PLACENTA ACCRETA: How to Stay Out of Trouble

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University of Utah
Salt Lake City, Utah
Placenta Accreta

Definition

- Placenta that is abnormally adherent to the uterus.
- Increta: Invades the myometrium
- Percreta: Invades the serosa or adjacent organs
- Accreta: Often refers to all of these
- MAP?
- PAS (Placenta accreta spectrum)
Placenta Accreta
Pathophysiology

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

Incidence

- 1960s: 1 in 30,000 deliveries
- 1982 – 2018: 1 in 533 deliveries

Miller et al., AJOG 1997;177:210
Wu et al., AJOG 2005;192:1458
Placenta Accreta

Risk Factors

- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
Cesarean Delivery
Trends

• Dramatic and steady increase
• One third of US deliveries!!!!
  – Currently – 32.0% of deliveries
  – 1.3 million women
  – Most common major surgery
  – Increased by > 50% since 1996
  – Accelerated since 2000
  – All ages, races, states, gestational ages
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
# Accreta

<table>
<thead>
<tr>
<th>CS#</th>
<th>N</th>
<th>Accreta</th>
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<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>1,457</td>
<td>31 (2.1%)</td>
</tr>
<tr>
<td>5</td>
<td>260</td>
<td>6 (2.3%)</td>
</tr>
<tr>
<td>≥ 6</td>
<td>89</td>
<td>6 (6.7%)</td>
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</table>

Silver et al., Ob Gyn 2006;107:1226
## Previa and Accreta

<table>
<thead>
<tr>
<th>CS#</th>
<th>Previa</th>
<th>Accreta</th>
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<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>
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<td>4</td>
<td>33</td>
<td>20 (61%)</td>
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<tr>
<td>5</td>
<td>6</td>
<td>4 (67%)</td>
</tr>
<tr>
<td>≥ 6</td>
<td>3</td>
<td>2 (67%)</td>
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</table>

Silver et al., Ob Gyn 2006;107:1226
Placenta Accreta
Risk Factors

- Cesarean delivery
- Placenta previa
- Asherman’s syndrome
- Myomectomy
- Uterine artery embolization
- Endometrial ablation
- In vitro fertilization
- ? Prior accreta
Placenta Accreta
Clinical Outcomes

- Torrential obstetric hemorrhage
  - “Audible bleeding”
- Secondary complications of hemorrhage
  - DIC
  - Renal 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%)

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

Clinical Outcomes

• Blood loss: 3,000 – 5,000 ml
• Average blood Tx: 10 Units
• Ureteral injury: 10 – 15%
• ICU: 25 – 50%
• Vesico-vaginal fistula
• Maternal death – up to 7%
  − May be under reported – low volume centers
• Fetal risks due to prematurity / bleeding

Bauer and Bonanno, Semin Perinatol 2009;33:88-96
<table>
<thead>
<tr>
<th>Morbidity</th>
<th>No Accreta</th>
<th>Accretta</th>
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<tbody>
<tr>
<td>Cystotomy</td>
<td>0.15%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Ureteral Injury</td>
<td>0.02%</td>
<td>2.1%</td>
</tr>
<tr>
<td>PE</td>
<td>0.13%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Ventilator</td>
<td>0.3%</td>
<td>14%</td>
</tr>
<tr>
<td>ICU</td>
<td>0.8%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Ex Lap</td>
<td>0.26%</td>
<td>5.6%</td>
</tr>
</tbody>
</table>
Placenta Accreta
Antepartum Diagnosis

• Highly desirable
• Improved outcomes with:
  – Planned delivery prior to bleeding
  – NOT attempting placental removal
• Current methods still imperfect
• Undiagnosed cases: common
• Fertility versus bleeding

Eller et al., Br J Obstet Gynecol 2009;116:648-54
Warshak et al., Obstet Gynecol 2010;115:65-9
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Diagnosis

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

• Placenta previa
• Placental lacunae
  ➢ High flow (distinct from placental lakes)
• Loss of retroplacental clear space
• Loss of myometrial border
• Vessel “bridging” placenta-myometrium
• Gap in myometrial blood flow
• Irregular bladder wall
• Cervical length! (predicts bleeding)

Comstock et al., Ultrasound Obstet Gynecol 2005;26:89-96
Placenta Accreta
Ultrasound Diagnosis

- Patients at risk for accreta
- ≥ 20 weeks gestation
- Sensitivity: 80 – 90%
- Specificity: 90 - 98%
- Not that good in real life!
- Studies done in very high risk patients
- Very experienced centers
- Small numbers
- Power Doppler may prove superior

Comstock et al., BJOG 2014;121:171-82
Placenta Accreta
Ultrasound Diagnosis

- All cases with previa
  - 55 PAS
  - 56 controls
  - 229 studies
- Six investigators (1374 observations)
- Blinded to clinical status
- Sensitivity: 53.5%
- Specificity: 88.0%
- PPV: 82.1% / NPV: 64.8%

Bowman et al., AJOG 2014;211:177.e1-7
Placenta Accreta
Ultrasound Diagnosis

• Same cohort (six investigators)
  – Inter-observer agreement: $\kappa = 0.47 \pm 0.12$
    • Pairs of investigators: 0.32 – 0.73
    • Average agreement: 0.35 – 0.53
  – Sensitivity: 55.9 – 76.4%
  – Specificity: 70.8 – 94.8%

Bowman et al., J Ultrasound Med 2014;33:2153-8
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MRI Diagnosis

- Retrospective studies
- Case series
- Accuracy similar to ultrasound
- Mixed results!
- May be useful with posterior accreta
- Expensive and less available
- Improved accuracy with expertise
Sagittal US and MRI

Ant abd wall muscles
SubQ fat

Colon
Axial

Ant abd wall muscles

Placenta!
No fat plane between right psoas and uterus

Normal fat plane between left psoas and uterus

Rt common iliac artery
Vessels in bladder wall

Percreta at bladder dome
Placenta Accreta
MRI Diagnosis

• 78 cases with suspicion of PAS
  • Clinical suspicion
  • Sonographic suspicion
  
  “Change in diagnosis” that could alter care
  • 28 cases (36%)
    – Correct change in 15 cases (19%)
    – Incorrect change in 13 cases (17%)
    – “Confirmation” of incorrect diagnosis in 15 cases (21%)

  No better with posterior placenta
  No better with percreta

Einerson et al., AJOG 2018;epub1-7
Placenta Accreta
Alpha-fetoprotein

- Abnormal placentation
  - Unexplained elevated MSAFP
  - 9/20 accretas with elevated MSAFP
  - 5/11 accretas with elevated MSAFP
  - Elevation in AFP with no other explanation is a risk factor for accreta

Kupferminc et al., Obstet Gynecol 1993;82:266
Zelop et al., Obstet Gynecol 1992;80:693
Placenta Accreta

Biomarkers

- Abnormal placentation
  - Maternal serum AFP
  - Placental mRNA
  - Free fetal DNA
  - β-hCG
  - Creatinine kinase
  - Proteome!

- Mostly experimental at present
Placenta Accreta
Management

• Not evidence based
• NO randomized clinical trials
• Varies widely among centers
  – Varies widely among tertiary care centers
• Paucity of high quality data
  – Relatively uncommon
  – Case series and retrospective cohorts
  – Single centers have too few cases
Placenta Accreta
Management: Vertical Skin Incision
Placenta Accreta

Clinical Management: Placenta

- In cases of known accreta:
  - Do not attempt placental removal
  - Proceed with cesarean hysterectomy
- Utah cohort: Attempted placental removal
  - Increased major morbidity
  - Increased blood loss
  - No cases of preserved fertility
Placenta Accreta
Clinical Management: Placenta

General consensus:
Do NOT remove the placenta
(unless PAS uncertain)
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Management:
Timing of Delivery

- Controversial
- Ideal:
  - Scheduled
  - Prior to bleeding
  - Fetal maturity
- Something has to give
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Management: Scheduled Hysterectomy

- Scheduled cesarean hysterectomy is less morbid than emergency hysterectomy
- Resources available
- Controlled setting
- Center of excellence
Placenta Accreta

Management:
Timing of Delivery

• If no bleeding:
  • Steroids
  • Delivery at 34 - 35 weeks gestation

• If bleeding:
  • Steroids
  • Delivery at 32 – 34 weeks gestation depending upon frequency/amount of bleeding

No Quality Data!!!
Placenta Accreta

Management: Timing of Delivery

- Decision analysis
- Patients with high index of suspicion
- Assessed fetal and maternal morbidity
- 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
  - Updated: No injuries with stents!

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

Management:
Hypogastric Artery Ligation

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

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

Management: Balloon Catheters

- Controversial
- Uterine Artery
- Hypogastric Artery
- Can be placed prior to the procedure
  - Balloons inflated after delivery of fetus
  - Catheter morbidity: thrombosis
- After the procedure in cases of bleeding
  - Avoid re-operation / gel foam / less risk
Placenta Accreta
Management: 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
Placenta Accreta
Management: Balloon Catheters

• 3/19 cases (16%)
  • Major complications
  • Thrombosis

• Other case reports of thrombosis in iliac arteries
  • Bypass required

Shrivastava et al., AJOG 2007;197:402
Greenberg et al., AJOG 2007;197:420
Placenta Accreta
Management: Balloon Catheters

- Not advised prior to procedure

- May be useful for postoperative bleeding to avoid a second surgery
Placenta Accreta

Clinical Management: Methotrexate

- Case series and case reports
  - Good and bad outcomes
- Effective against actively dividing trophoblast
- Little active trophoblast in third trimester
- No convincing evidence
- One death! Not advised
Obstetric Hemorrhage
Transfusion Therapy

- Autologous blood donation
  - Not routinely advised
  - Viable option in pregnancy (safe)
    - Risk for hemorrhage
    - Rare antibodies
  - Begin at 32 weeks gestation
  - Remove 400 mL per week
  - Total of 1,200 – 1,500 mL
  - Still risk of bacterial contamination and mismatching
  - Not acceptable to Jehovah’s Witnesses
Obstetric Hemorrhage

Transfusion Therapy

• Intraoperative cell salvage
  – Safe in pregnancy (small numbers)
  – Concerns about possible AFE
  – Leukocyte depletion filter
  – Same concentration of fetal cells as maternal blood
  – Better oxygen delivery than banked blood
  – RhD immune globulin (fetal cells)
  – Consider if
    • Difficult to crossmatch
    • Refuses transfusion
Obstetric Hemorrhage Transfusion Therapy

• Massive transfusion
  – 1:1 ratio of PRBCs, FFP and □platelets
  – 1:1 ratio of PRBCs and FFP
    • Platelets after 10 Units PRBCs
  – Warm the patient
  – Hyperkalemia
  – Citrate – give calcium
Placenta Accreta
Conservative Management

- No hysterectomy!
- “Great idea”
  - Fertility sparing
  - Potential for decreased morbidity
  - Less blood loss
  - Less injury to pelvic organs
  - May be especially helpful with percreta
Placenta Percreta: Conservative Management

- What does “conservative” mean?
  - Uterine preservation?
  - Future fertility?
  - No hysterectomy?
  - Removal of part of the uterus?
  - Delayed hysterectomy?
Placenta Accreta Spectrum
Conservative Management

- Extirpative technique
  - Manual removal of the placenta
- Expectant management
  - Fundal hysterotomy and placenta *in situ*
- Removal of part of the placenta
  - Over-sewing the placental bed or partial resection of the uterus
- Triple P procedure
Placenta Percreta: Conservative Management

- French series of 167 cases (1993 – 2007)
- Fertility sparing management
- Placenta *in situ*
- Varied approaches
  - Uterine devascularization
  - Methotrexate
  - B-Lynch / other sutures

Sentilhes et al, Obstet Gynecol 2010;115:526-34
Placenta Percreta:
Conservative Management

- 311 cases
  - 91: Extirpative
  - 53: Cesarean hysterectomy
  - 167 (54%): Conservative
    - Successful in 131 (78.4% - 95% CI, 71.4 – 84.4%)
    - 18 primary hysterectomy – hemorrhage
    - 18 delayed hysterectomy
    - (10.8% - 95% CI, 6.5 – 16.5%)

Sentilhes et al, Obstet Gynecol 2010;115:526-34
Placenta Percreta: Conservative Management

- Severe maternal morbidity:
  - 10 cases
  - One death due to myelosuppression, nephrotoxicity and sepsis / umbilical MTX!
  - Sepsis: 7 women
  - DVT / PE: 3 women
  - Fistula: 1 woman
  - Uterine necrosis: 2 women

Sentilhes et al, Obstet Gynecol 2010;115:526-34
Placenta Percreta: Conservative Management

- Spontaneous placental resorption
  - 87 cases: (75%; 95% CI, 66.1 – 82.6%)
  - Median delay of 13.5 weeks (4 – 60 weeks)
  - Further procedures to evacuate the uterus
    - Curettage
    - Hysteroscopic resection
- Percreta: success in 10/18 (55.6%)
- Histopathology confirmed Dx in 35/36 hysterectomies

Sentilhes et al, Obstet Gynecol 2010;115:526-34
Placenta Percreta: Conservative Management

- What about overall morbidity?
  - Transfusion: 41.9%
  - > 5 Units PRBCs: 15%
  - ICU admission: 25.7%
  - Infection: 28.1%

- These percentages comparable to or better than planned cesarean hysterectomy!!!
Placenta Percreta: Conservative Management

- Subsequent fertility / pregnancies?
- French cohort
- Follow-up data in 96 (73.3%)
- 8 women had Asherman’s / amenorrhea
- 27 wanted more children
  - 3 trying to conceive
  - 24 women had 34 pregnancies

Sentilhes et al, Hum Reprod 2010;25:2803-10
Placenta Percreta: Conservative Management

- 34 pregnancies (mean TTC – 17 months)
  - 21 (62%) third trimester deliveries
  - 10 early losses
  - 2 terminations
  - 1 ectopic
- Recurrent accreta: 6/21 (28.6%)
  - 4/6 conservative Rx again

Sentilhes et al, Hum Reprod 2010;25:2803-10
Placenta Percreta: Conservative Management

It’s All Good!
Placenta Accreta: Conservative Management

A Bad Idea!
Placenta Accreta
Conservative Management

• No hysterectomy!
• “Great idea”
  • Fertility sparing
  • Potential for decreased morbidity
  • Less blood loss
  • Less injury to pelvic organs
  • May be especially helpful with percreta
Placenta Accreta: Conservative Management

- Reasonable (even good) outcomes in several case reports and case series
- Difficult to evaluate available data
  - Heterogeneous definitions of accreta
  - Heterogeneous surgical and medical approaches to treatment
  - Multiple strategies often used simultaneously
  - No RCTs – considerable bias!
Placenta Accreta: Conservative Management

- Placenta accreta spectrum diagnosis:
  - “Gold standard” is histology!
  - Not possible with most conservative management strategies
  - Most expectant management accretas are diagnosed clinically!
  - Not clear that women included in these series are the same as those included in series with planned C-Hyst
Placenta Accreta: Conservative Management

- Placenta accreta spectrum diagnosis:
  - “Impossible to detach the placenta by gentle manipulation”
- In cases with no previa / no prior CD:
  - Placenta may be removed by manual removal and / or uterine curettage
  - No way to prove otherwise
  - Not the same cases…….
- Inflates success of expectant care!
Placenta Accreta: Conservative Management

- Prior cesarean deliveries:
  - Utah cohort: > 90%
  - NY cohort: > 90%
  - SD cohort: > 90%
  - Houston cohort: > 90%
  - French cohort: 53.8%
Placenta Accreta: Conservative Management

- French cohort:
  - Sonographic features of accreta: 44.3%!
  - Vaginal delivery: 16.8%
  - Placenta previa: 52.1%!

Sentilhes et al, Obstet Gynecol 2010;115:526-34
... like comparing apples and oranges or and
Placenta Accreta: Conservative Management

- Utah Case Series:
  - Planned “Conservative” management
  - Prior CD(s) and placenta previa
  - Fundal hysterotomy with care to avoid the placenta
  - No disruption of the placenta with “high ligation of the cord with permanent suture
  - Closure of hysterotomy
  - Expectant care
Placenta Accreta: Conservative Management

- Utah Case Series:
  - Five women
  - One case of intrauterine infection and hemorrhage 2 weeks postpartum
    - Emergency hysterectomy
  - One case of life-threatening hemorrhage 5 weeks postpartum
    - Unconscious / cardiac arrest
    - Emergency hysterectomy
    - Survived through “luck”
Placenta Accreta: Conservative Management

• Utah Case Series:
  • The other cases had scheduled interval hysterectomies 6 weeks postpartum
  • Difficult cases / no decrease in morbidity
  • Two bad surgeries instead of one bad surgery!
  • We quit doing these!
  • Never published
  • Publication bias in favor of better outcomes
Placenta Accreta: Conservative Management

Problem

Postoperative complications are unpredictable

May turn a scheduled surgery under optimal circumstances into an emergency surgery
Placenta Accreta: Conservative Management

- Great idea conceptually
- Not clear that excellent outcomes including subsequent pregnancies occurred in women with true accreta
- Outcomes may be higher than reported
- Risks may be higher than reported
- Need to standardize nomenclature, approaches, and follow-up
Placenta Accreta: Conservative Management

- What to do now?
- Data needed
- Apples to apples
- RCTs
  - Accreta: Fertility sparing conservative Rx vs planned cesarean hysterectomy
  - Percreta: Cesarean with delayed planned hysterectomy vs planned cesarean hysterectomy
Placenta Accreta
Clinical Management

• Consider the diagnosis
  • Prior cesarean delivery (multiples)
  • Placenta previa
  • Asherman’s syndrome
  • Myomectomy
  • Uterine artery embolization

• Ultrasound is best
• MRI – ????
Placenta Accreta
Clinical Management

- Well equipped operating suite
- Prepared anesthesiologist
- Experienced surgeon(s) / team
- Well stocked blood bank
- Consider transfer to tertiary care center
- Get help prior to starting the case
Placenta Accreta

Management: Center of Excellence

• State of Utah

• 141 cases of accreta
  – Multidisciplinary team (MDC): N = 79
  – Standard management (SM): N = 62

• MDC versus SM
  – TX > 4 units: 43% versus 61%
  – Re-operation: 3% versus 36%
  – Composite morbidity: 47% versus 74%
  – Composite morbidity: OR 0.22 (0.07 – 0.7)

Eller et al., Obstet Gynecol 2011;117:331-7
100% require an ‘army’
Placenta Accreta
Scheduled Cases

- Highly desirable
- Improved outcomes with:
  - Planned delivery prior to bleeding
  - NOT attempting placental removal
- Less bleeding
- Less morbidity
- Checklist!

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

Management: Summary

• Vertical skin incision
• Leave the placenta *in situ*
  • Exception if uncertain about accreta
  • Exception is risky and experimental
• No methotrexate
• No delayed hysterectomy
• No routine hypogastric artery ligation
Placenta Accreta
Management: Summary

- No prophylactic balloon catheters
- Consider ureteral stents
- Attempt to schedule the case
  - Steroids
  - 35 weeks if no bleeding
  - 32 – 34 weeks if bleeding
Placenta Accreta
Management: Summary

• Best strategy:

• Fewer cesarean deliveries