Preparing for and the ABC’s of Operative vaginal Delivery

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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, Vincenzo Berghella, MD, Katharine D. Wenstrom, MD, Brian M. Mercer, MD, and George R. Saade, MD
Primary Cesarean Delivery in the United States

Annelee Boyle, MD, Uma M. Reddy, MD, MPH, Helain J. Landy, MD, Chun-Chih Huang, PhD, Rita W. Driggers, MD, and S. Katherine Laughon, MD, MS

21.4% of C/S CPD in 2nd stage of labor
1.1% were offered OVD
Operative delivery: Objectives

• Discuss
  – Indications for OVD
  – Choice of instrument
  – Technique
  – Complications
Operative Vaginal delivery

- Procedure
- Reason
- Expectations
- Probability of success
- Alternatives
- Risk
- Expense
OVD: Procedure
OVD: **Reason**

- **Fetal**
  - Non-reassuring fetal status

- **Maternal**
  - Impaired ability to push/pushing contraindicated

- **Fetal-Maternal**
  - Prolonged 2\(^{nd}\) stage
    - >2 hours nulliparous
    - >1 hour multiparous
    - Add 1 hour if epidural
Contraindications to Operative Vag Delivery

• Vacuum contraindicated < 34 weeks
  – Due to risk of IVH
• Fetal demineralizing disease (eg, osteogenesis imperfecta)
• Fetal bleeding diatheses (eg, hemophilia, alloimmune thrombocytopenia, or vWD)
• Fetal head is unengaged
• Malpresentation (eg, brow, face)
• Unknown fetal position
OVD: **Expectations**

- Safe
- Successful
- Minimal neonatal trauma
- Minimal maternal trauma
OVD: Probability of Success

• Forceps
  – 4.1-7.9%

• Vacuum
  – 5.5-11.1%
## OVD: Probability of Success

<table>
<thead>
<tr>
<th></th>
<th>Vacuum</th>
<th>Forceps</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA</td>
<td>69/1097</td>
<td>3/341</td>
<td>7.53</td>
</tr>
<tr>
<td></td>
<td>(6.3%)</td>
<td>(0.9%)</td>
<td>(2.35-24.08)</td>
</tr>
<tr>
<td>OP</td>
<td>81/245</td>
<td>16/118</td>
<td>3.15</td>
</tr>
<tr>
<td></td>
<td>(33.1%)</td>
<td>(13.6%)</td>
<td>(1.59-6.21)</td>
</tr>
</tbody>
</table>
Analysis 1.1. Comparison of forceps versus any type of ventouse, Outcome 1: Failed delivery with allocated instrument (primary).

**Review:** Choice of instruments for assisted vaginal delivery

**Comparison:** 1 Type of forceps versus any type of ventouse

**Outcome:** 1 Failed delivery with allocated instrument (primary)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Forceps n/N</th>
<th>Ventouse n/N</th>
<th>Risk Ratio 95% CI</th>
<th>Weight</th>
<th>Risk Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doll 1969a</td>
<td>25/315</td>
<td>18/122</td>
<td>-</td>
<td>16.9%</td>
<td>1/42 [0.09, 2.56 ]</td>
</tr>
<tr>
<td>Doll 1985</td>
<td>3/45</td>
<td>14/73</td>
<td>-</td>
<td>7.3%</td>
<td>0.035 [0.011, 0.14 ]</td>
</tr>
<tr>
<td>Johnson 1989</td>
<td>13/152</td>
<td>35/132</td>
<td>-</td>
<td>16.8%</td>
<td>0.037 [0.021, 0.67 ]</td>
</tr>
<tr>
<td>Johnson 1993</td>
<td>32/311</td>
<td>45/296</td>
<td>-</td>
<td>21.2%</td>
<td>0.068 [0.044, 0.16 ]</td>
</tr>
<tr>
<td>Muzikali 2002</td>
<td>1/27</td>
<td>1/27</td>
<td>-</td>
<td>18%</td>
<td>1.35 [0.09, 20.31 ]</td>
</tr>
<tr>
<td>Vanca 1983</td>
<td>22/150</td>
<td>29/152</td>
<td>-</td>
<td>19.1%</td>
<td>0.09 [0.048, 0.191 ]</td>
</tr>
<tr>
<td>Weerakoon 2002</td>
<td>16/238</td>
<td>28/204</td>
<td>-</td>
<td>16.9%</td>
<td>0.049 [0.027, 0.88 ]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1213</strong></td>
<td><strong>1206</strong></td>
<td>-</td>
<td><strong>100.0%</strong></td>
<td><strong>0.65 [0.45, 0.94]</strong></td>
</tr>
</tbody>
</table>

Total events: 115 (forceps), 118 (ventouse)

Heterogeneity: $I^2 = 0.12, Q = 1.13, df = 6 (P = 0.94), I^2 = 0.0%

Test for overall effect: $Z = 2.26 (P = 0.024)$
OVD: Alternatives

- Forceps
- Vacuum Assisted Delivery
- Cesarean Section
OVD: Alternatives
Operative vaginal delivery

• Less infectious morbidity
• More severe lacerations
OVD: Alternatives

Vacuum Deliveries: Serious Potential Risks Involved

As every pregnancy is unique so is the labor and delivery process. The length of time it takes varies from one woman to the next. In some cases, it can happen in just a few short hours, while for other women it can take a full day—or more. Sometimes, the delivery process is unusually difficult or it gets to a certain point and fails to progress. The baby is close to being born, but is not quite out. When this occurs, a physician or other healthcare provider may choose to use an instrument to assist in the delivery. One such device is called a vacuum extractor.

Vacuum Extraction

A vacuum extractor uses a small, soft cup that is applied to the top and back of the baby's head. A tube runs from the cup to a vacuum pump that provides suction. During a contraction, the
OVD: Risks
OVD: Risks to the fetus

- Minor lacerations
- Forceps marks
- Facial and brachial plexus palsies
- Cephalohematoma
- Skull fracture
- Intracranial bleed
Forceps: Sequential Delivery

• California database
  – 583,340 liveborn singeltons
  – 2500-4000 grams
• Only nulliparous patients
• Breech deliveries excluded

Towner D et al. NEJM 1999
# OVD: Risks to the fetus

<table>
<thead>
<tr>
<th>Condition</th>
<th>Vacuum</th>
<th>Forceps</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subdural or cerebral hemorrhage</td>
<td>8.0</td>
<td>9.8</td>
<td>21.3</td>
</tr>
<tr>
<td></td>
<td>2.7 (1.9-3.9)</td>
<td>3.4 (1.9-5.9)</td>
<td>7.3 (2.9-17.2)</td>
</tr>
<tr>
<td>IVH</td>
<td>1.5</td>
<td>2.6</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>1.4 (0.7-3.0)</td>
<td>2.5 (0.9-6.9)</td>
<td>3.5 (1.5-25.2)</td>
</tr>
<tr>
<td>SAH</td>
<td>2.2</td>
<td>3.3</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td>1.7 (0.9-3.2)</td>
<td>2.5 (0.9-6.6)</td>
<td>8.2 (2.1-27.4)</td>
</tr>
</tbody>
</table>

*Towner D et al. NEJM 1999*
OVD: **Risks to the Patient**

- Lacerations
  - Cervical
  - Sidewall
- Pelvic hematomas
- Postpartum hemorrhage
- 3º/4º lacerations
  - Incontinence
  - Rectovaginal fistula formation
**OVD: Risks to the Patient**

### Analysis 1.8. Comparison | Any type of forceps versus any types of ventouse, Outcome 8 Third- or fourth-degree perineal tear (with or without episiotomy).

**Review**: Choice of instruments for assisted vaginal delivery

**Comparison**: Any type of forceps versus any types of ventouse

**Outcome**: Third- or fourth-degree perineal tear (with or without episiotomy)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>forceps nN</th>
<th>ventouse nN</th>
<th>Risk Ratio (95% CI)</th>
<th>Weight</th>
<th>Risk Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boll 1996a</td>
<td>90315</td>
<td>39632</td>
<td></td>
<td>420 %</td>
<td>2.42 [1.71, 3.42]</td>
</tr>
<tr>
<td>Bull 1966</td>
<td>1846</td>
<td>1873</td>
<td></td>
<td>109 %</td>
<td>0.90 [0.46, 1.78]</td>
</tr>
<tr>
<td>Fitzpatrick 2003</td>
<td>1062</td>
<td>569</td>
<td></td>
<td>49 %</td>
<td>2.26 [1.52, 3.35]</td>
</tr>
<tr>
<td>Johnson 1999</td>
<td>11136</td>
<td>6132</td>
<td></td>
<td>61 %</td>
<td>2.67 [1.29, 5.50]</td>
</tr>
<tr>
<td>Johnson 1993</td>
<td>25311</td>
<td>15296</td>
<td></td>
<td>131 %</td>
<td>1.59 [0.86, 2.96]</td>
</tr>
<tr>
<td>Malediwan 1986</td>
<td>4/31</td>
<td>191</td>
<td></td>
<td>11 %</td>
<td>5.13 [0.59, 44.87]</td>
</tr>
<tr>
<td>Mustafa 2002</td>
<td>120</td>
<td>027</td>
<td></td>
<td>65 %</td>
<td>4.00 [0.17, 91.30]</td>
</tr>
<tr>
<td>Vass 1983</td>
<td>28452</td>
<td>9452</td>
<td></td>
<td>94 %</td>
<td>2.67 [1.28, 5.50]</td>
</tr>
<tr>
<td>Weeversaama 2002</td>
<td>12238</td>
<td>2204</td>
<td></td>
<td>18 %</td>
<td>1.71 [0.32, 9.26]</td>
</tr>
<tr>
<td>Williams 1991</td>
<td>12951</td>
<td>12948</td>
<td></td>
<td>104 %</td>
<td>0.94 [0.47, 1.89]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1396</strong></td>
<td><strong>1444</strong></td>
<td><strong>100.0 %</strong></td>
<td><strong>1.89 [1.51, 2.37]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total events: 145 (forceps), 106 (ventouse)

Heterogeneity: \( \chi^2 = 13.28, \text{df} = 9 (P < 0.15), I^2 = 32\% \)

Test for overall effect: \( Z = 5.59 (P < 0.00001) \)

Test for subgroup differences: Not applicable
Forceps and Episiotomy

• Mississippi trial
  – 209/315 (66%) episiotomy in forceps
  – 97/322 (30%) episiotomy in vacuum

• Cohort of 3120 low risk deliveries
  – VBAC, <37w, multiples, breech, <2500 grams, medical comps excluded
  – Episiotomy more likely with forceps
    • Adjusted OR 5.08 (3.75-6.88)

Bofill JA et al. AJOG 1996
Allen RE and Hanson RW JABFP 2005
OVD: Expense

- Essentially no difference in MD $$
- Medicaid
  - More $ for vaginal delivery
- Hospital charges increased w/OVD
Forceps vs. Vacuum

• Efficacy rates for both similar
  – Forceps 92%
  – Vacuum 94%
• More cephalohematomas w/vacuum
  – 6% vs. 11.5%
• More $3^\circ$ /$4^\circ$ lacerations w/forceps
  – 28.6% vs. 11.8%

Bofill JA et al. AJOG 1996
Forceps vs. Vacuum

• Conclusions
  – As efficient as forceps
  – Faster than forceps
  – Less maternal trauma

Bofill JA et al. AJOG 1996
Forceps vs. Vacuum

• Vacuum
  – Easier to put on
  – Easier to pull off = higher failure rate
  – Popoffs generally from
    • Too much force
    • Traction in wrong axis

• Forceps
  – Harder to put on
  – Harder to pull of = lower failure rate
    = more maternal trauma
Forceps vs. Vacuum

- Parity
- Position
- How hard will I have to pull?
Choice of forceps

• Classical Instruments
  – Simpson
  – Elliot = unmolded head
  – Tucker-McLane = unmolded head

• Specialized Instruments
  – Kielland = midpelvic arrest, rotations
  – Piper = breech
ABC’s

• A- anesthesia, adequate pelvis
• B- bladder
• C- consent, complete, certain of position
• D- down far enough (+2 or greater)
• E- excellent reason, experience excellent application
Adequate Pelvis

• Mueller-Hillis Manuever
  – Fundal pressure
  – Assess descent
• Negative = no descent
• Positive = 1cm or greater descent
• Significant difference in C/S
  – 60 pts
  – 42.1% vs 0%

March MR et al Int J OB Gyn 1996
### Down far enough

<table>
<thead>
<tr>
<th>Type of procedure</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlet</td>
<td>Scalp visible @ introitus</td>
</tr>
<tr>
<td></td>
<td>Fetal skull reached pelvic floor</td>
</tr>
<tr>
<td></td>
<td>Fetal head at/on perineum</td>
</tr>
<tr>
<td></td>
<td>Rotation &lt;45°</td>
</tr>
<tr>
<td>Low</td>
<td>Vertex @ +2, not on pelvic floor</td>
</tr>
<tr>
<td></td>
<td>1. Rotation ≤45°</td>
</tr>
<tr>
<td></td>
<td>2. Rotation ≥45°</td>
</tr>
<tr>
<td>Midforceps</td>
<td>Above +2, head engaged</td>
</tr>
<tr>
<td>High</td>
<td>Not included</td>
</tr>
</tbody>
</table>
Excellent Application
Excellent Application

Figure 2. Cup Placement

CORRECT PLACEMENT

POSTERIOR FONTANELLE
FLEXING MEDIAN
ANTERIOR FONTANELLE

INCORRECT PLACEMENT

FLEXING PARAMEDIAN
DEFLEXING MEDIAN
DEFLEXING PARAMEDIAN
Forceps: Direction of traction
Technique

• Two hands
  – Vacuum
  – Forceps
    • Pajot Manuever
    • Saxtorph Manuever
• Perineum
  – Removal/Ritgen
  – Chang Chopstick manuever
When to Abandon Further Attempts

- Progress should be noted within the first couple pulls

Abandon procedure if…

- Difficulty applying instrument
- If descent does not easily proceed w/ traction
- No delivery in reasonable time frame
Conclusion

the spork.