Sultanate of Oman
Ministry of Health
The Royal Hospital
Department of Obstetrics and Gynecology

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Title: Induction of Labor

1.0 Introduction

Induction of labor is a relatively common procedure.

Induction of labor is the initiation of contractions in a pregnant woman who is not in labor to help her achieve a vaginal birth within 24 to 48 hours.

It should be performed only when there is a clear medical indication for it and the expected benefits outweigh its potential harms.

Wherever induction of labor is carried out, facilities should be available for assessing maternal and fetal well-being.

Prevalence - Between 1990 and 2018, the overall frequency of labor induction almost tripled in the United States, rising from 9.5 percent in 1990 to 27.1

percent in 2018.

2.0 Indications and contraindications of Induction of Labor (IOL)

2.1 Indications -

High Priority	**Other Indications**
Preeclampsia ≥ 37 weeks HELLP syndrome (hemolysis, elevated liver enzymes, low platelets)	Postdates (> 41+0 weeks) or post-term (> 42+0 weeks) pregnancy
Maternal disease for planned delivery	Uncomplicated twin pregnancy ≥ 38 weeks

Stable antepartum hemorrhage.	Pre-labor rupture of membranes, GBS negative
Chorioamnionitis**.**	Alloimmune disease at or near term
Suspected fetal compromise.	Intrauterine growth restriction
Term pre-labor rupture of membranes with maternal GBS colonization.	Oligo hydramnios
Diabetes mellitus (refer to Diabetes in Pregnancy guideline)	Gestational hypertension (refer to hypertensive disorders in pregnancy guideline)
	Intrauterine fetal death
	Logistical problems (history of rapid labor, distance to hospital)
	Intrauterine death in a prior pregnancy (Induction maybe performed to alleviate parental anxiety, but there is no known medical or outcome advantage for mother or baby.)

2.1 IOL not indicated

Care provider or patient convenience**.**

Suspected fetal macrosomia (EFBW-> 4000 gm) in a non-diabetic woman (no reduction in the incidence of shoulder dystocia but twice the risk of LSCS)

2.2 Contraindications

- Placenta or vasa previa.
- Previous uterine rupture**.**
- Significant prior uterine surgery (e.g. myomectomy entering the uterine cavity).
- Pelvic structural deformities.
- Abnormal fetal lie or presentation (e.g. transverse lie or footling breech)**.**
- Prior classical or inverted T uterine incision.
- Active genital herpes infection.
- Cord Presentation.
- Invasive cervical cancer.

3.0 Risks during induction of labour

- Failure to achieve labor
- Operative vaginal delivery
- Chorio amnionitis.
- Inadvertent delivery of preterm infant if wrong dating.
- Caesarean section
- Tachysystole with or without FHR changes.
- Cord prolapse with ARM.
- Uterine rupture in scarred and unscarred uterus.

4.0 PRE-INDUCTION ASSESSMENT/ Checklist.

1. **Reconfirm period of gestation** – By dates or 1st trimester ultrasound

Routine antenatal ultrasound for confirmation of expected date of delivery has been shown to reduce induction rates for postdates (> 41+0 weeks)

2. Counseling of patient regarding:

- Indication for induction & benefits.
- Options / recommendations for cervical ripening.
- Methods of pain relief in labor as pain may be more than spontaneous onset of labor.
- Possible side effects including
  - Tachysystole with or without Fetal Heart Rate (FHR) changes.
  - possibility of emergency caesarean delivery.
  - Potential for FHR abnormalities requiring intervention.
  - Failed response & further options if IOL fails.
- Alternative options if the woman chooses not to have induction of labor.

3. Confirm vertex presentation.

4. Obtain reactive Non Stress Test (NST)

5. Whenever possible, for patients with prior uterine incision or surgery, the operative report or the opinion of the surgeon should be obtained and reviewed.

6. Review the patient's pregnancy and medical history for risk factors for problems that may develop during labor and delivery (eg, past history of shoulder

dystocia or postpartum hemorrhage).

4.1 Cervical Assessment - Modified Bishop Scoring System-

Most important criteria for predicting successful vaginal delivery is Cervical dilatation followed by Effacement, Station & Position. Least important is Consistency

Factor	Score 0	Score 1	Score 2
Dilatation (cm)	0 (closed)	1-2	3-4
Effacement (%)	0-30	40-50	60-70
Length (cm)	>3	1-3	<1
Consistency	Firm	Medium	Soft
Position	Posterior	Mid	Anterior
Station	-3 or above	-2	-1 or 0

5.0 Factors influencing success of IOL

Factors which may increase the likelihood of success of IOL -

- Bishop score (favorable is 6 or more)
- Lower body mass index (BMI), (BMI >40Kgs/M2 increases LSCS rate)
- Maternal age (>35 years increases LSCS rate)
- Multiparity
- Taller height
- Ruptured membranes
- Lower estimated fetal weight (Fetal weight>4Kgs is associated with a higher CS rate)
- Absence of comorbidities which may be associated with placental insufficiency (eg, preeclampsia, Diabetes)

6.0 Role of Membrane sweeping prior to induction of labor

- Routine sweeping (stripping) of membranes promotes onset of labor and decreases induction rates.
- Membrane sweeping involves insertion of a digit past the internal cervical os followed by three circumferential passes of the digit causing separation of the membranes from the lower segment.
- When the cervix is closed, a massage of the cervical surface with the forefinger and middle finger for 15 to 30 seconds can be performed.

7.0 Options For Cervical Ripening / Induction With Unfavourable Cervix

7.1 Mechanical Options- Balloon Devices (foley's catheter or cervical catheter):

Applies pressure on the internal os of the cervix to stretch the lower segment & increase the release of local prostaglandins. Oxytocin infusion or prostaglandin can be planned if active labor is not started in 24

hours. There is no reported increased association with infection (chorioamnionitis and endometritis) or neonatal infection with catheter insertion

Advantages-

- Simple to use
- Potential for reversibility
- Lower risk of tachysystole
- Safer method of induction of labor in scarred uterus

Contra-indications

- Low-lying placenta or any other contraindication of vaginal delivery.
- Antepartum hemorrhage.
- Rupture of membranes.
- Evidence of lower tract genital infection (e.g GBS, Primary Herpes)

When cervix is unfavorable, mechanical method can be used followed by pharmacological method

7.1.1 Foley Catheter

Method

- For a single balloon catheter, a no. 18 Foley is introduced under sterile technique into the cervical canal past the internal os.
- The bulb is then inflated with 30 to 60 cc of saline.
- The catheter is left in place until either it falls out spontaneously or 24 hours have elapsed.
- Small degree of traction on the catheter by taping it to the inside of the leg may be applied
- Antibiotics to be given for 24 hours while the catheter is in situ.

7.1.2 Cooks double balloon cervical Catheter

The catheter is introduced with aseptic precautions through cervix. The uterine balloon is inflated with a maximum of 80 mL of saline above the level of the

internal os and then pulled back against the internal os. After removal of the speculum, the vaginal balloon is inflated with 80 mL of saline.

The balloon catheter is removed after 24 h of insertion if it is not expelled spontaneously.

Antibiotics to be given for 24 hours while the catheter is in situ.

7.2 Pharmacological Methods/ ProstaglandinE2

Prostaglandin E2 acts on the cervix by dissolving the collagen structural network of the cervix & are effective agents of cervical ripening and induction of

labor for an unfavorable cervix. . Intra vaginal prostaglandins E2 are preferred to intra cervical prostaglandins E2. Vaginal prostaglandins E2 may be

considered with ruptured membranes at term .PGE2 is not contra indicated in women with asthma.

Prostaglandin E2, dinoprostone, is available in 3 different preparations as a cervical ripening agent

- **Intra vaginal** 1 mg and 2 mg gel (Prostin)
    - If indicated Oxytocin infusion to be started at least after 6 hours gap

- **Intra cervical** 0.5 mg gel (Prepidil). (not available in our hospital)

- **Controlled-release gel** 10 mg (Cervidil/propess)- (available in our hospital)

1. Allows easier removal in case of tachysystole
2. Oxytocin infusion can be started after 30 minutes of its removal

7.2.1 Intravaginal gel (prostin):-

Primigravida with unfavorable cervix (Bishop score of 4 or less),

- Initial dose of 2 mg administered vaginally.
- 2^{nd}& 3^{rd} dose of 1 mg after 6-8 hours after assessment if uterine activity is insufficient for satisfactory progress of labor.
- Maximum dose 4 mg/24hours.

Multigravida or primi gravida with favorable cervix (Bishop score of 6 or more),

- Initial dose of 1 mg administered vaginally.
- Second & third dose of 1 mg after 6 -8 hours of last dose
- Maximum dose 3 mg/24 hours.

Method

The gel should be inserted high into the posterior fornix avoiding administration into the cervical canal. The patient should be instructed to remain recumbent for one hour.

7.2.2 Controlled-release gel 10 mg (Cervidil/propess):-

- It is a slow-release vaginal pessary containing 10mg prostaglandin E2. It releases prostaglandin at a steady rate of 0.3 mg/hr for up to24 hours and has a half-life of 1-3 minutes.
- Studies have shown that it is as effective as existing methods of induction of labor using prostaglandin preparations. Whilst using it, women may require fewer vaginal examinations, have no delay in administration of subsequent prostaglandins, have a reduction in IOL – delivery time and less time spent in the antenatal ward awaiting IOL.

Contraindication for use of Dinoprotone pessary:

- Parity of 5 and more
- Multiple pregnancy.
- Malpresentation.
- Small for gestational age/ intra-uterine growth restriction.
- Unexplained bleeding or Placenta previa.
- Non-reassuring or abnormal CTG's prior to insertion.
- Previous Cesarean section or uterine scar.
- Premature rupture of membrane (PPROM / PROM).
- Hypersensitivity.
- Bishops score 6 or more

Prior to administration of Dinoprostone pessary: -

- Remove from freezer or fridge immediately prior to use.
- Can be stored in the refrigerator for up to one month (2–8 degrees Celcius) after removal from the freezer.
- Warming is not required.
- Open only after decision has been made to use the pessary.
- Use water soluble lubricant (not obstetric cream)
- Insert and position transversely in the posterior fornix of the vagina: **-** To minimize potential for the pessary to fall out
- Ensure sufficient tape outside vagina to allow removal.

After Dinoprotone pessary insertion: -

- Women should remain in bed, in a semi-recumbent position for approximately 1-hour post insertion.
- After 1 hour, following CTG monitoring, women may mobilize as they wish.
- Women should be reminded to take care when going to the toilet, not to pull on the tape and detach the pessary.
- 4 hourly observations and auscultation of the fetal heart should be carried out.
- Women should inform the staff at the onset of painful regular contractions.
- Further vaginal examinations are unnecessary unless regular contractions are established or SROM occurs. Perform CTG at this time.

When to remove Dinoprostone pessary: -

The pessary is designed to remain in the vagina for up to 24 hours; however, it should be removed immediately in the following instances:

- Regular contractions are established, and the cervix is dilated greater than 3 cm
- In case of vaginal bleeding.
- Fetal compromise – CTG becomes pathological.
- If rupture of membranes occur subsequent to administration of pessary.
- Uterine hyperstimulation (rare, but can occur):

- More than 5 contractions in 10 minutes
- Painful contractions lasting 90 seconds or more.
- At least 30 minutes prior to starting an intravenous infusion of oxytocin.
- Adverse maternal systemic reaction – severe nausea or vomiting (rare side effect).
- Insufficient cervical ripening after 24 hours.

To remove the pessary, apply gentle traction on the retrieval tape (the insert will have swollen to 2-3 times its original size and be pliable). Document in the maternal notes time of removal.

If removal for a suspected indication proves to be inappropriate and the pessary has been kept post removal on a clean field for less than 30 minutes, the pessary can be reinserted and induction of labor resumed.

After 24 hours: -

- Remove the pessary after 24 hours and perform vaginal examination.
- Transfer to Labor ward if artificial rupture of membranes (ARM) is possible, or if in active labor
- If not possible to perform ARM, review by Consultant / Senior specialist for further plan.
- Oxytocin should not be commenced before 30 minutes of removing the pessary (following ARM)
- If ARM not possible, follow recommendations for failed induction.

Failed induction with Dinoprotone pessary:-

- The definition used by NICE for failed induction with prostaglandin is "the failure to induce progressive labor after one cycle of treatment" which means following the insertion of one Dinoprostone pessary for 24 hours.
- The decisions regarding the management of a failed induction must be made in accordance with the woman's wishes and the clinical circumstances. A full assessment of the pregnancy in general, the woman's condition and fetal wellbeing using electronic fetal monitoring (EFM), should be made.
- A management plan should be finalized after discussion with the Obstetric Consultant/ Senior specialist.
- If induction fails, the management options are:-

- A further cycle of vaginal prostaglandins in the form of Dinoprostone gel may be recommenced 24 hours after removal of the pessary.

- Insertion of cervical catheter.

- Caesarean Section.

8.0 Adverse effects of Vaginal Prostaglandins

- Uterine tachysystole
- Maternal effects (fever, chills, vomiting, diarrhea).
- Rare, idiopathic adverse cardiovascular events

8.1 Tachysystole refers to > 5 contractions per 10-minute period averaged over 30 minutes. This is further subdivided into two categories, one with and one

without fetal heart rate changes.

Terms hyperstimulation & hypertonia should be abandoned.

8.2 Management of tachysystole

- Prostaglandin should be removed by vaginal wash (possible if administered with in 1 hour)
- Maternal position change
- IV Fluid bolus
- Oxygen by mask
- Tocolytic agent if available -
    - Nitroglycerin spray (0.4 mg, 1 to 2 puffs sublingual), which has the advantage of a simple and rapid administration and uptake
    - Terbutaline I/V if available (0.25mg dose, diluted and given slow IV push).
- To evaluate need for urgent operative delivery in the case of tachysystole with FHR decelerations

9.0 <u>Options for Induction with a favourable cervix</u>

9.1 Amniotomy (ARM, Artificial Rupture of membrane)

ARM is a simple and effective method of labor induction when the membranes are accessible and the cervix is favorable.

If active labor does not commence in one hour after ARM augmentation with oxytocin can be started.

Risk of amniotomy

Cord prolapse especially in a high presentation or unstable lie or polyhydramnios.

Contraindications of amniotomy

- Placenta previa
- Vasa previa
- Cord presentation
- Active genital infection except for women colonized with GBS.

9.2 Oxytocin

Continuous fetal monitoring is recommended with the use of oxytocin.

The physiological dose of oxytocin to produce regular uterine contraction is 8 to 12 mU/min.

The rate of infusion should always be documented in mU/min rather than ml/hour.

	Low-dose protocol (5U in 500ml- 1mu in 1 ml)	***High-dose protocol (10U in 500ml -2mu in 1 ml)***

Initial dose of oxytocin	1 to 2 mU/min	4 to 6 mU/min
Increase interval	30 minutes	15 to 30 minutes
Dosage increment	1 to 2 mU	4 to 6 mU
Usual dose for good labour	8 to 12 mU/min	8 to 12 mU/min
Maximum dose before reassessment	30 mU/min	30 mU/min

10.0 Advantages & disadvantages of each protocol

	Advantages	**Disadvantages**
Low dose protocol	Less risk of tachysystole Small overall dose	Increased length of labor
High dose protocol	Reduces length of labor No appreciable increase in neonatal morbidity	Increase in uterine tachysystole with FHR changes

11.0 Failed induction - Defined as labor not starting after one cycle of induction

If induction fails

- Reassess the condition and the pregnancy in general
- Fetal wellbeing should be assessed
- Decisions about further management should be made in accordance with the woman's wishes and should take into account the clinical circumstances.

Subsequent management options include:

- A further **attempt to induce labo**r (the timing should depend on the clinical situation and the woman's wishes)
- **Caesarean section**

12.0 Induction of labor in specific circumstances

12.1 Induction of Labor in grandmultipara (More than para 8)

Prostaglandin should be used with caution with reduced dose, in grand multipara (WHO guideline).

Options of method of induction

Unfavorable cervix (Bishop <6)

- Cervical catheter
- PGE2- only 2 doses of 1 mg each 8 hours apart

Favorable Cervix (Bishop>6)

- Amniotomy with oxytocin infusion (low dose protocol)

12.2 Induction of labour and advanced maternal age

- Higher perinatal mortality rates have been reported among women aged 35 to 39 and those 40 years or older than in women aged 20 to 24.
- Women ≥ 40 years of age should be considered biologically post-term at 39 weeks' gestation and delivery be considered at this gestation
- Prostaglandin has been shown to be more effective than oxytocin with unripe cervix (bishop<6)
- Until there is more evidence available, induction should be considered on an individual basis

12.3 Induction of labour in women who have conceived with artificial reproductive techniques (ART)

ART has been shown to be associated with adverse outcomes in pregnancy including-

- Gestational hypertension
- Gestational diabetes
- Placenta previa
- Placental abruption
- Stillbirth, Neonatal death
- Preterm delivery
- Low and very low birth weight babies
- Intra uterine growth restriction
- Increased NICU admission.

Many women undergoing ART are older, which increases their risk of adverse perinatal outcomes.

Until there is more evidence available, induction should be considered on an individual basis

12.4 Prolonged pregnancy

Women with uncomplicated pregnancies should usually be offered induction of labour between 41+0 and 42+0 weeks to avoid the risks of prolonged

pregnancy.

The exact timing should take into account the woman's preferences and local circumstances.

If a woman chooses not to have induction of labour-

From 42 weeks offer twice weekly -

Cardiotocography

Ultrasound estimation of maximum amniotic pool depth

12.5 Preterm pre labor rupture of membranes

Induction of labor should not be carried out before 34 weeks unless there are additional obstetric indications (for example, infection or fetal compromise).

If preterm pre labor rupture of membranes occurs after 34 weeks, IOL can be done with prostaglandin after counseling about

- Risks to the woman (for example, sepsis, possible need for caesarean section)
- Risks to the baby (for example, sepsis, problems relating to preterm birth)
- Local availability of neonatal intensive care facilities.

12.6 Pre labor rupture of membranes at term

Women with pre labor rupture of membranes at term (at or over 37 weeks) should be offered a choice of induction of labor with vaginal PGE2 or expectant

management.

Induction of labor is appropriate approximately 24 hours after pre labor rupture of the membranes at term.

12.7 Previous caesarean section

- If delivery is indicated, women who have had a previous caesarean section may be offered induction of labor with mechanical method (cervical

catheter or foley's catheter) or vaginal PGE2, caesarean section or expectant management on an individual basis.

- Induction with prostaglandins appears to be associated with a higher risk for uterine rupture than induction with oxytocin or cervical ripening with mechanical methods.

- Women should be informed of the

  Increased risk of need for emergency caesarean section during induced labor.

  Increased risk of uterine rupture.

- Signs and symptoms of uterine rupture intrapartum:-

- Fetal heart rate changes. Bradycardia is the most common clinical manifestation of uterine rupture.

- Loss of station.

- Abdominal pain with/without hemodynamic changes.

- Uterine tenderness, cessation of contractions, change in uterine shape.

- Vaginal bleeding.

- Hematuria.

12.8 Maternal request

Induction of labor should not routinely be offered on maternal request alone.

However, under exceptional circumstances induction may be considered at or after 40 weeks.

12.9 Fetal growth restriction

If there is severe fetal growth restriction with confirmed fetal compromise, induction of labor is not recommended.

12.10 History of precipitate labor

Induction of labor to avoid a birth unattended by healthcare professionals should not be routinely offered to women with a history of precipitate labor.

12.11 Intrauterine fetal death

Offer **immediate induction** or **expectant manage**ment if

- Intact membranes
- No evidence of infection
- No evidence of bleeding p/v
- Good general physical condition

Immediate induction indicated if

- Ruptured membranes,
- Evidence of Infection or bleeding

Either Vaginal PGE2 or Vaginal/oral misoprostol can be used

12.12 Suspected fetal macrosomia

In the absence of any other indications, induction of labor should not "be carried out for suspected fetal macrosomia.

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Written By: Dr Rania Abudraz
Checked By: OBG PROTOCOL GROUP
Authorized by: MOUZA ABDULLAH AL SALMANI