Update on management of abnormal placentation

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Disclosures

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Lecture Objectives

• Discuss the increasing morbidity associated with abnormal placentation

• Review diagnostic and management options for abnormal placentation

• Propose management strategies for both timing of delivery and surgical interventions
Case Presentation

37 y.o. G6P3 at 34 weeks with history of 3 prior cesareans transferred from an outside hospital for preterm labor and known placental previa, possible accreta
On arrival patient with painful contractions

Sterile speculum examination revealed cervical os visually dilated ~2cm

Fetus transverse by bedside sonogram
Case Presentation cont.

- Anatomy difficult to assess:
  - Dilation of LUS and infiltration of placenta obscures landmarks

- Hemostasis challenging:
  - Massive transfusion protocol enacted
  - Hemodynamic instability of patient forces rapid surgical decision-making
Case Presentation cont.

• Massive transfusion for 6500ml EBL:
  17 units pRBCs
  14 units FFP
  6 units platelets
  5L crystalloid
  500ml Hespan

• Ureteral transection
• ICU admission
• Incidence of placenta accreta likely associated with climbing Cesarean Delivery rate

• Cesarean Delivery Rate
  o 1970 – 5.5% overall; 4% primary
  o 1980 – 16%
  o 1988 – 24.7% overall; 18% primary
  o 1996 – 21% overall; 15% primary
  o 1999 – 22% overall
  o 2002 – 26.1% overall; 18% primary
  o 2004 – 29.2% overall; 20.6% primary
  o 2007 – 31.8% overall
Background

Graph showing the rates of VBAC (Vaginal Birth After Cesarean), Total Cesarean, and Primary Cesarean over the years from 1989 to 2004.

- **VBAC**: The rate of VBAC increases from 1993 to 1999 and then decreases.
- **Total Cesarean**: The rate of total cesarean operations remains relatively stable from 1989 to 1997 and then increases significantly from 1997 to 2004.
- **Primary Cesarean**: The rate of primary cesarean operations increases gradually from 1989 to 2004.

**Footnotes:**
- †Preliminary data.
- ‡Number of vaginal births after previous cesarean per 100 live births to women with a previous cesarean delivery.
• If cesarean rate increases from 29% to 34%
  o 14 to 32 maternal deaths.
  o 5000 to 24,000 surgical complications
  o 4000 to 6000 post op infections
  o 2200 more re-admissions
  o 200 to 300 additional venous thromboses
  o 33,000 additional NICU admissions
  o 930,000 additional hospital days
  o $750 million to 1.7 billion healthcare dollars.

*Plante L. Obstet Gynecol Survey 61 (12) 2006
Background

• VBAC rate reached a nadir in 2007 at 8.3% (primary C/S rate 24.3%)

• It has gradually increased to reach 10.2% in 2012 (primary C/S rate 21.5%)

U.S. National Center for Health Statistics
Definitions

• Depends on the level of trophoblastic invasion

• Trophoblastic invasion:
  - *Absent Nitabuch’s layer - accreta*
  - *Into myometrium - increta*
  - *Beyond uterine serosa - percreta*
Background

• Incidence 1:533
• Mortality up to 10%
• Accounts for majority of C Hysts
• Risk Factors:
  ▪ Prior uterine surgery
  ▪ Placenta previa
  ▪ Advanced maternal age
  ▪ Increased parity ≥3
Accreta with and without previa

Silver et al, 2006
### Placenta accreta and comorbidity

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>No Accreta (%)</th>
<th>Accretta (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystotomy</td>
<td>0.15</td>
<td>15.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ureteral Injury</td>
<td>0.02</td>
<td>2.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PE</td>
<td>0.13</td>
<td>2.1</td>
<td>0.001</td>
</tr>
<tr>
<td>Ventilator</td>
<td>0.3</td>
<td>14</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ICU</td>
<td>0.8</td>
<td>26.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><em>Endometritis</em></td>
<td>3.34</td>
<td>3.50</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Silver et al., 2006
Peripartum mgmt and outcomes by whether accreta suspected prenatally

<table>
<thead>
<tr>
<th>Mgmt/Outcome</th>
<th>suspected</th>
<th>not suspected</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median EBL (range)</td>
<td>3000 (250-14,435)</td>
<td>3500 (200-24,000)</td>
<td>0.126</td>
</tr>
<tr>
<td>Estimated total EBL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2500</td>
<td>45% 55%</td>
<td>30% 70%</td>
<td>0.063</td>
</tr>
<tr>
<td>2500 or more</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood products given</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>27% 73%</td>
<td>15% 85%</td>
<td>0.109</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission to ICU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>20% 80%</td>
<td>43% 57%</td>
<td>0.003</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
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</tr>
</tbody>
</table>

Fitzpatrick et al, 2013
Diagnosis

• Antenatal diagnosis:
  • made by ultrasound
  • normally hypoechoic boundary between placenta and bladder
  • boundary lost in placental invasion (sensitivity 7% and specificity 6%)

Comstock et al 2005
Diagnosis

• Ultrasonographic presence of placental lacunae (sonolucent spaces)

• Best sign:
  • sensitivity of 100% after 15 weeks
  • specificity of 97-100%

Yang et al 2006 and Japaraj et al 2007
Diagnosis

Lacunae can be graded:

- Grade 0: none seen
- Grade 1: 1-3 present and generally small
- Grade 2: 4-6 present and tending to be larger and more irregular
- Grade 3: many throughout the placenta and appearing large and bizarre

Finberg et al. 1992
Diagnosis (Ultrasound)

• Increased vascularity on Color Doppler next to the bladder wall

• Sensitivity reported to be 84-100%

Diagnosis

• Other Signs:
  ○ Myometrial thickness <1mm or loss of visualization of myometrium (sensitivity 21 to 90%)
  ○ Mixed data on the utility of 3-D power sonography

Diagnosis (MRI)

- Utility for diagnosis controversial

- May be useful when:
  - concern for percreta
  - focus of accreta is in an unusual site
  - ultrasound negative for accreta but clinically very high concern
**Diagnosis**

- Test characteristics of ultrasound for placenta accreta:

<table>
<thead>
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<tbody>
<tr>
<td>Sensitivity</td>
<td>89.5%</td>
<td>82.4%</td>
<td>77.0%</td>
<td>93.0%</td>
<td>33.0%</td>
</tr>
<tr>
<td>Specificity</td>
<td>91.0%</td>
<td>96.8%</td>
<td>96.0%</td>
<td>71.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>PPV</td>
<td>68.0%</td>
<td>87.5%</td>
<td>65.0%</td>
<td>74.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>NPV</td>
<td>97.6%</td>
<td>95.3%</td>
<td>98.0%</td>
<td>92.0%</td>
<td>11.1%</td>
</tr>
</tbody>
</table>
Placenta Accreta Index (PAI)

Components of the PAI:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3 lacunae</td>
<td>10.8</td>
<td>1.4-83</td>
</tr>
<tr>
<td>No. of C/S</td>
<td>9.6</td>
<td>2.5-37.1</td>
</tr>
<tr>
<td>Placental location</td>
<td>3.9</td>
<td>1.1-14.1</td>
</tr>
<tr>
<td>Grade 2 lacunae</td>
<td>2.9</td>
<td>0.6-12.7</td>
</tr>
<tr>
<td>Bridging Vessels</td>
<td>2.3</td>
<td>0.6-8.7</td>
</tr>
</tbody>
</table>

Rac et al. 2014
## Placenta Accreta Index (PAI)

### Point value of each component of the PAI:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Cesareans or more:</td>
<td>3 points</td>
</tr>
<tr>
<td>Grade 3 lacunae:</td>
<td>3.5 points</td>
</tr>
<tr>
<td>Grade 2 lacunae:</td>
<td>1.0 points</td>
</tr>
<tr>
<td>Sagittal Smallest Myometrial thickness:</td>
<td></td>
</tr>
<tr>
<td>≤ 1 mm</td>
<td>1.0 points</td>
</tr>
<tr>
<td>&lt; 1 but ≥ 3 mm</td>
<td>0.5 points</td>
</tr>
<tr>
<td>&gt;3 but &lt; 5 mm</td>
<td>0.25 points</td>
</tr>
<tr>
<td>Anterior placenta previa:</td>
<td>1.0 points</td>
</tr>
<tr>
<td>Bridging vessels:</td>
<td>0.5 points</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PAI</th>
<th>Risk of Invasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;0</td>
<td>5%</td>
</tr>
<tr>
<td>&gt;1</td>
<td>10%</td>
</tr>
<tr>
<td>&gt;2</td>
<td>19%</td>
</tr>
<tr>
<td>&gt;3</td>
<td>33%</td>
</tr>
<tr>
<td>&gt;4</td>
<td>51%</td>
</tr>
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<td>&gt;5</td>
<td>69%</td>
</tr>
<tr>
<td>&gt;6</td>
<td>83%</td>
</tr>
<tr>
<td>&gt;7</td>
<td>91%</td>
</tr>
<tr>
<td>&gt;8</td>
<td>96%</td>
</tr>
</tbody>
</table>

Rac et al, 2014
Antepartum management

• Plan for delivery at institution with:
  - appropriate surgical facilities
  - ability to transfuse large amount of blood products

• Maximize pre delivery hemoglobin with iron supplementation

• Antenatal testing not indicated as accreta is not associated with increased risk of IUGR or fetal death.

• Multidisciplinary approach
Is there evidence for the multidisciplinary approach?

• A retrospective cohort study from 3 tertiary care hospitals looked at their outcomes before and after implementation of a multidisciplinary program (N=90)

• Protocol:
  o admission at 33-34 weeks of gestation
  o planned preterm delivery by C Hyst between 34 and 35 weeks
  o preop consultation with pulmonary critical care, urology, blood bank, anesthesiology, nursing and NICU (IR and vascular surgery as needed)
  o prospective planning for maternal and neonatal care by the multidisciplinary team
  o MFM coordinated care

Shamshirsaz AA et al, 2015
Is there evidence for the multidisciplinary approach?

• Results:
  • Multidisciplinary group had more cases with accreta but had
    o Less blood loss (2.1L vs 3.0 L, p = 0.025)
    o Less likely to be delivered emergently
    o Neonatal outcomes similar between groups despite multidisciplinary group being delivered at an earlier GA

Shamshirsaz AA et al, 2015
Timing of delivery

• Controversial

• Depends on specific clinical circumstances and extent of placental invasion

• Data shows planned delivery associated with less blood loss and complications than emergent delivery

Eller et al.
Timing of delivery

• Decision analysis (Robinson et al, 2010)
  • Compared 9 strategies

  • Outcomes:
    • maternal ICU admission
    • perinatal mortality
    • infant mortality
    • RDS
    • mental retardation
    • CP
Timing of delivery

- 34 weeks preferred strategy with the highest QALYs

- Strategies awaiting confirmation of FLM without better outcome compared to outright delivery

- 37 weeks without amniocentesis can be used in limited situations
Timing of delivery

- Eller et al showed that scheduled delivery by 34 weeks would avoid 27% of emergent deliveries.

- Though no RCT has been performed on this topic, unlikely that one can be performed given relative incidence of accreta.
Operative approach

• Use stirrups and dorsal lithotomy
  o direct assessment of vaginal bleeding
  o extra access if procedure more extensive

• Padding and positioning to avoid nerve injury

• Choice of incision made based on patient’s body habitus and prior surgical history
Operative approach

• Gold standard is planned preterm cesarean hysterectomy

• Placenta should be left in situ

• Placental removal associated with a high risk of hemorrhage

• Attempts at manual placental removal should be avoided
Surgical technique

• Delivery of baby followed by quickly whip stitching the uterus to close incision

• Hysterectomy performed in the usual fashion

• Total or subtotal hysterectomy can be performed based on circumstances.
Conservative Management

• Placenta is left in situ and subsequent interventions include:

  ○ Expectant management

  ○ Uterine Artery Embolization (UAE)

  ○ Adjuvant Medical Treatment (MTX vs GnRH analogues, mifepristone and misoprostol)
Conservative Management

  - Placenta partially removed in most but in some left in situ completely
  - Tx failure 15% for conservative therapy alone, 23% for conservative therapy + MTX, 25% for conservative therapy + embolization
  - Overall tx successful in 80%
  - Complications: fever 35%, endometritis 18%, DIC 6%
  - Recurrence of accreta 60%
  - Success may depend on amount of placental tissue left behind
Conservative Management

• Brettelle et al 2007
  ○ Retrospective study of 50 cases of abnormal placentation
    ○ Half got a hysterectomy, the other half managed conservatively
      ○ Of those managed conservatively, 92% required additional therapy (medical, surgical or embolization)
        ○ 19% failed conservative treatment and of those 15% developed fever and 12% DIC
Conservative Management

• Sentilhes et al, 2010
  o Retrospective study from 1993 to 2007
  o 40 university hospitals in France
  o 167 women treated conservatively
  o Conservative treatment successful in 78.4%
  o In the remaining group 50% had primary hysterectomy and 50% had delayed hysterectomy
  o Severe maternal morbidity in 6% (sepsis, peritonitis, vesicouterine fistula, uterine necrosis)
  o Spontaneous placental resorption occurred in 75% (25% needed hysteroscopic resection or curettage)
  o Median resorption time from delivery 13.5 weeks (4-60 weeks)
When is conservative tx appropriate?

- Consider only in selected cases when:
  - Blood loss minimal
  - Strong desire for fertility preservation
  - Patient understands outcome is unpredictable and no guarantee of subsequent pregnancy
  - Adequate technical support available
  - Rigorous surveillance is provided
Occlusion of Internal Iliac Arteries/Branches

Do they prevent excessive blood loss at the time of hysterectomy for accreta?

• Balloon-tipped catheters placed in retrograde fashion through femoral arteries immediately before surgery

• Catheters are inflated after delivery of fetus and during dissection

• Another option includes preoperative placement of femoral access by interventional radiology with selective embolization of uterine vessels at the time of delivery
Occlusion of Internal Iliac Arteries/Branches

• Literature inconsistent as to benefits of the procedure

• Some studies have reported significantly less blood loss, blood transfusion requirements and duration of surgery

• Other studies have shown no difference in blood loss or duration of surgery and an increase in complications:
  o vessel thrombosis/dissection
  o insertion site hematoma
  o abscess
  o Necrosis
  o pseudoaneurysms

Uterine artery embolization for post op management

• Catheter placed distal so when embolization occurs, bleeding through collateral circulations prevented

• Angiogram at time of embolization detects actively bleeding vessels

• Catheter may be advanced directly into bleeding vessel

• Success of procedure immediately verified by angiogram
Uterine Artery Embolization

• First used by Mitty et al as primary tx for abnormal placentation in 1993

• Currently worldwide, at least 35 reports involving 72 patients who underwent UAE for abnormal placentation

  ○ Success rate 62-71%
  ○ Overall failure rate 23%
  ○ Complication rate 11%
  ○ Most common complication: fever
  ○ Other complications: allergic reaction, pelvic infection, ischemic phenomena

Long term effects of UAE

• Menses returned in 83% of women with abnormal placentation treated with UAE

• Pregnancy occurred in 15%

• Recurrence risk for abnormal placentation was 18%
ACOG comments that “current evidence is insufficient to make a firm recommendation on the use of balloon catheter occlusion or embolization to reduce blood loss and improve surgical outcome, but individual situations may warrant their use.”
Other Surgical Techniques Described

- Removal of majority of placenta and Argon beam coagulator used on remaining portion

- Placement of circumferential sutures on serosal surface of the uterus around the bleeding area

- Partial excision of invaded uterine wall and repair of defect
Ureteral Stents

• Controversial

• Limited data available

• Most data is from colorectal surgery literature

• Until recently, no data looking at use of stents in setting of cesarean hysterectomy

• Some data looking at gynecologic surgery, both laparotomy and laparoscopy
Ureteral Stents - concerns

• Increased risk of UTI (though not confirmed)

• One case of ureterovenous fistula reported by Bhargava and Usuf

• Reflex anuria due to:
  
  ◦ ureterovesical junction edema
  ◦ renocortical vasoconstriction due to catheter stimulation
Ureteral Stents

• Kuno et al. performed a retrospective review of 3071 gynecologic procedures, 2238 of them laparotomies

• 1043 were hysterectomies
  - 15% had ureteral stents
  - 85% did not have ureteral stents
Ureteral Stents

- 0.6% in the stent group had ureteral injury
- 0.1% in the group without stents had ureteral injury
- Difference was not statistically significant (p>0.7)
Ureteral Stents

• Potential Benefits

  • may help identify ureteral injury during procedure

  • may help decrease amount of bleeding by reducing amount of time needed to identify the ureter

Kyzer and Gordon, Neuman
Ureteral Stents

Potential Risks:

- Increased risk of injury secondary to decreased pliability

- Catheters may situate ureter in an ectopic location increasing risk of injury

- Catheters result in 1% risk of iatrogenic injury

Singleton et al and Buchsbaum and Schmidt, Falk et al., Bothwell et al.
Anesthesia management

• Regional anesthesia for the Cesarean portion

• General anesthesia for the Chyst portion

• Good access

• Type and cross

Hematologic management

• Massive transfusion protocol
  
  o Early administration of fresh frozen plasma (FFP), platelets and PRBCs in a 1:1:1 ratio
  
  o Limited early aggressive use of crystalloids and colloids
  
  o Goal:
    • rapidly correct coagulopathy
    • decrease need for transfusion postoperatively leading to reduced morbidity
Hematologic management

• Preoperative autologous blood donation generally not cost effective
  
  o Can be considered in patients with rare blood types or alloimmunization to rare antibodies
Hematologic management

• Cryoprecipitate may be needed

• Factor VIIa may be beneficial in cases of uncontrollable obstetric hemorrhage
  o more effective when fibrinogen is >100 mg/dl
  o caution advised due to potential risk of vascular thrombosis and thromboembolic events
  o Doses of 81.5 to 92 ug/kg significantly reduced hemorrhage in 76-85% of women without increased incidence of thromboembolic events

Cell Saver

• Involves recycling the patient’s own blood

• Improved survival of and oxygen carrying ability of red cells compared to banked blood

• Used extensively in the fields of cardiac surgery, orthopaedics and trauma

• Severe hypotension occasionally reported

Cell Saver

• Use in obstetrics limited by concerns regarding amniotic fluid embolism and rhesus isoimmunization

  ○ Current filtering technology eliminates theoretical concern for amniotic fluid embolism, **BUT** risk of alloimmunization from fetal RBCs remains

Cell Saver

- Recent review of literature by Allam on cell saver in obstetrics revealed no significant problems with cell saver.

- Cell saver use at cesarean section has been endorsed by:
  - Association of Anaesthetists of Great Britain and Ireland
  - Obstetric Anesthesia Association
  - National Institute for Health and Clinical Excellence
Cell Saver

• Other important considerations:
  ○ Need to remove as much amniotic fluid as possible
  ○ Not available emergently
  ○ Expensive!
What’s the overall best management strategy?

• Recent work by Eller et al 2009; N = 76 suggests that the best strategy is:
  o Scheduled cesarean delivery
    ▪ mean blood loss (2.0L vs 3.0 L) p=0.03
  o No attempt at placental removal
    ▪ early morbidity (36% vs 67%) p = 0.04
  o Pre-operative ureteral stents
    ▪ No reduction in ureteral injury but a reduction in early early morbidity (18% vs 55%) p=0.02
What’s the best overall management strategy?

• Early morbidity defined as one or more of the following:
  - ICU admit for $\geq 24$ hrs
  - Transfusion of $\geq 4$ units of PRBC
  - Coagulopathy (plts $\leq 100,000$, INR $\geq 1.2$, fibrinogen $\leq 200$)
  - Ureteral injury
  - Early re-operation ($< 7$ days s/p procedure)
What are physicians across the U.S. doing?

- A cross sectional survey of MFM providers in the U.S. registered with SMFM
  - Most providers believe hysterectomy is the only management option for accreta but 32% of providers had attempted conservative management
  - 35% of providers reported use of ureteral stents
  - 36% of providers use internal femoral artery balloons
  - Variation by region was present

Esakoff et al 2012
SUMMARY: OPERATIVE PLANNING

Mode of Delivery considerations:

1. Placentation
2. Fetal presentation and gestational age
3. Desire for future fertility
4. Patient preference
5. Availability of surgical back-up
   (Gyn, Gyn-onc, and Urology)
6. Anesthesiology preparedness
Intra-Op

• Assess patient stability

• Access to blood-products

• Ask for surgical scrub-techs

• Availability of back-up and consultants

• Always in communication with anesthesiologist
Post-op

- Send patient to appropriate unit for the level of care required
- Assess for need of supplementation procedures (UAE)
- Frequent labs
Questions?
References


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