Introduction to Obstetric Anesthesia

Dr A Alberts

Department of Anesthesiology and Critical Care
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INTRODUCTION

During obstetric anesthesia the anesthetist controls the following:

- **Maternal**
  - Gas exchange, perfusion of vital organs and metabolism
  - Pain perception and reflexes
  - Skeletal muscle tone
  - Consciousness or unconsciousness

- **Fetal**
  - Gas exchange, perfusion of vital organs, metabolism

- **Uterine**
  - Myometrial tone

AND IS RESPONSIBLE FOR .....
the maintenance of

- Maternal
  - Physiology
  - Safety
  - Comfort
- Fetal
  - Physiology
- Surgical
  - Surgical conditions

This is the aim of the obstetric anesthetist
Risks involved

- Physician Insurers Association of America (PIAA)
  - Malpractice claims against anesthetists
  - Most frequent conditions for which claims were made
    - Pregnancy and birth
- American Society of Anesthetists (ASA)
  - Obstetric vs. non-O malpractice claims
  - C/S risk double that of any other procedure
Risks involved

Medical Insurance Cover
Obstetricians in Private Practice

R76 130 (2006)

(MPS)
“It will be necessary to ascertain anesthesia’s precise effect, both upon the action of the uterus and on the assistant abdominal muscles; its influence, if any, upon the child; whether it has a tendency to hemorrhage or other complications.”

Scottish obstetrician James Simpson after administering ether to a woman to treat the pain of childbirth

1847
“If we could induce local anesthesia without the absence of consciousness, which occurs in general anesthesia, many would see it as a still greater improvement.”

Sir James Young after the first maternal death due to anesthesia in England 1848
WHAT’S DIFFERENT?

Why the increased risk?

* TWO IN ONE
* INTRA-OPERATIVE AWARENESS
* PHYSIOLOGY / PHARMACOLOGY !
* ECG CHANGES
* ASSOCIATED PATHOLOGY
  * PRE-ECLAMPSIA – ECLAMPSIA
  * HELLP – SYNDROME
  * ANTEPARTUM HEMORRHAGE
  * RHEUMATIC HEART DISEASE
Q VADIS
What does the anesthetist need, firstly himself to survive, and secondly have mother and child survive too

• **KNOWLEDGE**
  - NORMAL Vs ALTERED PHYSIOLOGY
  - NORMAL Vs ALTERED PHARMACOLOGY

• **SKILLS**
  - VASCULAR ACCESS
  - AIRWAY MANAGEMENT
  - REGIONAL ANESTHESIA
  - RESUSCITATION

i.e. A COMPETENT CLINICIAN!
Altered Physiology

1. Hematological
2. Cardiovascular
3. Respiratory
4. Gastro-intestinal
5. Etc
1 Hematological

Obstetric blood loss

- Normal PV delivery
  - 600ml
- Normal PV delivery of twins
  - 1000ml
- Caesarian section
  - 1000ml

Substantial blood loss is to be expected in the obstetric patient!
1 Hematological

※ ↑ mineralocorticoid activity
   - Na⁺ retention, ↑ body H₂O content
※ ↑ PV 50% and ↑ TBV 40%
   - Hb ↓ 10-11 gm%
   - S-ChE activity ↓ 20%
   - S-Protein ↓ < 6 gm/dl

↑ Free fraction of protein-bound drugs
2 Cardiovascular

- ↓ SVR
  - Estrogens, progesterones
  - Initiated by prostacyclin
- ↑ HR 25%
- ↑ CO 50%

Aorta-caval compression, result ⇒ supine hypotensive syndrome
Lateral angiogram from two supine subjects

Non-pregnant

Pregnant
SHS
Paleness
Hypotension
Sweating
Tachycardia
Reflex bradycardia
Nausea

Max effect
36-38 weeks
SHS
Paleness
Hypotension
Sweating
Tachycardia
Reflex bradycardia
Nausea

Max effect
36-38 weeks
SHS
- management -

* POSITION  →  LATERAL
* IV VOLUME  →  >1000 ML RL
* VASOPRESSORS  →  EPHEDRINE
3 Respiratory

- ALVEOLAR VENTILATION
  - \(\uparrow 70\% \text{ (term)}\)
    - Tidal volume \(\uparrow 40\%\)
    - Respiratory rate \(\uparrow 15\%\)

- STATIC LUNGVOLUMES

- UPPER AIRWAY
The rate at which term patients change from pink to blue is breathtakingly fast.
4 Gastro-intestinal

- Large uterus
  - ↑ IAP
  - ↑ IGP
- ↑ Gastrin secretion
  - ↑ volume of gastric secretions
  - ↓ pH of gastric secretions
- ↓ Gastric emptying
  - ↓ secretion of motilin
  - pain, anxiety and opioids
  - ↑ secretion of progesterone (↓ smooth muscle tone)
- LES
  - ↓ tone
  - altered angle

Recipe for disaster i.e. ASPIRATION
Risk aspiration
Predicted mortality rates (%) after aspiration. Each shaded area represents the mortality rate interval predicted for a specific pH and volume of solution aspirated.
Prevention of aspiration

<table>
<thead>
<tr>
<th>Prevention Method</th>
<th>Prevention Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVOID GENERAL ANESTHESIA</td>
<td>SPINAL / EPIDURAL</td>
</tr>
<tr>
<td>NPO</td>
<td>FLUID</td>
</tr>
<tr>
<td>PRO-KINETICS</td>
<td>METOCLOPRAMIDE</td>
</tr>
<tr>
<td>ANTI-ACIDS</td>
<td>NON PARTICULATE</td>
</tr>
<tr>
<td></td>
<td>Na CITRATE, PNEUCID</td>
</tr>
<tr>
<td>SELLICK MANEUvre</td>
<td>CRICOID PRESSURE</td>
</tr>
</tbody>
</table>
Prevention of aspiration
- Sellick maneuver or cricoid pressure -

All(!) patients from 12 weeks gestation.
Altered pharmacology

- ↓ MAC for inhalational agents
  - From 8-12 weeks gestation
  - Due to ↑ progesterone levels

- ↓ dose of LA
  - Epidural venous engorgement
  - ↑ sensitivity of nerves, ? progesterone
Regression lines for dose of epidural solution and age in nonpregnant women at term. The gravida obviously requires much less drug.
WHAT’S ON OFFER?

a. STANDBY (“no interference”)
b. O₂, N₂O, OPIATES
c. GENERAL ANESTHETICS
   - USA; babies of 23% of pregnant women delivered by C/S (2005)
d. REGIONAL ANESTHETICS
   - EPIDURAL (CAUDAL)
   - SPINAL
   - COMBINED SPINAL-EPIDURAL
   - CONTINUOUS SPINAL
   - PATIENT CONTROLLED EPIDURAL ANALGESIA
c. General anesthetics

↓↓ incidence / popularity

● Risks involved
  – Failure to intubate
  – Aspiration

● Experience of childbirth
  – Bonding
  – Presence of father
Probably a difficult intubation!
Motto of many an obstetric unit

“Where possible, avoid general anesthesia”
d. REGIONAL ANESTHESIA

Potential advantages (c-section)

* INABILITY TO INTUBATE
* EARLY BONDING
* POSTOP PAIN / MOBILIZATION
* “positive experience in childbirth”
Regional anesthesia

I. Which drugs to use?

II. Which nerves to block?
I. Amide Na⁺-channel blockers

- Lignocaine
- Bupivacaine  
  Macaine
- Ropivacaine  
  Naropin
- L-Bupivacaine  
  Chirocaine

- with/without opiates/epinephrine -
II. Anatomy

- Early labor
  - T11 - T12
- Progressing cervical dilatation
  - T10 - L1
- Second stage
  - S2 – 4
  - distention of vaginal vault and perineum
PDPH

- Bilateral; frontal, occipital or both
  - May involve neck and upper shoulders
- Develops < 7 days following LP
  - Generally < 48 hours
  - > 3 days in 25% of cases
- Disappears < 14 days following LP
- Worsens < 15 min assuming upright position
- Improves < 30 min assuming recumbent position
PDPH

Proposed mechanisms

- Traction on pain sensitive intracranial structures
  - 150ml CSF: 75ml spinally / 75ml supra –
  - Volunteers: removal of 10% of CSF = headache

- Cerebral venous dilatation
  - “compensatory” intracranial hyperaemia
  - More evidence than first mechanism
1. Technique
   a. Direction of bevel (Quincke type needle)
      Parallel with longitudinal fibers of dura

2. Choice of needle
   a. Size (smaller is safer)
      Not larger than 26G
   b. Design
      Pencil-point tip, i.e. not to cut fibers
PDPH - management

- Conservative measures
  - Bed rest
  - Analgesics
  - Hydration (caffeine)
- Epidural saline
- Epidural blood patch (EBP)
SUMMARY
Role of anesthetist during C/S

Attending primarily to the mother, and by doing so, assuring the best possible outcome for the baby

- in a cramped space shared by at least seven demanding people -
SUMMARY

REALISE AND RECOGNISE ALTERED
– PHYSIOLOGY
– ANATOMY
– PHARMACOLOGY

COMMUNICATE WITH OBSTETRICIAN

CAN BE REWARDING!
THANK YOU!