When is a Caesarean Section really urgent/necessary?

Andy Shennan
Obstetricians do not like doing CS

- “Obstetrics” = “To stand by”
- “Obstetrician” = “One who stands by”
Anaesthetists love CS

- They get to twiddle their knobs and do something
Perinatal mortality

Postneonatal\(^1\), Neonatal\(^1\) and Stillbirth\(^2\) Mortality Rates: 1974–2009

The definition of a stillbirth was changed from 28 weeks to 24 weeks on 1\(^{st}\) October 1992

\(^1\) Rate per 1000 live births.
\(^2\) Rate per 1000 total births.

Source: Registrar General Scotland
Perinatal mortality/CS rate

Postneonatal\(^1\), Neonatal\(^1\) and Stillbirth\(^2\) Mortality Rates: 1974–2009

The definition of a stillbirth was changed from 28 weeks to 24 weeks on 1st October 1992

\(^1\) Rate per 1000 live births.
\(^2\) Rate per 1000 total births.

Source: Registrar General Scotland
Figure 4 – Total value (%) of reported CNST claims by specialty 01/04/95 to 31/03/11

- Obstetrics & Gynaecology: 49%
- All Other Specialties: 51%
Figure 7: Top 10 categories of claims by number between 1st April 2000 and 31st March 2010 as at 31st March 2010

- Management of labour
- Caesarean section
- Cerebral palsy
- Perineal trauma
- Antenatal care
- CTG interpretation
- Still birth
- Shoulder dystocia
- Antenatal investigations
- Retained swabs

% of Claims Numbers

Category
Figure 8: Top 10 categories of claims by total value between 1st April 2000 and 31st March 2010 as at 31st March 2010
Figure 12 – Was there a misinterpretation of the CTG?
Cost of claims

• NHS Litigation costs 2001/12 £1.33billion

• Since 1995, 61% of all negligence payments relate to claims arising out of birth.

• Cerebral palsy claims accounted for 66% of these payments (and stillbirths 2%).
Gross CNST maternity contributions per trust 2008/09
Maternity contributions 2009/10

- Will rise to £8m (gross) for the largest maternity units and an average of £3 m.
- Level 1 = 10% discount
- Level 2 = 20%
- Level 3 = 30%.

Level 3 could save the larger units £2.4m
Fetal compromise

Health

Intervention

Death

Handicap

Compensation

Decompensation

Hypoxia

Acidaemia

Courtesy Steve Robson
Hypoxia

• Hypoxia affects the autonomic NS before it has irreversible effects on the CNS
• Thus changes in the FHR may indicate developing hypoxia in time to intervene before the CNS is damaged
• Hypoxia initially raises the baseline rate and reduces FHR variability
CTG ‘Late’ decelerations
CTG Bradycardia

Cord accident  Uterine Rupture
Abruption        End stage hypoxia
EFHR monitoring

CTG suggest chronic hypoxia?

50% of cases not hypoxic therefore FBS

Correct the cause
Syntocinon
Epidural
Position
Fetal Blood Sampling
pH is inverse log of H+ concentration

pH 7.3  pH 7.2  pH 7.1  pH 7.0

Normal  Deliver  Small risk of fetal brain damage  Higher risk of fetal brain damage
# Fetal Monitoring

Review: Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour
Outcome: 20 Neonatal seizures

<table>
<thead>
<tr>
<th>Study</th>
<th>CTG n/N</th>
<th>Auscultation n/N</th>
<th>Relative Risk (Fixed)</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Continuous CTG and FBS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copenhagen 1985</td>
<td>0/485</td>
<td>0/493</td>
<td></td>
<td>0.0</td>
<td>Not estimable</td>
</tr>
<tr>
<td>Denver 1979</td>
<td>0/230</td>
<td>1/110</td>
<td>3.9</td>
<td>0.17</td>
<td>0.17 [0.01, 4.11]</td>
</tr>
<tr>
<td>Dublin 1986</td>
<td>12/6530</td>
<td>27/6554</td>
<td>53.0</td>
<td>0.46</td>
<td>0.46 [0.23, 0.88]</td>
</tr>
<tr>
<td>Melbourne 1976</td>
<td>0/175</td>
<td>4/175</td>
<td>8.9</td>
<td>0.11</td>
<td>0.11 [0.01, 2.05]</td>
</tr>
<tr>
<td>Seattle 1987</td>
<td>7/122</td>
<td>7/124</td>
<td>13.7</td>
<td>1.02</td>
<td>1.02 [0.37, 2.81]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>7542</td>
<td>7402</td>
<td></td>
<td>79.4</td>
<td>0.40 [0.26, 0.84]</td>
</tr>
<tr>
<td><strong>Total events:</strong></td>
<td>10 (CTG), 30 (Auscultation)</td>
<td></td>
<td></td>
<td>70.4</td>
<td></td>
</tr>
<tr>
<td><strong>Test for heterogeneity chi-square:</strong> 3.40 df=3 p=0.33 I² = 13.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for overall effect:</strong> z=2.01 p=0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02 Continuous CTG only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athens 1993</td>
<td>0/748</td>
<td>2/682</td>
<td></td>
<td>5.1</td>
<td>0.18 [0.01, 3.80]</td>
</tr>
<tr>
<td>Dallas 1986</td>
<td>1/729</td>
<td>3/7330</td>
<td>5.9</td>
<td>0.34</td>
<td>0.34 [0.03, 3.22]</td>
</tr>
<tr>
<td>Denver 1978</td>
<td>2/242</td>
<td>2/241</td>
<td>3.0</td>
<td>1.00</td>
<td>1.00 [0.14, 7.01]</td>
</tr>
<tr>
<td>Denver 1970</td>
<td>2/233</td>
<td>1/110</td>
<td>2.6</td>
<td>1.00</td>
<td>1.00 [0.09, 10.87]</td>
</tr>
<tr>
<td>Sheffield 1978</td>
<td>0/253</td>
<td>1/251</td>
<td>3.0</td>
<td>0.33</td>
<td>0.33 [0.01, 8.08]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>8702</td>
<td>8020</td>
<td></td>
<td>20.6</td>
<td>0.51 [0.18, 1.44]</td>
</tr>
<tr>
<td><strong>Total events:</strong></td>
<td>5 (CTG), 9 (Auscultation)</td>
<td></td>
<td></td>
<td>20.6</td>
<td></td>
</tr>
<tr>
<td><strong>Test for heterogeneity chi-square:</strong> 1.40 df=4 p=0.84 I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for overall effect:</strong> z=1.28 p=0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI):</strong></td>
<td>10304</td>
<td>10082</td>
<td></td>
<td>100.0</td>
<td>0.50 [0.31, 0.80]</td>
</tr>
<tr>
<td><strong>Total events:</strong></td>
<td>24 (CTG), 48 (Auscultation)</td>
<td></td>
<td></td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td><strong>Test for heterogeneity chi-square:</strong> 4.00 df=8 p=0.77 I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for overall effect:</strong> z=2.91 p=0.004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0.001 0.01 0.1 1 10 100 1000

Favours CTG  Favours IA
Randomised trials

• INFANT – funded
  – Intelligent decision support in the interpretation of the intrapartum CTG in labour - 46,000 women
  – Eligibility – women who are judged to require continuous electronic fetal monitoring in labour
  – Outcome – NE, IP stillbirth
INFANT

Antenatal information supplied to all women

All labour ward admissions ≥35 weeks except gross fetal abnormality, arrhythmia, triplets or higher

Intermittent auscultation

Decision made to initiate continuous EFM

Continuous electronic fetal monitoring

Randomisation

Control Arm
CTG monitoring with no decision support

Intervention Arm
CTG monitoring with decision support
Infant: Primary outcome

• “Poor neonatal outcome”:
  • Deaths (excluding congenital anomalies):
    – Intrapartum stillbirth
    – Neonatal
  • Neonatal encephalopathy:
    – Severe/moderate
    – Mild
  • Other significant morbidity:
    – Other admissions to NICU within 48 hrs of birth for \( \geq 48 \) hrs e.g. respiratory symptoms, seizures

• Developmental quotient at age 2 years
INFANT Sample size

Assuming:

Poor neonatal outcome rate:

3 per 1000 births

- 5% significance level
- 90% power
  - 50% reduction in poor neonatal outcome rate e.g. to compare 3 versus 1.5 per 1000

Need: 46,000 births in total (22,279 per arm)
Fetal distress = acidaemia
What is the indication?

Indications for C/S in labour

- Failure to progress
- Fetal Distress
- Other
What is fetal distress?

- pH < 7.20
### Figure 1. A classification relating the degree of urgency to the presence or absence of maternal or fetal compromise

<table>
<thead>
<tr>
<th>Urgency</th>
<th>Definition</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal or fetal compromise</td>
<td>Immediate threat to life of woman or fetus</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No immediate threat to life of woman or fetus</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Requires early delivery</td>
<td>3</td>
</tr>
<tr>
<td>No maternal or fetal compromise</td>
<td>At a time to suit the woman and maternity services</td>
<td>4</td>
</tr>
</tbody>
</table>
Benefits from 4 group categorisation

- Pre-existing
- Endorsed by RCOG, RCA, CNST
- Four categories rather than two
- Helps identify most urgent
- Reduces maternal (and possibly fetal) risk to less urgent
- Encourages clinical team to individualise care
- Avoids time based categorisation
- Can be integrated with colour coding
- Can be nationally audited
What category?

Category 1
- Prolonged deceleration
- Prolapsed cord
- Heavy vaginal bleeding
- Collapse
- FBS < 7.2
- Pathological CTG

Category 2
- APH (no shock, suspicious CTG)
- Failure to progress
- Suspicious CTG
The audit standards should be
• 30 minutes for category 1 and
• 75 minutes for category 2

NICE 2011
What category?

**Category 3**
- Failure to progress
- Failed IOL
- Ruptured membranes breech
- Early labour planned lscs

**Category 4**
- Elective LSCS
- IUGR
- Indication for delivery, IOL not appropriate
## Indications for LSCS

*(Sentinel lscs audit 2000) Thomas et al: National cross sectional survey to determine whether the decision to delivery interval is critical in emergency caesarean section. BMJ 2004*

<table>
<thead>
<tr>
<th></th>
<th>Grade 1 (n=3899)</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Total</th>
<th>Proportion of cat 1 Em LSCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTP</td>
<td>5.7%</td>
<td>60%</td>
<td>32%</td>
<td>5772</td>
<td>8.4%</td>
</tr>
<tr>
<td>Fetal compromise</td>
<td>49%</td>
<td>50%</td>
<td>0.04%</td>
<td>6254</td>
<td>79%</td>
</tr>
<tr>
<td>Cord prolapse</td>
<td>96%</td>
<td>2.8%</td>
<td>0</td>
<td>142</td>
<td>3.4%</td>
</tr>
<tr>
<td>PP active</td>
<td>46%</td>
<td>42%</td>
<td>2%</td>
<td>254</td>
<td>3%</td>
</tr>
<tr>
<td>PP non-active</td>
<td>25%</td>
<td>60%</td>
<td>12%</td>
<td>197</td>
<td>1.2%</td>
</tr>
<tr>
<td>PET</td>
<td>35%</td>
<td>60%</td>
<td>5%</td>
<td>582</td>
<td>5.2%</td>
</tr>
</tbody>
</table>
Maternal Choice for CS

For women requesting a caesarean section, if after discussion and offer of support (including perinatal mental health support for women with anxiety about childbirth), a vaginal birth is still not an acceptable option, offer a planned caesarean section. An obstetrician unwilling to perform a caesarean section should refer the woman to an obstetrician who will carry out the caesarean section.
HIV

• Do not offer a caesarean section on the grounds of HIV status to prevent mother-to-child transmission of HIV to:

  • women on highly active anti-retroviral therapy (HAART) with a viral load of less than 400 copies per ml or

  • women on any anti-retroviral therapy with a viral load of less than 50 copies per ml.
HSV

• Offer planned caesarean section to women with primary genital herpes simplex virus (HSV) infection occurring in the third trimester of pregnancy because it decreases the risk of neonatal HSV infection.

• Inform women with a recurrence of HSV at birth that there is uncertainty about the effect of planned caesarean section in reducing the risk of neonatal HSV infection. Therefore, do not routinely offer caesarean section outside a research context.
Breech

• For women with a singleton breech presentation at term, for whom external cephalic version is contraindicated or has been unsuccessful, offer caesarean section because it reduces perinatal mortality and neonatal morbidity.
Growth restriction

- The risk of neonatal morbidity and mortality is higher with 'small for gestational age' babies. However, the effect of planned caesarean section in improving these outcomes remains uncertain, therefore do not routinely offer caesarean section outside a research context.
Preterm birth

- Preterm birth is associated with higher neonatal morbidity and mortality. However, the effect of planned caesarean section in improving these outcomes remains uncertain, therefore do not routinely offer caesarean section outside a research context.
Cord Prolapse

• Rare

• Associated factors
  – Unstable Lie at term
  – Polyhydramnios
  – Malpresentations
  – High presenting part with ARM

• No need to panic
  – vaginal delivery if fully or baby dead
  – discuss anaesthetic options with obstetrician
Cord Prolapse: Anaesthetic options

- Fetal distress (bradycardia)
  - GA
- Normal CTG, not in labour
  - spinal
- In labour, normal cord pulse
  - attached obstetrician: GA
  - knee chest: GA
  - left lateral/filled bladder: consider spinal
Incidence of Placenta Praevia/Accreta as a Function of Number of Caesarean Sections
Teamwork?