ARRIVE Trial: Results & Implementation

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Disclosures
• No financial
• Vice-Chair of Committee for OB Practice for ACOG,
  Editor for Gabbe, Oral board examiner for ABOG
Induction and Cesarean

Induction and cesarean delivery

- Retrospective cohort studies
  - Induction of labor prior to 41 weeks of gestation is associated with an approximately 2-fold higher risk of cesarean delivery in nulliparous women

Increasing maternal and perinatal risks after 39 weeks

Maternal
  - Cesarean delivery
  - Operative vaginal delivery
  - 3rd and 4th degree lacerations
  - Febrile morbidity
  - Hemorrhage
Perinatal Complications

- Pregnancies that continue beyond 39 weeks are associated with increased risks of:
  - Stillbirth
  - Meconium aspiration syndrome
  - Mechanical ventilation
  - Birth trauma
  - Neonatal seizures/ICH/encephalopathy
  - Neonatal sepsis
  - UA pH ≤7/BE < -12
### Severe Neonatal Complications

- 40 vs. 39 weeks: adjusted OR 1.47 (1.1, 2.0)
- 41 vs. 39 weeks: adjusted OR 2.04 (1.5, 2.78)

### Induction vs. Expectant Management

<table>
<thead>
<tr>
<th>Week of Induction</th>
<th>IOL</th>
<th>Spontaneous</th>
<th>Expectant</th>
<th>aOR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 weeks</td>
<td>11.5%</td>
<td>7.0%</td>
<td>13.3%</td>
<td>1.80 (1.29-2.53)</td>
</tr>
<tr>
<td>39 weeks</td>
<td>14.3%</td>
<td>6.5%</td>
<td>15.0%</td>
<td>1.39 (1.08-1.80)</td>
</tr>
<tr>
<td>40 weeks</td>
<td>20.4%</td>
<td>10.5%</td>
<td>19.0%</td>
<td>1.24 (1.07-1.61)</td>
</tr>
<tr>
<td>41 weeks</td>
<td>24.3%</td>
<td>14.0%</td>
<td>26.0%</td>
<td>1.26 (0.99-1.61)</td>
</tr>
</tbody>
</table>

- Caughey et al, AJOG 2006;195:700-5

### Cesarean delivery with EIOL

- Favorable
- Undecided

- Osmundson et al, Obstet Gynecol 2010 & 2011
Walker et al, NEJM 2016

- 619 nulliparous women
- Age 35 years or older
- Randomized between 36 weeks and 39 6/7 weeks

![Cesarean Delivery Graph]

- Expectant vs. EIOL

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Walker et al, NEJM 2016

- Only women aged 35 or older
- No idea about cervical status
- UK system very different (e.g., OVD)
- Underpowered for perinatal outcomes

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EIOL vs. expectant management at 39 weeks

Perinatal mortality and morbidity

70% decreased odds of meconium aspiration and mortality, respectively, in EIOL group

Cheng et al. AJOG 2012; Stock et al. BMJ 2012
More than 50,000 women were screened
Low-risk nullips
Median BMI at delivery 30kg/m²
Median Bishop score in both groups was 4 (IQR 2-5)
ARRIVE Trial: Results & Implementation


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Table 1. Primary Perinatal Outcomes and Components

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Induction Group (n=1885)</th>
<th>Oxytocin Management Group (n=2026)</th>
<th>Odds Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary composite outcome</td>
<td>132 (7.0)</td>
<td>146 (7.2)</td>
<td>0.94 (0.64-1.38)</td>
<td>0.76</td>
</tr>
<tr>
<td>Demise/death</td>
<td>3 (0.2)</td>
<td>5 (0.2)</td>
<td>0.76 (0.13-4.39)</td>
<td>0.78</td>
</tr>
<tr>
<td>Respiratory support</td>
<td>15 (0.8)</td>
<td>17 (0.8)</td>
<td>0.76 (0.33-1.73)</td>
<td>0.61</td>
</tr>
<tr>
<td>Arterial oxygen saturation &lt;50 mmHg</td>
<td>12 (0.6)</td>
<td>14 (0.7)</td>
<td>0.86 (0.43-1.72)</td>
<td>0.68</td>
</tr>
<tr>
<td>Preterm birth premature delivery</td>
<td>14 (0.7)</td>
<td>20 (1.0)</td>
<td>0.86 (0.39-1.92)</td>
<td>0.72</td>
</tr>
<tr>
<td>Seizures</td>
<td>21 (1.1)</td>
<td>14 (0.7)</td>
<td>1.56 (0.83-2.92)</td>
<td>0.17</td>
</tr>
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Table 1. Secondary Outcomes

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<th>Outcome</th>
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<tr>
<td>Maternal infection in respiratory unit (in days)</td>
<td>24 (1.3)</td>
<td>25 (1.2)</td>
<td>0.95 (0.59-1.52)</td>
<td>0.80</td>
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<tr>
<td>Confidential death</td>
<td>5 (0.3)</td>
<td>7 (0.4)</td>
<td>0.78 (0.33-1.88)</td>
<td>0.58</td>
</tr>
<tr>
<td>Maternal complications, no (%)</td>
<td>46 (2.5)</td>
<td>48 (2.4)</td>
<td>0.99 (0.78-1.27)</td>
<td>0.93</td>
</tr>
<tr>
<td>Maternal complications, yes (%)</td>
<td>17 (0.9)</td>
<td>19 (0.9)</td>
<td>0.96 (0.75-1.23)</td>
<td>0.80</td>
</tr>
<tr>
<td>Adverse maternal infection in respiratory unit (in days)</td>
<td>24 (1.3)</td>
<td>25 (1.2)</td>
<td>0.95 (0.59-1.52)</td>
<td>0.80</td>
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Criticisms
1. ‘Strange results’
2. Number of women declined
3. Population differences
4. The way labor was managed
5. Inability to handle capacity
‘Strange results’
• Differ from older work with the wrong control group (induction v. spontaneous)
• Agree with modern work with correct control group (induction v. exp mgmt)
• Biologically plausible

Number of women who declined

Population differences
Labor management

- Protocolized
  - Participants with Bishop <5, cervical ripening
  - Induction ‘failed’ if 12 hours after ROM and oxytocin, still in latent labor
- Individual provider
  - Behave 1 way at 39 weeks and another at 41

Inability to handle capacity

- Not evidence-based
- On us to problem-solve

ARRIVE - Summary

- Labor inductions do not increase the risk of cesarean
  - Lower cesarean rate in the induction arm
- Induction at 39 weeks decreases the risk of hypertensive disease
- Practice-changing
- Logistical considerations to accommodate change

WHAT IS NEXT?

#1
Change how we counsel our patients

#2
Create initial capacity
Reduced healthcare utilization

- Secondary analysis of ARRIVE
  - 6906 women with available data
  - IOL group
    - Less likely to have an additional PNC visit
    - Less likely to have urgent or emergent visits
    - Fewer hospitalizations and tests

Grobman WA et al. AJOG, 2020 in press

Also, in the IOL group at delivery

- Longer median time L&D (0.83 v. 0.57 days)
- Both IOL moms and babies had fewer stays greater than 2 days
  - Mom (17.8% v. 20.9%, p=0.002)
  - Baby (23.1% v. 26.9%, p<0.001)

Grobman WA et al. AJOG, 2020 in press

#3

Ways to improve capacity

- Outpatient cervical ripening
- Cervical ripening off of L&D?
#4
Change how we think about inductions
– Are any elective?

All together
• Practice changing & myth busting
• Labor inductions do not cause cesareans
• 39 week elective inductions
  – Decrease cesarean
  – Decrease hypertensive disorders
• Should this apply to multips too?

Thank you