Current trends in Cervical Ripening and Labour Induction

Professor Tim Draycott
Consultant Obstetrician
Health Foundation Improvement Science Fellow
Keypad Questions 1
Bristol

Clifton Suspension Bridge
Snowy Bristol – March 2013
One born every minute - Bristol
UK and Turkey

- Similar obstetric drivers – pressure to reduce CS rates
Introduction

• Current approaches to IOL
  – National guidance
  – Methods

• Latest data from new meta-analyses
  – Induction of labour at term reduces perinatal mortality
  – Induction of labour with some induction agents reduces CS rates
  – Lower threshold for IOL
Labour

- Initiation of labour is a complex process
Cervical Ripening
PGE$_2$ and the Myometrium

- PGE$_2$
  - enhances myometrial response to oxytocin
  - accelerates gap junction formation leading to more coordinated contractions
  - stimulates fundal muscle contraction
  - impedes lower segment and cervical smooth muscle

- Note that ripening effects may occur without uterine contractions

Rayburn WF. Obstetrical and Gynecological Survey 2002
Induction of Labour

• NICE Guideline: Indication for IOL
  – Risks of pregnancy continuing outweigh benefits
Ideal method of labour induction

• Safe for babies
• Safe for mothers
  – Mode of delivery
  – Effect on caesarean rate
• Cost effective
ARM/Oxytocin vs PGs

• NICE Review
  • Vaginal PGE\textsubscript{2} is less invasive than Oxytocin
  • NB Oxytocin
    – IV access
    – Continuous monitoring
  • Vaginal PGE\textsubscript{2} preferred by women

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Recommendation on amniotomy with intravenous oxytocin

Amniotomy with oxytocin should not be used as a primary method of induction of labour unless there are specific contraindications to the use of vaginal PGE\textsubscript{2}, in particular the risk of uterine hyperstimulation.
Mechanical Methods

- Balloon vs Foley – no difference

- The Foley catheter is a reasonable and effective alternative for cervical ripening and inducing labor.
  
  ACOG. Practice Bulletin. 2009

Recommendation on mechanical methods

Mechanical procedures (balloon catheters and laminaria tents) should not be used routinely for induction of labour.

NICE. IOL Guideline. 2008
PROBAAT Study

• Foley vs PGE$_2$ Gel
  – IOL cephalic, term, unfavourable cervix
  – CS rate – no difference (23% vs 20%)
  – Costs - Mean costs per woman
    • Foley €3297
    • PG E$_2$ €3075
  – Saving €222 per woman using PGE$_2$

Jozwiak et al. BJOG. 2013
Misoprostol for IOL

- Misoprostol
  - High rates of hyperstimulation
  - Hyperstimulation associated with increase in poor neonatal outcomes
  - No better than vaginal PGE$_2$

- UK National Recommendation
  - Misoprostol should only be used for induction of labour for women who have an intrauterine death
Methods for IOL - NICE

- UK overall recommendation

Recommendations on vaginal PGE₂

Vaginal PGE₂ is the preferred method of induction of labour, unless there are specific clinical reasons for not using it (in particular, the risk of uterine hyperstimulation). It should be administered as a gel, tablet or controlled release pessary. Costs may vary over time and trusts/units should take this into consideration when prescribing PGE₂. For doses, refer to the SPCs. The recommended regimens are:

- one cycle of vaginal PGE₂ tablets or gel: one dose, followed by a second dose after 6 hours if labour is not established (up to a maximum of two doses)
- one cycle of vaginal PGE₂ controlled release pessary: one dose over 24 hours.
Future Mx of previous CS?

- USS in 1\textsuperscript{st}/2\textsuperscript{nd} trimester

**Figure 4** Dimensions of apparent scar ‘defect’ in the sagittal plane.

**Figure 6** Schematic diagram showing Cesarean scar dimensions in the sagittal (a) and transverse (b) planes. A, width of hypoechoic part of scar (apparent ‘defect’) on the sagittal plane; B, depth of hypoechoic part of scar (apparent ‘defect’) on the sagittal plane; C, length of hypoechoic part of scar (apparent ‘defect’) on the transverse plane; D, residual myometrial thickness on sagittal plane.
Predictive clinical value?

- Meta-analysis - occurrence of defect in vaginal birth after CS

- Myometrium thickness
  - 2.1-4.0mm – strong negative predictor
  - 0.6-2.0mm – strong positive predictor

- Future prospective observational studies required

N. Kok et al. Ultrasound O&G. 2013
Previous CS

• NICE 2008

Recommendation on previous caesarean birth

If delivery is indicated, women who have had a previous caesarean section may be offered induction of labour with vaginal PGE$_2$, caesarean section or expectant management on an individual basis, taking into account the woman's circumstances and wishes. Women should be informed of the increased risks with induction of labour:

• increased risk of need for emergency caesarean section
• increased risk of uterine rupture.

• ..........overall - Prostaglandins

The GDG also considered the comfort, convenience and acceptability of vaginal PGE$_2$ to the woman undergoing induction of labour. Vaginal PGE$_2$ is less invasive than amniotomy and oxytocin, with the latter requiring intravenous access and continuous EFM, thus reducing women’s mobility during induction. On balance, the GDG reached a consensus that a vaginal PGE$_2$ regimen is the preferred method of induction of labour for women with a history of previous caesarean section.
Previous CS

• The use of misoprostol in women with prior cesarean delivery or major uterine surgery has been associated with an increase in uterine rupture and, therefore, should be avoided in the third trimester.

ACOG. Obstet Gynecol. 2009
Latest data about Labour Induction

• What do women want?

• Outcomes after induction of labour
  – Induction of labour at term reduces perinatal mortality
  – Induction of labour with some induction agents reduces CS rates
  – Lower threshold for IOL
What do women want?

- Women preferred induction of labor to serial antenatal monitoring.

Acta Obstetricia et Gynecologica. 2007; 86: 950–956

ORIGINAL ARTICLE

Women’s experiences and attitudes towards expectant management and induction of labor for post-term pregnancy

RUNA HEIMSTAD¹², PÅL R. ROMUNDESTAD³, JON HYETT⁴, LARS-ÅKE MATTSSON⁵ & KJELL Å. SALVESEN¹²

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Outcomes of elective IOL?

• New data

Outcomes of elective induction of labour compared with expectant management: population based study

Sarah J Stock clinical lecturer and subspecialty trainee in maternal fetal medicine¹, Evelyn Ferguson consultant obstetrician², Andrew Duffy information analyst³, Ian Ford professor of biostatistics⁴, James Chalmers consultant in public health medicine⁵, Jane E Norman professor of maternal and fetal health¹

¹Tommy’s Centre for Maternal and Fetal Health, MRC Centre for Reproductive Health, University of Edinburgh, Queen’s Medical Research Institute, Edinburgh EH16 4SA, UK; ²NHS Lanarkshire, Wishaw General Hospital, Wishaw, UK; ³Information Services Division, NHS National Services Scotland, Edinburgh; ⁴University of Glasgow Robertson Centre for Biostatistics, Glasgow, UK
Elective IOL

• Associated with reduced perinatal mortality
  • OR 0.39 at 40 weeks gestation

• PPH and anal sphincter injuries reduced
  • OR 0.74 & 0.82 respectively

• Spontaneous vertex delivery rates not affected
IOL to improve birth outcomes

Induction of labour for improving birth outcomes for women at or beyond term (Review)

Gülmezoglu AM, Crowther CA, Middleton P, Heatley E
IOL and Perinatal Death

Analysis 1.1. Comparison of Labour induction versus expectant management by gestational age (all trials), Outcome 1 Perinatal death.

Review: Induction of labour for improving birth outcomes for women at or beyond term

Comparison: Labour induction versus expectant management by gestational age (all trials)

Outcome: Perinatal death

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Induction n/N</th>
<th>Expectant n/N</th>
<th>Risk Ratio M-H,Fixed,95% CI</th>
<th>Risk Ratio M-H,Fixed,95% CI</th>
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</thead>
<tbody>
<tr>
<td>1 39-40 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>415</td>
<td>395</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 41-42 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>501</td>
<td>497</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 &gt; 41 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>2814</td>
<td>2785</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>3730</td>
<td>3677</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PROMPT
Making Childbirth Safer, Together
### Analysis 1.10. Comparison 1 Labour induction versus expectant management by gestational age (all trials), Outcome 10 Caesarean section.

Review: Induction of labour for improving birth outcomes for women at or beyond term

Comparison: Labour induction versus expectant management by gestational age (all trials)

Outcome: 10 Caesarean section

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Induction</th>
<th>Expectant</th>
<th>Risk Ratio</th>
<th>Weight</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>M-H,Fixed,95% CI</td>
<td></td>
<td>M-H,Fixed,95% CI</td>
</tr>
<tr>
<td>1 37-39 weeks</td>
<td>481</td>
<td>235</td>
<td></td>
<td>2.6 %</td>
<td>0.58 [ 0.30, 1.11 ]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 39-40 weeks</td>
<td>415</td>
<td>395</td>
<td></td>
<td>2.4 %</td>
<td>0.74 [ 0.38, 1.41 ]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 41 weeks</td>
<td>501</td>
<td>497</td>
<td></td>
<td>13.6 %</td>
<td>0.74 [ 0.58, 0.96 ]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
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<tr>
<td>5 &gt; 41 weeks</td>
<td>3004</td>
<td>2990</td>
<td></td>
<td>78.9 %</td>
<td>0.91 [ 0.82, 1.00 ]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>4515</td>
<td>4234</td>
<td></td>
<td>100.0 %</td>
<td>0.89 [ 0.81, 0.97 ]</td>
</tr>
</tbody>
</table>

PROMPT
Making Childbirth Safer, Together
Labour induction at term

Does induction of labour increase the risk of caesarean section? A systematic review and meta-analysis of trials in women with intact membranes

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Accepted 8 February 2013. Published Online 3 July 2013.
Effect on CS

- IOL reduces the rate of CS

### 2.1.2 Other Indications

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>N</th>
<th>N</th>
<th>N</th>
<th>Rate (%)</th>
<th>OR</th>
<th>95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cole 1975</td>
<td>5</td>
<td>111</td>
<td>9</td>
<td>117</td>
<td>0.9%</td>
<td>0.57</td>
<td>[0.18, 1.74]</td>
<td>1975</td>
</tr>
<tr>
<td>Breart 1982</td>
<td>19</td>
<td>481</td>
<td>16</td>
<td>235</td>
<td>2.2%</td>
<td>0.56</td>
<td>[0.28, 1.12]</td>
<td>1982</td>
</tr>
<tr>
<td>Kjos 1993</td>
<td>25</td>
<td>100</td>
<td>31</td>
<td>100</td>
<td>2.4%</td>
<td>0.74</td>
<td>[0.40, 1.38]</td>
<td>1993</td>
</tr>
<tr>
<td>Gonen 1997</td>
<td>26</td>
<td>134</td>
<td>30</td>
<td>139</td>
<td>2.5%</td>
<td>0.87</td>
<td>[0.49, 1.50]</td>
<td>1997</td>
</tr>
<tr>
<td>Suzuki 2000</td>
<td>3</td>
<td>17</td>
<td>6</td>
<td>19</td>
<td>0.5%</td>
<td>0.46</td>
<td>[0.10, 2.25]</td>
<td>2000</td>
</tr>
<tr>
<td>Nielsen 2005</td>
<td>8</td>
<td>116</td>
<td>8</td>
<td>110</td>
<td>0.8%</td>
<td>0.94</td>
<td>[0.34, 2.61]</td>
<td>2005</td>
</tr>
<tr>
<td>Van den Hove 2006</td>
<td>3</td>
<td>16</td>
<td>4</td>
<td>17</td>
<td>0.3%</td>
<td>0.75</td>
<td>[0.14, 4.04]</td>
<td>2006</td>
</tr>
<tr>
<td>Nicholson 2008</td>
<td>14</td>
<td>136</td>
<td>20</td>
<td>134</td>
<td>1.9%</td>
<td>0.65</td>
<td>[0.32, 1.36]</td>
<td>2008</td>
</tr>
<tr>
<td>Koopmans 2009</td>
<td>54</td>
<td>377</td>
<td>72</td>
<td>379</td>
<td>6.5%</td>
<td>0.71</td>
<td>[0.48, 1.05]</td>
<td>2009</td>
</tr>
<tr>
<td>Boers 2010</td>
<td>45</td>
<td>321</td>
<td>45</td>
<td>329</td>
<td>4.0%</td>
<td>1.03</td>
<td>[0.66, 1.61]</td>
<td>2010</td>
</tr>
<tr>
<td>Dodd 2012</td>
<td>22</td>
<td>71</td>
<td>21</td>
<td>78</td>
<td>1.5%</td>
<td>1.22</td>
<td>[0.60, 2.48]</td>
<td>2012</td>
</tr>
<tr>
<td>Boulvain 2012</td>
<td>114</td>
<td>407</td>
<td>130</td>
<td>410</td>
<td>9.8%</td>
<td>0.84</td>
<td>[0.62, 1.13]</td>
<td>2012</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>2287</strong></td>
<td><strong>2067</strong></td>
<td>33.3%</td>
<td><strong>0.81 [0.69, 0.95]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total events | 338 | 392 |
| Heterogeneity | Chi² = 5.38, df = 11 (P = 0.91); I² = 0% |
| Test for overall effect | Z = 2.52 (P = 0.01) |

### Total (95% CI)

| Total (95% CI) | 6248 | 5918 | 100.0% | 0.83 [0.76, 0.92] |
| Total events | 1054 | 1184 |
| Heterogeneity | Chi² = 27.04, df = 30 (P = 0.62); I² = 0% |
| Test for overall effect | Z = 3.77 (P = 0.0002) |
| Test for subgroup differences | Chi² = 0.19, df = 1 (P = 0.66), I² = 0% |
Perinatal effects

• Reduces rate of perinatal death for women – OR 0.37
Latest data published this month

- Agrees with other systematic reviews
  - There were benefits for the fetus
  - The risk of cesarean delivery was lower for women whose labour was induced than those managed expectantly in term and post-term gestations.

Use of labour induction and risk of cesarean delivery: a systematic review and meta-analysis

Ekaterina Misharina MBBS, Ewelina Rogotnicka MSc, Tij Theeth, Rehan Uddin-Khan MBBS, Khalid S. Khan MBBS MSc, Catherine Meads MBChB PhD
## Benefits for the baby

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Relative risk (95% CI)</th>
<th>$I^2$ value, %</th>
<th>No. of trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal death</td>
<td>0.50 (0.25–0.99)</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Admission to NICU</td>
<td>0.86 (0.79–0.94)</td>
<td>0</td>
<td>55</td>
</tr>
</tbody>
</table>

### Table 1: Risk of adverse outcomes associated with labour induction versus expectant management

Use of labour induction and risk of cesarean delivery: a systematic review and meta-analysis

Ekatarina Misharina MBBS, Ewelina Rogozinska MSc, Tej Thadthi, Rehan Uddin-Khan MBBS, Khalid S. Khan MBBS MSc, Catherine Meads MPhil PhD

**ABSTRACT**

Background: Induction of labour is common, and cesarean delivery is regarded as its major complication. We conducted a systematic review and meta-analysis to investigate whether the risk of cesarean delivery is higher or lower following labour induction compared with expectant management.

Methods: We searched 6 electronic databases for relevant articles published through April 2022 to identify randomized controlled trials reporting the risk of cesarean delivery with labour induction or expectant management among women with a singleton pregnancy. We assessed risk of bias and obtained data on rates of cesarean delivery. We used regression analysis to explore the effect of patient characteristics, induction methods, and study quality on risk of cesarean delivery.

Results: There was a significant difference in rates of cesarean delivery between the two groups (p < 0.01). The rate was lower among women whose labour was induced (40.7%) compared with those managed expectantly (53.2%). The risk of cesarean delivery was lower in women who were induced (relative risk, 0.79; 95% confidence interval, 0.75-0.82; p < 0.01) than in those managed expectantly. There was no significant heterogeneity among studies ($I^2 = 0$).

Conclusions: Induction of labour is associated with a lower risk of cesarean delivery compared with expectant management. This finding is consistent with previous studies and supports the use of labour induction as a strategy to reduce cesarean delivery rates.

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Ekatarina Misharina, rehan.uddin-khan@uky.edu
Catharine Meads, catherine.meads@uky.edu
Method of induction – different effects

- PGE$_2$ preparations reduce CS rates
- Oxytocin and balloon catheters do not

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of trials</th>
<th>Relative risk (95% CI)</th>
<th>$P$ value, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxytocin</td>
<td>15</td>
<td>1.03 (0.83–1.28)</td>
<td>0.0</td>
</tr>
<tr>
<td>Prostaglandin E2</td>
<td>67</td>
<td>0.90 (0.84–0.96)</td>
<td>0.0</td>
</tr>
<tr>
<td>Mechanical</td>
<td>4</td>
<td>1.01 (0.75–1.35)</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Clinical advantages Propess

• Propess in clinical practice
  – Reduced requirement for oxytocin Augmentation after IOL
  – Reduced requirement for ventouse/forceps
    Kelly et al. Cochrane review. 2012

• Therefore Propess better for obstetricians as well as women
Bristol practice

• Propess for all Indications for induction of labour

• Standardisation
  – Advantages for our service
    • Single administration
    • Single CTG
    • Time saving
  – Review after 24 hours by senior member of the team if not in labour
How we use Propess

• Start of IOL
  – Antenatal assessment
  – 30 minute CTG

• Insert Propess
  – Further 30 minute CTG should be performed to confirm fetal well being
Insertion of Propess

1. Insertion
Holding the PropessØ insert between the index and middle fingers of the examining hand, insert it high into the vagina towards the posterior vaginal fornix using only small amounts of water soluble lubrica nts.

2. Positioning
The index and middle fingers should now be twisted a quarter turn clockwise, pushing the Propess insert higher up, behind the posterior fornix and turning it through 90°:o that it lies transversely in the posterior fornix.

3. After positioning
Carefully withdraw the fingers leaving the PropessØ insert in the position shown in this diagram where it should remain in situ. After insertion ensure that the patient remains recumbent for 20 - 30 minutes to allow time for the PropessØ insert to swell. Again, this will help it to remain in place for the duration of the treatment. Allow sufficient tape to remain outside the vagina to permit easy retrieval.

4. Removal
To stop prostaglandin E2 release, gently pull the retrieval tape and remove the Propess insert.
Next

• If CTG normal

• No further monitoring is required unless SRM or painful tightenings/contractions

• Selected low risk patients can return home for 6 hours
And then

- When/if the woman reports painful tightenings/contractions

- If regular tightenings/contractions palpated
  - Vaginal examination should be performed
  - Remove Propess (irrespective of any cervical change)
  - Transfer to labour ward
Cautions

• Remove Propess if:
  – Maternal side effects (rare)
  – Uterine hyperstimulation
    • Commence CTG
    • Palpate contractions
  – Abnormal FHR/CTG
Keypad Questions 2
Methods for IOL

• Mechanical methods
  • Equal efficacy
  • Possibly higher overall cost
  • Not recommended by NICE

• Misoprostol
  • Localise to setting - minimum dose
  • Not for previous CS
  • IUFD
Prostaglandins

• Prostaglandins
  • Gold standard for almost all indications for IOL

• Propess
  • Advantages for women and obstetricians
    – Reduces requirement for additional oxytocin and/or instrumental birth after IOL
    – Only single CTG and insertion
    – Standardisation of service
Conclusion

• Latest data from new meta-analyses
  – Induction of labour at term reduces perinatal mortality
  – Induction of labour with some induction agents reduces CS rates
  – Propess may have additional benefits
  – Lower threshold for IOL
  – Consider effects on system
Queen’s Anniversary Prize - 2014

Queen’s Anniversary Prize for Excellence in Education - 2014
Thankyou

• Ferring
• Hospitality

• tdraycott@gmail.com
• www.promptmaternity.org