PREVENTING THE FIRST C-SECTION?

DON’T GIT’ER DONE
The first cut is the deepest!!!!!

PRACTICE GAP: LACK OF KNOWLEDGE REGARDING CHANGING CRITERIA ON LABOR MANAGEMENT, FETAL TRACING INTERPRETATION AND HOW THEY CONTRIBUTE TO RISING CESAREAN DELIVERY RATE

DESIRED OUTCOME: INCREASE OUR KNOWLEDGE OF FACTORS THAT OPTIMIZE SUCCESS FOR VAGINAL DELIVERY

DISCLOSURE STATEMENT
The views and conclusions of this talk are solely those of the speaker and do not represent those of Legacy, ACOG, SMFM, my group, my wife, any of my patients, any pharmaceutical company, federal/state/local governments, insurance companies. The names have been changed to protect the innocent.

Disclosure Statement
Disclosure of relevant financial relationships in the past 12 months:
• I have commercial interests with: Hologic
• As a result of these financial relationships I have received: Honorarium
• This compensation was provided for my role as: Member of the Hologic Speaker’s Bureau
BACKGROUND

- Nearly 1/3 of deliveries are via cesarean section
- In 2011, that was about 1.3 million procedures
- It is the most common major surgical procedure performed in the U.S
- Growing concerns (by whom??)

BACKGROUND

- There was a gradual increase in the rate from under 20% in 1996 to over 30% in 2008
- Appears to have peaked and has been stable for the last 3 years
- Why the increase over the years?
- Why the concern?
- Can we stop it and in fact reduce the rate?

NATIONAL DATA DELIVERIES 2011

Number of vaginal deliveries: 2,651,428
Number of Cesarean deliveries: 1,293,267
Percent of all deliveries by Cesarean: 32.8%
CONCERNS

- Cesarean sections cost more
- Complications higher than with vaginal delivery
- More than likely will have repeat cesarean sections with subsequent births
- Risk of future surgery increase
  - Adhesive disease
  - Placental implantation problems

BACKGROUND

- Reason for increase is multi-factorial
- Probably won’t be a simple fix
- Preventing the 1st cesarean may be the best way to decrease the overall rate since 80% of these patients will have a repeat c-section
- Meeting Feb 2012 of NICHD, SMFM, ACOG to review ways to prevent the 1st c-section

Preventing the First Cesarean Delivery
Summary of a Joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, and American College of Obstetricians and Gynecologists Workshop

Catherine Y. Spong, MD, Vincente Berghella, MD, Katharine D. Wentworth, MD, Brian M. Mercer, MD, and George R. Scalise, MD

(Obstet Gynecol 2012;120:1181–93)
DOI: http://10.1097/AOG.0b013e3182704880
LET’S LOOK AT THEIR CONCLUSIONS AND OTHER SUGGESTIONS, SHALL WE?

SOME SUGGESTIONS

- Patient needs to be counseled to immediate and potential future risks of multiple cesarean sections
- Risks associated with mode of delivery should be presented in an objective and unbiased manner
- Indication for cesarean section should be clearly listed
- It should not be called elective, it should be labeled “not indicated cesarean delivery”

<p>| Table 2: Selected Potentially Modifiable Obstetric Indications for First Cesarean Delivery |
|-----------------------------------------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Indication</th>
<th>Diagnostic Accuracy</th>
<th>Effect on Prematurity</th>
<th>Precautions Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>High</td>
<td>Large</td>
<td>See Table 3 and Figure 1</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td>High</td>
<td>Small</td>
<td>Medicaid managed care, increase single embryo transfer</td>
</tr>
<tr>
<td>Preterm labor</td>
<td>High</td>
<td>Small</td>
<td>Shared ratio of labor: timing for surgical delivery, availability for surgery, limited, or breach extraction of second stage</td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>High</td>
<td>Small</td>
<td>Education: pre-eclampsia is not an indicator for cesarean delivery</td>
</tr>
<tr>
<td>Prior shoulder dystocia</td>
<td>Limited</td>
<td>Small</td>
<td>Improved documentation of prior shoulder dystocia: education regarding risk of recurrence based on estimated fetal weight</td>
</tr>
<tr>
<td>Prior cesarean</td>
<td>Limited</td>
<td>Small</td>
<td>Prior shoulder dystocia is not an absolute indicator for cesarean delivery</td>
</tr>
<tr>
<td>Prior cesarean</td>
<td>Limited</td>
<td>Small</td>
<td>Prior cesarean: improved documentation of prior cesarean</td>
</tr>
<tr>
<td>Prior third-degree or fourth-degree laceration</td>
<td>High</td>
<td>Small</td>
<td>Education: not an absolute indication for cesarean delivery</td>
</tr>
<tr>
<td>Prolonged labor</td>
<td>High</td>
<td>Small</td>
<td>Education: not an absolute indication for cesarean delivery</td>
</tr>
<tr>
<td>Steroid use</td>
<td>High</td>
<td>Small</td>
<td>Increased risk of cesarean delivery, acceptable as long as plasma is less than 8 mg/dL or vaginal birth amniotomy</td>
</tr>
</tbody>
</table>

*Diagnostic criteria accuracy: how many and accuracy cases can be diagnosed. For example, the ability to diagnose multiple gestations is high, whereas the ability to identify all cases of shoulder dystocia is limited as a result of subjectivity of the definition.
OTHER THINGS

Table 3. Selected Potentially Modifiable Fetal Indications for First Cesarean Delivery

<table>
<thead>
<tr>
<th>Indication</th>
<th>Diagnostic Accuracy</th>
<th>Effect on Prevention of First Cesarean Delivery</th>
<th>Prevention Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apiriformity</td>
<td>High</td>
<td>Large</td>
<td>Clinical epigastic version</td>
</tr>
<tr>
<td>Nonmeasuring antepartum or</td>
<td>Moderate</td>
<td>Large</td>
<td>Education regarding correct interpretation and management (Fig. 1)</td>
</tr>
<tr>
<td>intrauterine fetal surveillance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placenta</td>
<td>Limited</td>
<td>Small</td>
<td>Anecdotal evidence</td>
</tr>
<tr>
<td>Malformation, e.g. NTD, SC,</td>
<td>Moderate</td>
<td>Small</td>
<td>Education regarding delivery, not indicated for abdominal wall defects</td>
</tr>
<tr>
<td>EXIT procedure, hydrophoria</td>
<td></td>
<td></td>
<td>Multidisciplinary education of obstetricians and counseling of patients</td>
</tr>
</tbody>
</table>

INDICATIONS FOR PRIMARY CESAREAN SECTION

• Prelabor
  — Malpresentation 10-15%
  — Multiple gestation 3%
  — Hypertensive disorders 3%
  — Macrosomia 3%
  — Maternal request 2-8%

INDICATIONS FOR PRIMARY CESAREAN SECTION

• IN LABOR
  — First stage arrest 15-30%
  — 2nd stage arrest 10-25%
  — Failed induction 10%
  — NRFHRT 10%
FIRST, LET’S TALK ABOUT INDUCTIONS

ETHICS OF INDUCTION

INDUCTION OF LABOR

• Institutions should
  – Have clear policy regarding labor induction
  – List of acceptable indications
  – What defines a favorable cervix
  – Options for cervical ripening
  – Oxytocin infusion protocols
  – What defines a failed induction
• It should be clearly stated that the goal is for a vaginal delivery!!!!!

APPROPRIATENESS OF LABOR INDUCTION

• Four criteria in order of importance
  – Concordant with women’s autonomous informed decisions and desires
  – Conceivably optimizes outcomes including psychological well-being
  – Congruous with evidence based medicine
  – Cost-effective

Induction of labor in the United States: a critical appraisal of appropriateness and reducibility
INDUCTION OF LABOR (MYTHS?)

- Induction of labor increases the likelihood of cesarean section compared to spontaneous labor
- Even more pronounced in nulliparous patients with an unfavorable cervix

SOME MORE BACKGROUND

- All of the earlier studies looking at elective induction are flawed
  - Compare induction, favorable or not, to patients in spontaneous labor
  - Unfair comparison
- Also, another point
  - ACOG supports primary cesarean section at term if a patient desires this after appropriate counseling. If this is true, why can’t a patient opt for elective induction at term??

INDUCTION OF LABOR

- Is all of this true???
- Does elective induction with or without a favorable cervix increase the risk of cesarean section?
- Most of the studies saying this compare patients in labor to those being induced??
- Is that a fair comparison??
- Patients don’t have a choice of being induced or being in labor do they??

DOING NOTHING IS STILL DOING SOMETHING!!!
NATURAL HISTORY:
What happens when a patient hits 39 weeks with unfavorable cervix
26% go in to labor at 39-40 weeks
39% go in to labor at 40-41 weeks
35% go in to labor at 41-42 weeks

WHAT IS THE RISK OF DOING NOTHING??
SO WHAT IS THE RISK OF AN INDUCTION??

Increased risk of cesarean section (???)

SHOULD COMPARE INDUCTION AT 39 WEEKS TO EXPECTANT MANAGEMENT

• This has been done in a couple of studies now
• Compared nulliparous, multiparous, mixtures
• Favorable vs. not favorable
• Consistently show
  – Cesarean section rate is the SAME!!!
  – Lower meconium stained fluid
  – More time on labor and delivery
INDUCTION

- Retrospective, case controlled study
- 294 nulliparous patients
  - Elective induction 39.0 to 40.5 weeks
  - Bishop score > 5
- Compared to 294 patients expectantly managed from 39 weeks
- Cesarean delivery rate 20% in each group
  - 17% of expectantly managed group required induction due to oligohydramnios or post dates

OTHERS

• Induction vs expectant at term
  – Cheng, Kaimal AJOG Dec 2012
    • Lower cesarean rate and less labor dystocia
    • Better neonatal outcomes (better Apgars, less MAS, less NICU admission)
    • Seen for both inducing at 39 and at 40 weeks

• Unfavorable nulliparous at term
  – Osmundson Ob/Gyn March 2011
    • No increase in c-section rate
    • No improvement in outcomes
    • More costly for induction group

INDUCTION VS EXPECTANT MANAGEMENT AT TERM

• Compared
  – Cesarean section rate
  – Operative vaginal delivery
  – Birth trauma
  – 3rd and 4th degree lacerations
  – NICU admits
  – Hyperbilirubinemia
  – RDS
  – Macrosomia

Darney B OB/GYN Oct 2013

INDUCTION VS. EXPECTANT MANAGEMENT AT TERM

• Retrospective cohort study
• All singleton’s without a prior cesarean section in California in 2006
• 362,154 deliveries
• Induction vs expectant management

Darney B et al OB/GYN October 2013

INDUCTION VS EXPECTANT MANAGEMENT AT TERM

• Induction group
  – Lower c-section rate in nullips and multips
  – Lower laceration rate
  – Higher hyperbili at 37 & 39 weeks
  – Higher shoulder dystocia at 39 weeks
  – No difference in any other measures

Darney B OB/GYN Oct 2013
In a randomized trial, one compares induction of labor to expectant management. There are a number of these trials conducted at 41 or 42 weeks’ gestation, and in metaanalyses, induction of labor has been shown to decrease the risk of cesarean delivery compared with expectant management.\textsuperscript{2,3} There are far fewer studies conducted prior to 41 weeks’ gestation, but these, too, have demonstrated a reduction in the risk of cesarean delivery.\textsuperscript{4}

More recently, retrospective cohort studies have attempted to mimic these randomized trials by comparing women induced at a particular gestational age and comparing them with women managed expectantly to greater gestational ages.\textsuperscript{5-9} Overall, these studies generally have found either a lower risk of cesarean delivery with induction of labor or no difference.

Perinatal outcomes related to induction of labor: a call for randomized trials
Aaron B. Caughey, MD, PhD

All obstetric clinicians know that induction of labor causes more cesarean deliveries. If you spend time on the labor floor, you can see that women who are induced end up with more cesareans than those who experience spontaneous labor. However, we have been confused and wrong regarding this issue for decades. This is because at any gestational age, the options for a clinician and patient are not induction of labor vs spontaneous labor but induction of labor vs expectant management.\textsuperscript{1}
ELECTIVE INDUCTION OF LABOR

IS ELECTIVE INDUCTION UNDER 40 WEEKS REASONABLE?
I BELIEVE THEY ARE!!!!

MAKING DIAGNOSIS OF ARREST DISORDERS AND/OR FAILED INDUCTIONS

QUESTIONS?

WHAT IS LABOR NOW???

• Timing of active phase, length of normal progression, duration of 2nd stage have been re-defined
• Friedman is out, Zhang is in
• 6 is the new 4
• Longer labors do not appear to increase the risk of maternal or neonatal complications
**FRIEDMAN LABOR CURVE**

![Diagram of Friedman's curve showing phase of maximum slope]

**CONTEMPORARY LABOR CURVE**

![Diagram showing average labor curves by parity in singleton term pregnancies with spontaneous onset of labor, vaginal delivery, and normal neonatal outcomes. Po: nulliparous women; P1: women of parity 1; P2+, women of parity 2 or higher.]

**IS THE FRIEDMAN CURVE THAT FAR OFF??**

- Friedman labor curve
  - Nulliparous patients dilated 1.2 cm/hr after 4 cm
  - Multiparous patients dilated at 1.5 cm/hr

- In consortium for safe labor
  - Time of nulliparous patient to go from 4 to 10 was 4.2 hours (6 divided by 4.2 = 1.4 cm/hr)
  - In multiparous patients to go from 4 to 10 cm was 3.7 hours (6 divided by 3.7 = 1.6 cm/hr)

**LABOR CURVE**

<table>
<thead>
<tr>
<th>Cervical Dilatation (cm)</th>
<th>Parity 0 (n=23,624)</th>
<th>Parity 1 (n=16,755)</th>
<th>Parity 2+ (n=16,219)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–4</td>
<td>1.6 (0.1)</td>
<td>1.4 (0.1)</td>
<td>1.4 (0.0)</td>
</tr>
<tr>
<td>4–5</td>
<td>1.3 (0.4)</td>
<td>1.4 (0.3)</td>
<td>1.4 (0.0)</td>
</tr>
<tr>
<td>5–6</td>
<td>0.8 (0.2)</td>
<td>0.8 (0.4)</td>
<td>0.8 (0.4)</td>
</tr>
<tr>
<td>6–7</td>
<td>0.6 (0.2)</td>
<td>0.5 (0.9)</td>
<td>0.5 (1.8)</td>
</tr>
<tr>
<td>7–8</td>
<td>0.5 (1.6)</td>
<td>0.4 (1.3)</td>
<td>0.4 (1.2)</td>
</tr>
<tr>
<td>8–9</td>
<td>0.5 (1.4)</td>
<td>0.3 (1.0)</td>
<td>0.3 (0.9)</td>
</tr>
<tr>
<td>9–10</td>
<td>0.5 (1.4)</td>
<td>0.3 (0.9)</td>
<td>0.3 (0.9)</td>
</tr>
<tr>
<td>Second stage with epidural analgesia</td>
<td>1.1 (0.6)</td>
<td>0.4 (2.0)</td>
<td>0.3 (1.6)</td>
</tr>
<tr>
<td>Second stage without epidural analgesia</td>
<td>0.6 (2.8)</td>
<td>0.2 (1.3)</td>
<td>0.1 (1.1)</td>
</tr>
</tbody>
</table>

Data are median (95th percentile).
QUESTIONS?

FETAL HEART RATE INTERPRETATION

- In 2004, 89% of pregnancies had fetal monitoring
- Terminology has been problematic
- EFM has been criticized for high false (+) rate
- EFM does decrease intrapartum fetal mortality and fetal acidemia
- Associated with higher cesarean section rate and operative vaginal deliveries

FETAL HEART RATE INTERPRETATION

- In 2008, a workshop was convened by NICHD, SMFM, and ACOG
- Evaluated multiple terminologies
- To assist in management and interventions
- Decided on 3 tier system
  - Category 1: completely normal
  - Category 2: not completely normal
  - Category 3: bad and needs delivery

Table 5. Definitions of Failed Induction and Arrest Disorders

<table>
<thead>
<tr>
<th>Failed induction of labor</th>
<th>Failure to generate regular (eg, every 3 min) contractions and cervical change after at least 24 h of oxytocin administration, with artificial membrane rupture if feasible</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-stage arrest</td>
<td>6 cm or greater dilation* with membrane rupture and no cervical change for 4 h or more of adequate contractions (eg, &gt;200 Montevideo units) or 6 h or more if contractions inadequate</td>
</tr>
<tr>
<td>Second-stage arrest</td>
<td>No progress (descent or rotation) for 4 h or more in nulliparous women with an epidural 3 h or more in nulliparous women without an epidural 2 h or more in multiparous women with an epidural 2 h or more in multiparous women without an epidural</td>
</tr>
</tbody>
</table>

* Since women may still be in latent labor, additional time and interventions may be needed in order to diagnose an arrest of active labor before 6 cm dilatation (see Figure 1 for suggested management).
FETAL HEART RATE INTERPRETATION

• Over these couple of years, became clear that 3 tiers is probably not enough
  – 70-80% of tracings are category 2
• Parer and Ikeda developed a 5 tier system
• May be more complicated but also may be more discriminatory

OBSTETRICS

The 5-tier system of assessing fetal heart rate tracings is superior to the 3-tier system in identifying fetal acidemia

Jocly Gokte, MD; Elizabeth Murphy; Zachary Ruben, MD; Cynthia Guadalu Pepe-Assman, MD

CONCLUSION: The 5-tier system had a better sensitivity than the 3-tier system.
FETAL HEART RATE INTERPRETATION

IS FOCUSING ON STANDARDIZED TERMINOLOGY AND MANAGEMENT OF FHRT REASONABLE??

YES!!

OPERATIVE VAGINAL DELIVERY

• Operative delivery rate continues to decrease in U. S.
  – Fell 45% from 1994 to 2004 (9.4% to 5.2%)
  – Vacuum is 4.1% and forceps are 1.1%
• Less skilled instructors so less training of residents
• Vicious cycle

OPERATIVE VAGINAL DELIVERY

• Countries who have higher operative vaginal delivery rates often times have lower cesarean section rates
• Cause and effect
• Long term outcomes (up to 18 years) have demonstrated normal development comparing operative vaginal delivery to those delivered by cesarean section

OPERATIVE VAGINAL DELIVERY SUGGESTIONS

• Explain operative vaginal delivery is appropriate in proper circumstances
• Provide adequate training during residency for competence
• Continue with ongoing skill maintenance through lectures and simulation training post residency
OPERATIVE VAGINAL DELIVERY

IS THIS REASONABLE????

YES!!!
EXTERNAL CEPHALIC VERSION

• Tocolysis or not
• Earlier gestational age or not
• Epidural or not
• Prior cesarean section or not

QUESTIONS?

SUGGESTED SURVEILLANCE

Box 1. Quality Measures to Track and Provide Feedback for Each Obstetrician–Gynecologist Physician*

- Rate of nonmedically indicated cesarean delivery
- Rate of nonmedically indicated induction
- Rate of labor arrest or failed induction diagnosed without meeting accepted criteria
- Rate of cesarean deliveries for nonmeasuring fetal heart rate by Eunice Kennedy Shriver National Institute of Child Health and Human Development category 2

*For singleton gestation, vertex presentation, at 37 0/7 to 41 6/7 weeks of gestation.
Method of Delivery for Women With Prior Cesareans, Nationwide Inpatient Sample, 2000, 2003, 2005

<table>
<thead>
<tr>
<th></th>
<th>2000 N (%)</th>
<th>2003 N (%)</th>
<th>2006 N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Deliveries</td>
<td>3,975,574</td>
<td>3,964,514</td>
<td>4,100,779</td>
</tr>
<tr>
<td>Total Prior Cesarean</td>
<td>482,913</td>
<td>540,038</td>
<td>596,725</td>
</tr>
<tr>
<td>Elective Repeat (% Total Prior Cesarean)</td>
<td>285,636 (59.1%)</td>
<td>423,786 (78.5%)</td>
<td>495,151 (83.0%)</td>
</tr>
<tr>
<td>Attempted VBAC</td>
<td>197,276</td>
<td>116,251</td>
<td>101,574</td>
</tr>
<tr>
<td>Successful VBAC</td>
<td>136,334</td>
<td>74,287</td>
<td>61,210</td>
</tr>
<tr>
<td>% Success = Success/Attempt</td>
<td>69.1%</td>
<td>64.0%</td>
<td>60.3%</td>
</tr>
<tr>
<td>VBAC Rate = Success VBAC/All Priors</td>
<td>38.2</td>
<td>13.8</td>
<td>10.3</td>
</tr>
</tbody>
</table>

TO DECREASE THE OVERALL CESAREAN SECTION RATE WE NEED TO INCREASE THE NUMBER OF TOLACS!!!
### RISKS WITH MULTIPLE CESAREAN SECTIONS

#### Table 1: Demographic Characteristics and Delivery Outcome of Women Who Had Cesarean Deliveries Without Labor

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>First CD</th>
<th>Second CD</th>
<th>Third CD</th>
<th>Fourth CD</th>
<th>Fifth CD</th>
<th>Sixth CD</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race or ethnic group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (%)</td>
<td>52.6</td>
<td>61.7</td>
<td>47.1</td>
<td>41.6</td>
<td>41.6</td>
<td>41.6</td>
<td></td>
</tr>
<tr>
<td>African American (%)</td>
<td>27.8</td>
<td>22.0</td>
<td>21.1</td>
<td>27.1</td>
<td>28.9</td>
<td>28.9</td>
<td></td>
</tr>
<tr>
<td>Hispanic (%)</td>
<td>10.7</td>
<td>10.1</td>
<td>10.2</td>
<td>9.8</td>
<td>9.8</td>
<td>9.8</td>
<td></td>
</tr>
<tr>
<td>Other or unknown (%)</td>
<td>1.7</td>
<td>2.2</td>
<td>1.2</td>
<td>1.1</td>
<td>1.2</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Normal (cm)</td>
<td>37.2</td>
<td>38.9</td>
<td>39.0</td>
<td>39.0</td>
<td>39.0</td>
<td>39.0</td>
<td></td>
</tr>
<tr>
<td>Singleton pregancy (%)</td>
<td>51.8</td>
<td>51.3</td>
<td>51.3</td>
<td>45.6</td>
<td>45.6</td>
<td>45.6</td>
<td></td>
</tr>
<tr>
<td>Toddlers' age (%)</td>
<td>52.3</td>
<td>51.8</td>
<td>51.8</td>
<td>52.3</td>
<td>52.3</td>
<td>52.3</td>
<td></td>
</tr>
<tr>
<td>Average age at delivery (yr ± SD)</td>
<td>30.8 ± 4.2</td>
<td>38.5 ± 3.3</td>
<td>30.8 ± 2.1</td>
<td>30.8 ± 2.1</td>
<td>30.8 ± 2.1</td>
<td>30.8 ± 2.1</td>
<td></td>
</tr>
<tr>
<td>Delivery at &lt;0 weeks (%)</td>
<td>44.2</td>
<td>14.6</td>
<td>21.2</td>
<td>38.6</td>
<td>45.6</td>
<td>38.6</td>
<td></td>
</tr>
</tbody>
</table>

All cesarean deliveries are defined as normal vaginal delivery. Normal vaginal delivery includes all women who had vaginal deliveries with and without forceps or vacuum extraction. All cesarean deliveries are defined as normal vaginal delivery. Normal vaginal delivery includes all women who had vaginal deliveries with and without forceps or vacuum extraction.

#### Table 2: Maternal Morbidity of Women Who Had Cesarean Deliveries Without Labor

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>First CD</th>
<th>Second CD</th>
<th>Third CD</th>
<th>Fourth CD</th>
<th>Fifth CD</th>
<th>Sixth CD</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>12 (22%)</td>
<td>18 (30%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Uterine rupture</td>
<td>13 (25%)</td>
<td>15 (25%)</td>
<td>19 (37%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Uterine atony</td>
<td>15 (27%)</td>
<td>22 (37%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Abruptio placentae</td>
<td>14 (27%)</td>
<td>20 (33%)</td>
<td>19 (37%)</td>
<td>19 (37%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Hemorrhage, atony</td>
<td>12 (22%)</td>
<td>18 (30%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Placental abruption</td>
<td>10 (19%)</td>
<td>17 (28%)</td>
<td>19 (37%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Placental tear</td>
<td>13 (25%)</td>
<td>15 (25%)</td>
<td>19 (37%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Hemorrhage, atony, abruption</td>
<td>12 (22%)</td>
<td>18 (30%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
</tbody>
</table>

#### Table 3: Occurrence of Adverse Outcomes in Women Who Had Cesarean Deliveries Without Labor

<table>
<thead>
<tr>
<th>Adverse Outcome</th>
<th>First CD</th>
<th>Second CD</th>
<th>Third CD</th>
<th>Fourth CD</th>
<th>Fifth CD</th>
<th>Sixth CD</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>12 (22%)</td>
<td>18 (30%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Uterine rupture</td>
<td>13 (25%)</td>
<td>22 (37%)</td>
<td>19 (37%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Uterine atony</td>
<td>15 (27%)</td>
<td>20 (33%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Abruptio placentae</td>
<td>14 (27%)</td>
<td>20 (33%)</td>
<td>19 (37%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Hemorrhage, atony</td>
<td>12 (22%)</td>
<td>18 (30%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Placental abruption</td>
<td>10 (19%)</td>
<td>17 (28%)</td>
<td>19 (37%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Placental tear</td>
<td>13 (25%)</td>
<td>15 (25%)</td>
<td>19 (37%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
<tr>
<td>Hemorrhage, atony, abruption</td>
<td>12 (22%)</td>
<td>18 (30%)</td>
<td>12 (22%)</td>
<td>12 (22%)</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td></td>
</tr>
</tbody>
</table>

All cesarean deliveries are defined as normal vaginal delivery. Normal vaginal delivery includes all women who had vaginal deliveries with and without forceps or vacuum extraction. Normal vaginal delivery includes all women who had vaginal deliveries with and without forceps or vacuum extraction.

#### Table 4: Placenta Previa and Placenta Accreta by Number of Cesarean Deliveries

<table>
<thead>
<tr>
<th>Cesarean Delivery</th>
<th>Placenta Previa</th>
<th>Placenta Accreta</th>
<th>No Placenta Accreta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>308</td>
<td>13 (3.8)</td>
<td>2 (0.6)</td>
</tr>
<tr>
<td>2nd</td>
<td>211</td>
<td>33 (15.1)</td>
<td>20 (9.5)</td>
</tr>
<tr>
<td>3rd</td>
<td>22</td>
<td>29 (84.0)</td>
<td>7 (21.9)</td>
</tr>
<tr>
<td>4th</td>
<td>3</td>
<td>3 (100.0)</td>
<td>1 (33.3)</td>
</tr>
<tr>
<td>5th</td>
<td>1</td>
<td>1 (100.0)</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>0</td>
<td>0 (0)</td>
<td></td>
</tr>
</tbody>
</table>

Percentage of accreta in women with placenta previa increased with increasing number of cesarean deliveries (P < .001). Percentage of accreta in women without placenta previa. Primary cesarean.
RISKS WITH MULTIPLE CESAREAN SECTIONS

Table 5. Placenta Accreta and Comorbidity

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>No Accreta (%)</th>
<th>Accreta (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystotomy</td>
<td>0.15</td>
<td>15.4</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Ureteral injury</td>
<td>0.02</td>
<td>2.1</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>0.13</td>
<td>2.1</td>
<td>.001</td>
</tr>
<tr>
<td>Ventilator</td>
<td>0.3</td>
<td>14</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Intensive care unit</td>
<td>0.8</td>
<td>26.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Reoperation</td>
<td>0.26</td>
<td>5.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Endometritis</td>
<td>3.34</td>
<td>3.50</td>
<td>.81</td>
</tr>
</tbody>
</table>

How many C-sections can I have doctor????

RISKS WITH MULTIPLE CESAREAN SECTIONS

Table 6. Hysterectomy and Comorbidity

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>No Hysterectomy (%)</th>
<th>Hysterectomy (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystotomy</td>
<td>0.14</td>
<td>12.04</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Ureteral injury</td>
<td>0.01</td>
<td>2.31</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>0.13</td>
<td>1.85</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Ventilator</td>
<td>0.32</td>
<td>12.5</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Intensive care unit</td>
<td>0.74</td>
<td>23.15</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Reoperation</td>
<td>0.21</td>
<td>11.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Endometritis</td>
<td>3.33</td>
<td>4.17</td>
<td>.50</td>
</tr>
</tbody>
</table>

Let’s look at the numbers

Table 64. Family Households by Number of Own Children Under 18 Years of Age: 2000 to 2010

<table>
<thead>
<tr>
<th>Race, Hispanic origin, and year</th>
<th>Number of families (1,000)</th>
<th>Percent distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Three or more children</td>
<td>Three or more children</td>
</tr>
<tr>
<td></td>
<td>Total children</td>
<td>One child</td>
</tr>
<tr>
<td>All families 1</td>
<td>72,025</td>
<td>27,420</td>
</tr>
<tr>
<td>2000</td>
<td>72,025</td>
<td>27,420</td>
</tr>
<tr>
<td>2005</td>
<td>76,598</td>
<td>29,647</td>
</tr>
<tr>
<td>2010 total</td>
<td>78,833</td>
<td>31,615</td>
</tr>
<tr>
<td>Married couple</td>
<td>58,410</td>
<td>23,065</td>
</tr>
<tr>
<td>Male household 2</td>
<td>5,060</td>
<td>3,398</td>
</tr>
<tr>
<td>Female household 2</td>
<td>14,943</td>
<td>5,424</td>
</tr>
</tbody>
</table>
SUMMARY

- Best way to decrease overall c-section rate
  - Prevent the first one!!!!
  - Encourage TOLAC
- Choose TOLAC patient’s carefully based on calculator for success
  - Need to have success rate of at least 50% to be cost effective
  - Always weigh risk vs benefits
SUMMARY

- Ways I think we can prevent the first cesarean section
  - Allow for longer labors
  - Understand current management protocols for fetal heart rate tracings
  - Maybe be more aggressive with ECV
  - ? Improve training of operative vaginal delivery to residents

SUMMARY

- Stuff that doesn’t matter or won’t change the cesarean section rate
  - Eliminating elective inductions at term, especially with a favorable cervix
  - Being more aggressive in trying for vaginal delivery in more rare situations
    - Twins
    - Severe preeclampsia with unfavorable cervix
    - Everything else