Elective Induction of Labor

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Financial Relationships

- No relationship to any aspect of private industry
- Funded by:
  - NICHD – WRHR
  - AHRQ – Elective Induction of Labor
  - RWJ – Mode of Delivery: Outcomes, Preferences and Costs

Elective IOL

- What?
  - No Medical Indication
- Why?
  - Patients
  - MDs
  - Systems

Elective IOL – What?

- 24 yo G1P0 at 39 weeks GA with A2GDM
- 36 yo G4P0 at 39 wks GA s/p IVF
- 28 yo G2P1 at 39 wks GA, 3 cms, no ctxns
- 32 yo G1P0 at 39 wks with gestational HTN
Elective IOL – What?

- Not an indication for IOL
  - Impending macrosomia
  - Increased risk for developing:
    - Preeclampsia
    - IUGR (e.g. EFW 19%ile)
    - Favorable cervix

Elective IOL

- Why?
  - Patients
    - Control schedule/timing
    - Prevent future complications
  - MDs
    - Prevent future complications
    - Control schedule/timing
  - Systems
    - Prevent future complications
    - Control schedule/timing

Elective IOL

- Why Not?
  - Patients
    - Increases cesareans (does it really?)
    - Increases iatrogenesis
  - MDs
    - Increases cesareans (are we sure of this?)
    - Longer labors
  - Systems
    - Unclear health outcome differences
    - Increases costs

Case Question

27 yo G1P0 at 38 1/7 requesting IOL
Who would offer EIOL in this setting?

A. Yes
B. No
**Case Question**

27 yo GrP0 at 40 1/7 requesting IOL
Who would offer EIOL in this setting?

A. Yes
B. No

**Elective IOL at 38 wks**

Yes
↑ maternal prefs
↑ md prefs
↑ costs
→ neonatal comps
↑ cesareans
↑ maternal comps

No

**Elective IOL at 40 wks**

Yes
↓ neonatal comps
↑ maternal prefs
↑ md prefs

No
↑ cesareans
↑ maternal comps
↑ costs

**Elective IOL - CS**

- Does IOL increase cesarean delivery?
- Cohort and case-control data
  - IOL increases cesareans
- Prospective RCTs
  - 41 weeks GA – decreases cesareans
  - <41 weeks GA – ?
**Induction of Labor**

- Comparison of IOL vs. ANT
  - Hannah et al, NEJM, 1992
- 1701 IOL @ 41 wks vs. 1706 ANT @ 41 wks
  - C/S higher in ANT group (24.5% vs. 21.2%)
  - C/S for FD higher as well (8.3% vs. 5.7%)
  - Higher rate of meconium in ANT group
  - No difference noted in neonatal morbidity
    - Apgars, pH
    - Resuscitation, NICU admit, vent, O2
    - Seizures, sepsis, polycythemia

**Elective Induction of Labor**

- IOL vs. Expt Mgmt 41 wks and less
  - Meta-analysis, 9 prospective RCTs
- Fewer CD in EIOL – 1.17 (95%CI: 1.06-1.29)

**Induction of Labor**

- IOL vs. Expt Mgmt 41 wks and beyond
  - Sanchez-Ramos et al, OB Gyn, 2003
  - Meta-analysis, 16 prospective RCTs

**Mode of delivery**

- IOL vs Expt Mgmt
  - CS - 20.1% vs. 22.0%: OR = 0.78 – 0.99
  - Mec – 22% vs. 27%: OR = 0.49 – 0.88
  - PMR – 0.09% vs. 0.33%: OR = 0.14 – 1.18
  - PMR = perinatal mortality rate

**Elective Induction of Labor**

- IOL vs. Expt Mgmt 41 wks and less
  - Meta-analysis, 16 prospective RCTs
- Fewer CD in EIOL – 1.17 (95%CI: 1.06-1.29)

**Meconium**

- Less in EIOL - RR 1.67 (95%CI: 1.23-2.26)
**Induction of Labor - CS**

- Retrospective studies - more CS with IOL
- Prospective studies – fewer CS or no diff
- What are the groups being compared?
  - IOL at 39 weeks vs. Spont labor at 39 weeks
  - However, in RCT:
    - IOL at 39 weeks GA vs.
    - Patients beyond 39 weeks GA

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### Induction of Labor Compared to Delivery at a Greater Gestational Age

<table>
<thead>
<tr>
<th>Week of Induction</th>
<th>IOL CD</th>
<th>Expt mgmt CD</th>
<th>AOR* (95% CI)</th>
<th>Spont. Labor CD</th>
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<tbody>
<tr>
<td>38 weeks</td>
<td>11.9%</td>
<td>13.3%</td>
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<td>39 weeks</td>
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<td>15.0%</td>
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<td>40 weeks</td>
<td>20.4%</td>
<td>19.0%</td>
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A. Comparison by week of gestation

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B. Comparison of IOL and Expectant Management

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**Cochrane DB** – Gülmezoglu AM et al, 2006

- IOL < 41 weeks had lower CS rate
- RR 0.58; 95% CI 0.34 to 0.99

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**IOL < 41 wks GA**

- Cochrane DB – Gülmezoglu AM et al, 2006
- IOL < 41 weeks had lower CS rate
- RR 0.58; 95% CI 0.34 to 0.99

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**Induction of Labor < 41 wks GA**

- Table: Induction of Labor Compared to Delivery at a Greater Gestational Age

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B. Comparison of IOL and Expectant Management

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

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*controlling for method of induction, maternal age, parity, education, BMI, race/ethnicity, and epidural.
**Elective IOL - CS**

- National data, 2003

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<th>Expt mgmt CD</th>
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<td>23.3%</td>
<td>&lt;0.001</td>
</tr>
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<td>39 weeks</td>
<td>22.3%</td>
<td>23.6%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>40 weeks</td>
<td>24.2%</td>
<td>25.1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>41 weeks</td>
<td>27.0%</td>
<td>24.7%</td>
<td>&lt;0.001</td>
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**Induction of Labor**

- Another Approach – Selective/Preventive
  - Active mgmt of risk in pregnancy at term
  - Considers risk of:
    - CPD
    - IUGR / Fetal intolerance of labor
  - Earlier induction for higher risk patients

**AMOR-IPAT**

- CPD
  - BMI >29
  - Ht < 62”
  - Wt gain > 30 lbs
  - GDM
  - DM
  - H/o macrosomia
- UPI
  - Htn
  - GDM
  - DM
  - MSAFP
  - Cigarettes
  - AMA
- Add up risk factors and subtract from 41 weeks GA

Nicholson et al, AJOG, 2004;191:1516-28
**AMOR-IPAT**

- Median GA: Standard – 40.1; AMOR – 38.9
- Standard – 26% IOL – 17% C/S rate
- AMOR-IPAT – 63% IOL – 4% C/S rate
- Also AMOR-IPAT had less:
  - 3rd/4th degree lacs,
  - PPH
  - Macrosomia
- Nonrandomized
- Both multips and nullips

*Nicholson et al, AJOG, 2004;191:1516-28*

**AMOR IPAT - RCT**

<table>
<thead>
<tr>
<th>Cesarean Delivery</th>
<th>Assisted Vaginal</th>
<th>NICU Admission</th>
<th>APGAR@ 1min &lt; 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Group</td>
<td>10.3%*</td>
<td>5.2%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Control Group</td>
<td>14.9%**</td>
<td>7.5%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Odds ratio</td>
<td>0.61</td>
<td>0.69</td>
<td>0.21</td>
</tr>
<tr>
<td>p-value</td>
<td>0.20</td>
<td>0.43</td>
<td>0.05</td>
</tr>
</tbody>
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*AMOR IPAT Prospective RCT. Nicholson JM, et al. AJOG, 2007*

**Elective IOL - Costs**

- Induction of labor associated with higher costs
  - Bost, AJOG - 2003
  - Allen, AJOG - 2005
  - Allen, OB Gyn - 2006

**Elective IOL – Cost effectiveness**

- Cost-effectiveness
  - Not cheapest plan
  - Cost per outcome “worth it”
  - Threshold - $100,000/QALY
- IOL at 41 wks - $6,938 per QALY*
- IOL at 40 wks - $71,735 per QALY**
  - Least cost-effective with favorable cvx

*Kaimal et al. AJOG, 2006 abs  **Kaimal et al. AJOG, 2007 abs
Maternal and neonatal outcomes of elective induction of labor.
Back to Case

• 27 yo G1P0 at 40 1/7 requesting IOL
  • Normal pregnancy

• Expt Mgmt & ANT vs. IOL
  • Neonatal outcomes
  • Maternal outcomes
  • Cesarean Delivery

• What is the pt’s understanding of R/B

Case

• 27 yo G1P0 at 40 1/7 requesting IOL
  • Normal pregnancy
  • 5’ 5”, BMI 23, No AMOR-IPAT RFs
  • Tired of being pregnant
  • Based on evidence:
    • IOL at 40 weeks GA as compared to ANT
      • From recent Cochrane meta – lower CD rate
      • No demonstrated perinatal mortality difference
      • Not standard of care

Elective Induction of Labor

• No consistently demonstrated increased risks:
  • Cesarean delivery
  • Infection
  • Neonatal outcomes

• Perhaps
  • Decreased risk of CD
    • In particular subgroups
  • Decreased IUFD / perinatal mortality

• Increased costs
• Offer vs. Concede to requests
• Thank You

Debate?

• Elective IOL < 39 weeks of GA
• Elective IOL at 41 weeks of GA
• Elective IOL at 39-40 weeks of GA

Case Question

27 yo G1P0 at 38 1/7 requesting IOL
Who would offer EIOL in this setting?

A. Yes
B. No

98%
2%

Case Question

27 yo G1P0 at 40 1/7 requesting IOL
Who would offer EIOL in this setting?

A. Yes
B. No

82%
18%
Causes and consequences of labor induction

William Grobman, MD, MBA
Associate Professor
Department of Obstetrics and Gynecology
Institute for Healthcare Studies
Northwestern University
San Francisco
June, 2010

Disclosures

• None

Outline

• Trends in labor induction
• Etiologies of the trends
• Maternal and neonatal outcomes related to labor induction

Definitions

• Term gestation: at least 37 weeks
  – 37-39 weeks
  – After 39 weeks
• Labor induction: iatrogenic initiation of labor prior to contractions with cervical change
• Elective labor induction: Induction without established medical indication
**TRENDS**

**Gestational age at delivery**

- Trend to earlier deliveries among term singleton gestations
  - Percentage of births delivered at 40 weeks and greater has declined 14 percent since 2000, and 29 percent since 1990
  - In contrast, the percentage of births delivered at 37–39 weeks has increased 10 and 31 percent over these time periods

**Trends in IOL**

  - IOL rate (singleton) was 22.8 percent
    - Rate has more than doubled since 1990

**Induction of labor at term**

Similar trend for elective induction as well as medical induction

Murthy, Grobman, Lee, Holl 2009
Tita et al, NEJM 2009

- MFMU registry
- 13,258 women who underwent an elective cesarean at term
  - 6.3% during the 37th week
  - 29.5% during the 38th week

Clark et al, AJOG 2009

- 15 months, 27 hospitals
- 14,955 deliveries
  - 6562 (44%) were planned
    - 4645 (31%) were elective
      - 2794 of these were labor inductions
        » 112 (4%) during 37th week
        » 678 (24%) during 38th week

Up until now…

- Induction is rising
- Elective induction is rising at term
  - Not relegated to > 39 weeks

Labor induction: Outcomes

- Properly used, overall benefit for mother and child
  - Woman at 35 weeks with severe preeclampsia

  Proper use = Benefits > Risks
Risks

- Neonatal
  - 37-38 6/7 weeks of gestation
  - ≥ 39 weeks
- Maternal
  - Gestational age independent

What about neonatal outcome associated with elective delivery after 37 weeks?

- Tita et al, NEJM 2009

What about neonatal outcome associated with elective delivery after 37 weeks?

- Clark et al, AJOG 2009

Induction and maternal outcome: 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

What about elective induction?
Elective induction of labor in nulliparas

Vahratian et al, 2005

- Retrospective Cohort (37-40 6/7 weeks)
  - 143 nullips EIOL with cervical ripening
  - 286 nullips EIOL without cervical ripening
  - 1771 nullips in spontaneous labor

Induction and multiparas

- Studies inconsistent and most underpowered
- Yeast et al, AJOG 1999
  - Cesarean rate 3.3% after spontaneous labor
  - OR 3.5 (confidence interval 2.8-4.2) with an unripe cervix
  - OR 1.3 (confidence interval 1.0-1.7) with a favorable cervix
  - OR 2.5 (confidence interval 2.1-3.0) for cesarean for FTP

Induction and multiparas

- Battista et al, AJOG 2007
  - Elective induction vs. spontaneous labor
    - Cesarean delivery
      - After oxytocin only: OR 1.3 (1.0 – 1.7)
      - After ripening: OR 2.3 (1.1 – 5.1)
    - >12 hours on L&D
      - After oxytocin only: OR 1.6 (1.3 – 2.0)
      - After ripening: OR 6.8 (4.1 – 11.2)
IOL and resource use

- Increased time on L&D associated with IOL
  - Maslow and Sweeney, 2000 (mixed parity)
  - Clark et al, 2009 (nullips and multips separately analyzed)
- Increased resource use in general
  - Seyb et al, 1999

$$ \text{\$\$\$} \sim 15\text{-}25\%$$

“Control group” problem

<table>
<thead>
<tr>
<th>Induced labor</th>
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<tbody>
<tr>
<td>vs.</td>
<td>vs.</td>
</tr>
<tr>
<td>Spontaneous labor</td>
<td>Expectant management</td>
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Kaufman, Bailit, Grobman 2002

Kaufman, Bailit, Grobman 2002
Population level data

- 20 Sutter Health birthing hospitals
- All nullip term singleton births, 2001-2003

Main et al, AJOG 2006

Institutional change

- Magee-Women’s
  - Enforced guidelines
    - No elective induction prior to 39 weeks
    - No elective induction that used ripening agent

Fisch et al, 2009

Institutional change

- Intermountain Health System
  - Provider education
  - Patient education
  - Barriers to practice
  - Monitoring and feedback

Oshiro et al, 2009

Conclusions

- Labor induction has been rising
- No good evidence that changing threshold has improved outcomes
- Evidence of both neonatal and maternal morbidity from induction under certain circumstances
- Beginning of systems-based approaches