Placenta Percreta

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Issues

- Prediction – markers and risk factors
- Diagnosis – US versus MRI
- Delivery time – new recommendations from NIH working group (Belfort 2011)
- Management – aggressive or conservative?
  - Regionalization of care with Centers of Excellence
  - Preparation and technique
  - Staged Hysterectomy and embolization
  - Dealing with DIC and post hysterectomy bleeding
Maternal death in the 21st century: causes, prevention, and relationship to cesarean delivery

Steven L. Clark, MD; Michael A. Belfort, MD; Gary A. Dildy, MD; Melissa A. Herbst, MD; Janet A. Meyers, RN; Gary D. Hankins, MD

FIGURE

Relationship of maternal deaths to gestational age

![Graph showing the relationship of maternal deaths to gestational age.](image)

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complications of preeclampsia</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Amniotic fluid embolism</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Obstetric hemorrhage</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Pulmonary thromboembolism</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Nonobstetric infection</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Obstetric infection</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Accident/suicide</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Medication error or reaction</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>95</td>
<td>100</td>
</tr>
</tbody>
</table>

Frequency of Placenta Accreta cases referred to BCM tertiary centers from 2000 to 2013
Preventable Deaths

- **Berg et al 2005:**
  - Studied 108 maternal deaths NC 1995-1999
  - 93% PPH deaths preventable

- **Clark et al 2008:**
  - Studied 95 maternal deaths USA 2000-2006
  - 73% PPH deaths preventable
C/S and Placenta Previa / Accreta

If previa, incidence of accreta (%)

Number of prior cesareans

Clark et al 1985

Silver et al. 2006
Risk Factors for Accreta

- Placenta previa - 75%
- Prior cesarean section - 66%
- Prior accreta
- Prior myomectomy, manual removal of placenta, D+C, cornual resection, endometritis
- Prior hysteroscopic surgery, endometrial ablation
- Prior pelvic irradiation
- Uterine anomaly - Rudimentary uterine horn
Placenta percreta and rupture of rudimentary left horn
Bottom Line

- No universal predictor – clinical suspicion and early ultrasound for placental location

- Combination of placenta previa and abnormal markers in a patient with prior uterine surgery should be a warning
Diagnosis

- **2D Ultrasound associations:**
  1. Obliteration of retroplacental clear space
  2. Myometrial thickness < 1mm
  3. Vessels bridging placenta/uterine margin
  4. Disruption of placenta/uterine wall interface
  5. Vessels crossing sites of interface disruption

- 2 main discriminators are the last two

Wong et al: Journal of Clinical Ultrasound 2008;36:551-559 (Level II-3)
3D Power Color Doppler

- **Significant associations:**

  1. Numerous coherent vessels

  - Sensitivity = 97%, Specificity = 92%
  - and Predictive Positive Value = 76%

Percreta - 3D power Doppler

Percreta – Same Patient

MRI versus Ultrasound

- US usually sufficient for anterior placentas
- MRI for posterior and lateral invasion
Multidisciplinary Team Approach

- OR staff and Blood Bank Staff
- CV and Ob Anesthesia Service
- Urology Service
- Vascular Surgery Service/GYN Oncology
- Interventional Radiology Service
- CV and Pulmonary Critical Care
- Neonatology and NICU Service
Antepartum Management

- Similar to that for placenta previa

- Steroids as appropriate and MgSO4 for cerebral protection if delivery anticipated before 32 weeks

- In-house management?
  - Case dependent if bleeding
  - Stable: Admit 33 weeks, deliver at 34 – 35 wks
    - O’Brien (1996) – 93% > 35 weeks hemorrhaged
    - Warshack (2010) – 44% >36 weeks hemorrhaged
    - Robinson (2010) – decision analysis - 34 weeks
    - Belfort (2011) – 34 -35 weeks (NIH Workshop)
Pre-Op Management

- **Fetal - Neonatal Considerations**
  - Delivery at 34-35 weeks
  - No Amniocentesis
  - NICU available

- **Preoperative preparation for blood loss**
  - Prenatal vitamins, iron, iron-dextran ± EPO
  - Homologous blood product availability
  - Factor VIIa availability
Pre-Op Management in OR

- Maternal Preparation
  - Adequate IV access, A-line, central line Quad sheath
  - General endotracheal anesthesia +/- epidural (pain Mx)
  - DVT prophylaxis (“plexipulse”)
  - Shock trauma blood infusers and cell saver
  - Controlled OR and maternal body temperature

- Intraoperative management for blood loss
  - Combined embolization and surgery
  - Pelvic pressure pack equipment
  - Vascular sets and other specialized equipment
Operative Management

- Surgical technique:
  - General anesthesia
  - Cystoscopy & ureteral stents (Eller et al BJOG 2009)
  - Modified lithotomy/”frog leg” position
  - Adequate operative field exposure – midline/paramedian
  - Posterior CS approach
  - Leave placenta *in situ*
  - Pack vagina (Pelosi 1999) – Rumi Ring (unpublished data)
  - No benefit: routine balloons/hypogastric ligation
  - Modified radical hysterectomy technique – wide margins
  - Resect bladder invasion rather than dissect
Pack the Vagina

High hysterotomy
Placenta is not removed

bladder

packing
# Staged Hysterectomy


<table>
<thead>
<tr>
<th></th>
<th>Cases N = 8</th>
<th>Controls N = 18</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated blood loss (ml)</td>
<td>533 +/- 119</td>
<td>4517 +/- 711</td>
<td>0.0001</td>
</tr>
<tr>
<td>Transfused PRBCs</td>
<td>0.5 +/- 0.38</td>
<td>7.9 +/- 1.8</td>
<td>0.001</td>
</tr>
<tr>
<td>Need for transfusion</td>
<td>2/8 (25%)</td>
<td>16/18 (89%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Intensive care unit</td>
<td>1</td>
<td>7</td>
<td>0.16</td>
</tr>
<tr>
<td>Operating time</td>
<td>2.7 +/- 0.3</td>
<td>2.9 +/- 0.4</td>
<td>NS</td>
</tr>
<tr>
<td>Anesthesia time</td>
<td>6.6 +/- 0.4</td>
<td>2.7 +/- 0.3</td>
<td>0.0001</td>
</tr>
<tr>
<td>Days in hospital</td>
<td>6.6 +/- 0.8</td>
<td>8.3 +/- 0.5</td>
<td>NS</td>
</tr>
</tbody>
</table>
Intra Operative Blood Loss Mx

- Avoid dilutional coagulopathy !!!!!!!
  - check Hct/platelets/PT/PTT/fib/ABG q 15 min.
  - Avoid acidosis (bicarb if needed) and hypothermia
  - Transfuse FFP/cryoprecipitate/platelets early in heavy bleeding (1 unit FFP for every 4 units PRBC’s)
  - don’t hesitate to use Factor VIIa
  - Use cryoprecipitate if coagulopathic – FFP is not enough to normalize very low fibrinogen!
Intra Operative Electrolyte Mx

- Monitor ionized calcium at baseline and q15 min. during massive transfusion (treat aggressively any ionized calcium < 1 (normal 1.1 – 1.3 mmol/l) – risk of cardiac arrest
  - 10% CaCl -1g (1g/10ml vial CaCl2 in 100cc saline over 2 - 5 minutes via central line)
  - 10% Ca gluconate (1g/10ml) - 1-2 g over 2-3 minutes IV for every 4 U PRBC’s (Elmer et al 2013)
- Hypocalcaemia (0.77 mmol/l, SD 0.19) has a linear; concentration-dependent relationship with mortality
  - more important than the lowest fibrinogen concentrations, acidosis and lowest platelet counts in predicting hospital mortality
  - OR = 1.25 per 0.1 mmol/l decrement, CI: 1.04 to 1.52; P = 0.02

Ho and Lenard. 2011
Concentration-dependent effect of hypocalcaemia on mortality of patients with critical bleeding requiring massive transfusion: a cohort study

K. M. HO*, A. D. LEONARD†
Hyperkalemia: Cardiac Arrest

- 16 transfusion-associated hyper K+ cardiac arrests
- Cancer, major vascular, and trauma
- Mean K+ was 7.2 +/- 1.4 mEq/L (5.9-9.2 mEq/L)
- Number of RBC units before cardiac arrest between 1 - 54
- Nearly all patients were acidotic, hyperglycemic, hypocalcemic, hypothermic at the time of arrest
- Fourteen (87.5%) received RBC via central venous access.
- Commercial rapid infusion devices (pumps) used in 73%, but RBC units were rapidly administered (pressure bags, syringe pumped) in all patients.
- The in-hospital survival rate was 12.5% (Mayo Clinic)

Hyperkalemia: Cardiac Arrest

- $[K^+]$ (in mmol/L) increases linearly from 2 to 45 mEq/l) over 2 to 42 days of RBC unit storage.

- Irradiation causes a rapid increase in $[K^+]$.

- Sufficient K+ in supernatant of RBC packs to lead to hyperkalemia with large volumes.

- Usually transient due to the redistribution of the potassium load; hyperkalemic cardiac arrests.
Intra Operative Electrolyte Mx

- Prevention: RBC washing, in-line K+ filter

- For high potassium:
  - D10 (glucose) 500 mL + regular insulin 10 U over 60 min. Bolus of regular insulin 10 U may also be used
  - Correct acidosis by bicarbonate
  - Calcium infusion as mentioned above
Intra Operative Blood Loss Mx

- stop and wait for resolution of coagulopathy if possible – pelvic pressure/aortic occlusion, pack

- do not hesitate to use staged procedure with pressure pack placement
Intra Operative Blood Loss Mx

- Rapid Transfusion Devices:
  - More questions than answers regarding use in obstetrics
  - What is the optimum flow rate?
  - Vascular damage from massive rates > 700cc/min?
  - Hemodynamic response to massive transfusion?
Deliberate Cystotomy
POSTPARTUM HEMORRHAGE
Pelvic Pressure Pack
POSTPARTUM HEMORRHAGE
Pelvic Pressure Pack
COI Statement: I am the patent holder of this device and own stock in Glenveigh Medical
Unsuspected Increta/Percreta

- What about conservative therapy?
  - close the uterus and use methotrexate
  - supracervical hysterectomy and methotrexate
  - close uterus and do arterial embolization
  - Close uterus and tie hypogastric arteries
  - Close up and do radiofrequency ablation
  - Place an intrauterine tamponade balloon

- Anecdotal reports - not much in print

- Publication bias
  - more likely to publish a success than a failure
Methotrexate After C/S

- **Limited to case reports – 2007 (22 cases):**
  - 5/22 failure: infection, DIC, hemorrhage
  - Publication bias – be very cautious

- **Pros:**
  - avoid increased vascularity/decrease massive hemorrhage
  - less bulky lower uterine segment and ? technically easier surgery
  - allow time to transfer to a specialized unit

- **Cons:**
  - risk of DIC and uncontrolled bleeding, pneumonitis, toxicity
  - risk of infection and intra-abdominal abscesses
  - minimal placental shrinkage – risk of toxicity and immune issues
  - tissue is softer and more difficult to work with