemorrhage
    Embolism: amniotic fluid, air
  Obesity
    Airway difficulty
      ↑ gastric volume, ↓ pH
      ↑ O₂ requirement
    Difficulty ventilating
    Difficulty access for IV, blocks

Preoperative
  Assessment
    Pregnancy, complications
    Concurrent disease
    Medications, allergies...
  Premedication
    Non-particulate antacid, sodium citrate: ↑ gastric pH
    H₂ antagonist, metoclopramide: ↑ pH, ↑ motility

Intraoperative
  Positioning
    Supine with left lateral tilt 15°
    Avoid aorto-caval compression
  Monitoring
    ECG, SpO₂, NIBP on frequent cycle and manual BP cuff
    Arterial pressure if likely to be unstable
    CTG or doppler prior to positioning for surgery
    Supplemental O₂ for all mothers
  Regional
    Advantages
      Avoids need to intubate potentially difficult airway
      Spinal may be as fast as GA in experienced hands
      Preemptive analgesia, reduced postoperative analgesic requirement
      Allows greater experience of birth, partner present
      Often preferred by patient
    Disadvantages
      May delay surgery, especially epidural
      Spinal is of fixed duration, lacks flexibility
    Complications
      Failed block, hypotension, local anaesthetic toxicity, neuropraxia, PDPH
      Minimized with careful technique: fluid loading, pressors...
      Obese patient may require longer needle, ↑ technical difficulty, CSE is not possible with long epidural needle
  Epidural
    Lumbar epidural catheter
    Suitable for urgent procedure if
      Haemodynamically stable, block established

Obstetrics
Bolus lignocaine 2% with adrenaline and bicarbonate, 5ml aliquots to T4
Additional epidural narcotic (fentanyl 100 µg or pethidine 50 mg)
improves analgesia
May be combined with spinal (CSE)
May be supplemented intraoperatively

Spinal
L2-3 or L3-4
Fine pencil-point needle 26g minimizes PDPH
Hyperbaric bupivacaine 0.5% 2.2-2.5 ml
Fentanyl 10-20 µg
Posture for block to T4
Test block with cold or painful stimulus

General
Advantages
Reliable and rapid onset of anaesthesia
Greater control of airway, ventilation and haemodynamics
Disadvantages
Potential for failed intubation, aspiration
Major causes of anaesthetic-related death in pregnancy
Greater post-operative narcotic requirement
Neonatal depression from volatiles, N₂O and induction drugs
Rapid sequence induction
Required in all pregnant women after early second trimester or with
other indications
Suction and difficult airway equipment must be at hand
Preoxygenation: 100% O₂ by mask to denitrogenate FRC
Cricoid pressure
Thiopentone (4 mg/kg), suxamethonium (1.5 mg/kg) may be less in
obese, correct towards LBM
Laryngoscopy, cuffed ETT
Maintenance
O₂/N₂O/isoflurane: FiO₂ ≥ 50%, isoflurane ≤ 1 MAC
Higher FiO₂ and PIP required with obese patient
↑ sensitivity to non-depolarizing relaxants, esp. with Mg²⁺
Relaxants do not cross placenta significantly
Minimal narcotics prior to delivery, then morphine 0.2-0.5 mg/kg

Post-delivery
Oxytocics
Oxytocin 5-20 U plus infusion
Ergometrine 0.25-0.5 mg IV or IM if continued bleeding

Emergence
Extubation when awake and protecting airway

Postoperative
Analgesia, antiemetics
Appropriate review
Justify an epidural test dose in obstetrics and contraindications to epidural for LUSCS.

Test dose

Purpose
- Determine incorrect placement of epidural catheter
  - Intravascular or subarachnoid or subdural
- Aspiration is a useful test if positive: blood or CSF, but may be falsely negative

Procedure
- After placement of the catheter, 3 ml of local anaesthetic solution (typically bupivacaine 0.25% or lignocaine 1%) containing adrenaline 5 µg/ml is administered
- The heart rate is observed for a rapid rise of 20-30 bpm in response to intravascular adrenaline
- The degree of sensory and motor blockade is observed after 3-5 min for a dense spinal block as high as T10

Rationale
- The potential morbidity from incorrect placement of an epidural bolus dose can be severe
  - Bupivacaine 25-75 mg or lignocaine 200-400 mg administered intravascularly can cause fitting due to neurotoxicity and cardiac arrest due to Type I antidysrhythmic effect
  - The same dose given subarachnoid may cause a total spinal requiring urgent intubation and ventilation
- The cost or risk associated with a test dose is small: a 3-5 min delay in establishing a block
- The test is not 100% sensitive or specific, especially in labouring women in whom the heart rate is typically high and variable, but it is the best readily available and rapid test
- Contrast epidurography may be a better test, but involves fluoroscopy, requiring a radiation dose, and substantial delay and cost

Absolute contraindications
- Refusal by a competent patient
- Infection at the site of potential insertion
- Hypovolaemic shock
- Coagulopathy, severe thrombocytopenia
- Intellectual disability or other reason for being unable to cooperate

Relative contraindications
- Urgency of surgery, delay in establishing block may be 20 minutes
- Unstable neurological disease
- Cardiovascular disease requiring maintenance of SVR e.g. severe aortic stenosis
- Treatment with anticoagulants, aspirin or other NSAIDs
- Disease likely to cause technical difficulty or failure e.g. ankylosing spondylitis
Outline management of a 32 week pregnant woman who fits at home.

Immediate management

ABCDEF
- Lateral position, clear airway
- Expired air resuscitation if not breathing, oxygen when available
- External cardiac massage if no output
  - Requires supine position with left lateral uterine displacement
- Summon assistance: ambulance

Aetiology

- Eclampsia
- Organic brain problem
  - Idiopathic epilepsy
  - Arteriovenous malformation
  - Tumour
- Trauma
- Metabolic disturbance
  - Drug withdrawal
  - Uraemia, hypoglycaemia, hyponatraemia etc.

General management

- Once patient is well-oxygenated, fit is terminated and she is transported to a suitable hospital, the cause of the fit needs to be determined
- Unless another cause is found, the aetiology is assumed to be eclampsia

Eclampsia

Immediate management

- ABCDEF as above
- Mg\(^{2+}\) 2-4 g IV may terminate fit

Incidence

- Preeclampsia 30 per 1000 births
  - Most common in young primigravidas
- Eclampsia 0.4 per 1000 births
  - 44% fit before delivery
  - 37% during delivery
  - 19% after delivery

Management

- Definitive management is delivery of the foetus and placenta
- Examine and test for complications
  - Hypertension, proteinuria, thrombocytopenia, hepatic dysfunction
  - Growth-retarded or distressed foetus
- Monitoring
  - Fetal well-being: CTG
  - Mother: NIBP or IABP, urinary catheter, possibly CVC or PA catheter
  - Best managed in HDU or labour ward if adequately equipped
- Magnesium
  - Anticonvulsant, vasodilator, tocolytic, bronchodilator, ↓ renin, ↓ ACE, ↓ platelet activity, ↓ prostacyclin release
- Antihypertensives
  - Hydralazine, α-methyldopa, clonidine, prazosin, labetalol, nifedipine, nitrates
- Fetal management and delivery
  - Best done by experienced obstetrician

Epilepsy

Immediate management
Fits usually self-limiting
Administer oxygen
Fit can be terminated with barbiturate or benzodiazepine if prolonged
Incidence 50 per 100,000
Pregnancy
May increase frequency of fits
    Possibly due to increased clearance and altered distribution of drugs,
    electrolyte changes
Antiepileptic medication may be teratogenic
    Phenytoin → cleft lip and palate, cardiac lesions, digital hypoplasia
Increased incidence of preeclampsia, complications and intervention
Management
    Careful monitoring of blood levels of anticonvulsant and adjustment of dose
Outline differences between spinal and epidural for LUSCS

Requirement
Both
- Surgical anaesthesia to T4
- Adequate duration for surgery

Anatomy, technique
Both
- Lumbar technique midline or paramedian
- Sitting or lateral position

Epidural
- Probably safer in lateral position (less risk of dural puncture)
- Tuohy needle 16g-19g used to approach epidural space
- Space identified with LOR to air or saline
- Catheter passed into space or single dose of anaesthetic given
- Test for incorrect placement with aspiration and test dose of adrenaline-containing solution

Spinal
- Commonly easier in sitting position
- Pencil point needle 25g-27g used to enter subarachnoid space
- Space identified with “pop” through dura and return of CSF
- Single dose of anaesthetic
- Clearer confirmation of correct placement of drug

Indications, contraindications
Safe techniques for elective and urgent LUSCS
- Spinal usually faster to get the case started
- Epidural can be fast if block already established
- Both thought to be safer than GA (no conclusive evidence)

Coagulopathy or thrombocytopenia: both contraindicated, but epidural more strongly
Haemodynamic compromise e.g. aortic or mitral stenosis
- Relative contraindication to regional
- Fall in SVR more rapid and uncontrolled with spinal
- May be safer to use graduated epidural

Drugs used
Epidural
- Local anaesthetic: lignocaine 2%, ropivacaine 0.5-1%, bupivacaine 0.5%
- Dose up to 20ml of 2% lignocaine
- Addition of fentanyl or pethidine or morphine

Spinal
- Local anaesthetic: bupivacaine 0.5%, cinchocaine (obsolete)
- Dose typically 2.2-2.5ml of hyperbaric bupivacaine 0.5%
- Addition of fentanyl 10-20 µg or morphine 100-200 µg

Reliability, duration
Spinal a more reliable technique
- Clearer end-point
- Denser block
- Fixed duration, typically 45-60 min of good surgical anaesthesia

Epidural
- May be patchy, unilateral
- Intraoperative supplementation allows longer duration

Complications, risks
Both
- Major risks of anaesthetic
  - Failed block, inadequate block, headache, infection, neuropraxia, drug toxicity, hypotension
Major risks of surgery
  Haemorrhage, embolism, nausea, vomiting, infection probably unaffected by anaesthetic technique

Spinal
  Less risk of failure, headache, local anaesthetic toxicity
  Minor risk of respiratory depression with intrathecal morphine

Epidural
  Larger dose of local anaesthetic, possible intravascular injection so greater risk of toxicity
Management of a term female with moderate aortic stenosis for elective Caesarean section

Surgery
   Elective, moderate risk

Preoperative
   Assessment
      Routine anaesthetic assessment
      Obstetric issues
         Size, obesity
         Airway compromise
         Obstetric complications, e.g. preeclampsia
      Crossmatch
   Aortic stenosis
      Severity moderate
   History
      Symptoms of severity
         Exercise limitation, dyspnoea, angina, drop attacks
   Examination
      BP, pulse character
      Murmur, radiation
      Signs of failure: creps, oedema
   Investigations
      CXR, ECG, echocardiographic findings required
      Catheter study results if performed

   Optimize condition
      Consult with cardiologist, obstetrician
      Symptoms often worsen with pregnancy, fall in SVR
      Treat failure
      Valvuloplasty if indicated

   Premedication
      Ranitidine or antacid
      Benzodiazepine if anxiolytic required

   Transport
      Left lateral position
      Supplemental O₂

Intraoperative
   Monitoring and access
      Large bore IV access
      Routine monitoring, plus
      Arterial line
      If severe consider PA catheter or TOE

   Induction
      Position with 15° left lateral tilt and uterine displacement
      Preload with fluid
      Prepare resuscitation drugs
         Vasoconstrictor agents: metaraminol, phenylephrine

   Regional
      Graduated epidural
         L2-3 or 3-4 catheter
         Incremental boluses of lignocaine plus fentanyl to block to T4
      Maintain contractility, HR and BP with pressors and fluid

   General
      Preoxygenation, cricoid pressure
      Narcotic plus midazolam titrated to unconsciousness
      Relaxation with suxamethonium
      Oral intubation
Pressors as needed to maintain BP

Maintenance
   General
      Remifentanyl infusion or
      N₂O, O₂, low concentration volatile
      Slow administration of required syntocinon to prevent hypotension
      Expect neonate to require resuscitation: naloxone ± ventilation
      Aggressive replacement of volume loss

Emergence
   Awake extubation in lateral position
   May be delayed by high narcotic dose

Postoperative
   HDU or ICU care
   Continue ECG, arterial BP monitoring
   Analgesia with morphine PCA plus NSAID and paracetamol
Anaesthesia for LUSCS

Rate 62000/year Vic
Indications
- Distress 20%
- Malpresentation 15-20%
- FTP 40%
- Previous Caesar 30%
Maternal death rate 1/10000

Technique
Regional vs GA vs local
- Urgency, patient choice, anaesthetic opinion, indication for LUSCS
- Complications of pregnancy (PE, placenta praevia...)
- Classify as needs of: mother, baby, obstetrician

GA
Advantages
- Rapid, reliable, good conditions, safer in unstable conditions or coagulopathy, familiar to patients
Disadvantages
- Requirement for airway control, awareness, fetal depression, increased analgesic requirement, ↓ breast feeding at 6 months, no participation in birth

Regional
Advantages
- Participation, no airway problems, ↓ analgesic requirement, better Apgar at 1 minute
Disadvantages
- Limited duration, ? more hypotension, inadequate block, PDPH, neurological complications, total spinal, difficult conversion to GA, LA toxicity from IV injection
Assessing block
- T4-T6 required for surgery
- consider resiting epidural or CSE for poor block

Contraindications
- Refusal, thrombocytopenia, coagulopathy, conditions markedly worsened by afterload reduction (e.g. AS), urgency of induction

Premedication
- Possibility of conversion to GA, so non-particulate antacid immediately before, H₂ blocker or metoclopramide premedication

Complications
- Hypotension
  - prevent with fluid load (0.5-1 l), left lateral tilt, suitable spinal dose or titrated epidural, early use of ephedrine, close monitoring of BP and symptoms of hypotension
- High block, inadequate block

Supplemental oxygen
- ↑ maternal and foetal PO₂, given during block in case of hypotension before uterine incision: load with O₂ before reduced placental perfusion

Doses
- in recipes

GA
Complications
- Aspiration, failed intubation management, aortocaval compression,

Priorities
- Maintain oxygenation, adequate ventilation (PCO₂ 32-34), minimize incision to delivery time, avoid depressant drugs

Obstetrics 3.E.1.13 James Mitchell (December 24, 2003)
Initial gas mixture: 50:50 + 0.5 MAC volatile (initial overpressure)
Reduced anaesthetic requirements (25-40% MAC reduction)
Reduced FRC → rapid hypoxia and rapid equilibration of anaesthetic gases
Awareness most likely: intubation and incision
Perinatal Mortality 1997

Declining birth rate (p. 8)
62000 in 1997, similar number of births since 1962, but rate has fallen from 21.1 per 1000 population to 13.4

Declining perinatal deaths (p. 5)
429 deaths, 6.9 per 1000 births
269 stillborn, 160 before 28 days post-delivery
Rates are lower using WHO criteria (4.3 per 1000 births)
count infants ≥1000g or 28 weeks rather than 500g or 22 weeks

Preventable causes of perinatal death (p. 13)
Mostly related to obstetric practice
Some anaesthetic relevance
- Initiate management of maternal illness prior to transfer (e.g. controlling hypertension or treating preeclampsia)
- Avoid surgery unless mandatory
- Discourage smoking in pregnancy

Maternal Mortality 1997

Older population of mothers (p. 30)
Median age increased from 27 in 1984 to 30 in 1997
Perinatal mortality rate increases with maternal age (p. 29)

Method of delivery has changed (p. 34)
1984 16% forceps, 15% Caesarean
1997 10% forceps, 20% Caesarean

Duration of hospital stay has fallen (p. 38)
1985 84% stayed ≥5 days
1997 42% stayed ≥5 days

Maternal death (p. 72)
Rate continues to fall from 0.66 per 1000 births in 1953 to 0.08 in 1997
Only five deaths reported
- 36yo G₄P₂ ²⁹/₄₀ massive PE with history of DVT
- 35yo P₄ ⁴¹/₄₀ vaginal haemorrhage, Caesar, **failed intubation**
- 32yo P₁ ²⁴/₄₀ obese asthmatic hypertensive smoker, arrhythmia
- 32yo P₂ ³⁴/₄₀ hypertensive, SAH in doctor's rooms
- 26yo P₀ recurrent glioma
Analgesia in Labour

Schema for examining analgesic techniques

  Evidence
  Basic science
  Clinical
  Efficacy
  Costs
  Complications
  Mother
  Baby
  Monitoring requirement
  Technique, skill
  Effect on obstetric outcome

Analgesic options

  Psychological
    Education, visualization...
  Pharmacological
    Systemic: N₂O, pethidine
    Regional: epidural, spinal, nerve blocks

Indications for early epidural

  Preeclampsia without severe thrombocytopenia
  Serious contraindication to GA
  Failed intubation, morbid obesity
  Trial of scar
  Twins
  Poor cardiac reserve
  Likely Caesarean section

Indications for GA in labour ward

  Stuck second twin or shoulder dystocia without an epidural

Difficulties in pregnancy with epidural

  More likely to be fat, oedematous
  Increased lordosis, difficulty positioning
  Contraction increase risk of movement or bloody tap (?10%)
  Reduced volume of epidural space and increased sensitivity to LA
  Raised CO, low SVR before block
  Remote location
  ↑O₂ consumption, ineffective CPR in pregnancy if complicated

Contraindications

  Risk/benefit consideration
    Usual technique
    Modified technique

  Fever
    Generalized sepsis vs local vs febrile due to labour alone
    Epidural abscess is rare even in septic patients
    Modification of technique
      More likely to use α agonist for hypotension
    Close onervation of neurological status post-procedure

Thrombocytopenia

  <80 usually contraindicated
  >100 usually safe unless other contraindication
  80-100 consider other options: systemic analgesia, GA for Caesar, spinal with 27g needle

Hypovolaemia

  Valvular heart disease
    Modified technique usually suitable
Gradual development of block
Closer monitoring
Tocolysis

Preterm labour

Preterm delivery (before 37 weeks) incidence 7%
Increased risk of respiratory distress, hypothermia, hypoglycaemia, jaundice

Risk factors
Young, low body weight, low socioeconomic class, unsupported, smokers
Previous preterm delivery, early bleeding, heart disease, cervical incompetence, multiple pregnancy, premature rupture of membranes

Causes
Medical induction
Infection
Streptococci, mycoplasma, fusiform bacilli
↑ IL-1β, IL-6, TNFα → PG production → labour
Risk might be reduced with antibiotics for Gardnerella vaginosis

Ruptured membranes
Multiple pregnancy
Rising incidence with IVF, GIFT etc.
1985-95: twins 10 to 14 per 1000 births, triplets 0.14 to 0.44
Polyhydramnios, intrauterine death, fetal abnormality, uterine abnormality, cervical incompetence

Diagnosis
Cervical dilatation too late for treatment
Fetal fibronectin in vaginal mucus unreliable
Diagnosis is clinical, 30-40% false positive

Management
Tocolytic drugs
Effective for less than 48 hours
Time for transfer or steroids
Greatest gains in 25-30 week gestations
β-agonists
Salbutamol 100 µg bolus
MgSO₄
Muscle weakness
Nitrates
GTN best acute agent (first report 1986)
200-600 µg dose IV
Onset 90 s, duration 3-5 min
Surprisingly little hypotension
Indomethacin
Causes DA closure after 34 weeks → pulmonary hypertension
Ca²⁺ channel blockers
Nifedipine → hypotension, uteroplacental flow dysfunction
In trials
Atosiban (oxytocin blocker), nimesulide (COX-II inhibitor)
Obsolete
Alcohol, isoxuprine, amyl nitrite
Contraindications
Chorioamnionitis
Antibiotics for ruptured membranes (unproven)
Steroids to prevent neonatal respiratory distress
Mode of delivery depends on presentation
Delivery should be in a centre with NICU

Other uterine relaxants
Volatile agents (and cyclopropane)
MAC equipotent
Indications

Tocolysis (above)
Manipulative delivery
  Malpresentation, breech, second twin, abnormal uterine anatomy
Manual removal of placenta
Acute uterine inversion
  Pain, bleeding, vagal discharge, air embolism, venous congestion and
difficulty reducing
Acute hypertonus
  Drug-induced, following axial blockade
Intrauterine surgery
Antenatal class

Analgesia in labour

Historical perspective
  e.g. Queen Victoria and chloroform

Potential benefit of analgesia in labour
  Maternal distress
  Possible tocolytic effect of endogenous catecholamines

Epidemiology
  Caesarean section rate 20-25%
  Epidural analgesia in primiparas ≈50%

Analgesic options
  Psychological
    Visualization, relaxation
  Simple physical
    Position, heat, massage
  Pharmacological
    Systemic
      Oral analgesics
      Narcotics, N₂O
    Regional
      Epidural
      Spinal
      CSE

For various techniques
  Basic mechanism
  Safety, efficacy
  Advantages, disadvantages
  Complications

Anaesthesia for Caesarean section

General
  Indications
  Advantages, disadvantages

Regional
  Spinal vs epidural
  Advantages, disadvantages

Post-operative analgesia
Foetal monitoring

Antenatal
Noninvasive
Simple
Auscultation for foetal heart
Palpation of uterus, fundal height (cm above symphysis pubis = gestational age - 20)
Kick chart
Complex
Ultrasound
Head and abdominal circumference
Amniotic fluid index
Anatomical anomalies
Doppler flows in umbilical arteries
Cardiotocography
Biophysical profile
Scoring system derived from movements (limb and breathing), tone, AFI and CTG

Invasive
Amniocentesis
Chorionic villous sampling
Lecithin/sphingomyelin ratio
(oestriol)

Intrapartum
Noninvasive
Foetal heart rate monitoring (auscultation or CTG)
Examination of liquor for meconium
Invasive
Foetal scalp electrode for CTG
Foetal scalp pH (sensitive for stress)
Vibroacoustic stimulation
Trauma in pregnancy (also in Trauma)

Primary survey
A
  Difficult airway, ↑ risk of aspiration
B
  ↑ VO₂, ↓ PCO₂, risk of hypoxia, fetal consideration
C
  Resting tachycardia, expanded blood volume, altered resting BP, vasodilated
  Potential for aortocaval compression
  Blood loss related to pregnancy
  Abruption
  Abdominal assessment difficult e.g. retroperitoneal haemorrhage
  Pelvic fracture causes greater bleeding with enlarged vessels
  Coagulation altered, physiological anaemia, thrombocytopenia

Tests
  Bloods: ↑ WCC, ↓ Hb, plt, ↓ PCO₂
  ECG: LAD
  Abdo: Altered US assessment, risk with DPL
  Imaging: consider radiation dose
  Additional assessment of fetus: CTG, consultation with obstetrician

Obstetric management
  Resuscitation of mother is first priority
    Suitable hospital for trauma
  Management of fetus determined by mother’s stability, fetal/placental well-being,
    uterine damage
  Options
    Expectant, delivery, Caesarean
  Monitoring and frequent reassessment is important

Presentations
  Arrest
    ABC resuscitation, left lateral tilt, CPR may be ineffective
    Caesarean if failed resuscitation at 4 min
    Even if fetus is non-viable, improves CPR effectiveness
  Major uterine injury
    Rupture: pain, hypovolaemia, fetal distress or death, vaginal or IDC bleeding
    Emergency laparotomy
  Minor trauma, mother and baby apparently okay
    ↑ risk of premature labour, fetal distress
    Monitoring with CTG, expectant management
  If minor abruption
    Risk of DIC: monitor fibrinogen, possible AFE
    Fetomaternal haemorrhage: Kleihauer, anti-D if indicated
Doses

PGF\textsubscript{2\alpha} 5 mg (1 amp) in 20 ml, 1-2 ml up to 20 ml in myometrium
Mg\textsuperscript{2+} 4 g bolus (30 min) 1-2 g/h 6 h'ly levels
Ergometrine 250 \mu g IV, 250 \mu g IM
Case scenarios

1. Inadequate perineal cover from epidural
   LA bolus 5 ml 0.25% bupivacaine
   ± pethidine 25-50 mg
   ± clonidine 30-50 µg
   still failed: lignocaine 2% or bupivacaine 0.5% to block motor and sensory
   Caudal an option in theory (risk of toxicity and foetal injection)

2. Head at spines requests analgesia
   CSE: 0.5 ml 0.5% bupivacaine, 25 µg fentanyl intrathecal
   epidural infusion to start after ≈30 min

3. LUSCS with L3-4 epidural in situ top-up 15 ml 2% lignocaine, 50 µg fentanyl, block at T8
   bolus 5ml lig.
   still no block: resite epidural to ≈T12-L1

4. Inadequate perineal block with LUSCS open on table
   Wait, bolus epidural, narcotic, N₂O, clonidine, ketamine
   Lignocaine 0.5% applied by surgeon to bladder, pelvis

5. Late decelerations, emergency GA LUSCS. RSI, can’t see cords
   Ventilate?
   Yes: introducer, bougie, Fastrach, FOB, wake-up → regional
   No: help!, airway position, BURP position, different blade (straight, McCoy),
   ventilation is a higher priority than intubation, two hands on mask, Guedel,
   LMA, COPA, Combitube, cricothyroid puncture
   Cricothyroid puncture
   14G Jelco with syringe, aspirate air, attach 3 way tap, O₂ tubing, Sanders
   injector (50 psi initially), airway to improve exhalation
   Cricothyroidotomy

6. Post delivery, 14 hour labour, PPH 600 ml, BP 70 mmHg, HR 110 bpm, no IV access
   Acute resuscitation: ABC
   Supplemental O₂, large bore IV access, rapid fluid replacement
   Blood specimen for crossmatch, FBE
   Obstetric management of haemorrhage
   Remove placenta, rub fundus, oxytocin, ergometrine, PGF₂α, aortic
   compression, theatre
   Anaesthesia in theatre
   RSI with reduced doses, reduced volatile (uterine relaxant)
   Rapid IV infusion: Level 1 or warmer with pump set
   Scale up monitoring when time available: arterial line, CVC
   Early access to blood products: packed cells, platelets, FFP likely to be needed

7. 39 weeks BP 155/95 mmHg, protein +, oedema, 95 kg, req. analgesia in labour at 4 cm
   FBE, clotting, U&E, LFT, G&H, uric a., IDC (UO), CTG
Mg\textsuperscript{2+} bolus 4 g over 30 min, 1-2 g/h, 6 h'ly levels
Add hydralazine if still hypertensive after an hour 5 mg bolus, infusion
Aim 120-140/70-90 mmHg
If plt ≥80 and clotting normal, epidural preferred with patient discussion of risks