PLACENTA ACCRETA:
Can Disasters Be Avoided?

Ware Branch, MD
Disclosures

• UCB Pharmaceuticals Advisory Board, 2016
Placenta Accreta

Definitions

- Placenta that is abnormally (“morbidly”) adherent to the uterus
  - Increta: Invades the myometrium
  - Percreta: Invades the serosa or adjacent organs (<10%)
- Accreta: All of the above

Oyalese and Smulian, Obstet Gynecol 2006;102:927
Placenta Accreta
Pathophysiology

- Absence or deficiency of Nitabuch’s layer of the decidua
  - Failure to reconstitute the endometrium-decidua basalis after insult
- Histology: trophoblast (usually) invades myometrium without intervening decidua
- Placenta does not separate: bleeding
Placenta Accreta

Incidence

- 1960s: 1 in 30,000 deliveries
- 1982 – 2002: 1 in 533 deliveries
- 2000 – 2010: 1 in 333 deliveries!

Miller et al, AJOG 1997;177:210
Wu et al, AJOG 2005;192:1458
Pub Committee SFMFM; Belfort, Am J Obstet Gynecol 2010;430-8
Placenta Accreta

Risk Factors

• Interruption of and subsequent scarring of the endometrial layer of the uterus
## Placenta Accreta

### Risk Factors

- Cesarean delivery
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Placenta Accreta

Risk Factors

- Cesarean delivery
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In 2007, the cesarean rate was the highest ever reported in the United States.

Figure 1. Cesarean delivery rates: United States, 1991–2007

Methods

- Prospective observational cohort
- MFMU
- 19 Academic medical centers
- 4 years (1999 – 2002)
- Daily ascertainment of CD
- Trained study nurses
- 378,168 births / 57,068 CDs
- No labor – 30,132 CDs

Silver et al, Ob Gyn 2006;107:1226
## Placenta Accreta

<table>
<thead>
<tr>
<th>Number of Cesareans</th>
<th>N</th>
<th>Accreta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6,195</td>
<td>15 (0.2%)</td>
</tr>
<tr>
<td>2</td>
<td>15,805</td>
<td>49 (0.3%)</td>
</tr>
<tr>
<td>3</td>
<td>6,326</td>
<td>36 (0.6%)</td>
</tr>
<tr>
<td>4</td>
<td>1,475</td>
<td>31 (2.1%)</td>
</tr>
<tr>
<td>5</td>
<td>260</td>
<td>6 (2.3%)</td>
</tr>
<tr>
<td>6 or more</td>
<td>89</td>
<td>6 (6.7%)</td>
</tr>
</tbody>
</table>

Silver et al, Ob Gyn 2006;107:1226
## Placenta Accreta

<table>
<thead>
<tr>
<th>Number of Cesareans</th>
<th>Previa</th>
<th>Accreta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>397</td>
<td>13 (3.3%)</td>
</tr>
<tr>
<td>2</td>
<td>212</td>
<td>23 (11%)</td>
</tr>
<tr>
<td>3</td>
<td>72</td>
<td>29 (40%)</td>
</tr>
<tr>
<td>4</td>
<td>33</td>
<td>20 (61%)</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>4 (67%)</td>
</tr>
<tr>
<td>6 or more</td>
<td>3</td>
<td>2 (67%)</td>
</tr>
</tbody>
</table>

Silver et al, Ob Gyn 2006;107:1226
Placenta Accreta
Clinical Outcomes

- Torrential obstetric hemorrhage
  - “Audible bleeding”
- Secondary complications of hemorrhage
  - DIC
  - Renal insufficiency/failure
  - ARDS
  - Death
- Need for hysterectomy
- Surgical complications
Placenta Accreta
Clinical Outcomes (76 cases)

- Maternal ICU admission: 18 (26%)
- Blood transfusion: 56 (82%)
- ≥ 4 Unit blood transfusion: 27 (40%)
- Coagulopathy: 20 (29%)
- Ureteral injury: 3 (4%)
- Infections: 18 (26%)
- Reoperation: 6 (9%)

Placenta Accreta

Clinical Outcomes

- Blood loss: 3,000 – 5,000 ml
- Average blood transfusion: 10 units
- Ureteral injury: 10 – 15%
- ICU: 25 – 50%
- Vesico-vaginal fistula
- Maternal death – ? frequency
  - May be under reported – low volume centers
- Fetal risks due to prematurity / bleeding

Bauer and Bonanno, Semin Perinatol 2009;33:88-96
## Placenta Accreta

### C-Hyst: Morbid Business

<table>
<thead>
<tr>
<th>Reported outcomes w Accreta Spectrum</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfusion of 4+ U PRBC</td>
<td>39-79%</td>
</tr>
<tr>
<td>Coagulopathy</td>
<td>17-29%</td>
</tr>
<tr>
<td>Ureteral injury</td>
<td>1-8%</td>
</tr>
<tr>
<td>Bowel Injury</td>
<td>1%</td>
</tr>
<tr>
<td>ICU Admission</td>
<td>15-30%</td>
</tr>
<tr>
<td>Venous thromboembolism</td>
<td>2-10%</td>
</tr>
<tr>
<td>Abdomino-pelvic infection</td>
<td>5-8%</td>
</tr>
<tr>
<td>Reoperation</td>
<td>2-13%</td>
</tr>
<tr>
<td>Fistula</td>
<td>2-3%</td>
</tr>
<tr>
<td>Death</td>
<td>0.5%</td>
</tr>
<tr>
<td>Loss of uterus</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Composite:** 18-51%
## Placenta Accreta

### Antepartum Diagnosis

- **Highly desirable**
- **Improved outcomes with:**
  - Planned delivery prior to bleeding
  - Planned C-hyst vs planned delay at placental removal
- **Current methods still imperfect**

Eller et al., Br J Obstet Gynecol 2009;116:648-54

Warshak et al., Obstet Gynecol 2010;115:65-9
Placenta Accreta

Diagnosis

- Clinical
- Ultrasound
- Magnetic Resonance Imaging
- Biomarkers
- Histology
Placenta Accreta
Ultrasound Diagnosis

- PLACENTA PREVIA
- Placental lacunae
  - High flow (distinct from placental lakes)
- Loss of retroplacental hypoechoic zone
- Myometrial thinning or loss of border
- Lower uterine segment “bulge”
- Vessel “bridging” placenta-myometrium
- Irregular or interrupted bladder wall
- Subplacental and/or uterovesical hypervascularity
# Placenta Accreta

## Ultrasound Diagnosis

Ultrasound signs identified in diagnosis of 38 case reports and in 3 series, including 34 cases ranked according to depth of villous myometrial invasion

<table>
<thead>
<tr>
<th>Ultrasound signs</th>
<th>Accreta, n (%)</th>
<th>Increta, n (%)</th>
<th>Percreta, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray-scale parameters</td>
<td>(n = 29)</td>
<td>(n = 26)</td>
<td>(n = 17)</td>
</tr>
<tr>
<td>Loss of clear zone</td>
<td>18 (62.1)</td>
<td>22 (84.6)</td>
<td>8 (47.1)</td>
</tr>
<tr>
<td>Myometrial thinning</td>
<td>6 (20.7)</td>
<td>12 (46.2)</td>
<td>4 (23.5)</td>
</tr>
<tr>
<td>Placental lacunae</td>
<td>16 (55.2)</td>
<td>16 (61.5)</td>
<td>14 (82.4)</td>
</tr>
<tr>
<td>Bladder wall interruption</td>
<td>2 (6.9)</td>
<td>2 (7.7)</td>
<td>5 (29.4)</td>
</tr>
<tr>
<td>Placental bulge</td>
<td>-</td>
<td>1 (3.9)</td>
<td>2 (11.8)</td>
</tr>
<tr>
<td>Color Doppler parameters</td>
<td>(n = 14)</td>
<td>(n = 15)</td>
<td>(n = 11)</td>
</tr>
<tr>
<td>Uterovesical hypervascularity</td>
<td>3 (21.4)</td>
<td>2 (13.3)</td>
<td>2 (18.2)</td>
</tr>
<tr>
<td>Subplacental hypervascularity</td>
<td>5 (35.7)</td>
<td>9 (60.0)</td>
<td>6 (54.5)</td>
</tr>
<tr>
<td>Bridging vessels</td>
<td>10 (71.4)</td>
<td>7 (46.7)</td>
<td>2 (18.2)</td>
</tr>
<tr>
<td>Lacunae feeder vessels</td>
<td>4 (28.6)</td>
<td>8 (53.3)</td>
<td>5 (45.5)</td>
</tr>
</tbody>
</table>

## Placenta Accreta

### Ultrasound Diagnosis

<table>
<thead>
<tr>
<th>Ultrasound signs</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of clear zone</td>
<td>75-100%</td>
<td>35-80%</td>
<td>15-55%</td>
<td>95-100%</td>
</tr>
<tr>
<td>Myometrial thinning</td>
<td>25-100%</td>
<td>70-100%</td>
<td>70-100%</td>
<td>90-100%</td>
</tr>
<tr>
<td>Placental lacunae</td>
<td>75-100%</td>
<td>30-95%</td>
<td>20-95%</td>
<td>90-100%</td>
</tr>
<tr>
<td>Bladder wall interruption</td>
<td>10-70%</td>
<td>95-100%</td>
<td>75-100%</td>
<td>85-100%</td>
</tr>
</tbody>
</table>

Modified from Comstock and Bronsteen, BJOG 121:171, 2014
Placenta Accreta

- Placenta previa
- Multiple placental lacunae or "tornado vessels"
  - 80-93% sensitive
- Loss of retroplacental hypoechoic zone
  - 7-52% sensitive
  - 21% false positive rate
- Retroplacental myometrial thickness <1 mm
- Lower uterine segment "bulge"
- Abnormal bladder interface
- Placenta beyond uterine serosa
Placenta Accreta

- Placenta previa
- Multiple placental lacunae — 80-93% sensitive
- Loss of retroplacental hypoechoic zone — 7-52% sensitive — 21% false positive rate
- Decreased retroplacental myometrial thickness — <1 mm
- Abnormal bladder interface
- Placenta beyond uterine serosa
Placenta Accreta

- Placenta previa
- Multiple placental lacunae or “tornado vessels”
  - 80-93% sensitive
- Loss of retroplacental hypoechoic zone
  - 7-52% sensitive
  - 21% false positive rate
- Retroplacental myometrial thickness <1 mm
- Lower uterine segment “bulge”
- Abnormal bladder interface
- Placenta beyond uterine serosa
Placenta Accreta
Ultrasound Diagnosis

• In patients at risk for accreta and combining multiple criteria:
  • Decent sensitivity and specificity
  • So-so PPV
  • Pretty good NPV

• But it can’t tell me whether or not to attempt placental removal!!
Magnetic resonance imaging for abnormally invasive placenta: the added value of intravenous gadolinium injection

BJOG: 27 JUN 2016 DOI: 10.1111/1471-0528.14164
Placenta Accreta

MRI Diagnosis

- Best MRI signs: T2 hypointense placental bands, a focally interrupted myometrial border, infiltration of the pelvic organs (duh), and tenting of the bladder
- Accuracy probably similar to ultrasound
- May be useful with posterior accreta
- Expensive and less available
- *But it can’t tell me whether or not to attempt placental removal versus to perform an outright hyst!!*
Three-Dimensional Power Doppler Ultrasonography for Diagnosing Abnormally Invasive Placenta

Placenta Accreta Management
What to Do Depends Upon the Case

- 4 prior cesareans; major (complete/central) placenta previa; imaging findings c/w accreta
- 3 prior cesareans; major placenta previa; imaging findings show percreta into broad ligament

CURRENT MANAGEMENT:
Appropriate counseling of patient
Scheduled C-hyst with C-hyst team
Type and crossed for major hemorrhage
4-5 hours in OR expected
Planned ICU admission post op
Placenta Accreta
Management: Timing of Delivery

- If no bleeding:
  - Antenatal steroids
  - Delivery at 34-35 weeks gestation
- If bleeding:
  - Steroids
  - Delivery at 32 – 34 weeks gestation depending upon frequency/amount of bleeding

No Data!!!
Placenta Accreta
Management: Timing of Delivery

- Decision analysis
  - Patients with high index of suspicion
  - Assessed fetal and maternal morbidity
- Concluded
  - Scheduled delivery at 34 weeks gestation
  - No assessment of pulmonary maturity

Robinson and Grobman, Obstet Gynecol 2010;116:835-42
Placenta Accreta

Management: Ureteral stents

• Controversial
• Minimal morbidity in experienced hands
• Utah experience:
  • 17 stents: 0 ureteral injuries
  • 59 no stents: 3 ureteral injuries

Eller et al., Br J Obstet Gynecol 2009;116:648-54
Placenta Accreta
Management: Hypogastric/uterine Artery Ligation

• Controversial
• Utah Experience:
  • 20 with ligation
  • 56 with no ligation
  • No difference in blood loss or morbidity

Eller et al., Br J Obstet Gynecol 2009;116:648-54
Placenta Accreta

Management: Internal Iliac Balloon Catheters

- Cohort- control study
- 69 accretas
  - 19 catheters
  - 50 No catheters
- No difference between groups:
  - Blood loss
  - Transfusion
  - Operative time
  - Hospital days

Shrivastava et al., AJOG 2007;197:402
<table>
<thead>
<tr>
<th>Placenta Accreta Management: Internal Iliac Balloon Catheters</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 3/19 cases (16%)</td>
</tr>
<tr>
<td>• Major complications</td>
</tr>
<tr>
<td>• Thrombosis</td>
</tr>
<tr>
<td>• Other case reports of thrombosis in iliac arteries</td>
</tr>
<tr>
<td>• Bypass required</td>
</tr>
</tbody>
</table>

Shrivastava et al., AJOG 2007;197:402
Greenberg et al., AJOG 2007;197:420
Placenta Accreta
Adjunctive Measures – Preop Iliac Artery Balloon Catheters

- Single-center RCT of 27 women with placenta accreta
  - Balloons positioned in anterior division of internal iliac
- Inflated immediately after cord clamping for duration of surgery
  - Not all women had hysterectomy

Placenta Accreta

Adjunctive Measures – Preop Iliac Artery Balloon Catheters

- No difference in estimated blood loss, need for transfusion, perioperative morbidity, surgical time or complications
- Two of 13 women in balloon catheter group had symptoms of transient ischemia (leg pain and weakness; buttock claudication and pain)

Placenta Accreta

Conservative Management

- Preserve fertility and avoid hysterectomy
- Typically placenta is left *in situ*
- Embolization of internal iliac vessels
- Methotrexate
- Compression sutures
- Placental removal and over-sewing of the placental bed
### Placenta Accreta
#### Conservative Management

<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>

Data are n (%).
* The total number of additional uterine devascularization procedures exceeds the number of patients because some patients had more than one such procedure.


Median number of cases 3 (1-46)
## Placenta Accreta

### Conservative Management

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success of conservative management</td>
<td>131 (78.4%)</td>
</tr>
<tr>
<td>Primary hysterectomy</td>
<td>18 (10.8%)</td>
</tr>
<tr>
<td>Delayed hysterectomy</td>
<td>18 (10.8%)</td>
</tr>
<tr>
<td>Transfusion</td>
<td>70 (41.9%)</td>
</tr>
<tr>
<td>More than 5 units</td>
<td>25 (15%)</td>
</tr>
<tr>
<td>ICU care</td>
<td>43 (25.7%)</td>
</tr>
<tr>
<td>Sepsis</td>
<td>7 (4.2%)</td>
</tr>
<tr>
<td>Infection</td>
<td>47 (28.1%)</td>
</tr>
<tr>
<td>VTE</td>
<td>3 (1.8%)</td>
</tr>
<tr>
<td>Any severe maternal morbidity or death</td>
<td>10 (6.0%)</td>
</tr>
</tbody>
</table>

### Placenta Accreta

**Conservative Management with Pelvic Artery Embolization**

- **Success rates of ~80% reported**
  - But at least 20% of cases require hysterectomy
  - Higher rates (40%) in some case series
- **Return of menses in ~60% of successful cases**
- **Postembolization syndrome**
  - Nausea, malaise fever for 2-7 days
Placenta Accreta
Management
What to Do Depends Upon the Case

- 2 prior cesareans; anterior, low-lying placenta with several imaging findings c/w small area of accreta (but not percreta)
- 1 prior cesarean; major placenta previa; imaging findings c/w accreta (but not percreta)
(1) Suspected Accreta

Randomization

In Situ Management

Planned C-hyst

(2) Suspected Accreta w/ serosal invasion

Randomization

Interval C-hyst

Planned C-hyst
### Interventions (RCT 1)

<table>
<thead>
<tr>
<th><strong>In situ</strong> Expectant</th>
<th><strong>Planned C-Hyst</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Laparotomy</td>
<td>1. Laparotomy</td>
</tr>
<tr>
<td>2. Classical C/S</td>
<td>2. Classical C/S</td>
</tr>
<tr>
<td>3. Placenta left in place</td>
<td>3. Placenta left in place</td>
</tr>
<tr>
<td>4. Postop UAE</td>
<td>4. Hysterectomy</td>
</tr>
<tr>
<td>5. Postop Abx</td>
<td>+/- uterotonics</td>
</tr>
<tr>
<td>6. Inpatient observation</td>
<td>+/- ureteral stents</td>
</tr>
<tr>
<td>7. Outpatient observation</td>
<td>+/- art. occlusion/ligation</td>
</tr>
<tr>
<td>+/- interval resection</td>
<td>+/- postop UAE</td>
</tr>
<tr>
<td>Interval C-Hyst</td>
<td>Planned C-Hyst</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>1. Laparotomy</td>
<td>1. Laparotomy</td>
</tr>
<tr>
<td>2. Classical C/S</td>
<td>2. Classical C/S</td>
</tr>
<tr>
<td>3. Placenta left in place</td>
<td>3. Placenta left in place</td>
</tr>
<tr>
<td>4. Postop UAE</td>
<td>4. Hysterectomy</td>
</tr>
<tr>
<td>5. Postop Abx</td>
<td>+/- uterotonics</td>
</tr>
<tr>
<td>6. Inpatient observation</td>
<td>+/- ureteral stents</td>
</tr>
<tr>
<td>7. Interval hysterectomy, at 2-5 days</td>
<td>+/- art. occlusion/ligation</td>
</tr>
<tr>
<td></td>
<td>+/- postop UAE</td>
</tr>
</tbody>
</table>
**Placenta Accreta Management**

Most logical long-term strategies

- Limit cesareans to fewest possible
- Encourage patients with 2 or 3 prior cesareans to avoid or limit future pregnancies