Obstetric Emergencies
for Every Provider

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Disclosure

I have no financial relationships with manufacturers of pharmaceuticals or devices.
OB Emergencies

Non Hemorrhagic Emergencies
• Fetal distress
• Impending fetal distress (2nd twin is breech, etc)

Hemorrhagic Emergencies
• Placental abruption
• Placenta previa
• Placenta acreta (increta, percreta)
• Retained placenta
• Uterine rupture
• Uterine atony

Indications for Immediate Cesarean Delivery
• Persistent FHR < 80 beats/min
• Frequent repeated late decelerations with poor FHR variability
• Maternal hemorrhage
• Impending vaginal delivery when vaginal delivery is contraindicated
  – Placenta previa
  – Frank breech presentation
  – Active herpes
Anesthesia for Emergency Cesarean Section
Choice usually based on
• Urgency of situation
  – Speed of onset:
    GA > existing epidural > spinal > new epidural
• Maternal intravascular volume status
  – Hypovolemia is usually considered greater problem for regional anesthesia
• Coagulation status
  – Coagulopathy and thrombocytopenia can be contraindications to neuraxial block placement.

Epidural for Emergency Cesarean Section
• Extension of an existing epidural that is working well
• Dosing can begin before transport to the delivery room
  – increases chances of achieving sufficient block in time
  – risks hypotension or other regional anesthesia complications in transit.
• In very urgent cases prepare for general anesthesia and assess quality of block when surgery about to begin
Local Anesthetics for Epidural Anesthesia

• 2% lidocaine with or without epinephrine
  — Without epinephrine: higher pH, faster onset
  — With epinephrine: longer duration, easier to detect intravascular injection
• 3% 2-chloroprocaine
  — Fast onset but short duration often <1 hr
  — May interfere with effectiveness of epidural morphine
• 0.5% bupivacaine
  — Slower onset, longer duration.

• Typical dose usually 20 cc (15-30 cc range)
• Lower concentrations likely to give inadequate blocks.

Anesthesia for Emergency Cesarean Section

• Spinal anesthesia has rapid onset and in the right circumstances (cooperative patient with helpful anatomy, skillful provider, adequate preparation) placement can be rapid.

• The use of general anesthesia for cesarean section is now largely limited to patients who have a contraindication to regional anesthesia or to the most extremely urgent operations.
General Anesthesia for CS

- **Advantages:**
  - **Fast**
  - Few contraindications
  - Indefinite duration
  - Patient not awake

- **Disadvantages**
  - **Airway risks**
  - **Aspiration risks**
  - Patient not awake
  - Fetal uptake of anesthetics
  - Uterine relaxation from volatile agents
  - Drug interactions (e.g. neuromuscular blockers & MgSO₄)

Risks of General vs Regional Anesthesia

- General anesthesia is generally associated with more bad anesthesia outcomes
  - increased risk factors in obstetric patients
  - increased use of GA in high risk OB patients and emergent situations
**OB Anesthesia Deaths in US**


1\textsuperscript{st} national study in USA, performed by the CDC and National Pregnancy Mortality Surveillance System

Reviewed, where available:
Death certificates (1979-1990) for all pregnancy related deaths. Pregnancy outcome data for relation to anesthesia. (89\% avail.)
Number of live births from National Files of Health Statistics. Estimates of C/S rates, RA and GA rates from other surveys.

4097 deaths; 129 associated with anesthesia
Numbers, Case Fatality Rates, and Risk Ratios of Anesthesia-related Deaths during Cesarean Section Delivery by Type of Anesthesia: United States, 1979-1984 and 1985-1990

<table>
<thead>
<tr>
<th>Type of Anesthesia</th>
<th>Number of Deaths</th>
<th>Case Fatality Rate</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>33</td>
<td>20.0*</td>
<td>32.3*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95% CI</td>
<td>95% CI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.7 - 22.7</td>
<td>25.9 - 49.9</td>
</tr>
<tr>
<td>Regional</td>
<td>19</td>
<td>8.6†</td>
<td>1.9†</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95% CI</td>
<td>95% CI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.8 - 9.4</td>
<td>1.8 - 2.0</td>
</tr>
</tbody>
</table>

CI = confidence interval
*Per million general anesthetics for cesarean section
†Per million regional anesthetics for cesarean section

Hawkins et al., 1997
Limitations

Limitations of the Hawkins study:

• Numbers are estimates
• Types of anesthesia from independent surveys
• Data on who provided anesthesia is lacking
• Details on the actual events often sparse

Nonetheless:

Maternal Anesthetic Mortality in UK

Lyons and Akerman 2005, Minerva Anestesiol 71:27
Anesthesia for Fetal Stress / Distress

Regional anesthesia safe in chronic fetal stress.

General anesthesia usually preferred in dire distress - placental abruption, severe fetal bradycardia, uterine rupture.

Intermediate degrees of distress often managed well with regional anesthesia.

Consider early use of epidural anesthesia in patients at high risk of operative delivery

Peripartum Hemorrhage

- Hemorrhage has been one of the leading causes of maternal mortality since records have been kept
- #1 cause of maternal death worldwide
- A major cause of maternal death in developed and developing countries
- ~125,000 deaths per year
- Affects 5-15% of women giving birth
- Increases morbidity in ~20,000,000 women
Placental Abruption

• *Aka* abruptio placentae, accidental hemorrhage (UK)
• “Premature separation of the normally implanted placenta”. Different from placenta previa in that placenta is implanted some distance beyond the cervical internal os.
• Frequency ≈ 1 in 100-200 deliveries
• 10 – 12% of all third-trimester stillbirths
• Requires “emergent” CS if fetus viable and vaginal delivery not imminent
• May require maternal transfusion & resuscitation

Placenta Previa

Placenta implanted over or very near internal cervical os.
Risk of major antepartum bleed

<table>
<thead>
<tr>
<th>Cervical os – edge of placenta:</th>
<th>&lt;10 mm</th>
<th>10-20 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of bleeding:</td>
<td>29%</td>
<td>3%</td>
</tr>
<tr>
<td>Will require cesarean:</td>
<td>75%</td>
<td>31%</td>
</tr>
</tbody>
</table>

**Therapy:**
Elective delivery at 36 weeks.
Risk from fetal lung immaturity < risk from hemorrhage.
Placenta Previa, Prior Cesarean Section and Placenta Accreta

<table>
<thead>
<tr>
<th># Prior C/S</th>
<th># Patients with placenta previa</th>
<th># Patients with placenta accreta</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>238</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>7</td>
<td>47</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>67</td>
</tr>
</tbody>
</table>


Placenta Accreta

Abnormally adherent placenta

Normal decidua

Increta 17%

Accreta 78%

Percreta 5%
Placenta Accreta

Incidence: ~ 1/500
~35 % not confirmed at the time of surgery or pathology

Risk Factors:
• Previous cesarean (1 CS: 0.3%, 2 CS: 0.6%, 3 CS: 2.4%)
• Low lying placenta/placenta previa
• Maternal age > 35 years
• High parity-gravidity
• History of uterine curettage
• High 2nd-trimester AFP and β-hCG
• Previous uterine surgery
• Uterine fibroids
• IVF pregnancy

Placenta Accreta

Maternal Complications:
• Postpartum hemorrhage
• Maternal mortality (0 - 4.25% in Western nations)
• Increased rate of required uterine curettage

Treatment:
• Cesarean hysterectomy at 34 – 37 weeks
  – Decreased blood loss and morbidity if planned
  – Preoperative balloon catheters into the internal iliac arteries may decrease blood loss and shorten surgery
  – Conservative treatment should only be attempted in high risk centers prepared for sudden severe hemorrhage
**Uterine rupture**

Rare when no history of uterine surgery or trauma

Associated with
- Direct or blunt trauma
- Excessive fundal pressure, version
- Forceps, curettage or other intrauterine injury
- Inappropriate oxytocin
- Uterine anomaly
- Placenta percreta
- Tumors
- Fetal macrosomia, malposition, anomaly

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**Retained Placenta**

- ~ 1% of deliveries
- Bleeding usually slow but persistent
- Usually requires manual extraction of remaining placenta
- Anesthesia often needed for extraction
  - Good reason to delay removal of labor epidural for 30-60 minutes after delivery
- Uterine relaxation sometimes needed
  - Inhalation anesthesia gives excellent relaxation
  - Nitroglycerine 50-150 μg iv gives good relaxation
Uterine atony
Drugs to treat hemorrhage from uterine atony

• Oxytocin (Pitocin)
  – Pituitary hormone
  – 10 – 40 units/liter continuous infusion
  – Direct bolus injection (> 5 units) associated with maternal hypotension and possible death

• Methylergonovine (Methergine)
  – Ergot alkaloid; smooth muscle constrictor active also on vascular smooth muscle. Can cause vasospasm, severe hypertension if overdose or given i.v. Avoid in hypertension.
  – 0.2 mg IM repeat up to every 2 hrs

Uterine atony

• 15-methyl PGF$_{2\alpha}$ (Carboprost, Hemabate)
  – Prostaglandin F$_{2\alpha}$ analog, smooth muscle constrictor active also on bronchial smooth muscle. Can cause/exacerbate bronchospasm. Avoid in asthma.
  – 0.25 mg IM. May repeat every 15 – 90 minutes up to 8 doses.

• Dinoprostone (Cervidil, Prepidil, Prostin E$_2$)
  – 20 mg vaginal or rectal suppository, may repeat every 2 hours.
  – Stored frozen, must be thawed.
Uterine atony

- Misoprostol (Cytotec)
  - Prostaglandin E₁ analog
  - 800-1000 mcg rectally or sublingually, single dose
  - The only prostaglandin for uterine atony that can be stored at room temperature
  - Caution giving sublingually in patients under GA (aspiration risk)

Uterine atony: Surgical options

- Uterine tamponade
  - Gauze packing ± soaked in saline/thrombin 5000 units/5 ml
  - Foley catheter; one or more, inflated
  - Sengstaken-Blakemore tube
  - SOS Bakri tamponade tube

- Uterine curettage
- Uterine artery ligation
- B Lynch suture (uterine corpus compression)
- Hysterectomy
Uterine Tamponade Devices

Massive Transfusion Protocol

- Once initiated, Anesthesia, OB, Nursing, Blood Bank, Pathology, etc. all working from a written protocol.
- Protocol readily available (i.e. by computer).
- Pre-set amounts of blood products are prepared automatically
- Blood products prepared automatically, laboratory prepared to process samples quickly, ancillary personnel made available.
Massive Transfusion Protocol

<table>
<thead>
<tr>
<th>Set</th>
<th>Blood Components</th>
<th>Blood Bank Personnel</th>
<th>Clinician</th>
<th>Pathology Resident</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Female: O Neg</td>
<td>3 Type compatible or AB</td>
<td>Dispense set 1: Prepare set 2.</td>
<td>Notify Blood Bank (F 20-256): MTP Female or MTP Male. Draw 3 type and screen and send to Blood Bank via pneumatic tube. Send smear to Iowa Blood Bank to deliver sample if set sent via pneumatic tube and picking up Coder set 1. Send PT/INR and platelet count. Consider screening FVIIa.</td>
<td></td>
</tr>
<tr>
<td>2 Male: O Pos</td>
<td>3 Type compatible or AB*</td>
<td>Dispense set 2: Prepare set 3.</td>
<td>Send smear to Iowa Blood Bank to pick up set 2 or cancel MTP.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 Type compatible</td>
<td>Dispense set 3** Cell is deemed if to unit of CRVO is desired Prepare set 4.</td>
<td>Send smear to Iowa Blood Bank to pick up set 3 or cancel MTP. Review completion parameters (PT/INR) and give platelet transfusion.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3 Type compatible</td>
<td>If requested, 5 pool of 6</td>
<td>Dispense set 4*** Prepare set 5.</td>
<td>Send smear to Iowa Blood Bank to pick up set 4 or cancel MTP. Consider reporting FVIIa dose if applicable.</td>
</tr>
<tr>
<td>5</td>
<td>3 Type compatible</td>
<td></td>
<td>Dispense set 4*** Send further order.</td>
<td>Send smear to Iowa Blood Bank to pick up set 5 or cancel MTP.</td>
</tr>
</tbody>
</table>

*Plasma will not be sent after the 2nd set until type and screen sample is received in main Blood Bank
**If patient is an OR, first call OR to arrange when to send set 3, 4 and 5.

University of Iowa Hospitals and Clinics

Summary

- Fetal distress and/or maternal hemorrhage often require immediate cesarean delivery.
- General anesthesia offers greatest speed but may be associated with greater maternal risk.
- Epidural anesthesia using already-in-place catheter is often a good alternative.
- If time allows, spinal anesthesia is most commonly used.
- Hypovolemia, ongoing hemorrhage favor the use of general anesthesia.
- Be prepared for massive hemorrhage. Establish a massive transfusion protocol.