Induction of Labor
Improving Success Rates and Saving Resources

David C. Lagrew, Jr., M.D.
Regional Executive Medical Director Women’s Services SIMI
Clinical Professor UC Irvine, Dept OB-GYN

Conflict Statement
This presenter has no financial or other conflicts to report

Outline
• Background: Induction of labor
• Cervical preparation
• Induction checklist
• Methods of cervical ripening
• Inpatient versus outpatient
• Conclusion

Induction of labor:
The stimulation of labor for the purpose of accomplishing vaginal delivery!

Oxytocin

• 1906: Sir Henry Dale found that extracts form the human posterior pituitary gland contracted the uterus of a pregnant cat and coined the term oxytocin from two Greek words meaning “swift birth”.
• 1953: Oxytocin was the first ever polypeptide to be sequenced and synthesized by Vincent du Vigneaud, earning the Nobel Prize in 1955.
• 1962: Approved by the FDA for use in supporting milk production but widely used for other indications.

ACOG Medical Indications for induction of labor
• Preeclampsia-Hypertensive disorders
• Premature rupture of membranes
• Chorioamnionitis
• Suspected fetal jeopardy
• Maternal medical problems
• Fetal demise
• Logistic factors
• Postdate pregnancy

Contraindications
• Placenta or vasa previa
• Transverse fetal lie
• Prolapsed umbilical cord
• Prior classical uterine incision
• Active genital herpes infection

Cesarean Rate for Nullip Inductions
244 California Hospitals – 2015
(DMOCC Maternal Data Center)
Large Variation in Hospital Rates of Cesarean after Labor Induction

Cervical Ripening

Dr. Edward Bishop's Advice

• In many clinics, elective induction of labor has become a frequent and acceptable procedure justified by reportedly satisfactory results.” (EH Bishop, 1965)
• Due to the unpredictability of nulliparous labor even with favorable conditions, there is “no justification for labor induction during the first pregnancy”
• *Score of 9 or more will have a safe and successful labor*

Modified Bishop Score

• Modified to make it applicable to more patients and improve predictability
  • Most important change was to subtract one point for nullips and add one point for each prior vaginal birth
  • Predictive Value:
    Score: 0-4  50% failure rate
    5-9  10% failure rate
    10-13 0% failure rate

Bishop Score for Cervical Ripeness

Cervical Assessment

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilation (cm)</td>
<td>0</td>
<td>1-2</td>
<td>3-4</td>
<td>5-6</td>
</tr>
<tr>
<td>Effacement(%)</td>
<td>0-30</td>
<td>30-50</td>
<td>60-70</td>
<td>80+</td>
</tr>
<tr>
<td>Station</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
<td>0+</td>
</tr>
<tr>
<td>Consistency</td>
<td>Firm</td>
<td>Medium</td>
<td>Soft</td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td>Post</td>
<td>Mid</td>
<td>Ant</td>
<td></td>
</tr>
</tbody>
</table>
Support needed performing an induction

- Contraindications sought and precautions taken
- Qualified person has done cervical exam
- Personnel trained in giving uterine stimulating agents
- Because of increased chance of tachysystole, follow with high risk monitoring
- Physician privileged to do cesarean section

Nurse Staffing

Inductions require higher rates of nurse staffing and more resources. The recommended patient to nurse ratio in cases of induction using synthetic oxytocin (Pitocin) administration is 1:1, the recommended patient to nurse ratio in cases of spontaneous labor is 2:1.

(AWHONN, 2010)
Every Woman with a Labor Induction Should have a Patient Safety Checklist

Checklist-based Protocol for Oxytocin Administration

- Mean time of infusion to delivery was 8.5 +/- 5.3 hours versus 8.2 +/- 4.5 hours (NS)
- Newborn index of adverse outcome were significantly fewer in the post protocol group (31 vs 18, P = .049).
- System wide decline in the rate of primary cesarean delivery from 23.6% in 2005 to 21.0% in 2006.


New National Guidelines for Defining Labor Abnormalities and Management Options

Induction Pearls

- "First do no harm": are the risks minimal? What’s my rate? How long will labor be?
- First births + need for cervical ripening = Trouble
- Should elective inductions be limited to Bishop scores > 6 or 8?
- Should elective inductions not have cervical ripening?
- A nullip with a long hard cervix at 40wks has no easy choices...

CAVEAT: Induced labor has a different shaped labor curve and longer stages

Cervical Ripening

Given these data, if induction is performed there appears to be significant advantages to cervical ripening unless the patient has a significantly high Bishop score. What to use and where?

Term Cervical Ripening Techniques

- Hormonal
  - Estradiol
  - Relaxin
  - Prostaglandins E2 (Prostag, Cervidil)*
  - Misoprostol* vaginal vs. oral
- Mechanical
  - Laminæa/Laminaria
  - Stripping membranes
  - Catheters* Single vs. Double Balloon
- Other Techniques
  - Extravascular saline
  - Nitric Oxide

Keys for Induction Success

- Who you choose (parity and cervical ripeness)
- How you perform the induction
- Follow your success rates
Cervical Ripening

- Dissociation of the cervix
- Increase in glycosaminoglycans
- Increase in fibroblast activity
- Reduction of the stretch modulus

Cervical Ripening

Misoprostol vs. PG Insert

- 223 randomized patients
- Shorter median delivery interval with Misoprostol
- Delivery within 12 hours more common at 40.7% vs. 19.3%
- Tachysystole 21% of Misoprostol group vs. 7% of PG Insert


Cochrane Review:
Mechanical methods for induction of labor

- Mechanical methods results in similar cesarean section rates as prostaglandins, with a lower risk of hyperstimulation
- Mechanical methods do not increase the overall number of women not delivered within 24 hours, (exception: multiparas women had lower rates of vaginal delivery within 24 hours when compared with vaginal PG2)
- Compared with outpatient, mechanical methods reduce the risk of cesarean section.

Rationale of Outpatient Balloon

1. Mechanical methods as effective with respect to achieving ripenings and cesarean delivery rates in controlled studies
2. Balloon ripening can be used outpatient since tachysystole is not associated
3. Better experience comes from patients having less cramping and not spending the night in the hospital
4. Less cost since monitoring and nursing care not used for 8-12 hours while awaiting ripening of the cervix

Timing of Adverse Events with Foley Catheter for Cervical Ripening

- What is the risk for adverse events between Foley insertion and 6AM the following day in a low risk population (no prior CS, HTN, SM, or PPROM)?
- 1,905 women observed as inpatients
- 1.5% rate of CS for non-reassuring fetal tracing, vaginal bleeding, placental abruption, or intrapartum stillbirth, a patients received CS for having difficult on initial presentation
- This large cohort supports the outpatient use of Foley cervical ripening
Protocol based on results

**In Office Balloon Placement**

- Majority of patients can have balloon placed/remove same day
- Proper placement above internal os has very good success
- No need for monitoring needed since no hypertonic risk. Monitoring only for other indications
- If monitoring for monitoring you can use misoprostol or cyclopentolate in the office
- Balloon catheter placement in the office is easier
- Patients report early/morning management of labor easier
- Balloon catheter placement follow up is easier
- Patients report as happy as labor management care
- Staff is more satisfied in the office placement

**Double Balloon Catheter**

- Single versus double balloon catheter

**Conclusions**

1. Nulliparous women remaining in the labor for 12 hours compared with women who had exited the latent phase had significantly increased rates of cesarean sections (22.1% compared with 4.3%) and endomometritis (6.6% compared with 1.9%) and increased rates of maternal intensive care unit admission (8.7% compared with 0.3%).

2. Similar patterns were present for multiparous women at 15 hours.

3. With ruptured membranes, a latent phase (lasting 6-8 hours) after initiation of oxytocin at least 12 hours for multiparous women and 15 hours in nulliparous women is a reasonable criterion for diagnosing a failed induction.
Failed Induction-Exiting Latent Phase

Primiparous vs. Multiparous

Critiquing a Failed Induction

- Induction in the face of unripe cervix (Bishop score < 8 primip and < 6 multip)
- Inadequate documentation of cervical ripening procedure and timing
- Adequate trial defined by latent phase at least 12-18 hours of oxytocin and ruptured membranes

ACOG/SMFM Consensus.

Analysis of Induction Performance

Keys for Safe Successful Inductions

- Follow ACOG guidelines—avoid elective inductions in nullips with an unfavorable cervix
- Follow your hospital’s and your personal success rates for induction—Aim for 20%
- Remember, how you perform the induction is critical (standard guidelines, lots of patience!)
- Strongly consider outpatient approach to cervical ripening

What are your thoughts and questions?

30 mL Single- versus 80 mL double-balloon catheter

- A total of 98 women were included in the analysis (50 in the 80 mL double and 48 in the 30 mL single-balloon catheter groups)
- Among nulliparous women, a greater proportion of those randomized to the 80 mL double achieved a Bishop score ≥6 at time of catheter removal (88.0% versus 28.0%; p < 0.001) and delivered vaginally (60.0% versus 32.0%; p = 0.047) compared to those with the 30 mL single-balloon catheter.
- We found no difference by catheter type in achieving a Bishop score ≥6 or vaginal delivery among multiparous women.

OTHER CLINICAL PROTOCOL EXAMPLE: OXYTOCIN INDUCED UTERINE TACHYSYSTOLE
Foley Catheter Placement

The catheter is inserted just inside the internal cervical os. The balloon rests on the internal os and puts pressure down. The patient usually feel minimal cramping since the balloon elevates the amniotic sac and vertex.

Office Equipment List

1. Graves speculum
2. Betadine swabs
3. Ring forceps
4. 16 French Foley catheter with 30 cc balloon (60 cc)
5. 30 cc syringe and 19 G needle
6. 30 cc vial Normal Saline
7. Scissors
8. Umbilical tape
9. Sterile gloves
10. OR Marker pen

Patient Information

Outpatient versus Inpatient Meta-Analysis

Shifting Burden...

- Obvious that this adds some burden to the office/clinic in terms of time and costs.
- Consider a hospital supplied package (catheter, syringe, needle, saline, ties, marker)
- One reason for using Foley balloon is much lower cost than Cook catheter and no strong evidence double balloon is more effective (more studies needed to determine which patients would benefit from this device)

Cervical Ripening: Outpatient versus Inpatient Meta-Analysis

Mechanical and Pharmacologic Methods of Labor Induction

- This randomized trial compared four induction methods: misoprostol alone, Foley alone, misoprostol–Foley concurrently, women undergoing labor induction with full-term (37 weeks of gestation or greater)
- Untethered, vertex-presenting pregnancies, with no contraindication to vaginal delivery, intact membranes, Bishop score 6 or more, and cervical dilation 2 cm or less were included
- Results: Median time to delivery: misoprostol–Foley: 11.6 hours, Foley–misoprostol: 17.4 hours, Foley: 15.7 hours, no-Foley
- Conclusions: After counseling for cesarean delivery and adjusting for parity, misoprostol–Foley resulted in twice the chance of delivering before either single-agent method.
