Intrauterine Pressure Catheter (IUPC) and Amnioinfusion: Insertion and Monitoring

Site Applicability

St Paul's Hospital Pregnancy, Birthing and Newborn Centre

Practice Level

Specialized: Physicians (with perinatal privileges), Registered Midwives, Perinatal Registered Nurses

Insertion and management of an intrauterine pressure catheter (IUPC) and amnioinfusion are specialized skills that are performed by practitioners with the required training and competency (i.e. obstetrician or obstetrical resident).

Assessment and care of an IUPC and amnioinfusion are advanced skills that are performed by practitioners with the required training and competency (i.e. obstetrician/obstetrical resident, and perinatal Registered Nurse).

Requirements

Fetal Health Surveillance (FHS) education is strongly recommended for all perinatal care providers (physicians, midwives and nurses) every 2 years.

Continuous electronic fetal monitoring (EFM) is required.

An obstetrical consult is required when use of an IUPC and/or amnioinfusion is being considered by other perinatal primary care providers (e.g. Family Practice physician, Registered Midwife).

1:1 care by a perinatal Registered Nurse is required.

Need to Know

An IUPC is used in order to accurately monitor uterine activity (contraction strength, frequency, duration, and uterine resting tone) using hydrostatic pressure (mmHg). It may also be used to administer fluid (sterile normal saline) into the uterus in order to increase amniotic fluid volume (amnioinfusion).

The goals and benefits of an IUPC and amnioinfusion include:

- Guide titration of oxytocin in order to optimize contraction powers when ruling out labour dystocia
- Guide titration of oxytocin during trial of labour after Caesarean section
- Guide titration of oxytocin in presence of fetal distress
- Reduction of the recurrence of fetal heart rate (FHR) variable decelerations
- Improvement of neonatal short-terms outcomes (e.g. Apgar score, umbilical cord blood pH results)

The evidence to support the use of amnioinfusion in order to reduce the risk of meconium aspiration syndrome associated with meconium stained liquor is limited. Likewise, the evidence to support the use of

amnioinfusion in the management of chorioamnionitis is limited. Therefore the use of amnioinfusion for either of these conditions in the absence of FHR variable decelerations is not recommended.

Equipment and Supplies

IUPC	Amnioinfusion (+ IUPC)
• Electronic Fetal Monitor • Intrauterine pressure catheter (IUPC) • IUPC reusable cable (green cable) • Adhesive anchoring pad from IUPC package • Sterile gloves • Lubricant	• Alaris IV Pump • Intravenous infusion tubing • Normal Saline 1 Litre at room temperature, labelled Note: There is no evidence that warming the fluid above the ambient room temperature before administration confers any advantage • Labels

Protocol

Assessment

1. Pre-insertion:
    - Confirm cervical dilation and membrane status
    - Review patient/birthing person's history and status for presence of any contraindications (See below)
    - Baseline vital signs, including temperature
2. Continue to monitor FHR as per Fetal Health Surveillance: Intrapartum guideline (see B-00-07-10048).
3. Palpate and document uterine activity (contractions and resting tone) when FHR is assessed (every 15 minutes (q15 min) in active first stage of labour) (see B-00-07-10048).
    - Use of an IUPC (with or without an amnioinfusion) does not replace manual palpation of the uterus in monitoring uterine activity. Manual palpation is used to confirm and validate IUPC findings.
    - Calculate Montevideo Units (MVU) (see Appendix A)
        - 200 to 250 MVU in 10 minutes are considered effective for progress in labour
        - Amnioinfusion will increase intrauterine pressure readings by approximately 15 mmHg due to positive pressure flow of fluid at the end of the catheter
4. Assessment of the patient:
    - Monitor VS, including temperature, hourly (q1h) and PRN until delivery
    - Monitor patient tolerance of procedure and continued treatment
    - Monitor for frank red vaginal bleeding, pain and other signs of placental abruption, uterine rupture, and cord prolapse
5. Amnioinfusion - Accurate monitoring of ins and outs, including vaginal fluid losses:
    - Change and weigh pads frequently

- Monitor and document the following q15 min x4 and then q1h:
  - amount of fluid loss, colour, consistency and odour
  - IUPC placement at introitus
- Vaginal fluid losses should be monitored to ensure administered fluids are leaking and not being trapped behind the presenting part which contributes to increasing intrauterine pressures and risk for uterine rupture
- Assess for abdominal distention, procedure intolerance related to uterine distention and compression of the diaphragm (e.g. increasing discomfort, shortness of breath, hypotension, tachycardia, etc.), signs of placental abruption, cord prolapse, infection, etc.

Discontinuation of IUPC and/or Amnioinfusion

- **Do not use for more than 24 hours.**
- Consider the ongoing need for the IUPC and/or amnioinfusion in second stage
- Discontinue IUPC/amnioinfusion after physician assessment once Provider's Order has been received
- For amnioinfusion:
  - Disconnect Intravenous infusion tubing from amnio port on IUPC
  - Discard tubing and remaining infusion
- For IUPC:
  - Disconnect catheter from reusable cable
  - Pull gently on IUPC until fully withdrawn
    - Ensure tip is intact
  - Discard IUPC and set reusable cable aside for cleaning

	IUPC	Amnioinfusion (+IUPC)
Indications	• Inability to accurately monitor uterine activity externally • Titrating oxytocin and ruling out labour dystocia	• Relief of umbilical cord compression during labour and reduction fetal heart rate (FHR) variable decelerations unresponsive to usual intrauterine resuscitative measures
Contraindications	• Intact amniotic membranes • Undilated cervix (minimum dilation of 1 to 2 cm is required) • Bleeding of undetermined origin • Known or suspected placenta previa or vasa previa	
Relative Contraindications	• Exercise caution in the context of intrauterine infection • Avoid in context of Infections (e.g. HIV seropositive or high-risk/unknown HIV status, active genital herpes, hepatitis B, hepatitis C) unless benefit exceeds risk	
Potential Complications	• Intrauterine infection • Cord prolapse • Uterine rupture • Placental abruption • Newborn sepsis • Amniotic fluid embolism	• Iatrogenic polyhydramnios with associated increased intrauterine pressure and fetal bradycardia

Interventions

- ❖ In the event of an obstetrical emergency (e.g. cord prolapse, uterine rupture, etc.):
  - **CALL FOR HELP**
  - Initiate intrauterine resuscitation
  - Call **CODE PINK OB** as appropriate

1. Adjust Oxytocin infusion according to protocol and pattern of labour indicated by the IUPC tracing (if being used).
   - In the presence of high resting tone, discontinue oxytocin until cause is determined.
2. Report any of the following to the attending physician:
   - Atypical and abnormal fetal heart rate patterns
   - Tachysystole with atypical or abnormal FHR
   - Resting tone greater than 25 mmHg (corrected for amnioinfusion if being used)
   - Dampened IUPC waveform (may indicate blocked catheter)
3. Initiate intrauterine resuscitation interventions to improve fetal oxygenation (see below)
4. For tips on troubleshooting common issues with IUPC output refer to Appendix B

INTRAUTERINE RESUSCITATION	

PHYSIOLOGIC GOALS:
1. Improve birthing person status
2. Improve uterine blood flow
3. Improve umbilical cord circulation
4. Improve placental perfusion
	• **CALL FOR HELP**
	• Change birthing person position
	• Assess & document birthing person VS
	• Maintain optimal uterine blood flow
	  ○ Decrease or discontinue oxytocin
	  ○ Consider tocolysis
	  ○ Modify or pause pushing
	• Remove/alleviate pressure on the umbilical cord
	  ○ Vaginal exam to rule out cord prolapse
	  ○ Consider amnioinfusion
	• Administer IV fluids and/or oxygen by face mask if appropriate (i.e. birthing person hypotension, hypovolemia, or hypoxia)
	• Support the patient and family

Steps

- Don appropriate PPE prior to procedure

IUPC

Nursing:

1. Assemble all required equipment
2. Ensure patient's bladder is empty
3. Assist patient into a comfortable position for vaginal exam and IUPC insertion

4. Continue EFM during IUPC insertion to monitor FHR
    - Cord prolapse and placental abruption can occur during IUPC insertion
5. Open sterile IUPC package for physician
6. Support pregnant patient during IUPC insertion
7. Once IUPC is in place, plug reusable IUPC cable into fetal monitor and zero the monitor
    - This must be done prior to connecting the catheter to the cable
8. Receive catheter from physician, remove yellow cap and plug into the reusable IUPC cable
9. Look for amniotic fluid in the catheter lumen
    - Fluid in the catheter lumen indicates correct placement of the catheter
10. Ask the patient to cough and watch for a spike on the uterine tracing in response
    - A spike indicates proper positioning of the catheter
11. Anchor the catheter to the patient's upper inner leg using adhesive pad provided in the catheter packaging
12. Document procedure and continue to monitor patient (see Assessment above and Documentation below for details)

Physician:

1. Perform vaginal exam to:
    - Confirm cervical dilation and membrane status
    - Determine presenting part and optimal IUPC placement
2. Insert tip of hard plastic introducer with catheter inside up to cervical os without advancing introducer through the cervix
3. Advance only catheter through cervical os 10 to 14 cm until text "PAUSE FOR FLASHBACK" is visible at the bottom of introducer
    - Avoid placement between uterine wall and membranes
    - Observe for flashback of amniotic fluid (indicated proper positioning of catheter)
    - Do NOT insert against resistance
    - If meeting resistance or no amniotic fluid flashback is observed, pull back on catheter, alter direction of catheter and reattempt
4. Feed catheter until 45 cm mark is at the introitus
5. Slide introducer out of vagina along the catheter, separating introducer from the catheter.
6. Anchor catheter in place and remove introducer.
7. Pass end of catheter to nurse
8. Ask the patient to cough and watch for a spike on the uterine tracing in response
    - A spike indicates proper positioning of the catheter

9. Document procedure and continue to monitor patient (see Assessment above and Documentation below for details)

Amnioinfusion

Physician:

- Insert IUPC as above
- Provide Prescriber's Orders pertaining to initial bolus and continuous infusion parameters

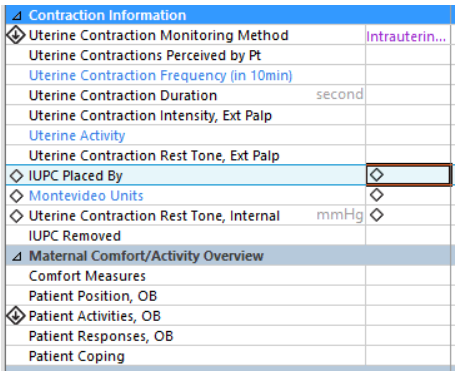
Nursing:

1. Prime intravenous tubing with normal saline
2. Load tubing into Alaris pump
3. Don gloves
4. Attach primed intravenous tubing to the amnioinfusion port on the IUPC
5. Initiate infusion as per Prescriber's Order:
    i. Initial bolus: 300 mL in 20 minutes (900 mL/hr)
    ii. Continuous infusion: usually 100 to 200 mL/hr
6. Document procedure and continue to monitor birthing person and fetus (see Assessment above and Documentation below for details)

Documentation

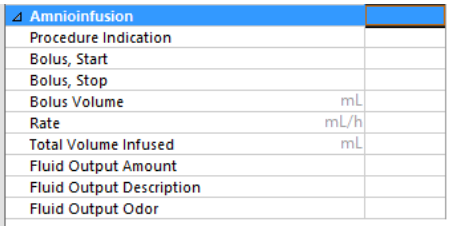
- Documentation will follow PHC and Cerner guidelines
- All assessments and interventions should be documented in real time
- At time of insertion of IUPC or initiation of amnioinfusion, ensure current assessments are documented and specific documentation is competed
- FetaLink
- Computer Provider Order Entry
- Cerner PowerChart → Interactive View and I&O →
    - Labour and Delivery Band:
        - FHR Monitoring including Maternal Heart Rate

- Contraction Information (all fields) including
  - Uterine Contraction Monitoring Method
  - IUPC Placed By
  - Montevideo Units
  - Uterine Contraction Rest Tone, Internal
  - IUPC Removed



- Maternal Comfort/Activity Overview including Patient Position and Patient Coping
- Vital Signs
- Vaginal Exam
- Membrane Status Information
- Pain Assessment
- Urinary Catheter and/or Intermittent Urinary Catheter
- Obstetrical Bleeding
- Provider Notification

- OB Special Assessment Band
  - Amnioinfusion



- Labour Progress Note

Patient and Family Education

- Provide birthing person and support person with information regarding the purpose of the procedure, the fetal monitoring required and expected outcomes
- Explain how the procedure is performed and the equipment required
- Explain to the patient they will need to remain in bed for the procedure
- Explain to the patient they may be asked to lie on their side or positioned with a wedge under their hip to decrease compression of vessels supplying blood to the uterus
- Ask the patient to inform the nurse or care provider if they experience:
  - increased abdominal discomfort or pain
  - vaginal bleeding

Related Documents

- B-00-07-10048 – Fetal Health Surveillance: Intrapartum
- B-00-07-10030 – Induction/Augmentation of Labour: Oxytocin Administration

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Appendices

Appendix A – Calculating Montevideo Units

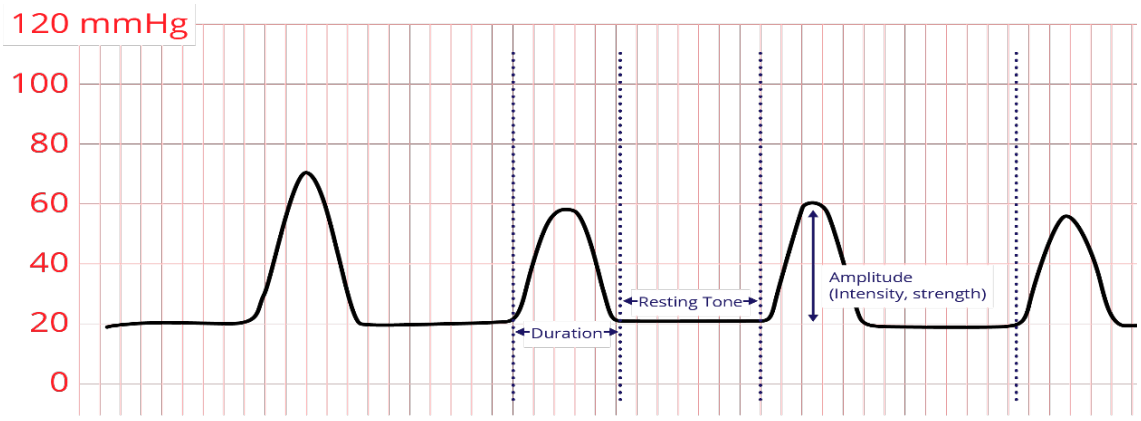
Appendix B – Troubleshooting for Common IUPC Issues

Appendix A – Calculating Montevideo Units (MVUs)

In a 10 minute window:

1. Calculate the amplitude of each contraction in that window
   - Contraction Peak Pressure – Resting Tone Pressure = Strength of Individual Contraction

2. Add together all the amplitudes to calculate total MVUs for that window
   - $\frac{[\text{Contraction \#1 + Contraction \#2 + Contraction \#3 + Contraction \#4}]}{\text{10 minutes}}$ = MVU/10 min



In the above diagram:

There are four contractions in the 10 minute window being assessed:

Contraction #1: 70 – 20 = 50

Contraction #2: 58 – 20 = 38

Contraction #3: 60 – 20 = 40

Contraction #4: 56 – 20 = 36

50 + 38 + 40 + 36 = 164 MVU in 10 minutes

In order to achieve progress in labour, 200 to 250 MVU in 10 minutes is required.

This contraction pattern is below the desired range, therefore oxytocin could be initiated or increased to strengthen the contraction pattern provided the FHR permitted use of or further titration of the oxytocin.

Appendix B - Troubleshooting the IUPC Output

Problem	Possible Causes	Actions

No contraction waveform or dampened waveforms	IUPC has fallen out;
	IUPC placement
	IUPC is disconnected from monitor or cable;
	Poor cable/monitor connection;
	IUPC is blocked
	IUPC or cable is defective.
		• Check IUPC is still in utero – 30 to 45 cm mark should be at the introitus
		• Check connections between IUPC, cable, and monitor
		• Re-zero IUPC transducer
		• Reposition catheter:
		  ○ Disconnect IUPC from cable and rotate, retract IUPC, with 15 seconds and reconnect
		• Flush catheter:
		  ○ Disconnect IUPC from cable and flush with 10 to 20 mL of Normal Saline through amnioinfusion port, then reconnect
		• Physician to replace IUPC if still needed and it has fallen out.

Resting tone is too low (less than 5 mmHg) or too high (greater than 25 mmHg with uterus soft on palpation) without apparent cause	IUPC malfunction; IUPC placement – entrapped between fetus and uterine wall or between membranes and uterine wall; Cable malfunction; Monitor malfunction.	• Re-zero IUPC transducer • Reposition the catheter ○ Disconnect IUPC from cable and rotate, retract IUPC, with 15 seconds and reconnect • Physician to replace IUPC if needed.
Artifact on contraction waveform or unusual jagged tracing:	IUPC is in a dry area (inadequate amount of amniotic fluid); IUPC defect	• Reposition the catheter ○ Disconnect IUPC from cable and rotate, retract, or advance IUPC, with 15 seconds and reconnect • Consider amnioinfusion to increase amniotic fluid volume if oligohydramnios • Physician to replace IUPC if needed

Re-Zeroing IUPC during Labour:

1. Disconnect IUPC from cable
2. Zero monitor
3. Wait 15 seconds
4. Reconnect IUPC to cable

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