Induction of Labor

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Goals today

- Brief review of epidemiology
- Comparison of various induction methods
- Discussion of special cases
  - Outpatient induction
  - Induction for TOLAC
  - Elective induction
- Impact of IOL on cesarean rate
- Defining a “failed induction”

Epidemiology

![Epidemiology Chart](image)

- Null hypothesis: Nothing to disclose
Epidemiology

• Rapid increase in frequency of inductions
  For singletons:
  – 1990 9.6%
  – 2012 23.3%


Induction Methods

• Membrane stripping/sweeping
• Amniotomy
• Cervical catheters/balloons
• Prostaglandins
  – Misoprostol (PGE1)
  – Dinoprostone gel or insert (PGE2)
• Oxytocin

Historical perspectives

• Hippocrates: nipple stimulation
• 1756 London: amniotomy
• Late 1800s: cervical balloons
• Early 1900s: ergot
• 1930: Kurzoak & Lieb (NY) show that semen makes myometrium contract
• 1953: du Vigneaud synthesizes oxytocin
• 1969: Corey et al synthesizes prostaglandins

Membrane Sweeping

Before membrane sweep

After membrane sweep
Membrane sweeping

- Goal: reduce the risk of needing more formal induction of labor
- Mechanism: releases endogenous prostaglandins from cervix & lower uterine segment (LUS), and stimulated release of oxytocin via Ferguson’s reflex
- Technique: separate amnion from LUS; some data that more surface area > more effective (Keirse et al)

Membrane Sweeping

- Cochrane meta-analysis: 22 trials, 2797 women
  - Benefits: reduced risk of pregnancy continuing
    - Beyond 41wk (RR 0.59)
    - Beyond 42wk (RR 0.28)
    - NNT to prevent one IOL: 8
  - Possible risks: no difference in infection or PROM

Membrane Sweeping

ACOG Takeaways:

- Discuss expectations (discomfort, bleeding)
- “insufficient data to guide clinical practice . . . in women whose GBS culture is positive”
  - In interim, one prospective study examined risk of infection of GBS+ and GBS- women (N=542) and found no increase in adverse outcomes for mothers or neonates (Kabiri 2015)

Cervical Ripening:
For a nullipara with an unripe cervix, what is your preferred method?

A. Misoprostol
B. Cervidil (dinoprostone insert)
C. Prepidil (dinoprostone gel)
D. Foley balloon (single balloon)
E. Cook (double) balloon
F. I go straight to oxytocin in most cases
Cervical Balloons

Proposed mechanism: mechanical dilation, increased prostaglandin release

Compared to prostaglandins (Cochrane 2012)
- No difference in cesarean
- No difference in rates of delivery within 24h
- More need for oxytocin (RR 1.51, CI 1.15-1.97)
- Less hyperstimulation (RR 0.19, 0.08-0.43)

Compared to oxytocin alone (Cochrane 2012)
- Reduced risk of cesarean delivery (RR 0.62, CI 0.42 to 0.90)
- None of the 5 studies reported time to delivery data

Cervical Balloons: methods

- Single versus double (“Cook”) balloon comparisons favor the single balloon:
  - Less expensive
  - Less painful to insert (Pennell 2009)
  - Shorter interval to delivery (Mei-Dan 2013; Pennell 2009)

Low (30ml) versus higher (60-80ml) volume: limited studies, but favor 80ml
- Levy 2004: for nulliparous subgroup only:
  - More deliveries in 24h (71 versus 49%)
  - Shorter induction (11.5 versus 15.5h)
  - Less need for oxytocin (69 versus 90%)
- Delaney 2010:
  - More deliveries in 12 hours (25 versus 13%), a secondary outcome
  - No difference in deliveries in 24 hour (the primary outcome), or in mean time to delivery or cesarean rate
Cervical Balloons: methods

• Tension versus no tension?
  – Considerable variety in current practice
  – Two studies (Gibson 2013, Lutgendorf 2012) examined traction with a bag of fluid (500-1000ml) versus taping, and both found
    • Shorter time to expulsion
    • No difference in time to delivery
  – Fruhman 2016 examined tension with serial taping versus no tension, both with low dose oxytocin
    • Shorter time to expulsion
    • No difference in time to delivery

Prostaglandins

Prostaglandins: Vaginal

Cochrane review: 70 RCTs with 11,487 women
• Compared to placebo, prostaglandins:
  – Improve chance of vaginal delivery in 24h
  – Lower risk of cesarean (RR 0.91, 0.81-1.02)?
  – Raise risk of tachysystole with FHR changes
• Compared to other prostaglandins, misoprostol:
  – Improves chance vaginal delivery in 24 hours
  – Reduces need for oxytocin
  – Raises risk of tachysystole & meconium

Prostaglandins: Oral Misoprostol

• Cochrane Review: 76 trials, 14,412 women
• Versus vaginal dinoprostone
  – Lower risk of cesarean (0.88, 0.78-0.99)
• Versus oxytocin
  – Lower risk of cesarean (0.77, 0.60-0.98)
  – Higher risk of meconium
• Versus vaginal misoprostol
  – Extremely varied findings, most notable significant findings were:
    • Lower risk of low APGAR (RR 0.60, 0.44-0.82)
    • Lower risk of PPH (RR 0.57, 0.24-0.95)
Prostaglandins: Conclusions

Cochrane: “Oral misoprostol is more effective than placebo, as effective as vaginal misoprostol, and results in fewer cesareans than vaginal dinoprostone or oxytocin . . . Given that safety is the primary concern, the evidence supports the use of oral regimens over vaginal regimens.”

ACOG Takeaway: “It is difficult to compare the results of studies on misoprostol because of differences in endpoints . . . Pharmacologic methods for cervical ripening do not decrease the likelihood of cesarean delivery.”

Combined methods?
Foley balloon + others

- Carbone 2013: RCT of FB + miso, versus FB alone.
  - Shorter time to delivery for combined method by 3.1 hours (95% CI -5.9, -0.3h)
- For MOMI trial 2016: RCT of FB + miso, FB + pit, miso alone, FB alone
  - Shorter time to delivery for combined methods, 13.1-14.5 hours, versus 17.6-17.7 hours

Amniotomy

- More evidence as a tool for shortening spontaneous labor
  - Best known part of Dublin National Maternity Hospital’s “active management” protocol
- Surprisingly little data as a tool for induction (Bricker 2000)
Amniotomy

- Several studies randomized nulliparas to early versus usual amniotomy (Fraser 1993; Gagnon-Gervais 2012; Macones 2012)
  - “early” meant either before 3-4cm dilation, or immediately after initiation of oxytocin (as opposed to 4 hour delay)
  - Early amniotomy resulted in shorter duration of labor by 2-3 hours in all 3 trials
  - No significant difference in cesarean rates or morbidity, though one study showed more cord prolapses (not significant) in early group

Oxytocin

- Remember, compared to cervical ripening with foley balloon or prostaglandins, oxytocin alone is associated with a higher risk of cesarean.
- High versus low dose protocols
  - No difference in time to delivery, cesarean rate, or serious maternal or neonatal morbidity
  - Increased risk of hyperstimulation with high dose

ACOG Takeaway: “Each hospital’s obstetrics and gynecology department should develop [its own] guidelines.”

Special Cases

- Outpatient inductions
- Inductions for women with prior cesarean
- Elective induction
  - With the question—does this increase cesarean risk?
Outpatient Induction

Outpatient Induction: Prostaglandins?

- OPRA study of PGE2 (Wilkinson 2015): no difference in outcomes, but fewer than half of the women randomized to outpatient actually went home (tachysystole or concerning FHT)
- O’Brien 1995: daily administration of PGE2 2mg x 5 doses, versus placebo: no adverse outcomes, higher chance of admission for labor during study interval (54% versus 20%)

ACOG Takeaway: “Larger controlled studies are needed . . . However, outpatient use may be appropriate in carefully selected patients.”

Outpatient Induction: Foley Balloon?

- Sciscione 2001: RCT of 111 women, showed no difference in delivery or safety outcomes, but ~10 hours less in the hospital
- Wilkinson 2015: pilot RCT of 48 women showed good acceptability; outpatient women got more rest & felt less isolated or emotionally alone
- Safety data: Sciscione 2014 retrospective cohort study of nearly 2,000 low risk women with FB for inpatient IOL found no cesareans for maternal or fetal wellbeing in the time period they would have been eligible for outpatient ripening

ACOG Takeaway: “Mechanical methods may be particularly appropriate for the outpatient setting.”

Outpatient Induction
Outpatient Induction

Special Case: Elective IOL

ACOG: as discussed in “Choosing Wisely” campaign

“Ideally, labor should start on its own initiative whenever possible. Higher Cesarean delivery rates result from inductions of labor when the cervix is unfavorable. Health care practitioners should discuss the risks and benefits with their patients before considering inductions of labor without medical indications.”

Specifies NO elective IOL before 39wk

Does IOL increase cesarean risk?

• The way you define the control group changes the answer. Do you compare women being induced to:
  1) Women in spontaneous labor?
  2) Women being expectantly managed?
IOL & Cesarean: the evidence

Little 2013: Excellent review article

• Retrospective data:
  – IOL versus spontaneous labor: OR ~2 for risk of cesarean delivery
  – IOL versus expectant management: 8 studies, showing either no increase risk, or slight decrease in risk

• 4 Meta-Analysis of RCTs
  – All showed reduction in cesarean risk, OR 0.78-0.89
  – More than half the studies were in pregnancies 41+wk

Elective IOL

• My takeaway:
  – Inductions are resource-intensive, and elective inductions medicalize what for many women would be a spontaneous process
  – However, at least if done well, they do not seem to increase the risk of cesarean
Special Case: TOLAC?

- Two concerns:
  - Will it work?
  - Is it safe?

Do you offer induction of labor for women with a prior c-section?

A. No, I don’t offer TOLAC at all
B. No, I only offer TOLAC for women who enter labor spontaneously
C. Yes, but only if her cervix is ripe
D. Yes, regardless of cervical status, I counsel about this as an option

Induced TOLAC: Efficacy

- Data similar to IOL for women without prior cesarean
  - If you compare induced TOLAC to spontaneous TOLAC, lower chance of success (68 vs 80%)
  - If you compare induced TOLAC to expectant management, higher chance of success (74 vs 61%)
- Protective factors: prior vaginal birth, favorable cervix

McDonagh 2005, Palatnik 2015
Induced TOLAC: Safety

- Best data on rupture risk: MFMU Network prospective cohort study of 20,095 primips (1st delivery cesarean) delivering at 19 academic medical centers
  - Spontaneous labor, 4 per 1000
  - IOL with oxytocin alone, 11 per 1000
  - IOL without prostaglandins (mechanical dilation with or without oxytocin), 9 per 1000
  - IOL with Prostaglandins included, 14 per 1000

Induced TOLAC

- ACOG:
  - Lists prior classical cesarean as contraindication
  - Otherwise doesn’t discuss directly except in the section regarding delivery for stillbirth, where they note that foley balloons are a safe option for cervical ripening, so even for women with unripe cervixes, “In patients with a prior low transverse cesarean delivery, trial of labor remains a favorable option.”

What would you consider too long for an attempt at labor induction?

A. Undelivered after 24 hours
B. Undelivered after 48 hours
C. Undelivered after 72 hours
D. I don’t have an upper limit by this criterion

When has an induction failed?

- Undelivered after 24 hours: 12%
- Undelivered after 48 hours: 20%
- Undelivered after 72 hours: 19%
- 48%
When has an induction failed?

- NICHD, ACOG and SMFM joint workshop
- Latent phase may be longer in induced labor
- Propose “requiring that oxytocin be administered for at least 12-18 hours after membrane rupture before deeming the induction a failure,” and note that some experts advise at least 24 hours.

Evidence-based IOL

- Ripen the cervix
  - Prostaglandins & FB both reduce risk of cesarean
  - Consider doing this at home
- Anticipate a longer latent phase & warn the patient
- Use oxytocin according to your hospital’s protocol
- Consider early amniotomy if safe
- Be patient: It hasn’t failed until 12+ hours after amniotomy + oxytocin without entering active labor
  - If she’s in labor, keep going!

References

References


References