LONG-TERM CONSEQUENCES OF CAESAREAN SECTION

THE MORBIDLY ADHERENT PLACENTA

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I. Cesarean delivery rates: What is the global context?

Ireland amidst the madness

II. Mothers and Infants: What are the long term implications?

Review context of other morbidities
Focus on morbidly adherent placenta

III. Summary
I. Cesarean Delivery Rates, 2007

- **Dramatic increase throughout the world except for Africa**
  - 26% Ireland
  - 31% USA
  - 46% China
CS rates among Organisation for Economic Co-operation and Development Countries, 2006

OECD 2009
Caesarean delivery rate for singleton births: Republic of Ireland, 2000-2008

Department of Health and Children, 2009
II. Mothers and Infants

- What are the long term health implications?
Reproductive Morbidity

- Subfertility
- Abnormal placentation
- Perinatal morbidity
- Preterm birth
- Small for gestational age
- Stillbirth
Maternal morbidity

- **Chronic pain**
- **Infection**
- **Major hemorrhage**
- **Thromboembolism**
- **Multiple Cesareans**
  - Abnormal placentation
  - Surgical morbidity
Abnormal placentation

- Placenta accreta associated with increase maternal & fetal adverse outcomes
- Antepartum hemorrhage often leads to PTD and in some cases < blood flow to fetus
- In addition to hemorrhage, mother at > risk for complications of ERCS, placenta accreta and peripartum hysterectomy

*Placenta previa, placenta accreta, and vasa previa.* Oyelese. Obstet Gynecol 2005

*Pregnancy outcomes for women with placenta previa in relation to the number of prior cesarean deliveries.* Grobman et al: Obstet Gynecol 2007

“the increased risks of placenta previa and placenta accreta for pregnancies subsequent to elective primary or repeat cesarean delivery are issues of major concern that are difficult to quantitate”

Greene, N Engl J Med 2004
Abnormal placentation - previa

- What is the risk for abnormal placentation in subsequent pregnancies in women with cesarean deliveries?
- Meta-analysis of 36 studies prior to 1996
- Assessed association between placenta previa and prior cesarean delivery
- 3.7 million pregnancies and 13,992 previas
Women with $\geq 1$ prior cesarean 2.6 times $>$ risk for previa than those delivered vaginally

Dose response with an increasing risk of previa with increasing numbers of cesareans in 4 studies that provided information on # CS
First-birth cesarean and placental abruption or previa at second birth

- Retrospective cohort study in Washington State (n = 96,975 primips)
- Singleton live birth and a subsequent singleton birth between 1987 – 1996
- Women with a CS in first births

- OR 1.4 (95% CI; 1.1 – 1.6) for placenta previa in next pregnancy compared to those with vaginal births

- Retrospective cohort in Missouri (n=187,000) women with 2 or 3 births 1989 – 1997

- RR 1.5 (95% CI; 1.3 – 1.8) for previa in subsequent pregnancies in women with prior cesarean deliveries
The likelihood of placenta previa with greater numbers of cesarean deliveries and higher parity  

Gilliam M: Obstet Gynecol 2002

- **Case-control study among multips 1986-1989**
  - Cases: 316 previa
  - Controls: 2051 no previa

- **OR 1.7 (95% CI; 1.12 – 2.64)** for previa with hx 1 CS
- **OR 8.76 (95% CI; 1.58 – 48.53)** for previa with hx ≥ 4 CS
Placenta Accreta

Definition

- Placenta that is abnormally adherent to the uterus
- Increta: Invades the myometrium
- Percreta: Invades the serosa or adjacent organs
- Accreta: All of the above

Oyalese and Smulian; Obstet Gynecol 2006;102:927
Placenta accreta – rates increasing

- **Approximate rates**
  - 1960s: 1 in 30,000 deliveries
  - 1982 – 2002: 1 in 533 deliveries

Wu S et al: Abnormal placentation: 20 year analysis. AJOG 2005
Miller et al., AJOG 1997
Abnormal placentation – *placenta accreta*

Most clinically significant long term maternal morbidity after CS occurs in subsequent pregnancies in women with placenta accreta

Placenta accreta spectrum includes *placenta accreta, increta and percreta*
Abnormal placentation – **placenta accreta**

Morbidity from placenta accreta is substantial and includes problems associated with *massive bleeding* such as disseminated intravascular disease, coagulation, multi-organ failure and death.
Abnormal placentation – *placenta accreta*

In most cases, the only way to stop the bleeding is an often difficult *hysterectomy* that has its own set of complications as well as resulting in a loss of fertility.

*Placenta accreta* has now become the most common reason for *cesarean hysterectomy* in developed countries.


Placenta Accreta - Risk Factors

- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
- Cesarean delivery
Placenta accreta
research summary

- **Case series (n=76)**
  - Blood transfusion required in over 80%
  - Transfusion of ≥ 4 units of packed red blood cells in over 40% of cases

*Eller et al: Optimal management strategies for placenta accreta. BJOG 2009*
Placenta accreta

research summary (cont)

- Literature review
  - Average blood loss 3,000 – 5,000 mL at the time of delivery
  - Most common surgical complication cystotomy (often intentional)
  - Ureteral injury in 10 – 15% of cases
  - Less common injuries to bowel, pelvic nerves and large vessels and vesico-vaginal fistulas

Prospective cohort study 1999-2002 from NIH/MFM Cesarean Registry Study

- 19 Academic medical centers
- 378,168 births
  - 57,068 CS
  - 30,132 CS no labor
- Daily ascertainment of CS
- Trained study nurses

**Placenta accreta and > number CS**

*Placenta Accreta among Women Who Had CS Without Labor*

<table>
<thead>
<tr>
<th>CS#</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>1,457</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>
</tr>
</tbody>
</table>

*Silver et al., Ob Gyn 2006;107:1226*
Combination of placenta previa and prior cesarean delivery dramatically increases the risk for placenta accreta

*Silver et al: Maternal morbidity associated with multiple cesarean deliveries. Obstet Gynecol 2006*
In the 723 women in the cohort with placenta previa

- accreta occurred in 3%, 11%, 40%, 61%, and 67% in those having their first, second, third, fourth, and fifth or greater CS respectively

<table>
<thead>
<tr>
<th>Cesarean Delivery</th>
<th>Previa</th>
<th>Previa:Accreta [n (%)]</th>
<th>No Previa‡:Accreta† [n (%)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>First§</td>
<td>398</td>
<td>13 (3)</td>
<td>2 (0.03)</td>
</tr>
<tr>
<td>Second</td>
<td>211</td>
<td>23 (11)</td>
<td>26 (0.2)</td>
</tr>
<tr>
<td>Third</td>
<td>72</td>
<td>29 (40)</td>
<td>7 (0.1)</td>
</tr>
<tr>
<td>Fourth</td>
<td>33</td>
<td>20 (61)</td>
<td>11 (0.8)</td>
</tr>
<tr>
<td>Fifth</td>
<td>6</td>
<td>4 (67)</td>
<td>2 (0.8)</td>
</tr>
<tr>
<td>≥ 6</td>
<td>3</td>
<td>2 (67)</td>
<td>4 (4.7)</td>
</tr>
</tbody>
</table>

† Increased risk with increasing number of cesarean deliveries; P < .001.
‡ Percentage of accreta in women without placenta previa.
§ Primary cesarean.
Placenta accreta –
maternal comorbidity

Research summary (cont)

- 25 to 50% of women required admission to an intensive care

- Increased risk of thromboembolism, pyelonephritis, pneumonia, wound and pelvic infections, need for a second operation to control bleeding or treat infection

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>No Accreta</th>
<th>Accreta</th>
</tr>
</thead>
<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>
This cohort is particularly informative because it includes only cesareans without labor, thereby excluding the morbidity associated with uterine rupture and emergency cesarean

<table>
<thead>
<tr>
<th>Cesarean Delivery</th>
<th>Accreta [n (%)]</th>
<th>OR (95% CI)</th>
<th>Hysterectomy [n (%)]</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First*</td>
<td>15 (0.2)</td>
<td>–</td>
<td>40 (0.7)</td>
<td>–</td>
</tr>
<tr>
<td>Second</td>
<td>49 (0.3)</td>
<td>1.3 (0.7–2.3)</td>
<td>67 (0.4)</td>
<td>0.7 (0.4–0.97)</td>
</tr>
<tr>
<td>Third</td>
<td>36 (0.6)</td>
<td>2.4 (1.3–4.3)</td>
<td>57 (0.9)</td>
<td>1.4 (0.9–2.1)</td>
</tr>
<tr>
<td>Fourth</td>
<td>31 (2.1)</td>
<td>9.0 (4.8–16.7)</td>
<td>35 (2.4)</td>
<td>3.8 (2.4–6.0)</td>
</tr>
<tr>
<td>Fifth</td>
<td>6 (2.3)</td>
<td>9.8 (3.8–25.5)</td>
<td>9 (3.5)</td>
<td>5.6 (2.7–11.6)</td>
</tr>
<tr>
<td>≥ 6</td>
<td>6 (6.7)</td>
<td>29.8 (11–78.7)</td>
<td>8 (9.0)</td>
<td>15.2 (6.9–33.5)</td>
</tr>
</tbody>
</table>

OR, odds ratio; CI, confidence interval.

*Primary cesarean delivery.
Placenta accreta –
perinatal morbidity

- Placenta accreta associated with increased perinatal morbidity
- most cases due to PTD
  - prompted by vaginal bleeding
  OR
  - desire to avoid vaginal bleeding and optimize surgical conditions
Placenta accreta – perinatal morbidity

- In fact, iatrogenic preterm birth is advised for antenatally diagnosed cases of accreta.
- In some cases, bleeding may precipitate abruption and compromise of fetal blood flow.

Oyelese Y, Smulian JC: Placenta previa, placenta accreta, and vasa previa. Obstet Gynecol 2005


Bauer ST, Bonanno C: Abnormal placentation. Semin Perinatol 2009
Outcomes were improved with antenatal diagnosis and specialized care

Bauer ST, Bonanno C: Abnormal placentation. Semin Perinatol 2009
Summary

- Diagnosis of and preparation for placenta accreta essential
- Do not abandon QA programs to reduce primary cesarean section
- Establish an Irish Cesarean Section Registry
Acknowledgements

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