Principles of Obstetric Anaesthesia

Jan Bilawicz MD Anna Dizner-Golab MD
1st Department of Anaesthesiology and Intensive Care
Medical University of Warsaw

Maternal and Neonatal Physiology

- Physiology of pregnancy
- The Placenta
- The Fetus
- The Neonate

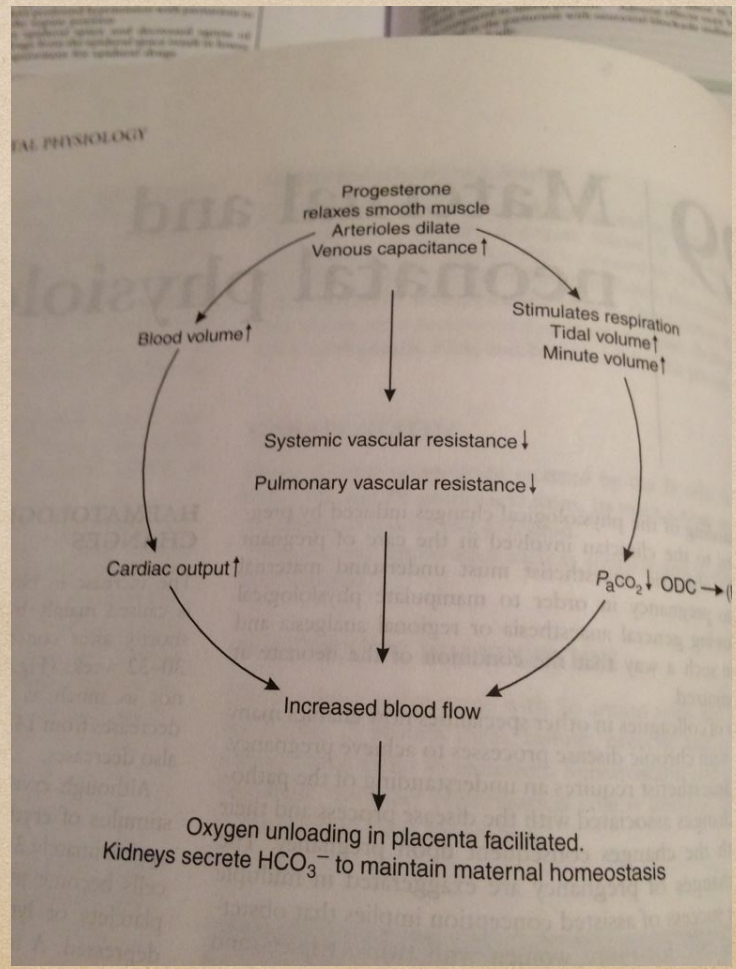
Physiology of Pregnancy

- Pregnancy is a physiological state, in which occurred exact physiological changes including all body organs . These changes help to carry developing fetus and allow for successful delivery of the neonate. The obstetric anaesthesiologist has to know all the differences of parturients' physiology to control the labour and delivery process in such a way ,that allows to provide comfort for parturient and optimise the neonate's condition.

Physiology of Pregnancy

- Progesterone may be considered as the most important physiological substance in pregnancy. Shortly after conception the main secretion of progesterone occurred due to activity of corpus luteum. In latter part of pregnancy placental secretion is dominant. The main physiological role of progesterone is the ability to relax smooth muscles. This mechanism stands behind a wide range of physiological changes during pregnancy.

Summary of the main actions of progesterone



Physiology of Pregnancy

- Haemodynamic & Haematological Changes during Pregnancy
- Respiratory Changes
- Central Nervous System Changes
- Gastrointestinal Changes
- Haemostatic Mechanisms in Pregnancy
- The Epidural and Subarachnoid Spaces / Spinal Cord Anatomy Changes
- Maternal Pharmacokinetics

Haemodynamic & Haematological Changes during Pregnancy

- Hyperdynamic: increased reliance on sympathetic nervous system (more frequent and more severe hypotension after neuraxial blockade)
- Decreased response to vasoactive agents (requirement of higher doses of vasoconstrictive agents to treat hypotension)
- Aortocaval compression (parturients in prone position are more susceptible for profound hypotension)
- Aortocaval compression combined with vasodilatation of azygous vein (less epidural space and decreased requirement for epidural drugs)

C hanges in blood , plasma and red cell volumes and cardiac output during pregnancy

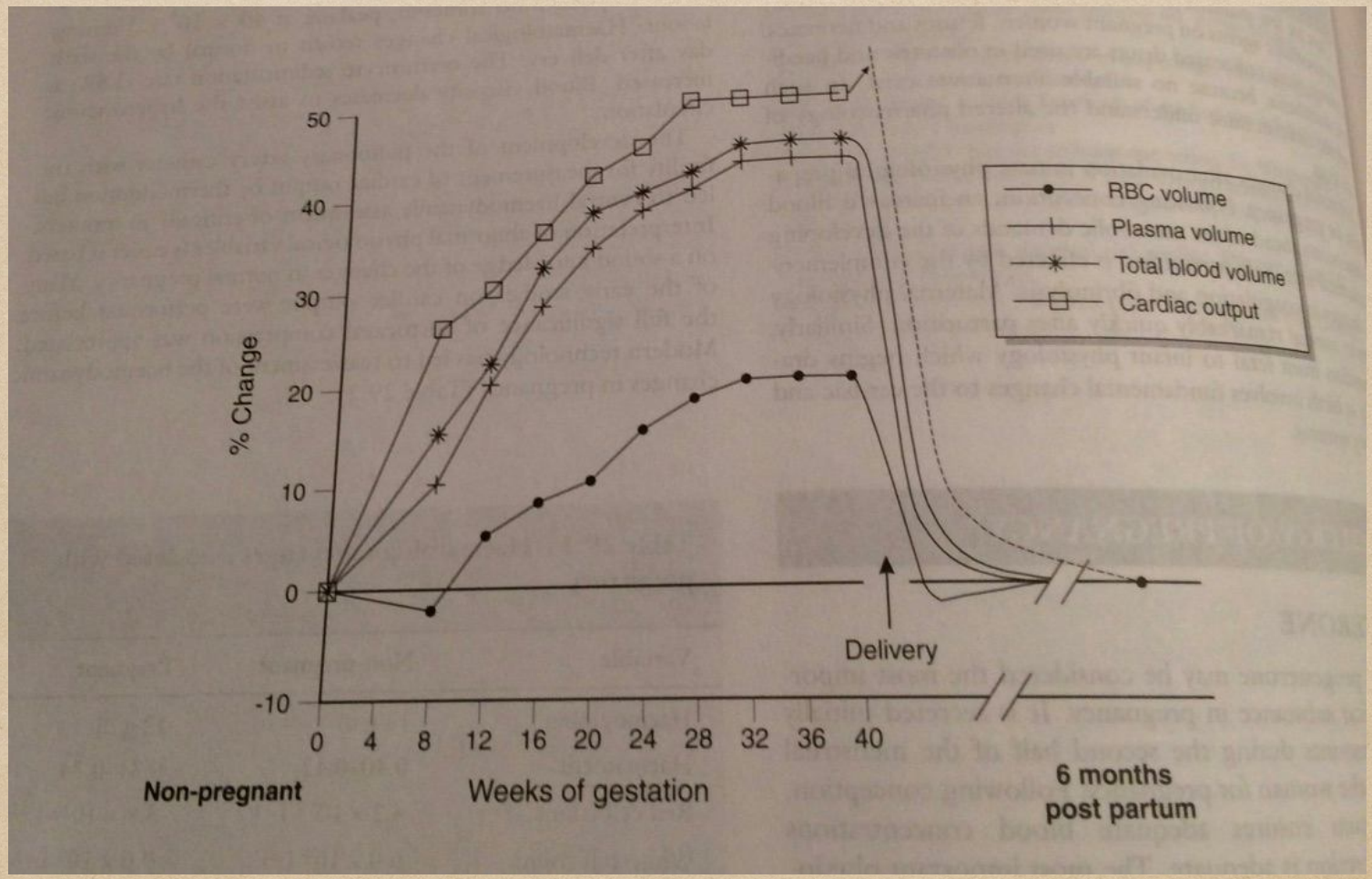
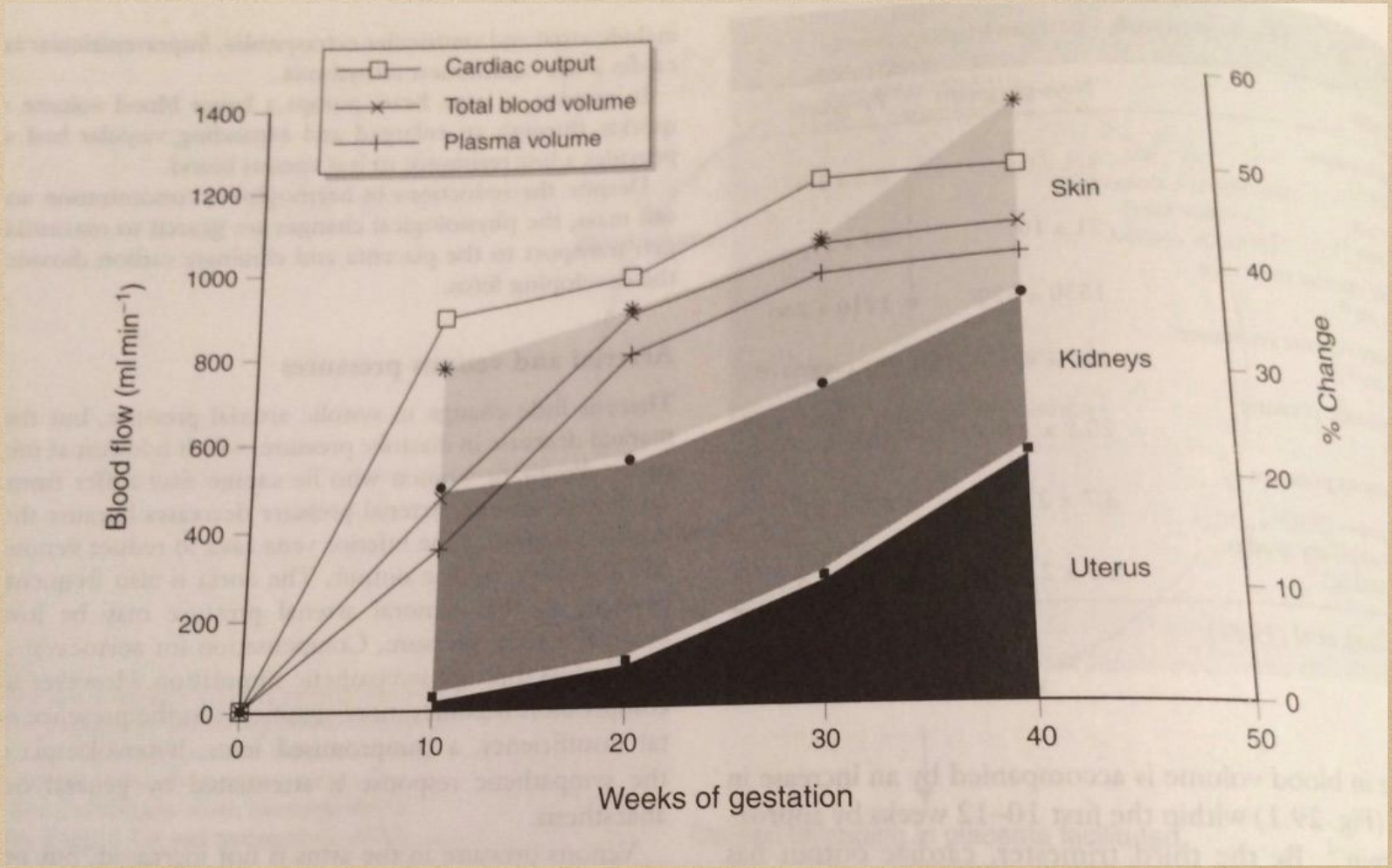


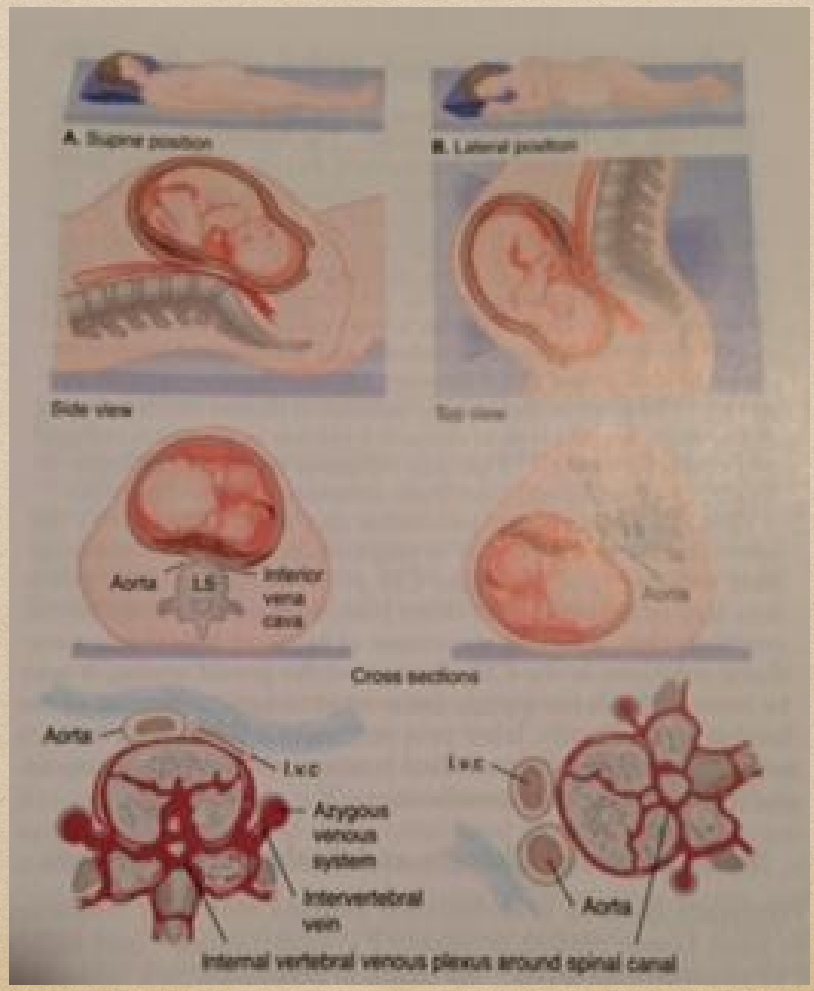
Table 29.1 Haematological changes associated with pregnancy

Variable	Non-pregnant	Pregnant
Haemoglobin	14 g dl^{1}	12 g dl^{1}
Haematocrit	0.40–0.42	0.31–0.34
Red cell count	4.2×10^{12} L^{-1}	3.8×10^{12} L^{-1}
White cell count	6.0×10^{9} L^{-1}	9.0×10^{9} L^{-1}
Erythrocyte sedimentation rate	10	58–68

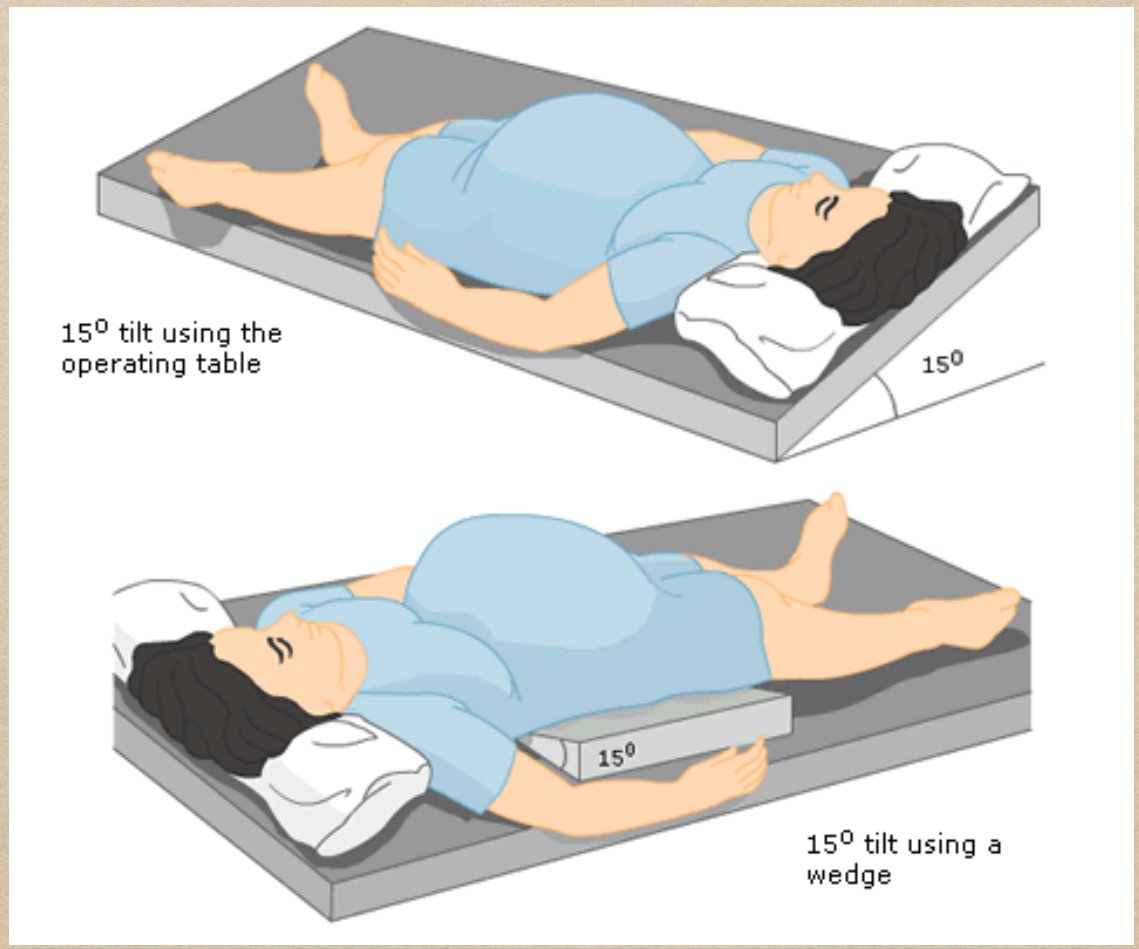
Changing in blood flow to various organs during pregnancy



Aortocaval Compression



Lateral Tilt Position



http://www.e-safe-anaesthesia.org

Haemodynamic & Haematological Changes during Pregnancy

- Due to fall in systemic vascular resistance and blood pressure, blood volume will increase. Estrogens stimulate the renin-angiotensin system, what results in water and sodium retention.
- Increased plasma volume during the first 24 weeks of gestation is approximately 50% larger than preconception value. Between 24-40 weeks' gestation plasma volume stands at 70 ml/kg.

Expanded plasma volume :

- Enhances circulation to the uterus,
- Meets excretory needs of the kidneys,
- Helps to control thermoregulation of elevated metabolism,
- Protects the fetus from improper venous return
- Controls decrease in cardiac output in aortocaval compression syndrome
- Safeguards against blood loss at delivery

Respiratory Changes

- Increase in O_2 requirement and CO_2 production (greater risk of desaturation during induction of general anaesthesia)
- Decrease in Functional Residual Capacity (FRC) (as above)

Table 29.3 Changes in respiratory function in pregnancy

Variable	Non-pregnant	Term pregnancy
Tidal volume ↑	450 ml	650 ml
Respiratory rate	16 min^{-1}	16 min^{-1}
Vital capacity	3200 ml	3200 ml
Inspiratory reserve volume	2050 ml	2050 ml
Expiratory reserve volume ↓	700 ml	500 ml
Functional residual capacity ↓	1600 ml	1300 ml
Residual volume ↓	1000 ml	800 ml
P_aO_2 slight ↑	11.3 kPa	12.3 kPa
P_aCO_2 ↓	4.7–5.3 kPa	4 kPa
pH slightly ↑	7.40	7.44

P_aO_2, arterial oxygen tension; P_aCO_2, arterial carbon dioxide tension.

Spinal Cord Anatomy Changes

- Increased lumbar lordosis and decreased thoracic kyphosis (decreased size of lumbar interspinous space and altered movement of anaesthetic agents within CSF)
- Rotation of pelvis (Tuffier's line - intercristal line is more cephalad)
- Widening of pelvis (Spine more "head-down" in lateral position)

Central Nervous System Changes / The Epidural and Subarachnoid Spaces

- Increased susceptibility to all anaesthetics (decrease in anaesthetics dose requirements)
- Increased progesterone levels (increased pain threshold)
- Decrease in Cerebro Spinal Fluid (CSF) volume (decrease in local anaesthetic dose requirements)
- Decrease in CSF specific gravity (altered baricity of spinal anaesthetic solutions)
- Increase in CSF pH (changes of proportions of un-ionized drug)
- Reduced excitability of nervous system due to high levels of progesterone results in antinociceptive effect

Gastrointestinal Changes

- Effect of progesterone on smooth muscles
- Reduction in lower oesophageal sphincter pressure (an increase in intragastric pressure and and a decrease in gastrooesophageal angle) greater in multiple pregnancy, in morbid obesity and hydramnios
- Slower gastric emptying
- Increase of gastric acids , pancreas and small intestine enzymes in second and third trimester
- Improper emptying of gallbladder may predispose to gallstones occurrence in pregnancy
- Liver enzyme increase activity, decrease of albumin concentration

Haemostatic Mechanisms in Pregnancy

- Vasoconstriction
- Platelet activation
- Activation of clotting cascade
- Increased level of fibrinogen
- Decrease of plasma fibrinolytic activity

Table 29.4 Coagulation changes in late pregnancy

Fibrinogen increased from 2.5 (non-pregnant value) to 4.6–6.0 g L^{-1}
Factor II slightly increased
Factor V slightly increased
Factor VII increased 10-fold
Factor VIII increased – twice non-pregnant state
Factor IX increased
Factor X increased
Factor XI decreased 60–70%
Factor XII increased 30–40%
Factor XIII decreased 40–50%
Antithrombin IIIa decreased slightly
Plasminogen activator reduced
Plasminogen inhibitor increased
Fibrinogen-stabilizing factor falls gradually to 50% of non-pregnant value

Maternal Pharmacokinetics

- There are observed prominent changes in pharmacokinetics of drugs during pregnancy. This phenomenon is dependent on physiological changes occurred during pregnancy.

Pharmacokinetics of drugs depends on :

- a plasma volume increase,
- total body water volume increase,
- haematocrit decrease,
- protein concentration and protein binding changes,
- increase of cardiac output and redistribution of regional blood flow

Principles of Drug Administration During Pregnancy and Lactation

TABLE 56.6

PRINCIPLES OF DRUG ADMINISTRATION DURING PREGNANCY AND LACTATION

Pregnancy
- Assess risk versus benefit
- Consider gestational age of fetus
- Use older drugs
- Use the minimum effective dose
- Avoid drugs with active metabolites
- Consider nerve blocks
- Consider nonpharmacologic therapies
- Use ultrasound and MRI for imaging

Lactation
- Assess risk versus benefit
- Choose the safest drug
- Use minimum effective dose
- Use drugs with no active metabolite
- If drug may present risk to neonate, measure neonatal drug concentration
- Give maternal dose just after feeding
- Consider age of infant (maturity of metabolic pathways)

Drug Classification During Pregnancy and Lactation

- The United States Food and Drug Administration (FDA) introduced 5 category pregnancy drug classification in 1979 - A, B, C, D, and X. The categories were determined by assessing the reliability go documentation and the risk to benefit ratio.
- The classification has some major limitations
- Due to ethical aspects there are not many human studies of fatal harm. Animal studies not precisely correlates with them. Teratogenicity seems to be markedly species specific.
- In 2015 FDA proposed Improved Benefit -Risk Information (Pregnancy, Lactation and reproductive Potential: Labeling for Human Prescription Drug and Biological Products - Content and Format - Guidance to industry) fda.gov
- The pregnancy letter categories (A B C D X) will be replaced by the narrative risk summary based on available data

Neonate- effects of drugs

- Effects of drugs on the neonate (opioids - respiratory depression, sudden bradycardia of fetes - even after intrathecal dosing ; intravenous anaesthetics can predispose to neonatal depression in high doses for thiopental is the dose of 8mg/kg - in doses of 4mg/kg there is no significant effect; propofol highly protein bound, neutral and lipophilic, crossing placenta but in low doses between 2-3mg/kg is safe.
- Important note: The most important thing during surgical delivery in general anaesthesia is TIME passes between IV drug administration and Umbilical Cord Clamping. This period of time determines the general state of neonates and their APGAR scores

T he Placenta

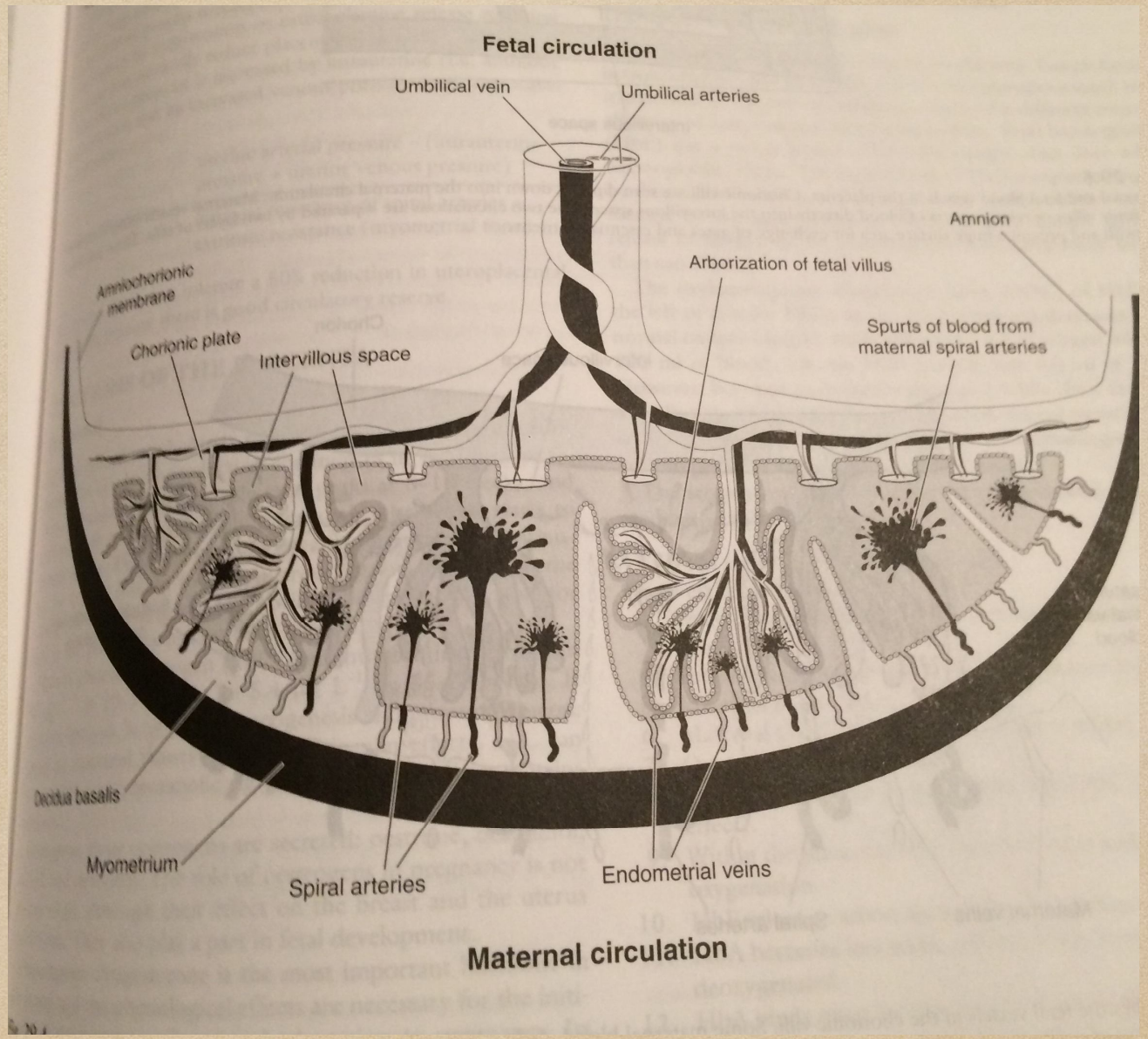
- A natomy of Placenta
- Placental B lood F low
- F unctions of the Placenta

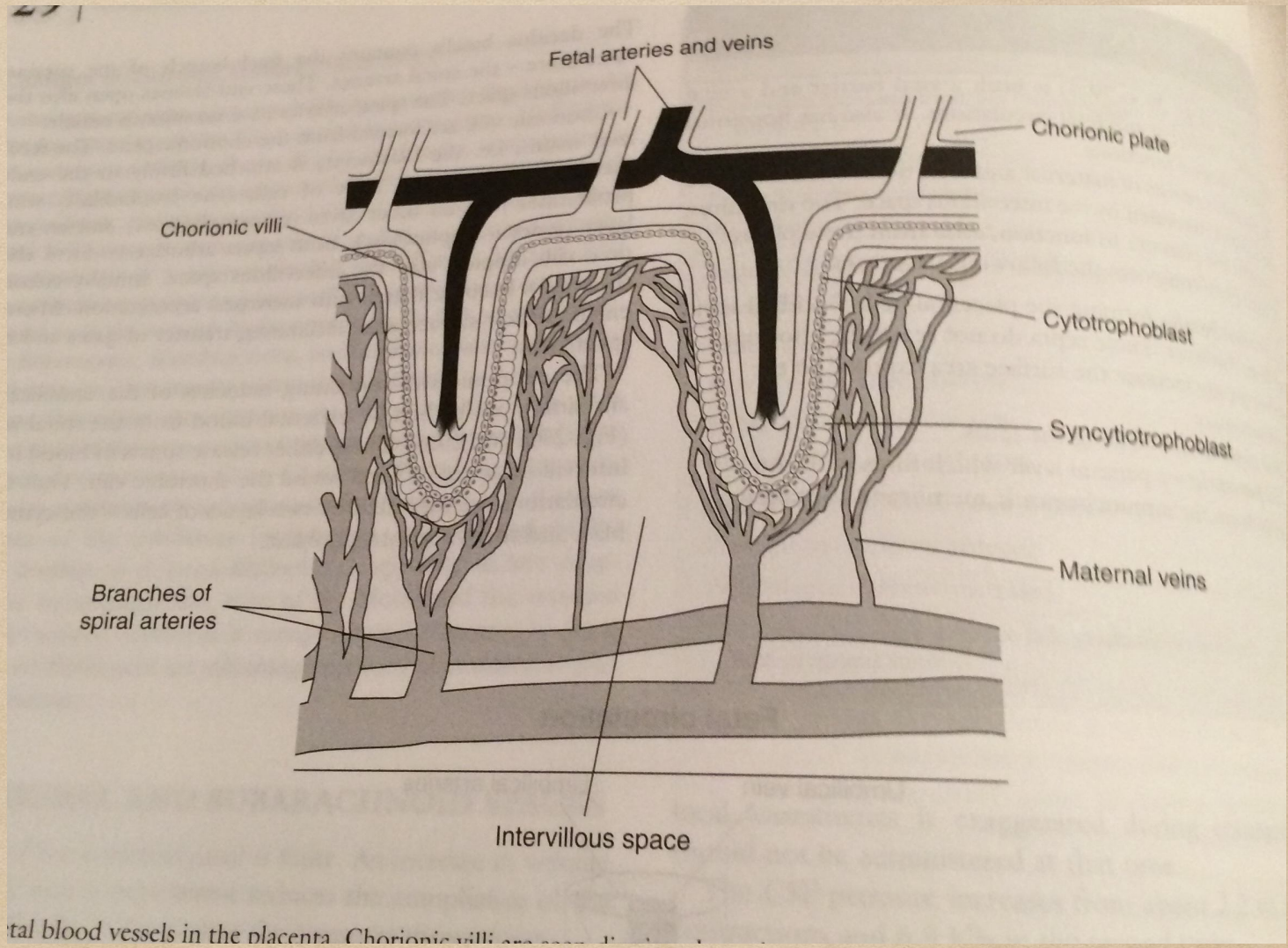
Anatomy of Placenta

- Placenta is the vital barrier and the vital link between maternal and fetal circulation
- Placenta consists from maternal and fetal tissue - the basal and chorionic plates separated by intervillous space

- T he basal plate is consisted from following structures:
- D ecidua basalis forming placental bed (containing final branch of the uterine vasculature - the spiral arteries)
- D ecidua capsularis overlying the fetus
- D ecidua parietalis - a parietal layer which fuses with the amnion to form the amniochorioric membrane containingg liquor

- Chorionic villi which dipping into the intevillous space are formed from chorionic plate. The chorionic villi contain branches of the umbilical vein and artery and are bathed by maternal blood from spiral arteries
- The two circulation system are separated by two layers of cells - the cytotrophoblast and the syncytiotrophoblast


Fetal circulation
Umbilical vein
Umbilical arteries
Amnion
Arborization of fetal villus
Amniochorionic membrane
Chorionic plate
Intervillous space
Spurts of blood from maternal spiral arteries
Decidua basalis
Myometrium
Spiral arteries
Endometrial veins
Maternal circulation



tal blood vessels in the placenta. Chorionic villi

Placental Blood Flow

Functions of the Placenta

- Hormonal (secretion of hCG -human chorionic gonadotropine, human placenta lactogen - hPL - increase lipolysis, inhibits gluconeogenesis, prevents glucose uptake to maternal tissues =antiinsulin effect, -oestrogens : oestrone, oestradiol,oestriol,oestetrol, -progestogens:progesterone; alkaline phosphatase; cystine amipetidase),
- Immunological (modification of both maternal and fetal immune system - physiological immunosuppression performed as reduction of activity of cell answer by decreased activity of CD 4 (helper)and CD8 lymphocyte cytotoxic; trophoblast is immunological barrier between maternal i fetal immune systems; there is observed increase activity of neutrophils ; IgG is passed trough placenta and confers passive immunity to the fetus)

Functions of the Placenta

- Transport of gases through the placenta (the most important function, takes place in intervillous space,fetal blood gives up CO_2, become more alkaline, FETAL OXYHEMOGLOBIN DISSOCIATION CURVE SHIFTS TO THE LEFT-increase oxygenn affinity-feral CO_2 diffuse across to maternal blood- decrease of pH of maternal blood maternal ODC shifts to right (Bohr effect)-facilitated oxygenn release- oxygen is taken to left shifted fatal ODC (double Bohr effect) _ fetalFHb more acidic after oxygenation- HbF release CO_2 (Haldane effect) HbA (less acidic and become deoxygenated afterwards binds mor CO_2 (double Haldane) - CO_2 enters maternal cells- HCO_3- is formed and exchanged for chloride (reverse Hamburger phenomenon-fetomternal gradient maintained-maternal blood with carbonic anhydrase -higher carbon dioxide binding power

Functions of the Placenta

- Transport of drugs through the placenta:
- Passive diffusion - lipophilic agents (concentration gradient) - flow-dependent transfer
- Channel transfer - hydrophilic molecules

The Fetus

Fetal Circulation

- Oxygenated blood in umbilical vein divides into two branches passing through the ductus venous and the portal sinus. The ductus venous enter IVC (inferior vena cava), bypassing the liver. The blood is divided in two streams at the level of right atrium: main stream enters the left atrium via foramen ovale, next to the left ventricle and aorta to main organs as brain, head, heart. The smaller stream blood is mixing with the blood from VCS (vena cava superior) and enters to right ventricle. Right ventricle is dominant - ejects 66% of combined ventricular output. Blood from RV is passed through pulmonary artery. Resistance of pulmonaryry artery Is so high that the blood is shunted to aorta via ductus arteries. Mixed both saturated and desaturated blood supplies lower part of fetal body and enters umbilicial arteries

The Fetal Lung

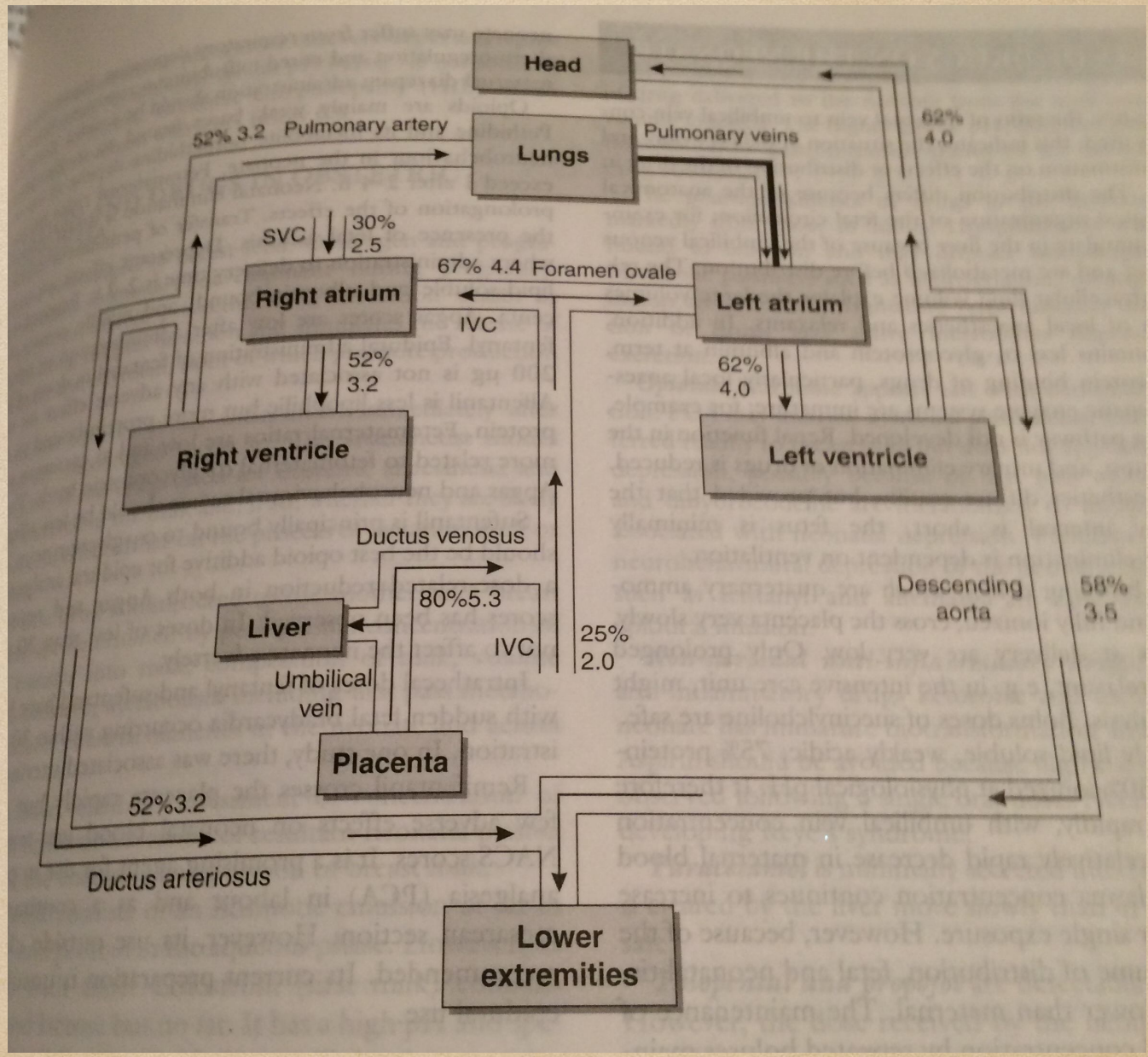
- Pulmonary circulation is high pressure, low-flow circuit
- Blood volume in fetal pulmonary circulation is very small
- In fetal lungs is higher vasomotor response than in adult ones
- High resistance in fatal pulmonary circulation is base on the action of large arteriolar muscle mass
- Pulmonary blood flow of fetes is less sensitive for neurotransmitters and endocrine stimulation

T he first breath and changes in circulation 1

- S queezing the chest of the foetus during delivery
- Recoil of the chest occurred with lungs expansion against the surface tension force (increasing F R C in few minutes to value of 3 / 4)
- T he first gasps of neonate generates negative intrapleural pressure between -25 up to -50 torrs.
- L ungs expands - pulmonary resistance lowering dramatically and occurred vasodilatation off pulmonary capillaries and post-alveolar vessels.

T he first breath and changes in circulation 2

- Right A rtrial Pressure (R A P) decreases below L A P (functional closure of F O - foramen ovale)
- A fter clamping of umbilical cord systemic vascular resistance occurred - increased L A P
- F oramen ovale closing results in blood from vena cava entering the pulmonary circulation
- Rapid increase in pulmonaryy blood flow results in lowering pulmonary vascular resistance
- B lood flow via ductus arterious (D A) is gradually decreased, simultaneous increase of Pa O 2 leads to closure of the D A


Head
52% 3.2 Pulmonary artery
Lungs
Pulmonary veins
62%
4.0
SVC
30%
2.5
67% 4.4 Foramen ovale
Right atrium
Left atrium
IVC
52%
3.2
62%
4.0
Right ventricle
Left ventricle
Ductus venosus
Descending
aorta
58%
3.5
80%5.3
Liver
IVC
25%
2.0
Umbilical
vein
Placenta
52%3.2
Ductus arteriosus
Lower
extremities

Obstetric anaesthesia and analgesia

O bstetric anaesthesia and analgesia

O bstetric anaesthesia and analgesia is defined as a care perform in woman during childbirth in tree clinical situation:

1. Provision of analgesia for labour (epidural , spinal, combined spinal-epidural analgesic technique)
2. Instrumental labour anaesthesia (forceps / Ventouse labour (general - T IV A anaesthesia, regional anaesthesia techniques / /. C esarean delivery - spinal / cse / epidural anaesthesia as a first choice method of C S anaesthesia; general anaesthesia of cesarean section in special cases
3. C are of critically ill parturient

Anatomy and Physiology of Pregnancy

- Pain Pathways in Labour and Cesarean Section
- Anatomy of The Epidural Space
- Anatomy and Physiology of The Airway in Pregnancy

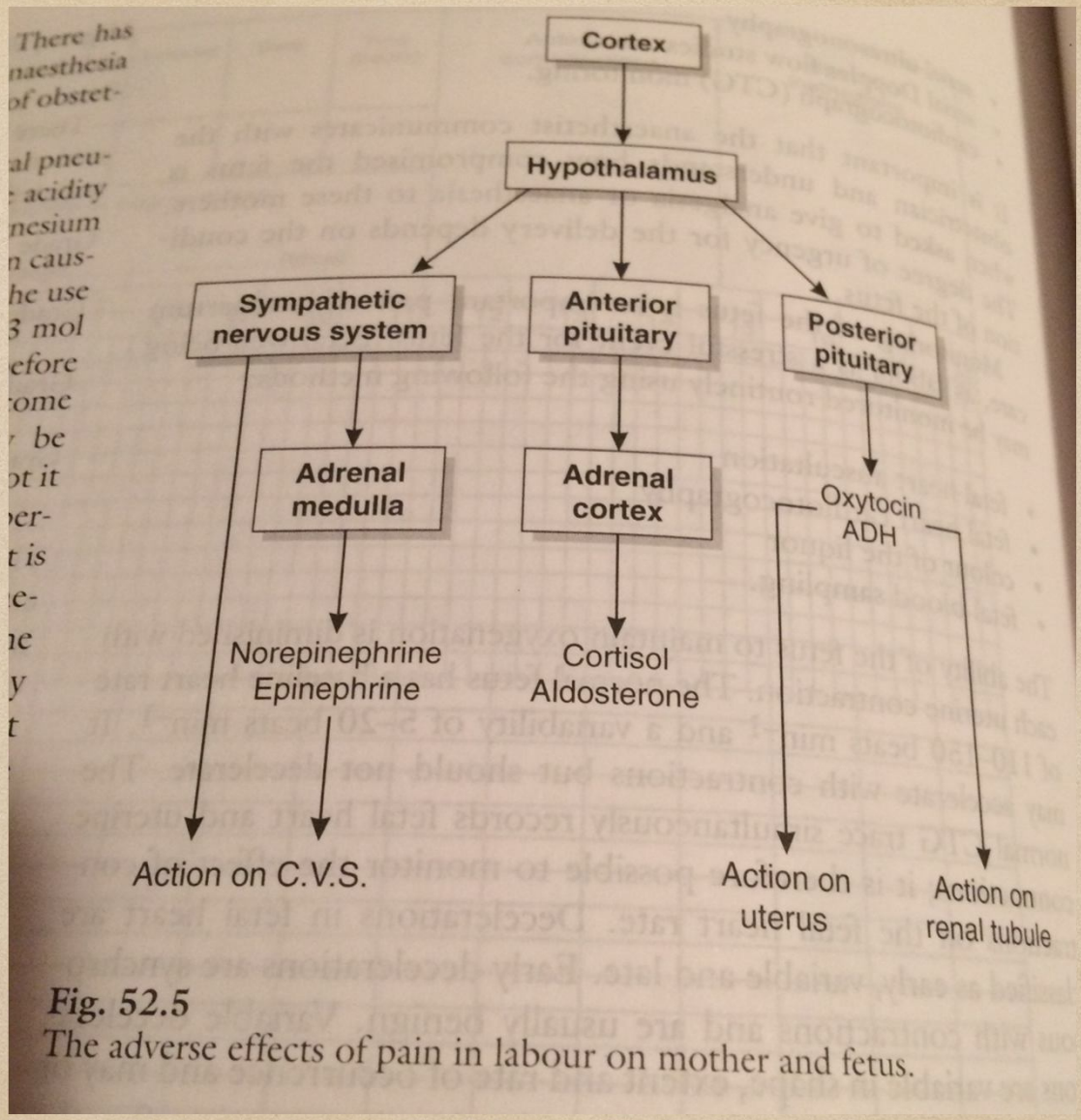


Fig. 52.5
The adverse effects of pain in labour on mother and fetus.

Pain Pathways in Labour and Cesarean Section

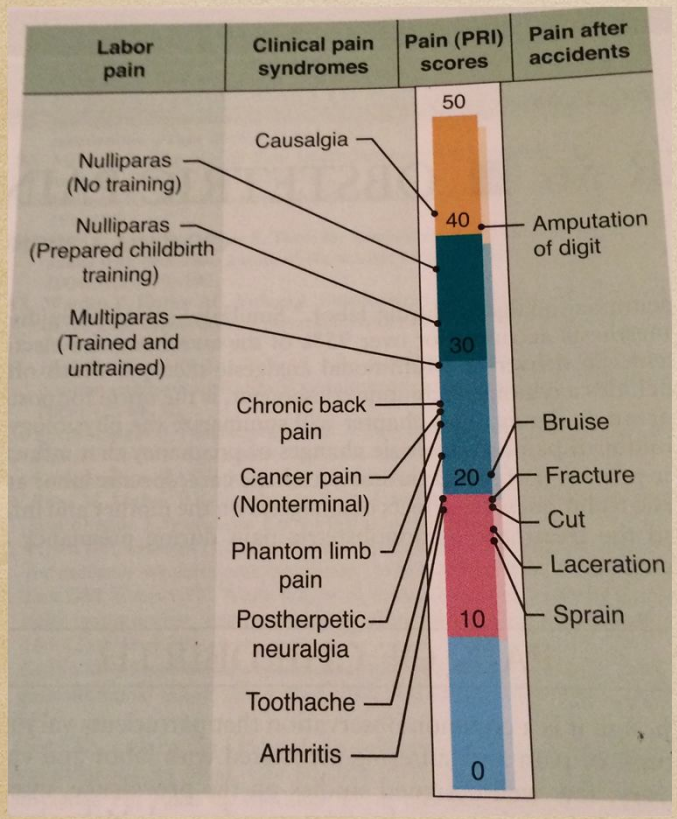
- In common observation pain of childbirth should be considered individually. In different parturients pain sensation vary prominently
- Significantly pain sensations differs especially between the population of nulliparas and parous women
- Labour pain scores assessment using NRS or VAS scale was situated at the higher levels of scales (typically for NRS scale between 8-10 points)
- Labour pain was compared with painful sensations typical for cancer, phantom limb pain or postherpetic neuralgia
- Usually parturients describe pain as mild up to excruciating

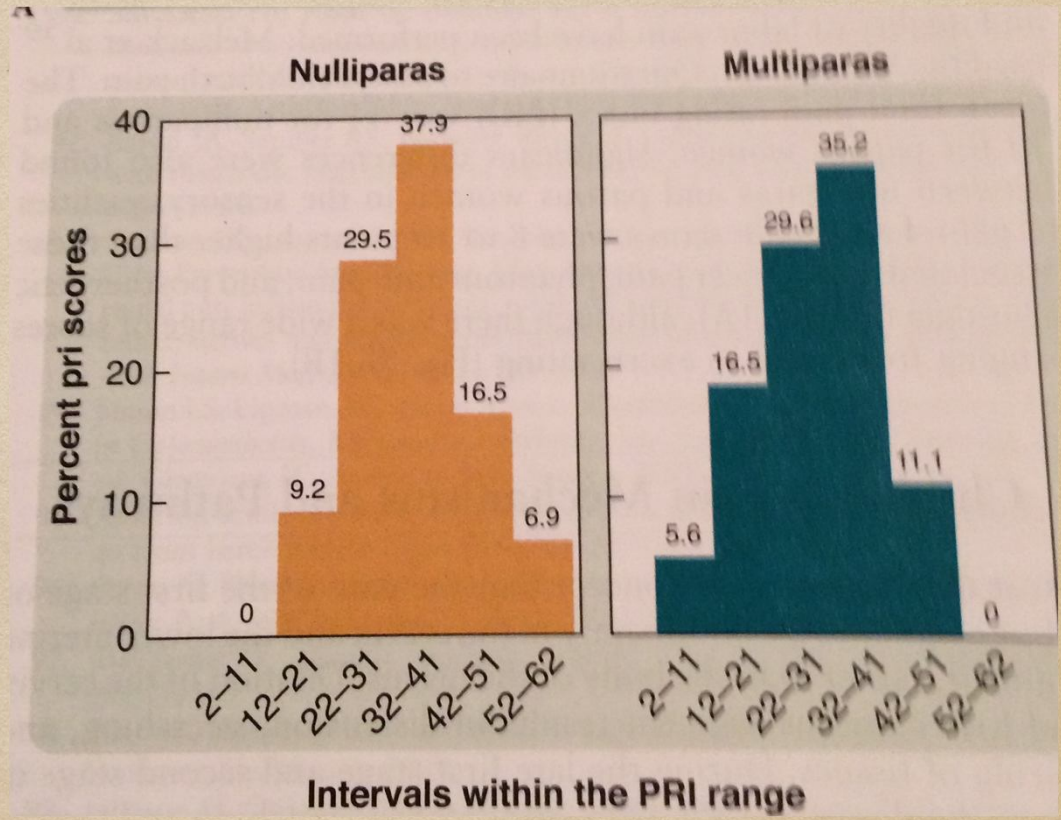
Childbirth Pain mechanisms and Pathways

- Pain of the first stage of labour derived from cervix and lower uterine segments areas. Usually results in distention, stretching and tearing of the tissues. The cervix is innervated by fibres derived from levels of TH10-TH11. Visceral sensory afferents are mainly responsible for sensation of this type of pain. Accordingly to Bonica's observations, these visceral sensory afferents acompany to sympathetic efferents of uterine and cervical plexus, inferior, middle and superior hypogastric plexuses and aortic plexuses. By rami communicates on the level Th10-L1 afferent fibres achieving the spinal segments. Finally they pass through dorsal roots of these nerves and make synaptic contact of the interneurons of dorsal horn.
- During late first stage and second stage of labour lowering descent of fetus and distention and tearing of vaginal and perineal tissues become additional source of pain. Second stage pain from descent of fetus in the birth canal is primarily somatic in nature. This pain is transmitted through sacral nerves afferents to level of S2-S4.

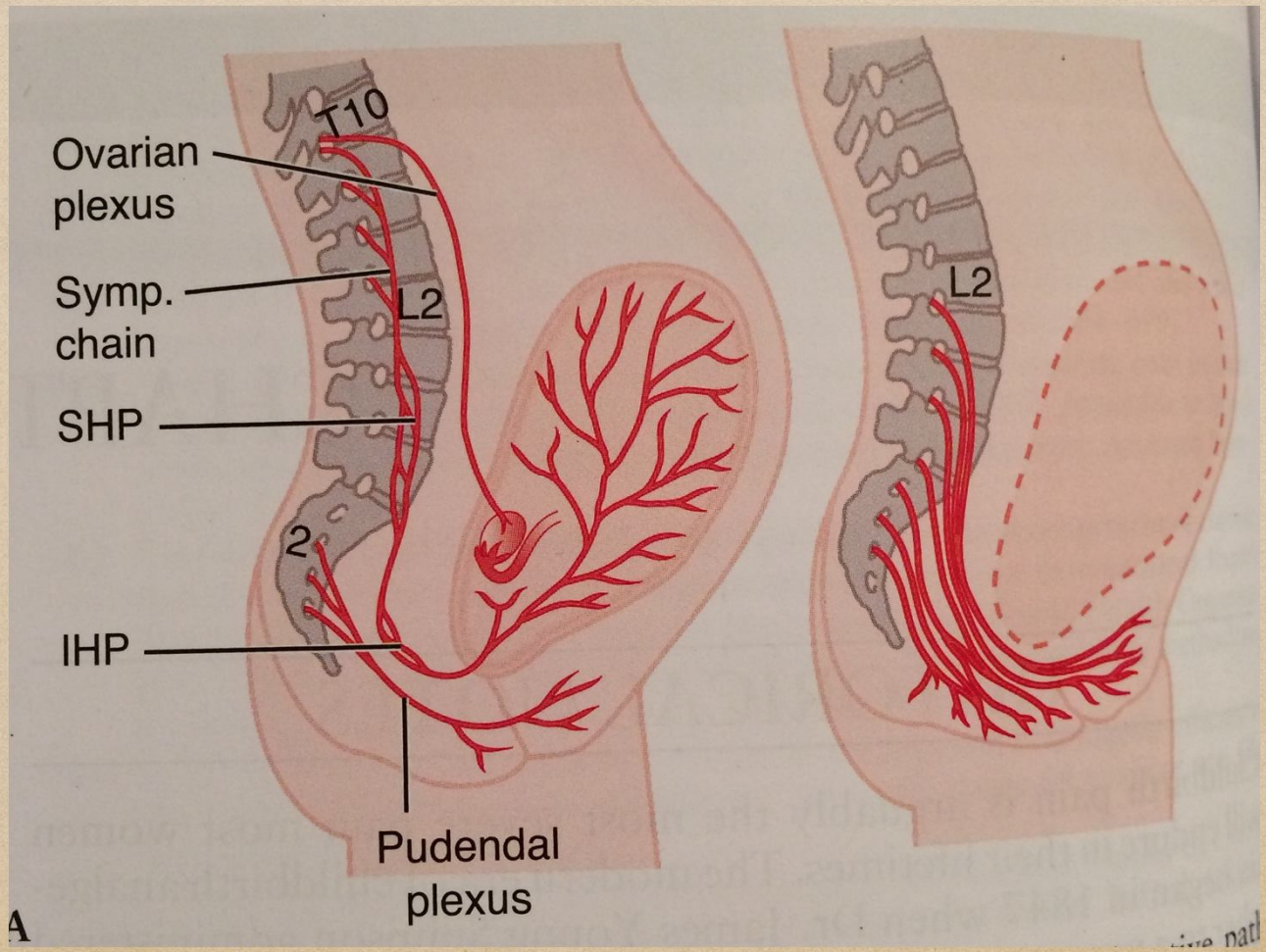
A. Comparison of pain scores using the McGill Pain Questionnaire

B. Distributioin of PRI scores (Pain Rating Index)

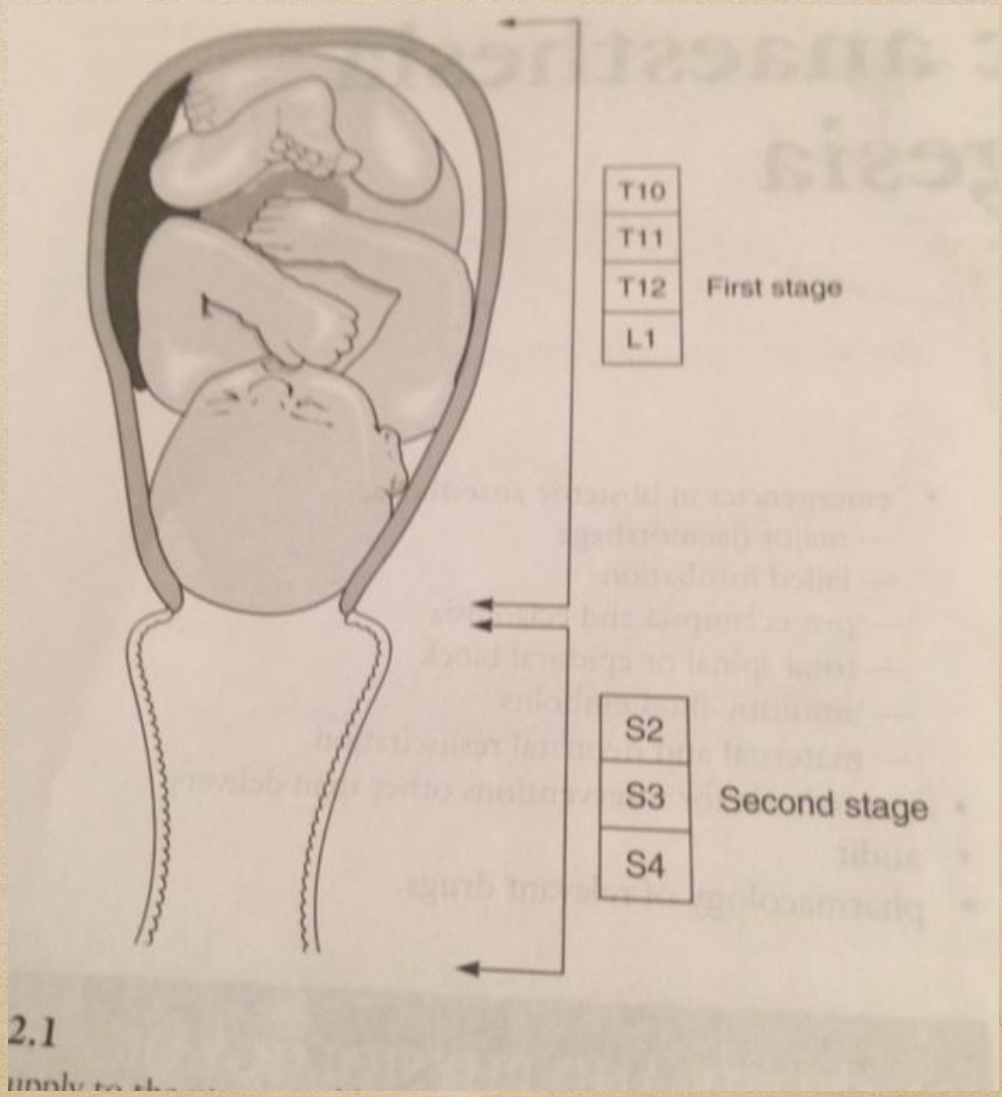




Peripheral nociception pathways of labour pain



Nerve supply to the uterus and birth canal



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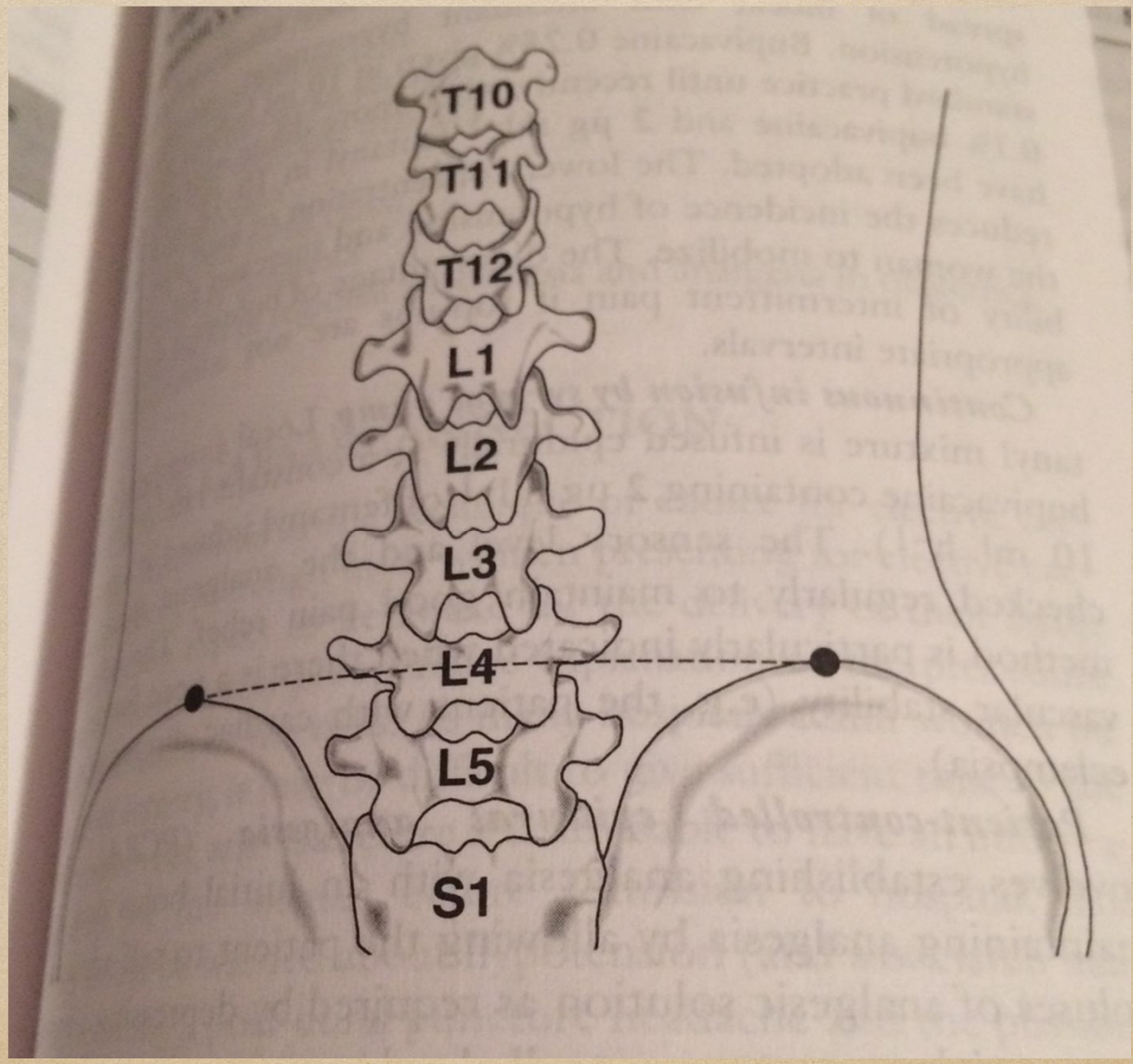
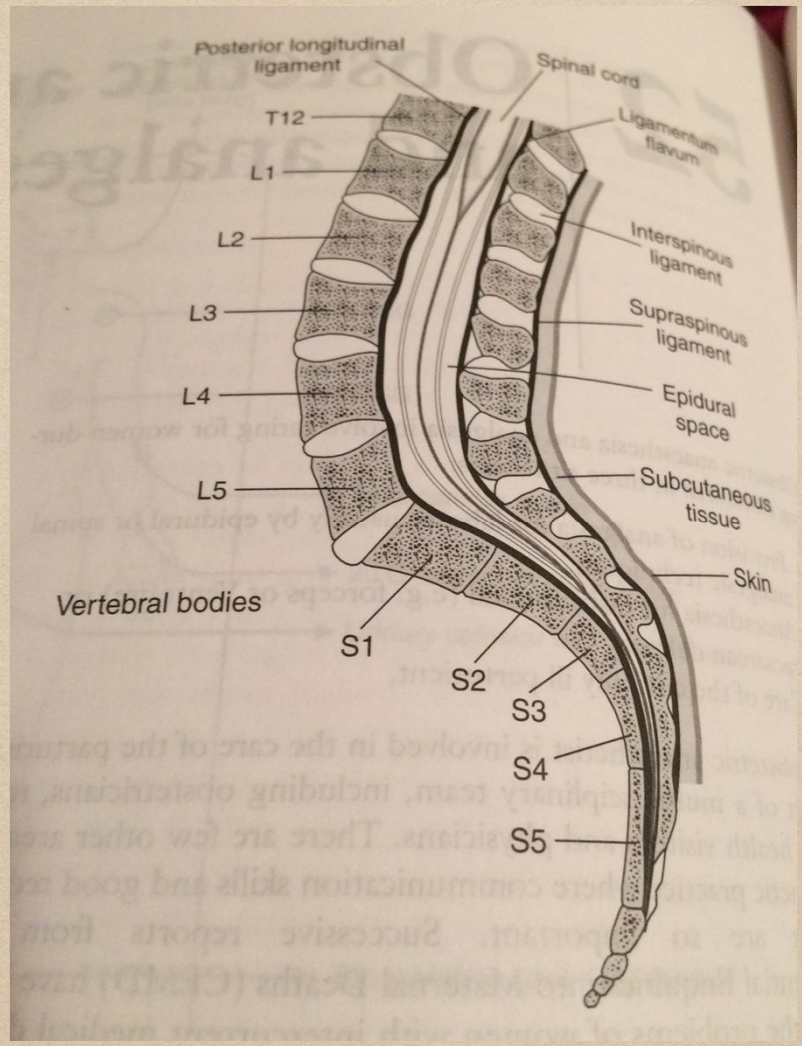
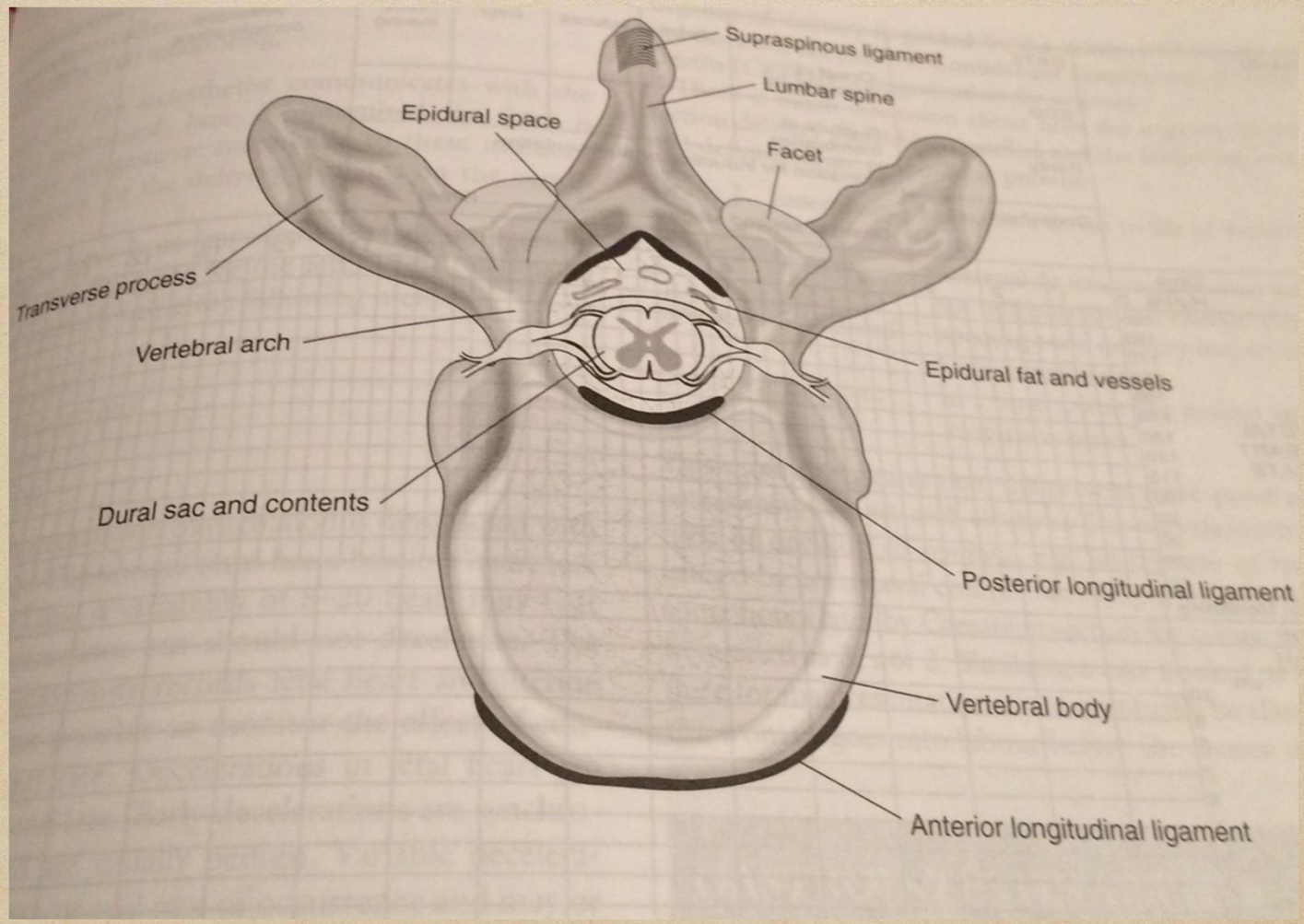
Anatomy of The Epidural Space


T10
T11
T12
L1
L2
L3
L4
L5
S1


Posterior longitudinal ligament
Spinal cord
T12
Ligamentum flavum
L1
L2
Interspinous ligament
L3
Supraspinous ligament
L4
Epidural space
L5
Subcutaneous tissue
Skin
Vertebral bodies
S1
S2
S3
S4
S5


Supraspinous ligament
Lumbar spine
Epidural space
Facet
Transverse process
Vertebral arch
Epidural fat and vessels
Dural sac and contents
Posterior longitudinal ligament
Vertebral body
Anterior longitudinal ligament

Anatomy and Physiology of The Airway in Pregnancy

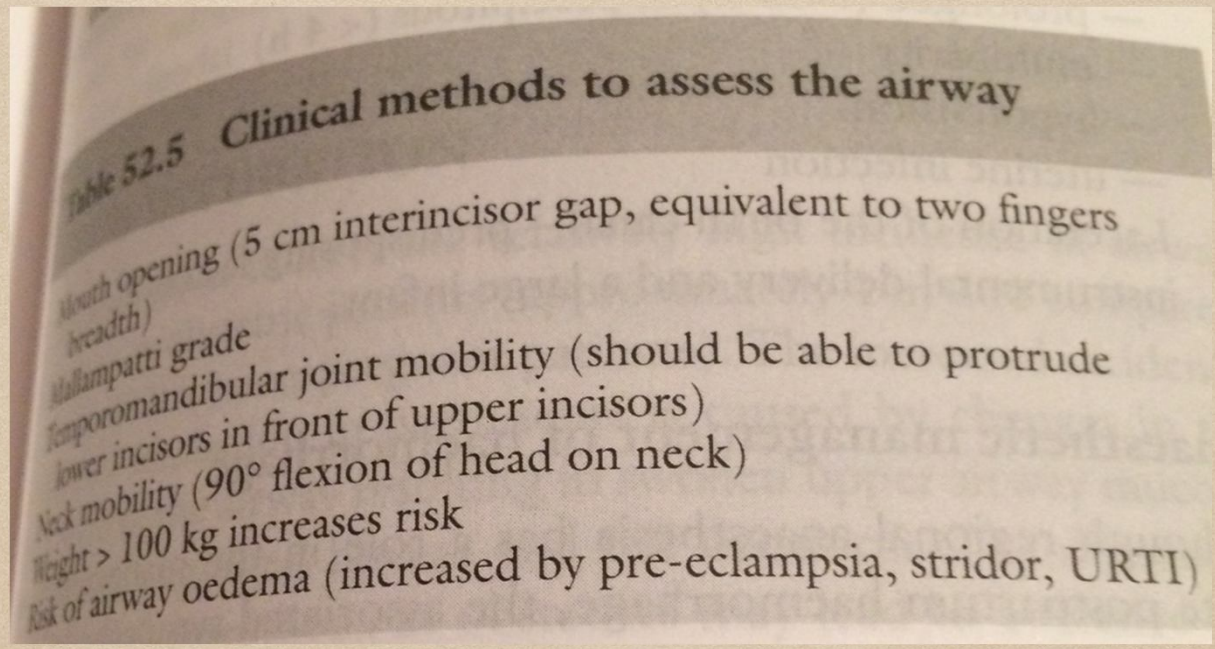


Table 52.5 Clinical methods to assess the airway

Mouth opening (5 cm interincisor gap, equivalent to two fingers breadth)
Mallampatti grade
Temporomandibular joint mobility (should be able to protrude lower incisors in front of upper incisors)
Neck mobility (90° flexion of head on neck)
Weight > 100 kg increases risk
Risk of airway oedema (increased by pre-eclampsia, stridor, URTI)

lemon airway assessment

lemon airway assessment

- Looks externally (facial trauma, large incisors, large Tonge, mucous oedema -parturients!)
- Evaluate (3-3-2 rule: interincisor distance 3fingers, hyoid-mental distance 3fingers thyroid-hyoid distance 2fingers) + size of breast in parturients !
- Mallampati score
- Obstruction (presence of any condition as epiglottis, peritonsilar abscess, trauma) + mucous oedema in parturients
- Neck mobility (limited neck mobility)

Basics Obstetrics

- Normal Labour
- Fetal Monitoring

Gastrointestinal Physiology and Antacid Therapy

- Witholding oral feeding during labour, fluid therapy if necessary but are recommendation for modest one to avoid overload with fluids and decrease the concentration of endogenic or exogenic oxytocin
- Preference of regional anaesthesia
- Alkalinization and emptying of stomach contents before general anaesthesia
- Sellick Manoeuvre (Cricoid pressure) - technique during endotracheal intubation to reduce risk of regurgitation
- Adequate equipment
- Anaesthetist to remain with the patient until return of laryngeal reflexes lemon airway assessment

Every parturient should be treated as the patient with full stomach

Pain and Pain Relief in Labour

- Regional analgesia (epidural, subarachnoid - spinal, cse)
- Parenteral (systemic) analgesia _farmacotherapy _ pethidinemorphine diamorphine PCA NCA
- Inhalational analgesia (Entonox - mixture of N_2O - nitrous oxide / O_2 oxygen
- Non-pharmacological analgesia (birth preparation classes, TENS - transcutaneous electrical nerve stimulation, hypnosis, Acupuncture)

Epidural and Subarachnoid Analgesia of Labour

Table 52.3 Comparison of sitting and lateral positions for performing spinal or epidural procedures

Sitting	Lying (left lateral)
Advantages	
Midline easier to identify in obese women	Can be left unattended without risk of fainting
Obese patients may find this position more comfortable	No orthostatic hypotension
	Utero-placental blood flow not reduced (particularly important in the stressed fetus)
Disadvantages	
Uteroplacental blood flow decreased	May be more difficult to find the midline in obese patient
Orthostatic hypotension may occur	
Increased risk of orthostatic hypotension if Entonox and pethidine have been administered	
Patient sitting on edge of bed may be too far away from a small anaesthetist for good manual dexterity	
Assistant (or partner) needed to support patient	

Table 52.4 Comparison of air and saline for loss-of-resistance technique

Saline	Air
Advantages	
May give a better end point for loss of resistance	If fluid appears during insertion it can be assumed to be CSF until proved otherwise
May push the dura away from the point of the needle, thus reducing the chances of dural puncture	No filter is required
	No dilutional effect; the small amount of air used does not usually distort the tissues
	No possibility of confusion with other substances
Disadvantages	
May be confused with CSF	More difficult to define the point of loss of resistance with air than with saline
Must be filtered to avoid introduction of minute glass particles	
Dilutes the local anaesthetic which is put into the epidural space	
Another ampoule is opened, thus providing a possibility for user error	
Preservative-free saline must be used	

Regional Anaesthesia for The Parturients

- Elective Cesarean Section
- Emergency Cesarean Secrtion
- Forceps and Ventouse Delivery
- Retained Placenta
- Trauma to the Birth Canal
- Post-Delivery Analgesia

Indication of Regional Anaesthesia in Obstetrics

- Labour analgesia
- Elective cesarean delivery
- Forceps and Ventouse Delivery
- Emergency cesarean section (not in every cases)
- Retained placenta (manual removal)
- Trauma to the birth canal
- Post delivery analgesia

Indication of Regional Anaesthesia in Obstetrics - Labour

Table 52.2 Indications for epidural analgesia

- Maternal request
- Occipitoposterior presentation
- Pregnancy-induced hypertension or pre-eclampsia
- Prematurity or IUGR
- Intrauterine death
- Induction or oxytocin augmentation of labour
- Instrumental or caesarean delivery likely
- Previous caesarean delivery
- Presence of significant concurrent disease (e.g. heart disease, diabetes, hypertension)
- Twin pregnancy

Contraindication of Regional Anaesthesia in Obstetrics

- Maternal refusal
- Allergy for Local Anaesthetics
- Bleeding disorders: coagulopaties, thrombocytopenia (below 100M/ml platelets) DIC, HELLP syndrome
- Septic changes in lumbar area
- Systemic sepsis
- Aortic stenosis

Complications of regional Anaesthesia and Analgesia in Obstetrics

- Shearing of epidural catheter
- Postdural puncture headache (PDPH)
- Backache
- Epidural Haematoma
- Epidural Abscess / Meningitis
- Systemic Toxic reaction
- Hypotension
- Neurological deficit
- Arachnoiditis

Management of PDPH

- Bed rest is still recommended, although it is worthless in terms of reducing leak of CSF.
- Infusion of epidural normal saline 60 ml before the epidural catheter is removed may reduce the incidence of PDPH by 20%, as may infusion, under gravity, of normal saline for 12–24 h postpartum.
- Give i.v. and oral fluids to prevent dehydration.
- Give simple analgesics, e.g. paracetamol, 500 mg 4-hourly.
- Caffeine 0.5% infusion may produce cerebral vasoconstriction.
- Antidiuretic hormone may also relieve symptoms by an unknown mechanism.
- Blood patch – a sample of the patient's own venous blood is collected under aseptic conditions and injected into the same or an adjacent epidural space to seal the CSF leak. It is 90% effective. It is not usually recommended as a first-line treatment because it carries complications such as infection, arachnoiditis and potential problems with subsequent epidurals.

General Anaesthesia for the Parturient

- Epidemiology / History
- Cesarean Section General Anaesthesia
  - ✍ ▪ Preparation
  - Technique

Preparation for C S

Table 52.6 Equipment that should be available for general anaesthesia in a maternity unit

Two Macintosh laryngoscopes (one standard, one long blade)
Short-handled Macintosh laryngoscope (or 'Polio-blade' laryngoscope)
McCoy laryngoscope
Gum elastic bougie
Wide selection of tracheal tubes
Selection of oral and nasal airways
Laryngeal mask airway size 3
Percutaneous cricothyroidotomy kit

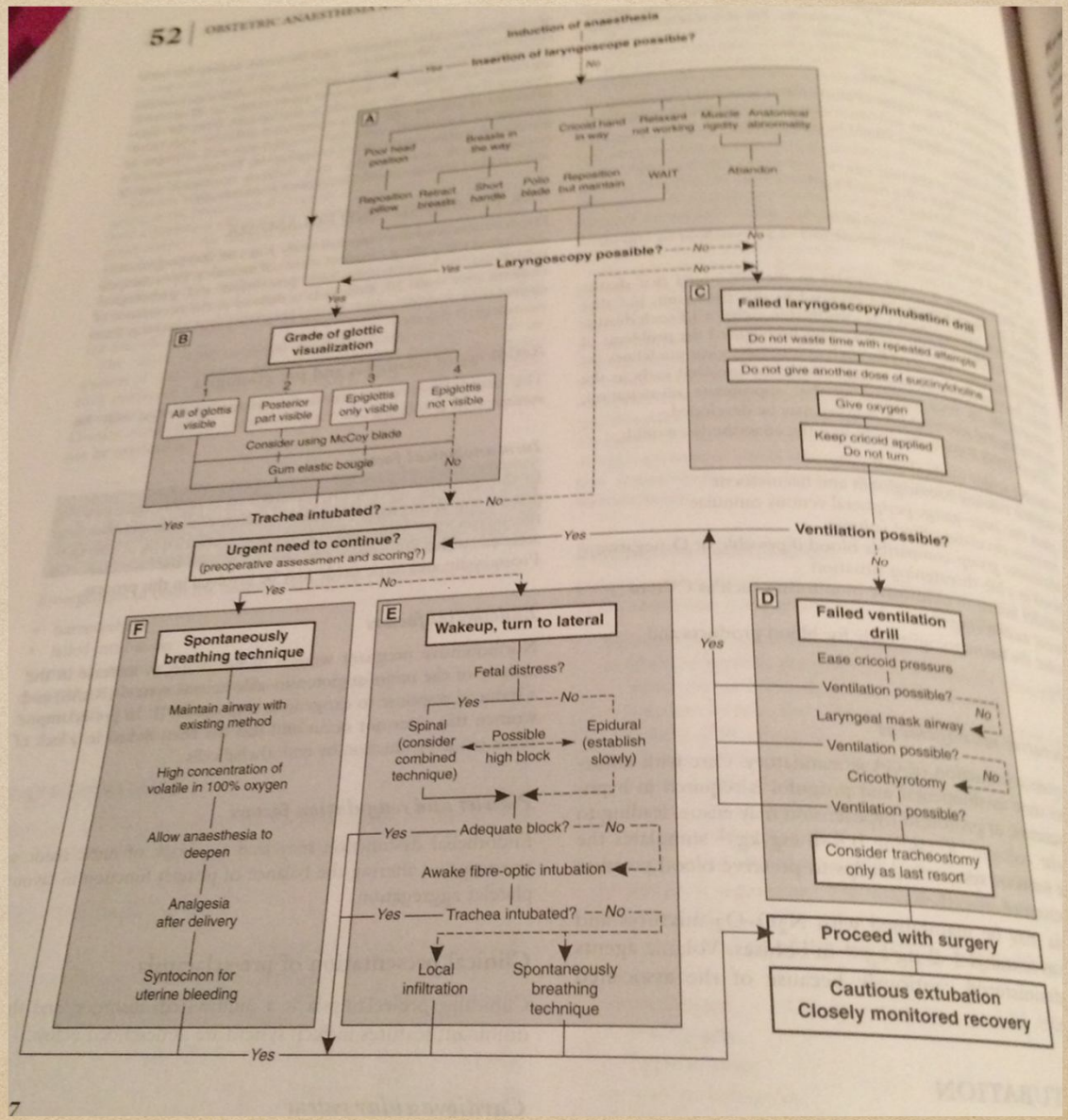
Preparation for C S

- Checking the equipment (anaesthesia machine test, sucking equipment)
- pre-anaesthetic check on the patient - attention AIRWAY / Gastric Contents
- Assistant is ready
- Well position of patient, (Aortocaval Compression, position for tracheal intubation)
- 16 gauge cannula IV (500ml of crystalloid - normal saline, ringer lactate)
- Checking of routine monitoring (HR NBP pulsoximetry ETCO2!!!) Vital Signs measurement
- Preoxygenation obligatory ! 3 minutes of 100% oxygen via mask or in emergency 3 deep breaths of 100% oxygen
- Cricoid pressure (Sellick manoeuvre) can be apply by assistant
- Commence the anaesthetic using a rapid sequence induction

Assessment of the Pregnant Woman before Anaesthesia & Analgesia

Emergencies in Obstetric Anaesthesia

- Haemorrhage
- Failed Intubation
- Pre-Eclampsia & Eclampsia, HELLP syndrome
- Total Spinal / Epidural Block
- Amniotic Fluid Embolism ☠; DIC syndrome -disseminated intravascular coagulation syndrome
- Maternal & Neonatal Resuscitation


Induction of anaesthesia
Insertion of laryngoscope possible?
Yes
No
A
Poor head position
Breasts in the way
Crycoid hard in way
Relaxant not working
Muscle rigidity
Anatomical abnormality
Reposition pillow
Retract breasts
Short handle
Polio blade
Reposition but maintain
WAIT
Abandon
Laryngoscopy possible?
Yes
No
B
Grade of glottic visualization
1
2
3
4
All of glottis visible
Posterior part visible
Epiglottis only visible
Epiglottis not visible
Consider using McCoy blade
Gum elastic bougie
Trachea intubated?
C
Failed laryngoscopy/intubation drill
Do not waste time with repeated attempts
Do not give another dose of suxamethonium
Give oxygen
Keep cricoid applied
Do not turn
Ventilation possible?
Urgent need to continue?
(preoperative assessment and scoring?)
D
Failed ventilation drill
Ease cricoid pressure
Ventilation possible?
Laryngeal mask airway
Cricothyrotomy
Consider tracheostomy only as last resort
E
Wakeup, turn to lateral
Fetal distress?
Spinal (consider combined technique)
Possible high block
Epidural (establish slowly)
Adequate block?
Awake fibre-optic intubation
Trachea intubated?
Local infiltration
Spontaneously breathing technique
F
Spontaneously breathing technique
Maintain airway with existing method
High concentration of volatile in 100% oxygen
Allow anaesthesia to deepen
Analgesia after delivery
Syntocinon for uterine bleeding
Proceed with surgery
Cautious extubation
Closely monitored recovery

Anaesthesia for Interventions Other than Delivery

- Extraction of Retained Products of Conception (ERPC)
- Cervical Circlage
- The Pregnant Patient with a Surgical (Non-Obstetric) Emergency

Pharmacology of Relevant Drugs

- Syntocinon (Oxytocin)
- Ergometrine
- Syntometrine
- Prostaglandins
- Carboprost
- Ritodrine

References

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- 2. Clinical Anesthesia Procedures of the Massachusetts General Hospital Sixth Edition 2002
- 3. Bonica's Management of Pain Fourth Edition 2010
- 4. Mark c. Norris M.D. Handbook of Obstetric Anesthesia 2000