Obesity and Obstetric Anaesthesia

KSS CT2 Study Day
22\textsuperscript{nd} November 2012

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Obesity and Obstetric Anaesthesia:

- Definitions/Incidence
- Maternal Effects of Obesity
- Fetal Effects of Obesity
- Effects on Labour/Delivery/Complications
- UKOSS Study on BMI > 50
- CMACE/RCOG Recommendations
- Regional Anaesthesia
- General Anaesthesia
- Summary
Obesity Classification:

<table>
<thead>
<tr>
<th>WHO</th>
<th>BMI</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>18.5 20 24.9</td>
<td></td>
</tr>
<tr>
<td>Pre-Obese</td>
<td>25.0 to 29.9</td>
<td>(overweight)</td>
</tr>
<tr>
<td>Obese Class I</td>
<td>30.0 to 34.9</td>
<td>(obese)</td>
</tr>
<tr>
<td>Obese Class II</td>
<td>35.0 to 39.9</td>
<td>(obese)</td>
</tr>
<tr>
<td>Obese Class III</td>
<td>above 40</td>
<td>(severe or morbid obesity)</td>
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Surgical literature sometimes uses different classification
e.g. extreme obesity = BMI > 50
UK has 4th highest incidence of obesity in OECD countries (Scotland even worse)

? no national figure for incidence in pregnant females

Individual units have published change in incidence:

Cardiff            3% in 1990      9% in 1999
Middlesborough    10% in 1990      16% in 2004
Glasgow            9% in 1990      19% in 2004
Maternal Physiology (if obese):

- FRC reduced if obese (but pregnancy may improve this)
- Increased pulmonary shunt
- $O_2$ consumption & $CO_2$ production
- Desaturate faster
- Increased CO (but quoted figures not plausible)
- Increased BP, PAP, CVP
- LV hypertrophy and dilatation
- Arrhythmias more common
- OSA more common (but preg improves OSA)
Fetal Effects of Maternal Obesity:

• Increased risk of prematurity and stillbirth
• Increased risks of macrosomia, child becoming obese and having metabolic defects
• Increased risk of neural tube defects and cardiac defects
• risk of failing to see anatomical abnormalities on antenatal ultrasound scans
Effects on Pregnancy and Labour:

Increased risks of:

- Pre-eclampsia
- Gestational Diabetes
- Pre-term delivery
- Shoulder dystocia (see later)
- Instrumental Delivery (RR = 1.2 in one review)
- Caesarean Section (RR = 2.0 – one meta analysis)
- Postpartum Haemorrhage
- DVT/PE
- Post Delivery/CS complications – infection, wound dehiscence, delayed discharge etc.
UKOSS Study of Extreme Obesity  2007-2008

Prospective study of all mothers in UK with extreme obesity (BMI > 50), over one year, with comparison cohort

665 mothers. Incidence = 1/1000

Obese mothers were:
• older, lower SEC
• more pre-existing medical conditions
• higher parity
• previous CS more likely
**Medical Problems/Outcome of Labour:**

<table>
<thead>
<tr>
<th></th>
<th>BMI &gt; 50</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-eclampsia</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>Gest DM</td>
<td>11%</td>
<td>2%</td>
</tr>
<tr>
<td>No labour</td>
<td>33%</td>
<td>15%</td>
</tr>
<tr>
<td>Caesarean Section</td>
<td>50%</td>
<td>22%</td>
</tr>
<tr>
<td>(½ elective, ½ emergency in the morbidly obese)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Partum Haem</td>
<td>12%</td>
<td>2%</td>
</tr>
</tbody>
</table>

No increase in shoulder dystocia (but high elective CS rate)

Pre-term delivery and perinatal mortality **not sig increased**

? DVT incidence not documented
Anaesthesia:

<table>
<thead>
<tr>
<th></th>
<th>BMI &gt; 50</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seen by anaesthetist</td>
<td>72%</td>
<td>11%</td>
</tr>
<tr>
<td>Epidural difficult/failed</td>
<td>17%</td>
<td>5%</td>
</tr>
<tr>
<td>Spinal difficult/failed</td>
<td>12%</td>
<td>2%</td>
</tr>
<tr>
<td>CSE difficult/failed</td>
<td>5%</td>
<td>0% (smaller numbers)</td>
</tr>
<tr>
<td>GA for delivery</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>ICU admission</td>
<td>3%</td>
<td>1% !</td>
</tr>
</tbody>
</table>

No deaths!
Also:

Complications of Labour/Delivery were not higher in those planning vaginal delivery rather than planned CS

Thus planning elective CS in the morbidly obese not justified
Obesity and Maternal Mortality

- CEMACH 2003 – 2005: 52% of women dying were overweight or obese. Of 6 direct deaths due to anaesthesia 4 were obese, 2 morbidly (No airway problems)

- CEMACE 2006-2008: 49% of women who died from were overweight or obese. Of 7 direct anaesthetic deaths 2 women were obese (1 failed intubation, 1 trache dislodged)

- Therefore 45% of direct anaesthetic deaths were in obese parturients
CMACE/RCOG Joint Guideline

Management of Women with Obesity in Pregnancy

March 2010
CMACE/RCOG Joint Guideline 2010 (1)

• Pregnant women with a booking BMI > 40 should have an antenatal consultation with an obstetric anaesthetist, so that potential difficulties with venous access, regional or general anaesthesia can be identified. Anaesthetic management plan for labour and delivery should be in notes

• Obstetrician and anaesthetist at ST6 or above, or with equivalent experience, should be informed and be available during labour and delivery
CMACE/RCOG Joint Guideline 2010 (2)

• Inform duty anaesthetist if mother with BMI > 40 admitted

• Consider timing of epidural, especially if BMI > 40

• Insert i.v. cannula early

• If BMI > 35 should deliver in consultant led unit (risk of shoulder dystocia and PPH)
CMACE/RCOG Joint Guideline 2010 (3)

Thromboprophylaxis Guidance:

If BMI > 30 + 2 additional risk factors, consider LMWH for all of pregnancy & for 6/52 postnatally

- Up to 90kg  40mg enoxaparin/day
- 91-130kg  60mg
- 131-170kg  80mg
- > 170kg  0.6mg/kg

If BMI > 40 , LMWH for 1/52 postnatally
If BMI > 30 + any risk factors, ditto
Epidurals & Spinals – Practical Tips (1)

Some relationship between BMI and depth of epidural space

Despite many advantages of using lateral position, most recommend sitting position for the very obese – easier to identify midline

Epidural space closer to skin if sitting?

? Tilt table towards anaesthetist
Epidurals & Spinals – Practical Tips (2)

Many publications have said very rare for epidural space to be > 8cm from skin
i.e. use normal length needle initially
May need to tent skin in, remove flanges

Easier to identify tissue planes with an epidural needle – many recommend using epidural needle as a guide for spinal needle

Can leave needles in marking spinous processes
Epidurals & Spinals – Practical Tips (3)

Identifying precise interspace unrealistic (without U/S) – can record “mid-lumbar”, “high lumbar”

Likely to be further up lumbar spine in the very obese

Change of maternal position may move catheter by 2-3 cms, in or out. ? Do not fix catheter in very flexed position.

Ideal catheter depth ??? 6 cms in epidural space
Epidurals & Spinals – Practical tips (4)

? Epidural space more shallow (or ? distended by veins)

CSF volume smaller (confirmed on MRI)

Risk of accidental dural puncture ?? increased – but no figures

But risk of PDPH less (abdominal binder, high intra-abdominal pressure)

If in lateral position larger buttocks may mean mother is more head down
Epidurals & Spinals – Practical Tips (5)

Insertion will nearly always take longer

High frequency of reinsertion for epidural in labour & also less effective

What dose is needed for epidurals and spinals, for equivalent block?

Reduced (for surgical anaesthesia) – but by how much? Perhaps up to 30%
Minimum Local Anaesthetic Concentration (MLAC)

= effective concentration to provide effect in 50% of subjects

Up and down sequential allocation

Useful for studying pain relief in labour – studies have shown that the bupivacaine concentration needed to provide effective analgesia in labour is almost halved in obese women

(?) Partly due to same volume being given, not a smaller volume
Typical example of up–down sequential allocation for epidural analgesia with levobupivacaine in labour, plotted with median effective concentration (EC50) and 95% confidence interval.

MLAC Levobupivacaine

Neuraxial Blockade

Figure 11.1 Approach to epidural catheter insertion in the morbidly obese parturient. With the patient in the sitting position, insert the epidural needle in the midline perpendicular to the skin at a point anchored horizontally by the first skin crease above the gluteal fold and vertically by an imaginary line drawn from the C7 spinous process to the gluteal fold.
Ultrasound Guidance – Tutorial:

Ultrasound-Facilitated Epidurals and Spinals in ... - KU Leuven
www.kuleuven.be/anesthesie/wintersymposium/.../Carvalho_j.pdf
by JCA Carvalho
Larger needles may be required
General Anaesthesia

The Airway - is difficult/failed intubation more common?

Barnardo. Anaesthesia. 2000 – much quoted
14 hospitals in SW Thames 1993-1998
Difficult intubation in 1/250, c.f. 1/2000 in
non-pregnant
No adverse outcomes? Many intubated with
difficulty.
Some small series suggest even worse
airway difficulties if very obese.
**Airway (2)**

However some other publications do not support this e.g.

- One study of 3430 obstetric GAs found no cases of failed intubation

- One systematic review found no evidence that intubation more difficult in the obstetric population

- Bariatric Anaesthetists – report few intubation difficulties

- Thus airway challenges perhaps exaggerated
Airway (3)

UKOSS – Prospective study of Failed Tracheal Intubation, national two year UK study 2008 - 2010
57 cases, 107 case controls

Failed Intubation more likely if:
• older
• heavier, higher BMI (but RR 1.06)
• documented Mallampati score, and Mallampati score > 1

Rescue procedures:
• classic LMA 39, ILMA 4, Proseal 3, iGEL 3
• intubated later 5, trache 1, spinal 3, woken up 4
Gastric aspiration 4, no ICU admissions due to airway difficulty

Incidence = 1/25,000 deliveries
= (1/225 GAs) 1/850 in my calculation
Airway (5)

Prediction of Difficult Intubation:

- One study found only Mallampati Score III or IV were predictors, no other measurements helpful

- Some have found that thyromental distance also helpful

- Mallampati Score possibly one worse in pregnancy
General Anaesthesia – Practical Tips (1)

- Regular antacids
- Senior assistance
- ? Two ODPs
- Position – “ramping”/Head Elevating Laryngoscopy Pillow (see later)
- Difficult Airway Equipment – short handle, polio handle, McCoy, videolaryngoscope, Proseal LM
General Anaesthesia – Practical Tips (2)

- Thorough pre-oxygenation
- May need high FiO$_2$/PEEP/high airway pressure
- Consider n/g tube per-op
- Extubate semi-sitting, check NMJ blockade

- Drug Doses:
  Thiopentone: 5-6mg/kg (ideal body wt) up to 500mg
  Suxamethonium: 1-1.5mg/kg total body wt up to 200mg
  Lean Body weight for paracatamol, diclofenac, non-depolarising muscle relaxants
Oxford HELP Pillow

(Head Elevating Laryngoscopy Pillow)
Videolaryngoscopes (Airtraq)
Theatre Procedures in the Obese – general:

- I.V. Access may be very difficult (peripheral vein with U/S)
- Consider arterial line if NIBP difficult
- Prevent aortocaval compression
- Transfer and positioning time will be increased
- Anaesthesia time will be increased
- Surgical time will be increased
What is the Evidence for Anaesthesia Difficulty?

Some units report few problems, e.g.

Manchester – no difference between obese and non-obese parturients in:
- rate of CS
- co-morbidities
- anaesthesia complications:
  - spinal failure 3%, epidural failure 4%
  - no relationship between obesity and laryngoscopy grades
  - no increase in GA rate in the obese
  - no invasive monitoring
  - no ICU or HDU care
Summary (1)

Are pregnant women getting larger?
- Yes

Are medical and obstetric complications more common if obese?
- Yes, slightly

Is Caesarean Section more common?
- Yes, but not in all units
Summary (2)

Do spinals and epidurals take longer in the obese?
- Yes, but usually we succeed

Should we do elective Caesarean Sections?
- Probably not

Should we electively insert epidurals in early labour?
- ? Not routinely
Summary (3)

Ask for assistance

Be prepared

Use epidural needle as guide for spinal needle, do CSE

Use ultrasound

Longer needles rarely needed
Summary (4)

Reduce dose of LA slightly

Airway difficulties are probably rare

No convincing evidence that either regional or GA more dangerous if obese
“Inside every fat person (on the labour ward) is a little person trying to get out”

Cyril Connolly 1903-1974
Intellectual, literary critic, author