The Morbidly Adherent Placenta

Tripp Nelson, MD
Maternal-Fetal Medicine Fellow
Medical University of South Carolina
Disclosure

• I have no relevant financial disclosures.
Objectives

- Historical Perspective
- Epidemiology and pathophysiology
- Diagnosis and imaging modalities
- Delivery planning and management
- Adjuvant Therapies
Accreta: Organic or Man Made?

• A disease of the 20th century
• 1937 – case series of 20 patients by Irving and Hertig
  – “abnormal adherence, either in whole or in part, of the afterbirth to the underlying uterine wall”

• First cases occurred approx 2 decades after Pfannenstiel and Kerr papers updated cesarean technique
Morbidly Adherent Placentation

- Abnormal attachment of the placental villi directly to the myometrium due to an absence of decidua basalis and an incomplete development of the fibrinoid layer
Types

- Normal: 82%
- 1 Accreta: 12%
- 2 Increta: 6%
- 3 Percreta:
Epidemiology

• Incidence 1:533
• Largest risk factors =
  – **Previa + Previous cesarean section**
  – Increasing parity
  – Increased maternal age
  – Other prior uterine surgery
  – IVF
  – UAE, endometrial ablation
  – Chemotherapy/prior pelvic radiation
  – Adenomyosis/fibroids
Cesarean Delivery on the rise...

Accreta outpacing cesarean

Wu et al, Am J Obstet Gynecol, 2005
How does previous CD affect risk?

<table>
<thead>
<tr>
<th>No. of Prior Cesarean Delivery</th>
<th>Accreta Risk (%) No previa</th>
<th>Accreta Risk (%) Previa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.03</td>
<td>3.3</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>0.1</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>0.8</td>
<td>61</td>
</tr>
<tr>
<td>5</td>
<td>0.8</td>
<td>67</td>
</tr>
<tr>
<td>6+</td>
<td>4.7</td>
<td>67</td>
</tr>
</tbody>
</table>

Diagnosis

• Antepartum Diagnosis is of paramount importance!
  – Multiple studies demonstrate improved maternal outcomes with antepartum vs. intra-partum dx
    • Decreased hemorrhage
    • Overall decreased maternal morbidity
  
  – Exclusion of diagnosis equally important
    • Prevent iatrogenic prematurity
    • Reduce invasive maternal procedures
    • Appropriate allocation of resources
Modalities for diagnosis

- Ultrasound
  - Gestalt
  - Standardized scoring

- MRI
  - More limited resource
  - Accurate interpretation requires experience
Ultrasound

• Gold standard for diagnosis

• Sensitivity 77-90%, Specificity 71-97%
  – Depends on placenta location

• In general evaluate:
  – Loss of hypo-echoic retro-placental myometrial zone
  – Thinning, disruption of serosa-bladder interface
  – Increased vascularity at uterine-bladder interface
  – Increased intra-placental vascular lacunae
Ultrasound
Ultrasound predictors of placental invasion: the Placenta Accreta Index

- Retrospective review of 184 gravidas with >1 prior cesarean + previa or low lying placenta
  - Published in 2015
  - Investigators reviewed US images blinded to pregnancy outcome
  - Placental Accreta Index developed with logistic regression
  - 54 (29%) had invasion confirmed on pathologic assessment

PAI Index Calculation

- Value of each parameter is added together to generate the overall PAI score

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 2 cesarean deliveries</td>
<td>3.0</td>
</tr>
<tr>
<td>Lacunae</td>
<td></td>
</tr>
<tr>
<td>Grade 3</td>
<td>3.5</td>
</tr>
<tr>
<td>Grade 2</td>
<td>1.0</td>
</tr>
<tr>
<td>Sag Smallest Myometrial Thickness</td>
<td></td>
</tr>
<tr>
<td>&lt;1mm</td>
<td>1.0</td>
</tr>
<tr>
<td>&lt;1 but &gt;3mm</td>
<td>0.5</td>
</tr>
<tr>
<td>&gt;3 but &lt;5mm</td>
<td>0.25</td>
</tr>
<tr>
<td>Anterior placenta previa</td>
<td>1.0</td>
</tr>
<tr>
<td>Bridging vessels</td>
<td>0.5</td>
</tr>
</tbody>
</table>
## Ultrasound predictors of placental invasion: the Placenta Accreta Index

<table>
<thead>
<tr>
<th>PAI</th>
<th>Probability of invasion</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;0</td>
<td>5%</td>
<td>100%</td>
<td>19%</td>
<td>38%</td>
<td>100%</td>
</tr>
<tr>
<td>&gt;1</td>
<td>10%</td>
<td>97%</td>
<td>47%</td>
<td>47%</td>
<td>97%</td>
</tr>
<tr>
<td>&gt;2</td>
<td>19%</td>
<td>93%</td>
<td>58%</td>
<td>52%</td>
<td>94%</td>
</tr>
<tr>
<td>&gt;3</td>
<td>33%</td>
<td>86%</td>
<td>68%</td>
<td>57%</td>
<td>91%</td>
</tr>
<tr>
<td>&gt;4</td>
<td>51%</td>
<td>72%</td>
<td>85%</td>
<td>70%</td>
<td>86%</td>
</tr>
<tr>
<td>&gt;5</td>
<td>69%</td>
<td>52%</td>
<td>92%</td>
<td>75%</td>
<td>79%</td>
</tr>
<tr>
<td>&gt;6</td>
<td>83%</td>
<td>31%</td>
<td>100%</td>
<td>100%</td>
<td>75%</td>
</tr>
<tr>
<td>&gt;7</td>
<td>91%</td>
<td>24%</td>
<td>100%</td>
<td>100%</td>
<td>73%</td>
</tr>
<tr>
<td>&gt;8</td>
<td>96%</td>
<td>17%</td>
<td>100%</td>
<td>100%</td>
<td>71%</td>
</tr>
</tbody>
</table>

Validation of the PAI

- Retrospective blinded review of MUSC patients with previa/accreta
- 2005-15 – identified 66 cases
- 3 independent MFM reviews for PAI score

- Pre PAI implementation – 66% accurate
- Post PAI implementation – 80.3% accurate
Validation of the PAI
MRI

• 11 studies evaluating MRI evaluation of invasive placentation
• Sensitivity: 78-93%
• Specificity: 77-100%
MRI

• Utilize selectively, not universally
  – Improved evaluation of posterior placentation

• Drawbacks:
  – Requires radiologist expertise in placental imaging
  – Later GA (28-32 weeks)
  – Maternal discomfort
  – Cost
Clinical Management
Management Goals

1. ANTEPARTUM DIAGNOSIS

1. Balance risks of prematurity while avoiding need for emergency delivery due to labor or bleeding
• Review of all accreta cases in Utah 1996-08

• Compared cases managed:
  – 1. multi-disciplinary care team at 2 tertiary hospitals
  – 2. similar cases managed at 26 other hospitals
Early morbidity = ICU admit >24 hrs, transfusion >4uPRBC, coagulopathy, ureteral injury, reoperation within 24 hrs
### Suggested criteria for accreta center of excellence

1. **Multidisciplinary team**
   - a. Experienced maternal-fetal medicine physician or obstetrician
   - b. Imaging experts (ultrasound)
   - c. Pelvic surgeon (i.e., gynecologic oncology or urogynecology)
   - d. Anesthesiologist (i.e., obstetric or cardiac anesthesia)
   - e. Urologist
   - f. Trauma or general surgeon
   - g. Interventional radiologist
   - h. Neonatologist

2. **Intensive care unit and facilities**
   - a. Interventional radiology
   - b. Surgical or medical intensive care unit
     - i. 24-h availability of intensive care specialists
   - c. Neonatal intensive care unit
     - i. Gestational age appropriate for neonate

3. **Blood services**
   - a. Massive transfusion capabilities
   - b. Cell saver and perfusionists
   - c. Experience and access to alternative blood products
   - d. Guidance of transfusion medicine specialists or blood bank pathologists

Timing of Delivery

Robinson, BK and Grobman WA, Obstet Gynecol, 2010
Peri-Operative Considerations

- OB or cardiac anesthesia
  - Preoperative consultation
- Neonatology
- Consideration of betamethasone course
- Large bore IV access / central line
- Availability of significant blood products
- General anesthesia
- Skin Incision
- Hysterotomy
- ICU available for recovery
Leave the placenta ALONE!

• Manual removal of the placenta
  – Increases maternal morbidity 67% vs 36% (p=0.04)
    • ICU admission for >24hrs
    • Massive Transfusion (>4uPRBC)
    • Coagulopathy
    • Ureteral Injury
    • Early re-operative

Eller, AG, et al. BJOG, 2009
Intra-operative Diagnosis

- **Delay** uterine incision if things look abnormal
  - Distorted/ballooned LUS
  - Blood vessels on uterine serosa
  - Bladder or surrounding tissue invasion
- Evaluate for active bleeding
- Determine availability of resources
  - Blood, surgical assistance, equipment
  - If patient stable, facility unprepared – consider fascial closure, transfer to tertiary care center
Adjuvant Therapies
Ureteral Stenting

- Risk of overall ureteral injury 29%
- Antenatal Dx decreases risk 39% vs 63% (p=0.04)
- Preoperative stent placement:
  - Decreased risk of injury (6% vs 33%) (p=0.01)

Vessel Occlusion

• Goal = decreased uterine perfusion
• Accomplished with balloon occlusion or embolization of uterine or internal iliac artery
• Controversial –
  – Critics site collateral uterine blood flow and risk of complications
    • Arterial rupture
    • Pseudo-aneurysm formation
Conservative Management

- Appropriate for focal/limited disease
  - Curettage, wedge resection
- Desired future fertility?
  - At least a 20% recurrence risk
- Extreme percreta, unresectable disease
Considerations for uterine conservation

• No clear consensus or “best practice”
  – Often considered:
    • Utero-tonics
    • Prophylactic uterine artery embolization
    • Antibiotic therapy
    • Methotrexate administration*
    • Inpatient vs outpatient
    • Serial lab assessment
    • Interval to hysterectomy
Maternal Morbidity with Conservative Management

- **Sentilhes et al**: n=167
  - 51% PPH
    - 40% transfusion, 15% >5uPRBC
  - 44% with secondary PPH
  - 65% required additional procedures
  - 28% infection, 4% sepsis
  - 2% DVT/PE
  - 1 maternal death (assoc with MTX use)

- **Pather review**: n=57
  - 60% delayed hysterectomy, 40% emergent

- **Clausen et al**: n=119
  - 58% delayed hysterectomy, 85% emergent
A word about Methotrexate

• Considered in therapy to increase rate of placental absorption
  – First described in 1986
• Contra-indicated in breast feeding
• Additional risks of pancytopenia, nephrotoxicity
• Mixed results in literature
• Largest cohort of conservative mgmt (Sentilhes)...
  – “no convincing evidence currently supports the efficacy of methotrexate in cases of placenta accreta”
Conclusions

• Attempt to prevent the first cesarean
• Antepartum Diagnosis
  – Always consider clinical history in US interpretation
  – Incorporate PAI scoring system
• When suspected MFM referral and tertiary care delivery
• Unsuspected cases – take time to assemble the troops
• Leave the placenta alone!
Maternal Outcome After Conservative Treatment of Placenta Accreta

- Retrospective multi-center French Trial
- 167 conservatively managed accreta
- 25% with more than 1 prior cd
- 55% had no prior imaging
- Successful in 78%
- Placenta absorption in 75%, avg 13.5 weeks

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Placenta Accreta, Including Percreta (n=167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysterotomy (n=139)</td>
<td></td>
</tr>
<tr>
<td>Fundal</td>
<td>71 (51.1)</td>
</tr>
<tr>
<td>Low transverse</td>
<td>68 (48.9)</td>
</tr>
<tr>
<td>Placenta left in situ</td>
<td>167 (100)</td>
</tr>
<tr>
<td>Partially</td>
<td>99 (59.3)</td>
</tr>
<tr>
<td>Entirely</td>
<td>68 (40.7)</td>
</tr>
<tr>
<td>Preoperative ureteric stent placement</td>
<td>6 (3.6)</td>
</tr>
<tr>
<td>Uterotonic administration</td>
<td>167 (100)</td>
</tr>
<tr>
<td>Primary postpartum hemorrhage</td>
<td>86 (51.5)</td>
</tr>
<tr>
<td>No additional uterine devascularization procedure</td>
<td>58 (34.7)</td>
</tr>
<tr>
<td>Additional uterine devascularization procedure</td>
<td>109 (65.3)</td>
</tr>
<tr>
<td>Pelvic arterial embolization*</td>
<td>62 (37.1)</td>
</tr>
<tr>
<td>Vessel ligation*</td>
<td>45 (26.9)</td>
</tr>
<tr>
<td>Stepwise uterine devascularization</td>
<td>15 (9.0)</td>
</tr>
<tr>
<td>Hypogastric artery ligation</td>
<td>23 (13.8)</td>
</tr>
<tr>
<td>Stepwise uterine devascularization and hypogastric artery ligation</td>
<td>7 (4.2)</td>
</tr>
<tr>
<td>Uterine compression suture*</td>
<td>16 (9.6)</td>
</tr>
<tr>
<td>Balloon catheter occlusion</td>
<td>0</td>
</tr>
<tr>
<td>Methotrexate administration</td>
<td>21 (12.6)</td>
</tr>
</tbody>
</table>

Cecil’s Pearls of Wisdom
Buy low and sell high

• Antepartum diagnosis is paramount in decreasing maternal morbidity and mortality
  – Use of PAI score to assist in diagnosis
Son, don’t peak too soon

- Any suspicion of accreta should be managed with multi-disciplinary care with delivery in a tertiary care center
Blind hogs and acorns

• While tempting, conservative management should be reserved for only the most severe cases
  – Avoid methotrexate therapy
NEVER GO CAMPING

WITH A C-SECTION BABY
Grading Systems

- Questionable clinical utility in the antepartum period
- Improving imaging technology makes more relevant
- Refer to grades of histological invasion by trophoblastic cells into the myometrium
Abnormal Placentation

• Risk factors well established...  
  ...but underlying mechanisms poorly understood

• Pathologic adherence likely involves:
  – Myometrial degenerative changes
    • Increased fibrous tissue deposits
    • Inflammatory cell infiltration
  – Abnormal cell signaling
    • VEG-F, EGF, sFlt-1

• All predisposes to
  – Total or partial loss of decidua
  – Increased depth of myometrial invasion

Jauniaux, E. and Jurkovic D. Placenta, 2011
Vessel Occlusion

• Small case-control study (n=117)
  – 59 pts managed with intraoperative uterine artery balloons (UAB)
  – UABs
    • Lower mean EBL (2165mL vs 2837mL, p=0.02)
    • More EBL>2500mL and massive transfusions (>6uPRBC) in non UAB group
    • 3% complication rate related to UAB
    • No difference in surgical time

Scope of the Problem

• Projections that cesarean rate will continue to climb
  – By 2020, US rate may approach 56.2%
  – Annual increase:
    • 6,236 placenta previas
    • 4,504 placenta accreta
    • 130 maternal deaths