Prolonged and Post-term pregnancy and induction of labour

DEFINITION: any pregnancy which has passed beyond the expected date of delivery, is called a prolonged or postdated pregnancy. **But for clinical purposes**, **a pregnancy continuing beyond 2 weeks of the expected date of delivery (> 294 days) is called postmaturity or post-term pregnancy**.

INCIDENCE: The incidence of pregnancies continuing beyond 42 completed weeks (> 294 days) ranges between 4% and 14%.

ETIOLOGY: So long as the complex mechanism in initiation of labor remains unknown, the cause of the prolongation of pregnancy will remain obscure. But certain factors are related with postmaturity.

(1) **Wrong dates**—due to inaccurate LMP (most common)
(2) Biological variability (Hereditary) may be seen in the family
(3) **Maternal factors:** Primiparity, previous prolonged pregnancy, sedentary habit, elderly multiparae
(4) **Fetal factors:** *Congenital anomalies*: Anencephaly → abnormal fetal HPA axis and adrenal hypoplasia → diminished fetal cortisol response
(5) **Placental factors:** Sulfatase defi ciency → low estrogen.

Diagnosis

The following are the useful clinical guides:

1. ***Menstrual history***—If the patient is sure about her date with previous history of regular cycles, it is a fairly reliable diagnostic aid in the calculation of the period of gestation. But in cases of mistaken maturity or pregnancy occurring during lactational amenorrhea or soon following withdrawal of the"pill", confusion arises
2. The suggested clinical findings when a pregnancy overruns the expected date by 2 weeks are:
    - **Weight record:** Regular periodic weight checking reveals stationary or even falling weight.
    - **Girth of the abdomen**: It diminishes gradually because of diminishing liquor.
    - **History of false pain**: Appearance of false pain followed by its subsidence is suggestive.
    - **Obstetric palpation**: The following findings, taken together are helpful. These are : height of the uterus, size of the fetus and hardness of the skull bones. As the liquor amnii diminishes, the uterus feels "full of fetus"— a feature usually associated with postmaturity
    - **Internal examination:** While a ripe cervix is usually suggestive of fetal maturity, to find an unripe cervix does not exclude maturity. Feeling of hard skull bones either through the cervix or through the fornix usually suggests maturity.

INVESTIGATIONS: Aims are: **To confirm the fetal maturity To detect placental insufficiency**

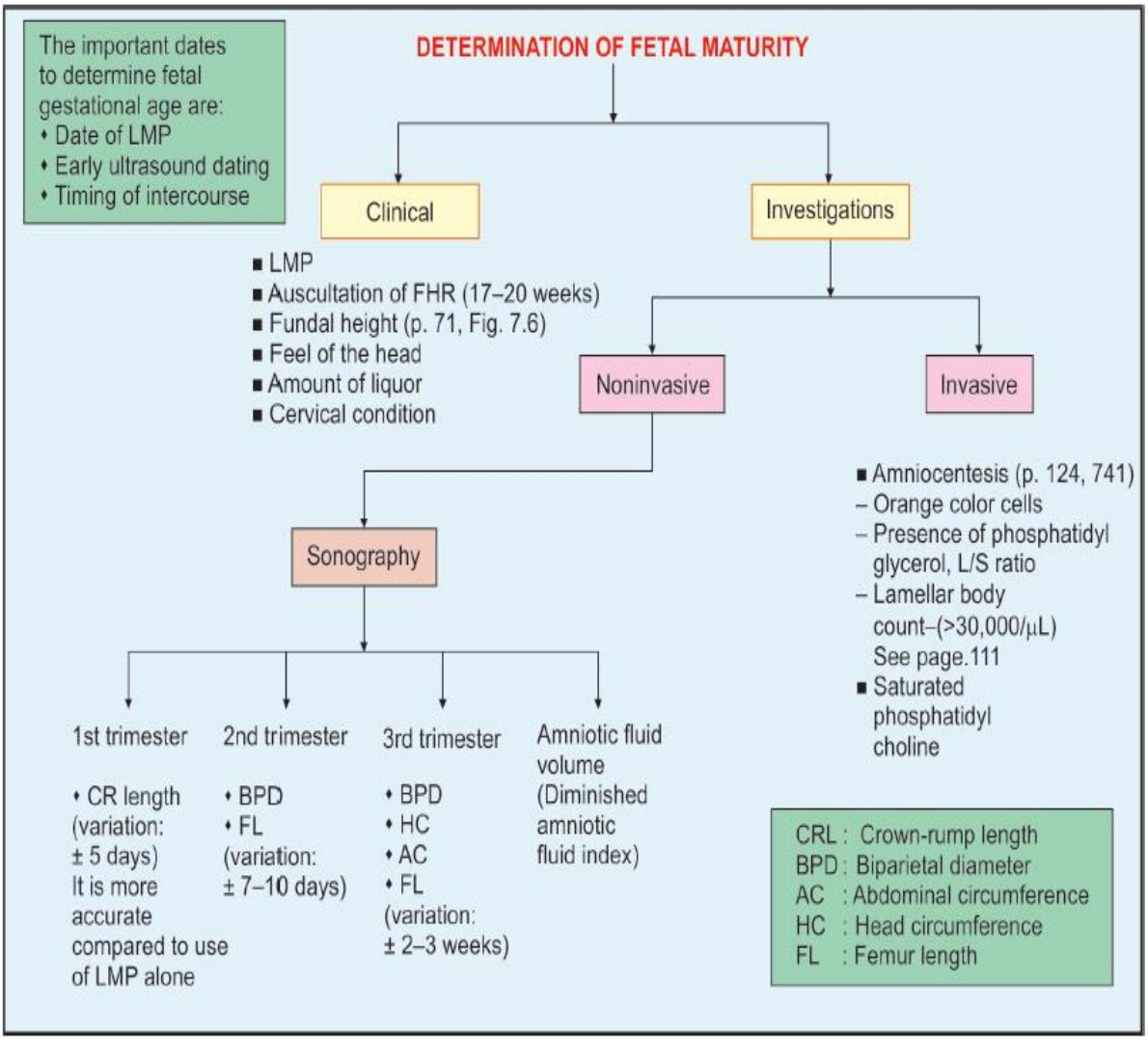
Assessment of fetal maturity:

Sonography: Early ultrasound scan can reduce the incidence of true postmaturity .

Amniocentesis: The biochemical and cytological parameters are helpful. However, this invasive method has been mostly replaced by sonography.

Assesssment of fetal wellbeing is done by twice weekly nonstress test , biophysical profile and ultrasonographic estimation of amniotic fluid volume. Oligohydramnios has been associated with abnormal fetal CTG , umbilical cord compression and meconium stained liquor.

Modified biophysical profile (NST and amniotic fluid volume) is commonly done . Amniotic fluid pocket < 2 cm and AFI < 5 cm indicates induction of labor or delivery. Doppler velocimetry study of umbilical and middle cerebral arteries waveforms are informative. Absence of umbilical artery end-diastolic velocity indicates fetal jeopardy.



CLINICAL CONCEPT: The following criteria have been used to establish the diagnosis of postmaturity retrospectively, i.e. after the birth of the baby.

- ***Baby***—(1) **General appearance:** Baby looks thin and old. Skin is wrinkled. There is absence of vernix caseosa. Body and the cord are stained with greenish yellow color. Head is hard without much evidence of molding. Nails are protruding beyond the nail beds; (2) **Weight** often more than 3 kg and **length** is about 54 cm. Both are variable and even an IUGR baby may be born.
- ***Liquor amnii:*** Scanty and may be stained with meconium.
- ***Placenta:*** There is evidence of aging of the placenta manifested by excessive infarction and calcification.
- ***Cord:*** There is diminished quantity of Wharton's jelly which may precipitate cord compression.

COMPLICATIONS OF POST-TERM PREGNANCY: When pregnancy overruns the expected date, there is risk of placental insufficiency due to placental aging. This is manifested by placental calcification and infarction. Associated complications like hypertension and diabetes aggravates the pathology.

FETAL: **During pregnancy**—There is diminished placental function, oligohydramnios and meconium stained liquor. These lead to fetal hypoxia and fetal distress.

During labor—(1) Fetal hypoxia and acidosis; (2) Labor dysfunction; (3) Meconium aspiration; (4) Risks of cord compression due to oligohydramnios; (5) Shoulder dystocia; (6) Increased incidence of birth trauma due to big size baby and non-molding of head due to hardening of skull bones and (7) Increased incidence of operative delivery. The main clinical significance of post-term pregnancy is **dysmaturity** or **macrosomia**.

Following birth—(1) Chemical pneumonitis, atelectasis and pulmonary hypertension are due to meconium aspiration; (2) Hypoxia (low Apgar scores) and respiratory failure; (3) Hypoglycemia and polycythemia and (4) Increased NICU admissions.

Perinatal morbidity and mortality is calculated in terms of stillbirth. The risk of stillbirth is increased by about threefold from 37 weeks (0.4 per 1,000) to 43 weeks (11.5 per 1,000)

MATERNAL: There is increased morbidity, incidental to hazards of induction, instrumental and operative delivery. Postmaturity *per se* **does not put the mother at risk.**

MANAGEMENT

Before formulating the management, **one should be certain about the maturity of the fetus** as previously described. **Increased fetal surveillance is maintained**. Perinatal morbidity and mortality are increased when pregnancy continues beyond 41 weeks. Induction of labor may be considered at or beyond 41 weeks. Timely delivery reduces the risk of stillbirth. Increased fetal surveillance (twice weekly) is maintained when conservative management is done. For the formulation of management, **the cases are grouped into**:

・Uncomplicated・Complicated

UNCOMPLICATED:

・***Selective induction:*** In this regime, the pregnancy may be allowed to continue till spontaneous onset of labor. Fetal surveillance is continued with **modified biophysical profile** twice a week

・***Routine induction:*** The expectant attitude is extended for 7–10 days past the expected date and thereafter labor is induced.

Induction: Induction of labor reduces the rate of cesarean delivery and perinatal mortality. *If the cervix is favorable (ripe),* induction is to be done by stripping of the membranes or by low rupture of the membranes. If the liquor is found clear, oxytocin infusion is added to be more effective. Careful fetal monitoring is mandatory. *If the cervix is unripe,* it is made favorable by vaginal administration of PGE2 gel. This is followed by low rupture of the membranes. Oxytocin infusion is added when required. Cervical length (TVS) < 25 mm is a predictor of successful induction of labor.

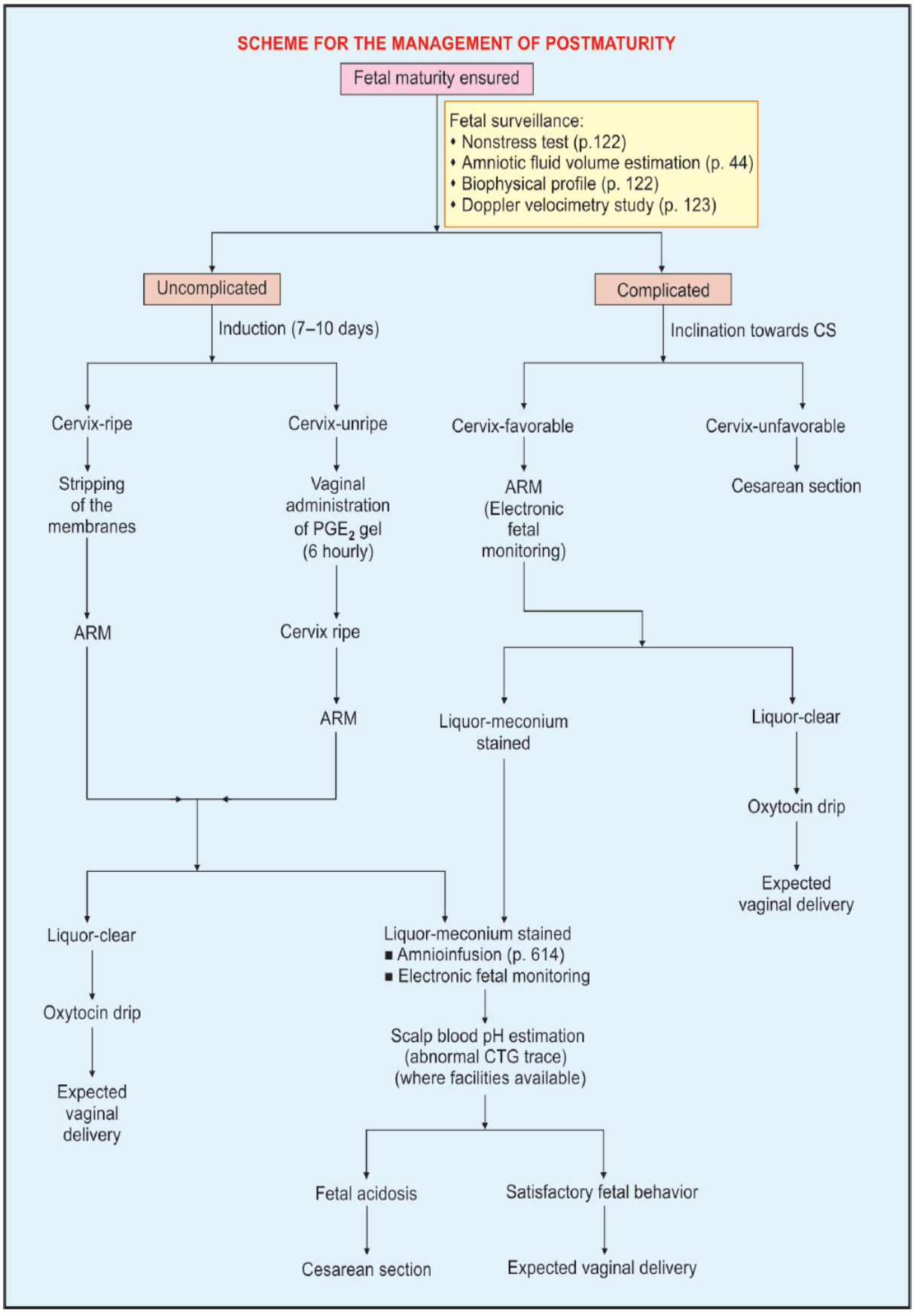
COMPLICATED GROUP: *(Associated with complicating factors)*

・***Elective cesarean section*** *is advisable when postmaturity is associated with high risk factors like: elderly primigravidae, preeclampsia, Rh-incompatibility, fetal compromise or oligohydramnios.*

Associated complications that are likely to produce placental insuffi ciency—Ideally, pregnancy should not be allowed to go past the expected date*.*

CARE DURING LABOR:

Whether spontaneous or induced, ***the labor is expected to be prolonged*** *because of a big baby and poor molding of the head. More analgesia is required for pain relief.* ***Possibility of shoulder dystocia is to be kept in mind****. Careful fetal monitoring with available gadgets is to be done. If fetal distress appears, prompt delivery either by cesarean section or by forceps/ventouse is to be done.*



Induction of Labor

Induction of labor (IOL) means initiation of uterine contractions (after the period of viability) **by any method (medical, surgical or combined) for the purpose of vaginal delivery**. The patient and the family members are informed about the benefits, potential complications and the possibility of cesarean delivery. Overall induction rate is 10%.

Augmentation of labor is the process of stimulation of uterine contractions (both in frequency and intensity) that are already present but found to be inadequate.

Table 35.1: Indications for Induction of Labor (IOL)

- Pre-eclampsia, eclampsia (see p. 266, 275) (hypertensive disorders in pregnancy)
- Maternal medical complications
  - Diabetes mellitus (see p. 325)
  - Chronic renal disease (see p. 278)
  - Cholestasis of pregnancy (p. 336)
- Postmaturity (see p. 371)
- Abruptio placentae (see p. 294)
- Intrauterine Growth Restriction (IUGR) see p. 533
- Rh-isoimmunization (see p. 386)
- Premature rupture of membranes (see p. 370)
- Fetus with a major congenital anomaly
- Intrauterine death of the fetus (see p. 378)
- Oligohydramnios, polyhydramnios (see p. 251)
- Unstable lie-after correction into longitudinal lie (see p. 459)

Table 35.2: Contraindications of Induction of Labor

- Contracted pelvis and cephalopelvic disproportion
- Malpresentation (breech, transverse or oblique lie)
- Previous classical cesarean section or hysterotomy
- Uteroplacental factors: Unexplained vaginal bleeding, vasaprevia, placenta previa
- Active genital herpes infection
- High-risk pregnancy with fetal compromise
- Heart disease
- Pelvic tumor
- Elderly primigravida with obstetric or medical complications
- Umbilical cord prolapse
- Cervical carcinoma

Common Indications for Induction of Labor (IOL)

- Postmaturity
- Pre-eclampsia/eclampsia
- Intrauterine fetal death
- Premature rupture of the membranes
- Congenital malformation of the fetus
- Antepartum hemorrhage
- Chronic hydramnios

Dangers of Induction of Labor

Maternal	Fetal
♦ Psychological upset when there is induction failure and cesarean section is done	♦ Iatrogenic prematurity
♦ Tendency of prolonged labor due to abnormal uterine action	♦ Hypoxia due to uterine dysfunction
♦ Increased need of analgesia during labor	♦ Prolonged labor
♦ Increased operative interference	♦ Operative interference
♦ Increased morbidity	

PARAMETERS TO ASSESS PRIOR TO INDUCTION OF LABOR

Maternal	Fetal
▪ To confirm the indication for IOL ▪ Exclude the contraindication of IOL ▪ Assess Bishop score (score > 6, favorable) ▪ Perform clinical pelvimetry to assess pelvic adequacy ▪ Adequate counseling about the risks, benefits and alternatives of IOL with the woman and the family members	♦ To ensure fetal gestational age ♦ To estimate fetal weight (clinical and USG p. 84). ♦ Ensure fetal lung maturation status (p. 124). ♦ Ensure fetal presentation and lie. ♦ Confirm fetal well-being (p. 119).

Cervical Ripening is a series of complex biochemical changes in the cervix which is mediated by the hormones. There is alteration of both cervical collagen and ground substance. Ultimately, the cervix becomes soft and pliable.

Table 35.4: Methods of Cervical Ripening

Pharmacological Methods	Nonpharmacological Methods
Prostaglandins (PGs) ▪ Dinoprostone (PGE_2): Gel, tablet, suppository ▪ Misoprostol (PGE_1): Tablets.	▪ Stripping the membranes
Oxytocin	▪ Amniotomy (artificial rupture of the membranes)
Progesterone receptor antagonists ▪ Mifepristone (RU 486)	▪ Mechanical dilators, osmotic dilators (laminaria)
Relaxin: a protein hormone from corpus luteum, dissolutes cervical connective tissue	▪ Transcervical balloon catheter
Hyaluronic acid	▪ Extra-amniotic saline infusion
Estrogen	

Table 35.5: Bishop's Preinduction Cervical Scoring System (Modified)

Parameters	Score			
	0	1	2	3
Cervix				
▪ Dilatation (cm)	Closed	1–2	3–4	5 +
▪ * Effacement (%)	0-30	40-50	60-70	≥ 80
▪ Consistency	Firm	Medium	Soft	–
▪ Position	Posterior	Midline	Anterior	–
Head: Station	–3	–2	–1,0	+ 1, + 2
Total score = 13; Favorable score = 6-13; Unfavorable score = 0-5				
* Cervical length (cm)	> 4	2-4	1-2	< 1

* Modification (1991) replaces effacement (%) with cervical length in cm.

Methods of induction of labour

Medical induction: drugs used : ・Prostaglandins PGE2, PGE1 ・Oxytocin ・Mifepristone

Local application of **prostaglandin E_2—dinoprostone**—is commonly used for cervical ripening . Its gel form—Prepidil—is available in a 2.5-mL syringe for an intracervical application of 0.5 mg of dinoprostone.. Doses may be repeated every 6 hours, with a maximum of three doses recommended in 24 hours. **A 10-mg dinoprostone vaginal insert—Cervidil**—The insert provides slower release of medication—0.3 mg/hr—than the gel form, is used as a single dose placed transversely in the posterior vaginal fornix. Following insertion, a woman should remain recumbent for at least 2 hours. The insert is removed after 12 hours or with labor onset.

Side Effects

1. Uterine tachysystole(is defined as 6 contractions in a 10-minute period).
2. *Uterine hypertonus* is described as a single contraction lasting longer than 2 minutes.
3. *Uterine hyperstimulation* is when either condition leads to a nonreassuring fetal heart rate pattern.

Contraindications to prostaglandin agents in general include asthma, glaucoma, or increased intraocular pressure. Moreover, manufacturer recommendations caution against its use in women with ruptured membranes.

Misoprostol (PGE1) is currently being used either **transvaginally** or **orally** for induction of labor. Oral use of misoprostol is less effective than vaginal administration.

1. A dose of 25 μg vaginally every 4 hours is found either superior or similarly effective to that of PGE2 for cervical ripening and labor induction. With the above dose schedule, the risk of uterine hyperstimulation, meconium stained liquor and fetal heart irregularities are reduced.
2. Total 6–8 doses are used.
3. Buccal and sublingual use of misoprostol can avoid the first pass hepatic circulation and can maintain the serum bioavailability similar to that of vaginal use.

Side effects are :

1. Tachysystole,
2. meconium passage
3. possibly uterine rupture.
4. It is contraindicated in women with previous cesarean birth.

Oxytocin is an endogenous uterotonic that stimulates uterine contractions. Oxytocin receptors present in the myometrium are more in the fundus than in the cervix. Receptor concentrations increase during pregnancy and in labor, is effective for induction of labor when the cervix is ripe. It is less effective as a cervical ripening agent.

Mifepristone (progesterone receptor antagonists) blocks both progesterone and glucocorticoid receptors. RU 486, 200 mg vaginally daily for 2 days has been found to ripen the cervix and to induce labor. **Onapristone (ZK 98299)** is a more selective progesterone receptor antagonists.

Mechanical Techniques

1- Transcervical Catheter

A Foley catheter may be placed through the internal cervical os. Downward tension that is created by taping the catheter to the thigh can lead to cervical ripening. A modification of this, termed *extra-amnionic saline infusion (EASI),* consists of a constant saline infusion through the catheter into the space between the internal cervical os and placental membranes .

2- Hygroscopic Cervical Dilators(Laminaria)

Cervical dilatation can be accomplished using hygroscopic osmotic cervical dilators.

Surgical induction

1- **Artificial rupture of the membranes (ARM)** After the membranes rupture, the following are to be assessed:

・(a) Color of the amniotic fl uid; (b) Status of the cervix; (c) Station of the head; (d) Detection of cord prolapse if any; (e) FHR pattern is again checked. In high-risk cases scalp electrode for fetal monitoring is applied.・A sterile vulval pad is placed. Prophylactic antibiotic may be prescribed.

Hazards: (1) Cord prolapse; (2) Uncontrolled escape of amniotic fluid and placental abruption; (3) Injury to the cervix or the presenting part; (4) Rupture of vasa previa leading to fetal blood loss; (5) Amnionitis.

2- Stripping the membranes

describes the insertion of a gloved finger through the cervix and its rotation against the wall of the uterus. This safe technique strips off the chorionic membrane from the underlying decidua and releases natural prostaglandins. It can be uncomfortable for the woman, and is only possible if the cervix is beginning to dilate and efface. It can be performed more than once and evidence shows that it reduces the need for formal induction. It is usually only performed at term, and placenta praevia must be excluded before it is offered. It should be considered an adjunct to the normal processes of induction.

Combined Method

The combined medical and surgical methods are commonly used to increase the efficacy of induction by reducing the induction-delivery interval. The oxytocin infusion is started either prior to or following rupture of the membranes depending mainly upon the state of the cervix and head brim relation. With the head nonengaged, it is preferable to induce with prostaglandin gel or to start oxytocin infusion followed by ARM. The advantages of the combined methods are: (1)

More effective than any single procedure; (2) Shortens the induction-delivery interval and thereby—(a) minimizes the risk of infection and (b) lessens the period of observation