

# INDUCTION AND AUGMENTATION OF LABOR

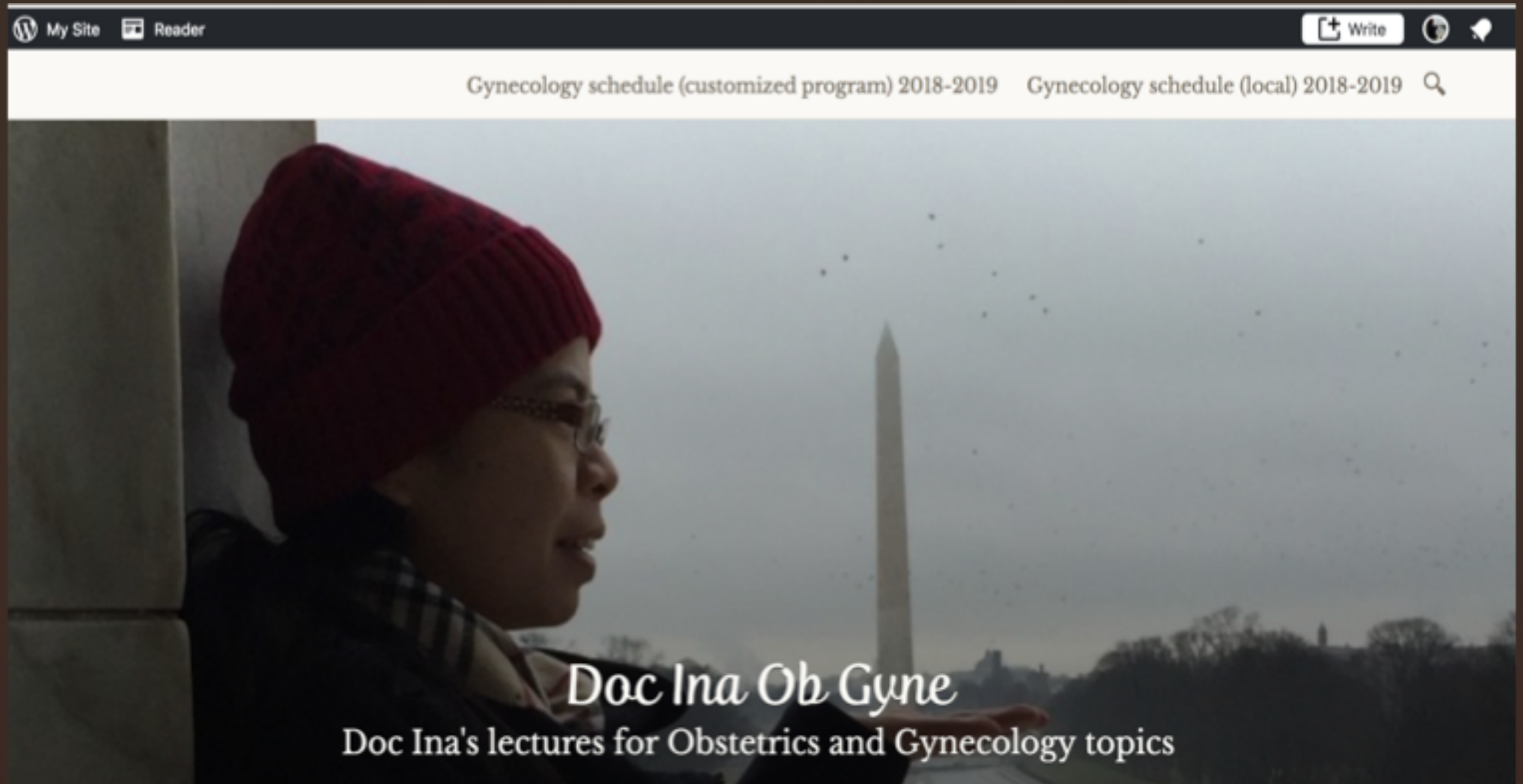
**Ina S. Irabon, MD, FPOGS, FPSRM, FPSGE**

Obstetrics and Gynecology

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# Reference

- Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, Casey BM, Sheffield JS (eds). William's Obstetrics 24<sup>th</sup> edition; 2014; chapter 26 Induction and Augmentation of Labor

# ▶ OUTLINE

1. Definition
2. Labor induction indications
3. Labor induction contraindications
4. Labor Induction techniques
5. Labor induction risks
6. Preinduction cervical ripening
7. Methods of labor induction and augmentation



## DEFINITION

- **Induction:** stimulation of contractions before the spontaneous onset of labor, with or without ruptured membranes.
- When the cervix is closed and uneffaced, labor induction will often commence with **cervical ripening**, a process to soften and open the cervix.
- **Augmentation** refers to enhancement of spontaneous contractions that are considered inadequate because of failed cervical dilation and fetal descent

## ▀ Labor Induction: Indications

- Induction is indicated when the benefits to either mother or fetus outweigh those of pregnancy continuation.
  1. membrane rupture without labor
  2. gestational hypertension
  3. oligohydramnios
  4. nonreassuring fetal status
  5. postterm pregnancy
  6. various maternal medical conditions such as chronic hypertension and diabetes

## ▀ Labor Induction: Contraindications

- Methods to induce or augment labor are contraindicated by most conditions that preclude spontaneous labor or delivery.
  1. prior uterine incision type
  2. contracted or distorted pelvic anatomy
  3. abnormally implanted placentas
  4. uncommon conditions such as active genital herpes infection or cervical cancer.
  5. Fetal factors include appreciable macrosomia, severe hydrocephalus, malpresentation, or nonreassuring fetal status.

## ▸ Labor Induction: Techniques

- Oxytocin
- Prostaglandins (misoprostol and dinoprostone)
- Mechanical methods: stripping of membranes, artificial rupture of membranes, extraamniotic saline infusion, transcervical balloons, and hygroscopic cervical dilators



## ▀ Labor Induction: Risks

1. cesarean delivery (2-3 fold increased risk in nulliparas)
2. Chorioamnionitis (Women whose labor is induced with amniotomy have an increased incidence of chorioamnionitis compared with those in spontaneous labor)
3. uterine scar rupture
  - labor induction using oxytocin without prostaglandins: 5-fold increased risk
  - Labor induction using oxytocin + prostaglandins 15.6-fold increased risk
  - spontaneous labor: 3-fold increased risk

*The American College of Obstetricians and Gynecologists (2013d) recommends against the use of misoprostol for preinduction cervical ripening or labor induction in women with a prior uterine scar*

4. postpartum hemorrhage from uterine atony

## ✓ Labor Induction: Factors Affecting Successful Induction

- Favorable factors include multiparity, body mass index (BMI) < 30, favorable cervix, and birthweight < 3500
- a latent phase as long as **18 hours** during induction allowed most of these women to achieve a vaginal delivery without a significantly increased risk of maternal or neonatal morbidity.
- Rouse and associates (2000) recommend a **minimum of 12 hours** of uterine stimulation with oxytocin **after membrane rupture**.

## Preinduction Cervical Ripening

- pharmacological and mechanical methods that can enhance cervical favorability
- The condition of the cervix—described as **cervical “ripeness” or “favorability”**—is important for a successful labor induction.

## ▀ Cervical Favorability

- One quantifiable method used to predict labor induction outcomes is by using **BISHOP SCORE**
- As Bishop score decreases, the success rate of labor induction declines.
- A **Bishop score of 9** conveys a high likelihood for a successful induction.
- **Bishop score of 4 or less** identifies an unfavorable cervix and may be an indication for cervical ripening.

**TABLE 26-2.** Bishop Scoring System Used for Assessment of Inducibility

Score	Cervical Factor				
	Dilatation (cm)	Effacement (%)	Station (-3 to +2)	Consistency	Position
0	Closed	0-30	-3	Firm	Posterior
1	1-2	40-50	-2	Medium	Midposition
2	3-4	60-70	-1	Soft	Anterior
3	≥ 5	≥ 80	+1, +2	—	—

From Bishop, 1964.



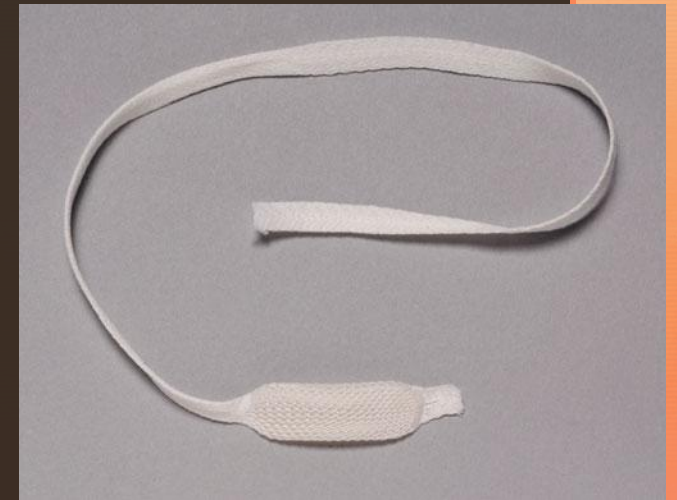
# Cervical Ripening: Pharmacologic Techniques

## 1. Prostaglandin E<sub>2</sub>

- **Dinoprostone** is a synthetic analogue of prostaglandin E<sub>2</sub>. It is commercially available in three forms: a gel, a time-release vaginal insert, and a 10-mg suppository.
- the gel and time-release vaginal insert formulations are indicated only for cervical ripening before labor induction.
- **Dinoprostone gel**: With the woman supine, the tip of a prefilled syringe is placed intracervically, and the gel is deposited just below the internal cervical os. After application, the woman remains reclined for at least 30 minutes. Doses may be repeated every 6 hours, with a maximum of 3 doses recommended in 24 hours.



# Cervical Ripening: Pharmacologic Techniques



**FIGURE 26-1** Cervical ripening insert contains 10 mg of dinoprostone. The insert provides a steady release of approximately 0.3 mg/hr during a 10-hour period.

- 1. Prostaglandin E<sub>2</sub>**
  - **Dinoprostone insert:** thin, flat, rectangular polymeric wafer held within a small, white, mesh polyester sac. The sac has a long attached tail to allow easy removal from the vagina. The insert provides slower release of medication—0.3 mg/hr—than the gel form.
  - used as a single dose placed transversely in the posterior vaginal fornix. Following insertion, the woman should remain recumbent for at least 2 hours. The insert is removed after 12 hours or with labor onset and at least 30 minutes before the administration of oxytocin.

# Cervical Ripening: Pharmacologic Techniques

## 1. Prostaglandin E<sub>2</sub>

- Prostaglandin E<sub>2</sub> preparations should only be administered in or near the delivery suite to guard against uterine tachysystole
- When contractions begin, they are usually apparent in the first hour and show peak activity in the first 4 hours.
- oxytocin induction that follows prostaglandin use for cervical ripening *should be delayed for 6 to 12 hours following prostaglandin E<sub>2</sub> gel administration or for at least 30 minutes after removal of the vaginal insert.*

# Cervical Ripening: Pharmacologic Techniques

## 1. Prostaglandin E<sub>2</sub>

- Side Effects.
  - Uterine tachysystole: >5 contractions in a 10-minute period (It should always be qualified by the presence or absence of fetal heart rate abnormalities)
  - Because uterine tachysystole associated with fetal compromise may develop when prostaglandins are used with preexisting spontaneous labor, such use is not recommended.
- If tachysystole follows the 10-mg insert, its removal by pulling on the tail of the surrounding net sac will usually reverse this effect. Irrigation to remove the gel preparation has not been shown to be helpful.



# Cervical Ripening: Pharmacologic Techniques

## 1. Prostaglandin E<sub>2</sub>

- Exercise caution for women with *ruptured membranes, glaucoma or asthma*.
- Other contraindications include the following:
  - a history of dinoprostone hypersensitivity
  - suspicion of fetal compromise or cephalopelvic disproportion
  - unexplained vaginal bleeding
  - women already receiving oxytocin
  - 6 or more previous term pregnancies
  - contraindication to vaginal delivery
  - women with a contraindication to oxytocin or who may be endangered by prolonged uterine contractions, for example, those with a history of cesarean delivery or uterine surgery.

# Cervical Ripening: Pharmacologic Techniques

## 2. Prostaglandin E<sub>1</sub>

- Considered illegal in the Philippines, but still used in some other countries as the preferred cervical ripening agent.
- Misoprostol—Cytotec—is a synthetic prostaglandin E<sub>1</sub> that is approved as a 100- or 200- $\mu$ g tablet for peptic ulcer prevention. It has been used “off label” for preinduction cervical ripening and may be administered orally or vaginally.
- The American College of Obstetricians and Gynecologists (2013b) reaffirmed its recommendation for use of the drug because of proven safety and efficacy.

# Cervical Ripening: Pharmacologic Techniques

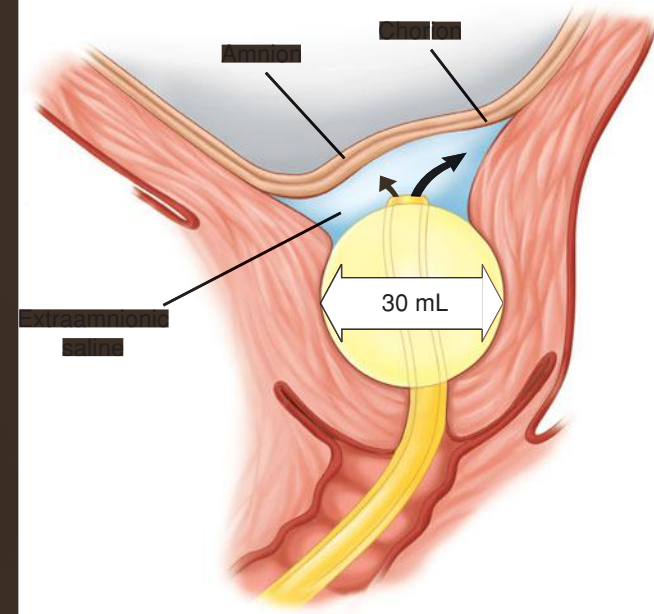
## 3. Nitric Oxide Donors

- Rationale: nitric oxide is likely a mediator of cervical ripening; Also, cervical nitric oxide metabolite concentrations are increased at the beginning of uterine contractions; cervical nitric oxide production is very low in postterm pregnancy
- **isosorbide mononitrate and glyceryl trinitrate.**
- Isosorbide mononitrate induces cervical cyclooxygenase 2 (COX-2), and it also brings about cervical ultrastructure rearrangement similar to that seen with spontaneous cervical ripening.
- Despite this, clinical trials have not shown nitric oxide donors to be as effective as prosta- glandin E2 for cervical ripening
- the addition of isosorbide mononitrate to either dinoprostone or misoprostol did not enhance cervical ripening either in early or term pregnancy nor did it shorten time to vaginal delivery

# Cervical Ripening: Mechanical Techniques

## 1. Transcervical Catheter

- a Foley catheter is placed through the internal cervical os, and downward tension is created by taping the catheter to the thigh
- A modification of this—**extraamniotic saline infusion (EASI)**—consists of a constant saline infusion through the catheter into the space between the internal os and placental membranes
- chorioamnionitis was significantly less frequent when infusion was done compared with no infusion—6 versus 16 percent.





# Cervical Ripening: Mechanical Techniques

## 2. Hygroscopic Cervical Dilators

- Laminaria
- these mechanical dilators have been successfully used for more than 40 years when inserted before pregnancy termination.
- their use appears to be safe, although anaphylaxis has rarely followed laminaria insertion
- Dilators are attractive because of their low cost.



## Methods of Induction and Augmentation

- Labor induction has primarily been done with the use of amniotomy, prostaglandins, and oxytocin, alone or in combination.

# ▸ Methods of Induction and Augmentation

## 1. **Prostaglandin E<sub>1</sub>**

- both vaginal and oral misoprostol are used for either cervical ripening or labor induction.

# Methods of Induction and Augmentation

## 2. Oxytocin

- induction or augmentation may be continued with solutions of oxytocin given by infusion pump.
- first polypeptide hormone synthesized, an achievement for which the 1955 Nobel Prize in chemistry was awarded
- Oxytocin may be used for labor induction or for augmentation.
- With oxytocin use, the American College of Obstetricians and Gynecologists (2013b) recommends fetal heart rate and contraction monitoring similar to that for any high-risk pregnancy.



# Methods of Induction and Augmentation

## 2. Oxytocin

- In general, *oxytocin should be discontinued if the number of contractions persists with a frequency of more than 5 in a 10-minute period or more than seven in a 15-minute period or with a persistent nonreassuring fetal heart rate pattern.*
- When oxytocin is stopped, its concentration in plasma rapidly falls because the **half-life is approximately 3 to 5 minutes.**
- uterus contracts within 3 to 5 minutes of beginning an oxytocin infusion and that a plasma steady state is reached in 40 minutes.
- uterine response to oxytocin increases from 20 to 30 weeks' gestation and increases rapidly at term

# Methods of Induction and Augmentation

## 2. Oxytocin

- Oxytocin Dosage. A 1-mL ampule containing 10 units usually is diluted into 1000 mL of a crystalloid solution and administered by infusion pump.
- A typical infusate consists of 10 or 20 units, which is 10,000 or 20,000 mU or one or two 1-mL vials, mixed into 1000 mL of lactated Ringer solution → results in an oxytocin concentration of 10 or 20 mU/mL, respectively.
- To avoid bolus administration, the infusion should be inserted into the main intravenous line close to the venipuncture site.

# Methods of Induction and Augmentation

## 2. Oxytocin Regimens

*Although the regimens at first appear disparate, if there is no uterine activity, either regimen is delivering 12 mU/min by 45 minutes into the infusion.*

**TABLE 26-3.** Various Low- and High-Dose Oxytocin Regimens Used for Labor Induction

Regimen	Starting Dose (mU/min)	Incremental Increase (mU/min)	Interval (min)
Low-dose	0.5–1.5	1	15–40
	2	4, 8, 12, 16, 20, 25, 30	15
High-dose	4	4	15
	4.5	4.5	15–30
	6	6 <sup>a</sup>	20–40 <sup>b</sup>

<sup>a</sup>With uterine tachysystole and after oxytocin infusion is discontinued, it is restarted at the previous dose and increased at 3 mU/min incremental doses.

<sup>b</sup>Uterine tachysystole is more common with shorter intervals.

Data from Merrill, 1999; Satin, 1992, 1994; Xenakis, 1995.

# Methods of Induction and Augmentation

## 3) Amniotomy

- Artificial rupture of the membranes—sometimes called **surgical induction**—can be used to induce labor, and it always implies a commitment to delivery.
- “**Elective amniotomy**” - Membrane rupture with the intention of accelerating labor.
- amniotomy at approximately 5-cm dilation accelerated spontaneous labor by 1 to 1½ hours.
- During amniotomy, to minimize cord prolapse risk, dislodgement of the fetal head is avoided. For this, fundal or suprapubic pressure or both may be helpful.
- Some clinicians prefer to rupture membranes during a contraction.
- Because of the risk of cord prolapse or placenta abruptio, the fetal heart rate is assessed before and immediately after amniotomy.

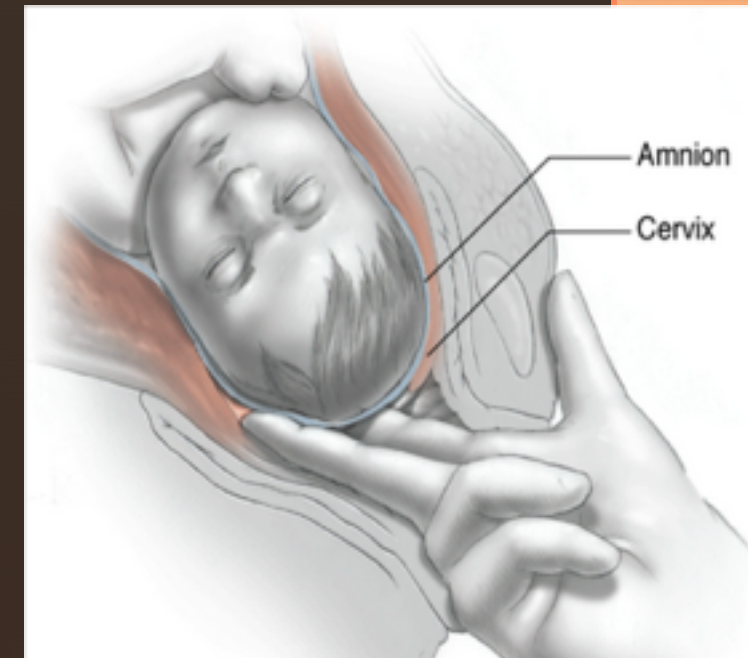


# Methods of Induction and Augmentation

## 3) Amniotomy

- With early amniotomy, however, there is an increased incidence of chorioamnionitis.
- main disadvantage of amniotomy used alone for labor induction is the unpredictable and occasionally long interval until labor onset
- “amniotomy augmentation” → performing amniotomy when labor is abnormally slow.
  - the American College of Obstetricians and Gynecologists (2013a) recommends the use of amniotomy to enhance progress in active labor, but cautions that this may increase the risks of chorioamnionitis and maternal fever.

# Methods of Induction and Augmentation



## 4) Membrane Stripping

- Fingers separate the chorionic membrane from the decidua of the lower uterine segment → releases prostaglandins
- can induce labor and thereby prevent postterm pregnancy
- Drawbacks of membrane stripping included pain, vaginal bleeding, and irregular contractions without labor

# ▸ SUMMARY

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