Discussion

- Anesthesia related mortality

Labor Epidurals
- Early Epidurals
- Late epidurals
- Epidural failures
- Progress of labor
- Motor Block
- Epidurals and c sections

CSE
- Walking Epidural

Others
- NPO
- BTL
Anesthesia Related Maternal Mortality

1.7 per million Live Births 1997
1.2 per million Live Births in 2002

Hawkins 2011
## Anesthesia Related Mortality

<table>
<thead>
<tr>
<th></th>
<th>1979-1984</th>
<th>1985-1990</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Anesthesia</td>
<td>33</td>
<td>32</td>
<td>↓</td>
</tr>
<tr>
<td>Regional Anesthesia</td>
<td>19</td>
<td>9</td>
<td>↑</td>
</tr>
<tr>
<td>Risk Ratio GA/Regional</td>
<td>2.3</td>
<td>16.7</td>
<td>1.7 (5-10)</td>
</tr>
</tbody>
</table>

Hawkins JL: Anesthesiology: 1997
Regional vs. General

Regional anesthesia
- Toxicity
- High or total level
- Failure

General anesthesia
- Difficult airway
- Aspiration
- Resident training
- Associated mortality figures
Incidence of Difficult/Failed Intubations

- OB population: 1:280 (0.38%)
  - Getting worse
- Non-OB population: 1:2,230 (0.05%)

Hawthorne et al. RJA 1996;76:680-684
Anesthesia-Related Deaths During Obstetric Delivery 1979-90

General Anesthesia (N=87)

Hawkins et al., Anes, 86:277-84, 1997
Failed Intubations
Time and Urgency of Operation

<table>
<thead>
<tr>
<th>Time of Operation</th>
<th>Cesarean Sections</th>
<th>Failed Intubations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>85%</td>
<td>22%</td>
</tr>
<tr>
<td>Evening</td>
<td>4%</td>
<td>9%</td>
</tr>
<tr>
<td>Night/Weekend</td>
<td>12%</td>
<td>69%</td>
</tr>
<tr>
<td>Urgency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>56%</td>
<td>9%</td>
</tr>
<tr>
<td>Emergent</td>
<td>44%</td>
<td>91%</td>
</tr>
</tbody>
</table>
Difficult Airway Facts

- Difficult / failed intubation a major cause for maternal morbidity and mortality
- 80% anesthetic fatalities during emergency C/S
- Exposure of anesthesia trainees to GA
Because

- Continuing requests by obstetricians to provide anesthesia for stat c. section
- Urgency of situation precludes proper evaluation of airway
- Pregnancy-related changes add to hazard of difficult/failed intubations
- Time constraint
  - Important preanesthetic airway assessment had not occurred in 10% of mortalities reviewed
  - Confidential Enquiry into Perioperative Death - 1997
**Obesity**

**C. section rate**
- 20.7% in a normal weight control group
- 33.8% in obese women
- 47.4% in morbidly obese

Weiss et al., Am J Obstet Gynecol. 2004

**Morbidly obese parturient (≥136kg)**
- C/S rate 62%
- 24% C/S received GA
- 1/3 intubations difficult
- 6% failed intubation rate

Hood et al., Anesthesiology 1990; 73:A952
Labor Epidurals

Myths/realities

- Early epidurals and progress of labor
- Late epidurals
- Failed Epidurals
- Increase in forceps & cesarean section rate
- Contraindications
- Motor block
 Regional Anesthesia – F A Q

- Does Epidural work all the time?
  - Myth – Yes
  - Reality - Yes

- Will the epidural slow the progress of labor?
  - Myth – Yes
  - Reality - Yes

- Will the epidural prolonged second stage?
  - Myth – Yes
  - Reality – Yes

- Will the epidural increase assisted deliveries?
  - Myth – Yes
  - Reality – Unlikely

- Will epidural increased cesarean section rate?
  - Myth – Yes
  - Reality – Unlikely
Effect on First Stage

Timing
Duration
Contractions
First Stage: Timing

Conventional Wisdom

- Early epidural analgesia in latent phase
  - May markedly slow cervical dilation
  - OR even arrest labor

3 studies (Siever 1943, Friedman 1959 & 1961)
  - Conclusion: does not affect the course of labor “but” nonetheless proper administration entails withholding it until active phase of labor is entered

Carefully proven studies has never proven this fact
Thorp adds fuel to the fire in 1989

Conclusion:
If you have an epidural before 5 cm you ARE -------
Early Epidurals and Progress of labor

Thorp, JA et al. - 3 different studies between 1989-1993

Epidural Vs. Opiates

447 (E) + 264 (NE) patients

10.3% Vs. 3.8%

Increases the duration of labor ~ 100 min

Increases the cesarean section rate


Bias: Cervix: 3 Vs. 4.8, PIT augmentation 73 Vs. 27%, larger (1500) babies; and longer duration

The risk of cesarean with epidural was

- 50% at 2cm
- 33% at 3cm
- 26% at 4cm
- 0% at 5cm
Timing

2 studies from University of Iowa

- One where patients were induced/augmented
- Other where patients were in labor spontaneously

All healthy, nulliparous women with singleton fetus

Randomization for early or late epidurals only after

- Request for pain relief
- Epidural catheter inserted
- Cervix >3, <5
Timing

First study
- No difference between duration of first and second stage
- C section rate: 18% vs. 19%
- Conclusion: RA does not effect uterine contractile response to oxytocin

Second study
- No difference
- 30% received oxytocin for augmentation

Chestnut 1994
### Effect of epidural analgesia on the duration of the first stage of labor

<table>
<thead>
<tr>
<th>Study</th>
<th>Epidural</th>
<th>Control</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thalme et al.</td>
<td>8 of 12</td>
<td>9 of 12</td>
<td>NS</td>
</tr>
<tr>
<td>Proportion &gt; 8 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxytocin augmentation</td>
<td>4 of 12</td>
<td>1 of 12</td>
<td>NS</td>
</tr>
<tr>
<td>Jouppila and Hollmén</td>
<td>402 (120-1040)</td>
<td>245 (90-480)</td>
<td>NS</td>
</tr>
<tr>
<td>Mean (range) minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous</td>
<td>8.6 (3-15)</td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Intermittent</td>
<td>8.3 (3-15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paracervical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxytocin augmentation</td>
<td>19 of 34</td>
<td>6 of 39</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Mean (range) minutes</td>
<td>189 (123-355)</td>
<td>330 (120-630)</td>
<td>NS</td>
</tr>
<tr>
<td>Robinson et al.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD) hours</td>
<td>8.2 ± 3.5</td>
<td>8.3 ± 3.1</td>
<td>NS</td>
</tr>
<tr>
<td>Nulliparous</td>
<td>6.0 ± 3.0</td>
<td>6.4 ± 4.2</td>
<td>NS</td>
</tr>
<tr>
<td>Parous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ryhänen et al.</td>
<td>341 ± 190</td>
<td>320 ± 210</td>
<td>NS</td>
</tr>
<tr>
<td>Mean (SD) minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philipsen and Jensen</td>
<td>197 (10-580)</td>
<td>180 (25-925)</td>
<td>NS</td>
</tr>
<tr>
<td>Median (range) minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thorp et al.</td>
<td>676 ± 394</td>
<td>519 ± 279</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Mean (SD) minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Howell and Chalmers 1992
Effect on Duration

Average

- 38 minutes for primiparous
- 23 minutes for multiparous

Johnson S - J Fam Pract. 1995
Halpern SH, Abdallah FW. Curr Opin Anaesthesiol. 2010
Effect on Cervical Dilation

- Probably minimal

- Meta-analysis of 10 randomized, recent studies
  - Epidural Vs. IV opiates
  - Prolonged by 42 minutes

Halpern 1998
Pain Vs Dilatation

Wutchick 1989
Pain Vs Analgesia

Women with abnormal labor

- Are in pain early
- Pain is more intense
- Are the ones likely too ask for epidurals
- And ask for epidurals early in labor

Are they telling us something?????????
Effect on Contractions

Effect of Epidural Analgesia on Fundal Dominance

Nielsen

1996
Latent Phase

PCA pump
- Really short acting opiates
  - Fentanyl, Remifentanil, Precedex (Dexmedetomidine)
    - Caution: neonatal depression

Concept of walking epidurals
- CSE (Combined Spinal Epidurals)
- MLAC – Minimal Local Anesthesia Concentration
First stage of labor pain

- Visceral
- Helped by opiates given IT
  - Not via epidural
- Addition of small amount of LA
  - Does not interfere with motor block at all
- Limitation – duration of action

Concept of walking epidural
CSE - Spinal Anesthesia

**Advantage**
- Quick
- Less drug
- Nearly always reliable
- Great for latent stage of labor - opiates only
- Great for 9 cm dilation - LA mainly
- May shorten labor

**Disadvantage**
- Hypotension
- Higher block
- Headache - PDPH
- Drug choice
- Transition from CSE to Epidural
  - Change in analgesia
  - Unsure
Effect on Cervical Dilation

- Probably minimal

- Some evidence to suggest that CSE, when compared to epidural, might even shorten labor, can be safely performed in latent stage of labor

  Tsen, Anesthesiology 1999

- Meta-analysis of 10 randomized, recent studies
  - Epidural Vs. IV opiates
  - Prolonged by 42 minutes

  Halpern 1998
MLAC

Minimum Local Anesthesia Concentration

- Reduction of pain by 80%
- Changes as labor changes

Early labor only 0.03% bupivacaine

- Requirement changes every 2 hours
- 0.0625% Bupivacaine with fentanyl effective in more than 80%

No motor block
Effect on Second stage

Length
Pushing
Second Stage

Definitely increase

ACOG defines prolonged second stage in

Nulliparous women
- > 3 hours with regional analgesia
- > 2 hours without

Multiparous women
- > 2 hours with regional
- > 1 hour without regional
Duration of Second Stage

- Prolongation results in fetal acidosis

- Delay not harmful to mother or infant if:
  - FHR shows no fetal distress
  - Mother well hydrated, not exhausted and has adequate analgesic
  - Fetal head descent and rotation
  - Avoid aorto-caval compression

Katz 1987

Most other studies
Effect of Epidural on Second Stage

High (0.25%) vs. Low (0.0625%) Bupivacaine concentrations

↑ incidence of forceps deliveries

~ incidence of cesarean section rate

Chestnut 1996
Epidural vs. Second Stage

Low concentration (0.0625%)
Bupivacaine vs. saline after 8 cm cervical dilation

No difference in the incidence of either instrumental deliveries or c. section rate

Chestnut 1997
Effect of Epidural on Second Stage

Fear

- Bearing down feeling

↓ perinatal muscle paralysis

⇒ ↑ incidence of mal-rotation

Effect on IUP ???
<table>
<thead>
<tr>
<th>Effect of epidural analgesia on the duration of the second stage of labor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Epidural block continued through the second stage</strong></td>
</tr>
<tr>
<td>Noble et al. (^{10})</td>
</tr>
<tr>
<td>Proportion &gt; 30 minutes</td>
</tr>
<tr>
<td>64 of 100</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>32 of 102</td>
</tr>
<tr>
<td>(P &lt; 0.01)</td>
</tr>
<tr>
<td>Thaisne et al. (^{12})</td>
</tr>
<tr>
<td>Proportion &gt; 60 minutes</td>
</tr>
<tr>
<td>6 of 12</td>
</tr>
<tr>
<td>Mean (variance) minutes</td>
</tr>
<tr>
<td>50 (N/A)</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>4 of 12</td>
</tr>
<tr>
<td>(N/A)</td>
</tr>
<tr>
<td>NS</td>
</tr>
<tr>
<td>Bratteby et al. (^{15})</td>
</tr>
<tr>
<td>Mean (range) minutes</td>
</tr>
<tr>
<td>Continuous</td>
</tr>
<tr>
<td>59 (5-150)</td>
</tr>
<tr>
<td>Intermittent</td>
</tr>
<tr>
<td>52 (10-135)</td>
</tr>
<tr>
<td>Paracervical</td>
</tr>
<tr>
<td>51 (8-120)</td>
</tr>
<tr>
<td>Nitrous oxide</td>
</tr>
<tr>
<td>20 (1-51)</td>
</tr>
<tr>
<td>NS</td>
</tr>
<tr>
<td>Robinson et al. (^{17})</td>
</tr>
<tr>
<td>Mean (SD) hours</td>
</tr>
<tr>
<td>Nulliparous</td>
</tr>
<tr>
<td>0.9 (0.4)</td>
</tr>
<tr>
<td>Parous</td>
</tr>
<tr>
<td>0.5 (0.3)</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>0.7 (0.3)</td>
</tr>
<tr>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Thorp et al. (^{25})</td>
</tr>
<tr>
<td>Mean (SD) minutes</td>
</tr>
<tr>
<td>115 ± 71</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>54 ± 45</td>
</tr>
<tr>
<td>(P &lt; 0.05)</td>
</tr>
<tr>
<td><strong>Epidural block during the first stage only</strong></td>
</tr>
<tr>
<td>Jouppila and Hollmén (^{14})</td>
</tr>
<tr>
<td>Mean (range) minutes</td>
</tr>
<tr>
<td>12.1 (1-31)</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>14.8 (4-58)</td>
</tr>
<tr>
<td>NS</td>
</tr>
<tr>
<td>Jouppila et al. (^{16})</td>
</tr>
<tr>
<td>Mean (range) minutes</td>
</tr>
<tr>
<td>9.5 (4-17)</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>15.0 (8-32)</td>
</tr>
<tr>
<td>NS</td>
</tr>
<tr>
<td>Ryhänen et al. (^{22})</td>
</tr>
<tr>
<td>Mean (SD) minutes</td>
</tr>
<tr>
<td>18.6 ± 14.2</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>5.8 ± 3.4</td>
</tr>
<tr>
<td>NS</td>
</tr>
<tr>
<td>Philipsen and Jensen (^{23})</td>
</tr>
<tr>
<td>Median (range) minutes</td>
</tr>
<tr>
<td>47 (5-274)</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>37 (5-150)</td>
</tr>
<tr>
<td>NS</td>
</tr>
</tbody>
</table>
Early vs. Late Pushing

↓ in rate of mid-cavity forceps

Less exhaustion for mother
Uterus remains the main force
In labor 9 cm desires analgesia

Is it too late???

- Patient autonomy
- CSE
  - Quick, reliable analgesia in 3-5 minutes
  - Lasts for 2 hours
  - LA + Opiates – need a somatic block
  - >50% need activating of epidural
  - Flexible
Effect on Mode of Delivery

Instrumental Deliveries

C. Section
## Assisted Vaginal Deliveries

### Effect of epidural analgesia on the incidence of assisted vaginal delivery

<table>
<thead>
<tr>
<th>Block maintained during the second stage of labor</th>
<th>Experimental</th>
<th>Control</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bratteby(^{21})</td>
<td>16 of 36</td>
<td>7 of 41</td>
<td>3.6 (1.3-9.6)</td>
</tr>
<tr>
<td>Noble et al.(^{10})</td>
<td>30 of 100</td>
<td>6 of 102</td>
<td>5.2 (2.5-10.6)</td>
</tr>
<tr>
<td>Buchan et al.(^{11})</td>
<td>5 of 10</td>
<td>0 of 10</td>
<td>12.6 (1.8-90.6)</td>
</tr>
<tr>
<td>Thalme et al.(^{12})</td>
<td>6 of 14</td>
<td>4 of 14</td>
<td>1.8 (0.4-8.3)</td>
</tr>
<tr>
<td>Robinson et al.(^{17})</td>
<td>22 of 45</td>
<td>9 of 48</td>
<td>3.8 (1.6-9.0)</td>
</tr>
<tr>
<td>Thorp et al.(^{25})</td>
<td>9 of 48</td>
<td>5 of 45</td>
<td>4.2 (2.7-6.6)</td>
</tr>
</tbody>
</table>

Typical odds ratio (95% confidence interval)

<table>
<thead>
<tr>
<th>Block discontinued for the second stage of labor</th>
<th>Experimental</th>
<th>Control</th>
<th>Odds ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philipsen and Jensen(^{23})</td>
<td>14 of 57</td>
<td>14 of 54</td>
<td>0.9 (0.4-2.2)</td>
</tr>
<tr>
<td>Jouppila(^{13})</td>
<td>1 of 12</td>
<td>1 of 12</td>
<td>1.0 (0.1-17.0)</td>
</tr>
<tr>
<td>Jouppila et al.(^{16})</td>
<td>0 of 8</td>
<td>0 of 10</td>
<td>1.0 (1.0-1.0)</td>
</tr>
</tbody>
</table>

Typical odds ratio (95% confidence interval)

0.9 (0.4-2.1)
Epidural Vs. Cesarean Section

- 3 trials at U.T. Southwestern
- All prospective randomized trials
- Randomization with intent to treat
- Allowed cross over
- 1638 (E) Vs 1630 (N) patients
- C. section rate: 6% Vs 5%
# Mode of Delivery

<table>
<thead>
<tr>
<th>Method of delivery</th>
<th>Epidural analgesia (n = 358)</th>
<th>Patient-controlled intravenous meperidine analgesia (n = 357)</th>
<th>( \rho ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous</td>
<td>319 (89)</td>
<td>326 (91)</td>
<td>NS</td>
</tr>
<tr>
<td>Instrumental vaginal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26 (7)</td>
<td>15 (4)</td>
<td>NS</td>
</tr>
<tr>
<td>Low forceps(^a)</td>
<td>22 (6)</td>
<td>12 (3)</td>
<td>NS</td>
</tr>
<tr>
<td>Outlet forceps(^b)</td>
<td>4 (1)</td>
<td>3 (1)</td>
<td>NS</td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13 (4)</td>
<td>16 (5)</td>
<td>NS</td>
</tr>
<tr>
<td>Dystocia</td>
<td>9 (3)</td>
<td>10 (3)</td>
<td>NS</td>
</tr>
<tr>
<td>Nonreassuring FHR tracing</td>
<td>4 (1)</td>
<td>6 (2)</td>
<td>NS</td>
</tr>
<tr>
<td>Total operative delivery</td>
<td>39 (11)</td>
<td>31 (9)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Data are \( n (\%) \).

FHR, fetal heart rate.

\(^a\)Low forceps, +2 cm to +4 cm below the ischial spines.

\(^b\)Outlet forceps, fetal head at the perineum.

Data from ref. 78.


### Mode of delivery and epidural use

<table>
<thead>
<tr>
<th></th>
<th>Clinic (n = 192)</th>
<th>Private (n = 415)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cesarean rate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5.2</td>
<td>17.1</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Failure to progress</td>
<td>0.5</td>
<td>13.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>Vaginal delivery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum/forceps</td>
<td>14.6</td>
<td>13.7</td>
<td>—</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>80.2</td>
<td>69.2</td>
<td>&lt; 0.005</td>
</tr>
<tr>
<td><strong>Epidural use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>41.6</td>
<td>41.7</td>
<td>—</td>
</tr>
<tr>
<td>Placed before 4 cm</td>
<td>20.0</td>
<td>18.5</td>
<td>—</td>
</tr>
</tbody>
</table>

Neuholt 1989
Other Non-Biologic Factors

- Marked obstetrician variations
  - Guillemette & Fraser 1992

- Private care vs. clinic care
  - De Regt 1986

- Temporal variations: c-sections for dystocia at 5.00 PM: obstetric convenience
  - Fraser 1987

- Reimbursements vs. time
3 Initiatives Vs. Cesarean Section

3 very similar studies:
- A rural Canadian hospital
- A private hospital in California
- A University hospital

- Encourage VBAC
- Individual/group cesarean section rate circulated
- AML for nulliparous women

<table>
<thead>
<tr>
<th></th>
<th>1986</th>
<th>1991</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-section Total</td>
<td>27%</td>
<td>17%</td>
</tr>
<tr>
<td>Primary</td>
<td>18%</td>
<td>11%</td>
</tr>
<tr>
<td>Repeat</td>
<td>9%</td>
<td>6%</td>
</tr>
<tr>
<td>Epidural</td>
<td>28%</td>
<td>48%</td>
</tr>
</tbody>
</table>

Secol 1993
Northwestern Memorial University Hospital for P.P.
Effect on Duration

Other factors

- Size of the fetus
- Size of mother
- Cervical dilation at admission and speed
- Station
- CPD
- Oxytocin augmentation
Maternal-fetal factors and obstetric management - not the use of epidural analgesia - are the most important determinants of cesarean delivery rate

D.H. Chestnut 1997
Legs too numb

How can we help?

- Assess the motor block

- Switch of the pump
  - For 30 minutes
  - Keep an eye on motor block
  - Start the pump back as soon as
    - Has urge to push
    - Moving legs
  - At lower strength/volume
  - Too long too late!
Failure Rate

- Incidence of missed segment, unilateral block, hot spots ~
  Ranges from 10-30%

- Much higher for c section than labor

- Sacral Sparing

- Second epidural work

- Epidural or CSE
## Local Anesthetics vs. C. section rate

<table>
<thead>
<tr>
<th>Bupivacaine Concentration</th>
<th>Period</th>
<th>C section rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5%</td>
<td>1970s</td>
<td>~6-7</td>
</tr>
<tr>
<td>0.25%</td>
<td>1980s</td>
<td>~10%</td>
</tr>
<tr>
<td>0.125%</td>
<td>1990s</td>
<td>~15%</td>
</tr>
<tr>
<td>0.1%</td>
<td>2000s</td>
<td>~20</td>
</tr>
<tr>
<td>0.625%</td>
<td>Late 2000s</td>
<td>~30</td>
</tr>
</tbody>
</table>
Contraindications to RA

- Soften over years

- Especially when the risks of RA (not only the benefits of RA) outweighs the risks of GA

Situations

- Hypovolemia, hemodynamic instability, severe hemorrhage
- Low platelet count
- Maternal Coagulopathy √√√
- Cardiac diseases
- Febrile parturient
- Localized infection √
- Patient refusal √√
- Neurological diseases/ Back problems
Hypovolemia

Active hemorrhage
- Most will agree

Expected hemorrhage
- Placenta accreta/increta/percreta
- Anterior placenta previa
  - ~ 50% anesthesiologists prefer GA over RA
  - Some evidence in favor of RA
    - Less blood loss
Platelet Count and Coagulopathy

- **Chronic Thrombocytopenia as in ITP**
  - ? 50-55,000/mm³

- **Acute Thrombocytopenia as in PIH**
  - ~ 71,000/mm³

- **Role of platelet function analysis**
  - TEG
  - PFA-100

- **Other maternal coagulopathies**
Anticoagulants versus RA

- **Heparin**
  - > 5000 BID - unpredictable

- **Low Molecular Weight Heparin**
  - Predictable
  - Prophylactic 12 hours and therapeutic 24 hours

- **Aspirin**
Patient Refusal

- Medico legally strongest contraindication

- Must remember patient autonomy
  - Education (medical and community)
  - Facts versus scare ?????????
Febrile Parturient

- Arbitrary 100.8 cut off point

- Latest recommendations
  - No obvious septicemia
  - Antibiotic on board for an hour
  - Trend showing temp ↓
Cardiac Diseases

Drop in SVR contraindicated

- Mitral stenosis
- Pulmonary hypertension
  - Eisenmenger’s syndrome
  - Primary pulmonary hypertension
- Severe aortic stenosis

Careful titration of drug, block level, preload and resistance guided by invasive monitoring
Harrington’s road insertion

- Lowest level
- Spinal
- CSE
- Spread of epidural injection of drugs
Neurological Diseases

- High ICP
  - Increase in ICP during epidural injection
  - Dural tap versus herniation

- Actual worsening of disease (MS) versus blame

- Resistance to drugs
NPO during Labor

Pros and Cons
Parturients Should Be NPO During Labor

- Pulmonary Aspiration may be life-threatening

- Labor and the analgesics employed for pain relief delay gastric emptying significantly

- It is not always possible to employ a regional technique for cesarean section

Ergo, parturient should be NPO
Parturients Should Not Be NPO During Labor

- Labor is a stressful high-energy state requiring metabolic support.
- Fasting produces adverse metabolic effects that can alter labor progression.
- Strict NPO states are highly stressful to the mother who is already in an emotionally stressed state.

Ergo, parturient should NOT be NPO.
Current Practices

- The vast majority of labor units allow some level of oral intake (96.4%)
- The most common policy is clear liquids only (64.7%)
- Specified food and drink (27.3%)
- Unlimited food and drink (4.3%) and strict NPO (3.6%) policies are rare
Post Partum BTL
General Anesthesia

CDC

- Deaths attributed to BTL 1977-1981
- 11/29 deaths general anesthesia
- 4/11 in postpartum period
Consider

**Pro**

- Easy
- Cost and convenience
- Reimbursement
- Serious complications lower than laparoscopy – CDC 1987
- No problem of patient follow-up

**Cons or Disadvantages**

- Neonatal status
- Patient ambivalent or unsure
- Uterine atony
- PPH
- Non medical issues – consent
Preoperative Evaluation

- Blood loss underestimated
- HCT > 4 hours after delivery
- Hemodynamic stability
- Orthostatic hypotension
- Fever
- Neonatal status
## Favorable or Unfavorable Changes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Immediate</th>
<th>6 – 24 hours</th>
<th>After 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss &gt; 1000mL</td>
<td>U</td>
<td>~</td>
<td>F</td>
</tr>
<tr>
<td>CVS</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>PIH</td>
<td>U</td>
<td>U</td>
<td>F</td>
</tr>
<tr>
<td>Respiratory</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>General Anesthesia</td>
<td>U</td>
<td>U</td>
<td>F 48 hours</td>
</tr>
<tr>
<td>Epidural</td>
<td>F</td>
<td>U</td>
<td>F</td>
</tr>
<tr>
<td>Spinal after epidural</td>
<td>U</td>
<td>F*</td>
<td>F*</td>
</tr>
<tr>
<td>GI changes</td>
<td>U</td>
<td>U</td>
<td>F</td>
</tr>
<tr>
<td>Patient unsure</td>
<td>U</td>
<td>U</td>
<td>F</td>
</tr>
<tr>
<td>Patient comfort/feeding</td>
<td>~</td>
<td>~</td>
<td>~</td>
</tr>
<tr>
<td>Neonatal effect</td>
<td>U</td>
<td>U</td>
<td>F</td>
</tr>
</tbody>
</table>
Epidural Catheter Reactivation

- Contrary evidence
- Maximum success within first 4 hours
- Success declines rapidly after 8 hours
- Definitely declines after 20 hours
- Difference is the length of catheter in space

Kopaez DJ, Reg Anesth: 1990
Vincent RD, J Clin Anesth: 1993
Lawlor M, Reg Anesth: 1994
General Anesthesia

- ↑ Risk of Aspiration

- Delayed gastric emptying: contrary evidence
  - Opiates during labor

- Gastric volume and pH
  - Risk of aspiration ↓ after 9-12 hours

- Reflux returns to normal at 4 hours
Summary

We can modify as per needs of women in latent phase of labor
  - Use of CSE technique
  - PLEASE CALL US

We can help them achieve quick pain relief when 9 cm
  - CSE technique
  - PLEASE INFORM US AT 8 CM
    and PLEASE PLEASE stop using your crystal balls

Legs too numb
  - PLEASE LET US EVALUATE- We can help
Thank you