South Australian Perinatal Practice Guidelines

Induction of Labour Techniques

Introduction

- Cervical ripening refers to softening, effacement (thinning) and dilatation of the cervix (Maul et al. 2006), which can be assessed with a (modified) Bishop score (< 5 or ≥ 5)
- Induction of labour (IOL) may be defined as 'an intervention designed to initiate uterine contractions artificially leading to progressive effacement and dilatation of the cervix and birth of the baby' (NICE 2008)
- Induction of labour should only follow informed consent by the woman
- Explain:
  - Reasons for induction
  - Method of induction of labour
  - Potential risks
  - Consequences of accepting or declining an offer of induction of labour (RCOG 2001)
- A detailed vaginal examination and pelvic assessment should precede induction of labour
- For fetal demise / genetic termination of pregnancy induction of labour, please refer to the PPG 'perinatal loss'

Indications

- Generally whenever continuation of the pregnancy is more hazardous for mother and / or baby than ending pregnancy

Maternal:

- Hypertensive disorders of pregnancy
- Diabetes
- Renal disease
- Social
- Other conditions requiring the end of pregnancy

Fetal:

- Prolonged pregnancy (from 41^{+0} weeks of gestation onwards)
- Intrauterine growth restriction (IUGR)
- Oligohydramnios
- Isoimmunisation

Table 1 Cervical Screening

Modified Bishop (Calder et al. 1974) cervical score system

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Characteristic	0	1	2	3	Score
Dilatation (cm)	< 1	1-2	2-4	>4	
Length (cm)	> 4	2-4	1-2	< 1	
Consistency	firm	average	soft	-	
Position of cervix	posterior	middle / anterior		-	
Station	-3	-2	-1 to 0	+1 to +2	TOTAL

Literature review

- Women with a cervical score ≥ 5 generally labour more easily than those with a cervical score < 5
- Women with a low cervical score (nulliparous and parous) experience higher rates of unsuccessful induction and caesarean section (Enkin et al. 2000)
- Randomised trials comparing induction of labour to waiting have shown that, for a number of indications e.g. maternal diabetes at 38^{+0} weeks, term PROM and gestation > 41^{+0} weeks
  - IOL increases the number of epidural and operative vaginal deliveries
  - There is no increase in caesarean section rate (RCOG 2001)
- A policy of labour induction at 41^{+0} weeks or later compared to awaiting spontaneous labour either indefinitely or at least one week is associated with fewer perinatal deaths (Mandruzatto et al. 2010)
- Studies on breast (nipple) stimulation are too small to evaluate the efficacy and safety of this practice. The medical expert consensus is that breast stimulation should not be recommended as a means of stimulating cervical ripening or inducing labour in high risk pregnancies (Kavanagh et al. 2005)

Methods

- Currently, medical expert consensus recommends the following for cervical ripening and induction of labour:
  - Sweeping the fetal membranes
  - Artificial rupture of the membranes (ARM)
  - Cervical ripening - prostaglandin E_2 (PGE_2)
  - Cervical ripening – balloon catheter
  - Intravenous oxytocin (Syntocinon®)

Sweeping the membranes

- Refers to the digital separation of the fetal membranes from the lower uterine segment by vaginal examination (this is known to stimulate intrauterine prostaglandin synthesis)
- Cervical massage has been suggested if the cervix is closed

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- Research has found that sweeping the membranes reduces the duration of pregnancy and the subsequent need for post-term IOL. However, there is a slight increase in the frequency of prelabour rupture of the membranes (Enkin et al. 2000)

Contraindications:

- Low lying placenta
- Planned elective caesarean

Education:

- Membrane sweeping does not increase maternal or neonatal infection
- The procedure may be uncomfortable
- There may be a small amount of blood loss after the procedure
- (NICE 2001; RCOG 2001)

Amniotomy

- Amniotomy refers to the surgical artificial rupture of the membranes (ARM) to induce or augment labour

Indications

- Cervix is favourable (see Table 1)
- Augmentation when labour progress is unsatisfactory due to inadequate contractions
- To observe the colour and amount of liquor when clinically indicated

Note

- Labour should begin within the next 12 hours and birth should occur within 18 hours to minimise the risk of ascending infection

Associated risks

- Bleeding from placenta praevia, vasa praevia (very rare)
- Cord prolapse or compression
- Maternal or neonatal infection
- Fetal heart rate deceleration
- To reduce the risk of cord prolapse, the clinician should ensure that the fetal head is positioned in or directly above the pelvis, is well-applied to the cervix and the umbilical cord or other fetal part is not presenting
- An obstetrician should perform a controlled amniotomy in the following situations:
- Unstable lie
- Polyhydramnios
- High presenting part (Presenting part is not engaged and is poorly applied to the cervix)

Intravenous antibiotics in labour are recommended for:

- Women with clinically suspected chorioamnionitis
- Women with maternal Group B Streptococcal vaginal colonisation (according to individual hospital criteria)
- Rupture of the membranes > 18 to 24 hours

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- ARM is often followed by secondary intervention with intravenous oxytocin after four hours. However, research has not identified a recommended time frame between amniotomy and the secondary intervention (Bricker and Luckas 2000)

Procedure:

- Abdominal examination
- The clinician identifies the cervix and membranes by digital vaginal examination
- An appropriate instrument (usually an amnihook or amnicot) is introduced in the vagina and the membranes are pierced
- The fetal heart rate is recorded immediately following ARM and should continue to be recorded every 15 – 30 minutes until the woman is established in labour
- Note and document the colour of the amniotic fluid
  - Meconium stained liquor is an indication for continuous electronic monitoring, using a fetal scalp electrode if unable to obtain continuous monitoring (unless contraindicated e.g. Preterm < 34 weeks gestation, malpresentation, Hepatitis B, C or HIV)
- Once the woman is established in labour, the fetal heart rate should be recorded every 15 minutes (RCOG 2001)
- Continuous CTG if indicated

Cervical ripening - prostaglandins

Introduction

- Dinoprostone is prostaglandin E_2 (available as Prostin E_2; 1 mg and 2 mg in gel) and is currently used for pre-induction cervical ripening
- Onset of labour after dinoprostone gel administration is variable (6 – 18 hours)
- Cervidil®, a polymeric pessary (vaginal insert) containing 10 mg prostaglandin E_2 is a pre-induction cervical ripening alternative for women and is currently used in major South Australian tertiary centres (APP Guide 2007)

Indications

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- Prostin gel and Cervidil pessary (PGE_2) may be used for pre-induction cervical ripening in women around term who have a clinical indication for induction of labour. These agents commonly also cause uterine contractility and, sometimes, labour (Hofmeyr et al. 2000)

Contraindications

- Known hypersensitivity to dinoprostone or the constituents of the preparations used (triacetin, colloidal silica or urethane)
- History of previous uterine surgery including caesarean section
- Dinoprostone gel - grand multiparity (five or more previous births)
- Cervidil > 3 previous vaginal deliveries
- Ruptured membranes
- Signs of fetal compromise on cardiotocography
- Any contraindication to vaginal birth
- Cervidil® pessary is contraindicated in multiple pregnancy or if the fetus is in a non-vertex presentation

Place of induction

- Women who are healthy and have had an otherwise uncomplicated pregnancy may have induction of labour with vaginal prostaglandin E_2 agents conducted on the antenatal ward, before the active phase of labour
- When undertaking induction of labour of women with recognised risk factors (e.g. suspected fetal growth compromise, previous caesarean section or high parity) the induction process should not occur without close surveillance (usually not available on an antenatal ward)

Dosage and administration

- Intravaginal mode of administration

Dinoprostone gel dosage

- The initial dose for dinoprostone (PGE_2) gel is 2 mg per vaginam (PV) in nulliparous women with an unfavourable cervix , 1 mg PV for parous women and 1 mg PV in cases of suspected fetal compromise (intra uterine growth restriction)
- If the woman is not established in labour, a second dose of 1 or 2 mg of dinoprostone (PGE2) gel may be administered after 6 hours
- The maximum dose in a 12 hour period is 4 mg PGE_2 for nulliparous women with an unfavourable cervix and 3 mg for all other women
- In situations where the maximum recommended dose has been used and amniotomy is not possible, depending on the indication for induction of labour, a third dose of 1 or 2 mg of dinoprostone (PGE_2) may be considered after discussion with an obstetric consultant

Cervidil® pessary dosage

- Single dose of 10 mg of dinoprostone (releases approximately 0.3 mg dinoprostone per hour over 12 hours)

Before procedure:

- Complete 20 minutes CTG tracing that fulfils the hospital's accepted criteria
- Ensure the woman has emptied her bladder

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- Confirm maternal pulse, blood pressure, respiration rate and uterine activity meet accepted criteria
- Abdominal palpation to confirm cephalic presentation
- Vaginal examination to obtain a (modified) Bishop score (Table 1)

Dinoprostone (PGE_2) gel administration

- Insert dinoprostone (PGE_2) gel into the posterior fornix of vagina
- Advise the woman to remain recumbent in 30˚ left lateral tilt for at least thirty minutes before sitting up or walking around

Cervidil® pessary administration

- Remove Cervidil® pessary from freezer immediately before insertion
- Use the retrieval tape to gently pull the product out of the sachet
- Insert Cervidil® pessary high in the vagina, positioning pessary transversely into the posterior fornix of the vagina (use small amount of water soluble lubricant to aid insertion)
- After insertion, cut the withdrawal tape (allow sufficient tape outside the vagina for removal)
- Advise the woman to remain recumbent in 30˚ left lateral tilt for at least thirty minutes (allows prostaglandin absorption) before sitting up or walking around

Cervidil® pessary precautions

Remove pessary if:

- Uterine hyperstimulation occurs
- Labour becomes established
- After SROM or before performing ARM
- Syntocinon® augmentation should not be commenced within 30 minutes of removal of Cervidil

After the procedure

- Continue CTG monitoring for 20 minutes after insertion of Prostin gel / Cervidil® pessary. Discontinue CTG only if accepted criteria are met
- Perform regular observation of maternal uterine activity, vaginal loss, pulse, blood pressure, respiration rate and FHR as indicated
- * Refer to midwifery standard for further guidelines

Failure to establish in labour after PGE_2

Prostin gel or Cervidil® pessary

- After the maximum dose has been administered or if the cervix is favourable, induction can be undertaken immediately with amniotomy
- Syntocinon® augmentation may be commenced 6 hours after the last dose of PGE_2 gels has elapsed or 30 minutes after removal of Cervidil®
- Admission to the labour / delivery suite should occur before amniotomy or Syntocinon® augmentation is commenced

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Adverse effects

- Gastrointestinal (e.g. nausea, vomiting), back pain, fever.
- Increased intraocular pressure in women with a history of glaucoma
- Uterine hypercontractility (more than five contractions in 10 minutes, or contractions lasting more than 2 minutes)
- Placental abruption or uterine rupture
- Burning sensation in the vagina (due to the triacetin vehicle) and, rarely, anaphylactic reaction

Management of uterine hypercontractility (hyperstimulation)

- A study reporting cases of hyperstimulation associated with Cervidil® pessary observed reversal of hyperstimulation 2 to 13 minutes after removal of product. Tocolytics were adminsitered in one in five cases
- Uterine hypercontractility occurs more frequently with dinoprostone (PGE_2) gel than with intravenous oxytocin (Syntocinon®) (Enkin et al. 2000)
- The following interventions *may* be instituted:
  - If Cervidil® in situ: remove pessary by pulling the withdrawal tape
  - If dinoprostone (PGE_2) gel is used, consider manually removing the gel
  - Change maternal position
  - Continuous CTG monitoring
  - Prepare and administer emergency tocolysis 250 micrograms intravenous salbutamol as below
  - Consider fetal scalp blood sampling (where possible and available)
  - Consider caesarean section if hypercontractility and fetal compromise persist

Intravenous tocolytic solution

- *Obstetric salbutamol: 5 mL ampoule 5 mg / 5 mL*
  - Using a 1 mL syringe, draw up 0.25 mL (250 micrograms) of salbutamol
  - Add to a 10 mL syringe and make up to 10 mL with sodium chloride 0.9 % (25 micrograms per mL)
  - Give intravenous salbutamol slowly in 50 microgram boluses up to 250 micrograms in total (often 100 micrograms will be sufficient)
  - ***Ensure monitoring of maternal pulse whilst bolus doses are administered***
  - ***Stop IV administration if maternal pulse > 140***

Best practice notes

- Assess woman and review indication before commencing induction of labour
- Document cervical score in case notes
- If the cervical score is > 7 and the woman is not in labour, negotiate an appropriate time to perform ARM as clinically indicated

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- The second dose of prostaglandins should be withheld if:
  - An ARM can be performed
  - The woman is established in labour
  - 4 or more contractions are present over each ten minute period – review in 2-4 hours to assess whether the woman is in established labour
- Continue or repeat short CTG if regular uterine activity is present
- Women who have an established clinical indication for continuous monitoring should be continuously monitored from the very start of having regular uterine activity
- Inform the woman to notify the midwife should uterine contractions become regular and / or painful, or if the woman has any vaginal loss
- Ensure there is a documented plan for ongoing management in the woman's case notes
- If not in labour within 12 hours of the first dose of dinoprostone gel or Cervidil pessary, review IOL management

Cervical ripening - balloon catheter

Introduction

- The use of a transcervical Foley catheter for pre-induction cervical ripening has been shown to be an efficient, safe, cost effective, reversible method, and is associated with a low incidence of uterine contractile abnormalities (Gelber, Sciscione 2006; Kashanian et al. 2009)
- Balloon catheter use has been shown to improve Bishop scores and decrease the interval until birth (Gelber, Sciscione 2006)
- A recent randomised controlled trial found that ripening an unfavourable cervix in nulliparous women with a Foley catheter with the balloon inflated with 80 mL rather than 30 mL, provided a more effective dilatation, faster labour, and decreased need for oxytocin (Levy et al. 2004).

Indication

- To provide a non pharmacological method of cervical ripening in women around term where delivery is indicated but not urgent, and the Bishop score is less than 7 with an unfavourable cervix (KEMH 2009)
- Transcervical Foley catheter placement may provide an option for cervical ripening when there are contraindications to pharmacological agents

Transcervical Foley catheter placement

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Equipment
- Speculum (Cuscoe)
- 16 gauge Foley catheter (30 mL sized balloon) and spigot

OR
- 16 gauge Foley catheter (75 mL sized balloon) and spigot
- Sponge forceps
- Water and sterile water
- Syringe (10 or 20 mL)
- Lubricating gel
- Tape

Before procedure
- Complete 20 minutes CTG tracing that fulfils the hospital's accepted criteria
- Ensure the woman has emptied her bladder
- Confirm maternal pulse, blood pressure, respiration rate and uterine activity meet accepted criteria
- Abdominal palpation to confirm cephalic presentation
- Vaginal examination to obtain a modified Bishop score (Table 1)

Insertion of transcervical Foley catheter
- The procedure should be done by the attending medical officer
- Cleanse vulvo-vaginal area with water
- Insert speculum and visualise the cervix
- Pass the Foley catheter through the internal os of the cervix using sponge forceps to assist
- Spigot the catheter
- Inflate the balloon with sterile water
- Gently withdraw the catheter until it rests at the level of the internal os
- Place the balloon on moderate traction by taping it to the inner aspect of the woman's thigh
- Check fetal heart after completion of procedure

After procedure
- Ongoing care of women with an uncomplicated pregnancy may be conducted on the Antenatal ward
- Check the Foley catheter every 2 hours – apply moderate traction and if necessary, readjust the tape on the woman's inner thigh
- Perform regular observation of maternal uterine activity, vaginal loss, pulse, blood pressure, respiration rate and FHR as indicated
- Return to labour and delivery if
  - Labour commences
  - The catheter falls out
  - The catheter has not fallen out after 12 hours (arrange for medical review)

Indications for removal of catheter
- Rupture of the membranes
- Uterine hypercontractility with associated fetal compromise
- Maternal request

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Intravenous oxytocin (Syntocinon®)

Indications

- Syntocinon® is synthetic oxytocin and the most common induction agent in use
- It may be used:
  - Alone
  - In combination with amniotomy
  - After cervical ripening with other pharmacological or non pharmacological methods (Kelly and Tan 2001)
- Induction of labour using a combination of amniotomy and intravenous Syntocinon® is the preferred method of induction for women who have a favourable cervix
- When compared to dinoprostone (PGE_2) gel, induction with Syntocinon® results in a lower rate of some infective sequelae e.g. chorioamnionitis in women who have ruptured membranes

Administration

- Syntocinon® infusion is run as a separate line piggybacked into the mainline
- RCOG (2001) recommends the following Syntocinon® regimen guidelines:
  - Allow a delay of six hours after administration of intravaginal dinoprostone gel and 30 minutes after removal of Cervidil® before commencing Syntocinon®
  - In women with intact membranes, amniotomy should be performed where feasible before starting a Syntocinon® infusion
  - Commence Syntocinon® at 1-2 mU / minute (i.e. 6-12 mL / hour of 10 IU / 1000 mL solution)
  - Use the minimum dose possible and aim for a maximum of *3 – 4 contractions in ten minutes*
  - Prescribe and record the *dose* of oxytocin being delivered (i.e. mU / minute)
  - Continuous CTG whenever Syntocinon® is used for induction or augmentation

Maximum Syntocinon® infusion dosage

- The summary of product guidelines recommends a maximum dose of *IV* Syntocinon® 20 mU / minute
- In cases where labour progress is unresponsive, RCOG recommends higher doses which should not exceed 32 mU / minute
- NB: Individual organisations may differ in their management

Best practice notes

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- Discuss Syntocinon® augmentation with consultant if the woman is > 5 cm dilated

Uterine hypercontractility without signs of fetal compromise:

- Reduce Syntocinon® infusion rate and seek review

Uterine hypercontractility with associated signs of fetal compromise:

- Decrease or discontinue Syntocinon®
- Position woman on her left side
- Increase intravenous fluids
- Review by medical officer
- Oxygen at 8 litres for duration of fetal compromise
- Palpate the uterus to determine uterine response to management
- Consider the need for uterine tocolytic e.g. salbutamol (for further information, refer to the PPG 'tocolysis for uterine hypercontractility')

Syntocinon® dosage regimen

- The following regimen is consistent with RCOG and Syntocinon® product guidelines. *However, individual organisations may differ in their management*
- Prepare an infusion of 10 IU Syntocinon® in either one litre of Hartmann's solution or 0.9 % sodium chloride and infuse using an appropriate volumetric infusion pump
- (For further information, see refer to the PPG 'Syntocinon® augmentation and induction of labour infusion regimens')

Indications:

- Induction or augmentation of labour

Initial rate:

- 12 mL / hour (2 mU / min)

Increments:

- Increase every 30 minutes by 12 mL / hour (2 mU / min)

Maximum:

- 192 mL / hour (32 mU / min)

Table 2 Syntocinon® infusion regimen

10 IU Syntocinon® in one litre of either Hartmann's or 0.9% sodium chloride solution		
initial rate	increments	maximum
12 mL / hour (2 mU / min)	every 30 minutes	192 mL / hour (32 mU / min)
	Increase with: 12 mL / hour (2 mU / min)	

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Prolonged Syntocinon® infusion

- If a second litre of Syntocinon® infusion is required, consider doubling the dose per litre and running the infusion at half the rate to reduce the risk of fluid overload (e.g. increase Syntocinon® dose to 20 units per litre and infuse dose at half the previous rate)

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Useful websites

RANZCOG College statement: Use of prostaglandins for cervical ripening prior to the induction of labour. Available at: http://www.ranzcog.edu.au/publications/statements/C-obs22.pdf

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Induction of Labour Techniques

Abbreviations

APP Guide	Australian Products Prescription Guide
ARM	Artificial rupture of the membranes
CTG	Cardiotocography
cm	Centimetre(s)
FHR	Fetal heart rate
IOL	Induction of labour
IUGR	Intrauterine growth restriction
mg	Milligram(s)
mL	Millilitre(s)
mU	Milliunit(s)
min	Minute(s)
NICE	National Institute for Clinical Excellence
PV	Per vaginam
PROM	Prelabour rupture of the membranes
PGE_2	Prostaglandin E_2
RANZCOG	Royal Australian and New Zealand College of Obstetrics and Gynaecology
RCOG	Royal College of Obstetricians and Gynaecologists
SROM	Spontaneous rupture of the membranes

Version control and change history

PDS reference: OCE use only

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1.0	28 Aug 07	04 Oct 07	Original version
2.0	04 Oct 07	04 Aug 08	Review
3.0	04 Aug 08	18 May 10	Review
4.0	18 May 10	27 Sept 10	Review
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