Remifentanil Patient-Controlled Analgesia in Labour - Full Clinical Guideline

Reference No.: Anaesthetics/05:18/P4

Contents

1. Introduction

Remifentanil is an ultra-short-acting opioid, which can deliver intravenous pain relief during a contraction and wear off between contractions (similar time-frame to Entonox).
It crosses the placenta but does not accumulate in the neonate. Its use in labour is widespread but unlicensed. Remifentanil PCA has been agreed by the Trust Drugs and Therapeutics Committee for use in labour only.
In common with other opioids, it may cause respiratory depression, pruritis, nausea and vomiting.

2. Abbreviations

CTG - Cardiotocography
IUFD - Intra Uterine Fetal Death
IUGR - Intra Uterine Growth Restriction
LW - Labour Ward
PCA - Patient Controlled Analgesia

3. Indications

Remifentanil PCA may be considered for analgesia in labour when epidural analgesia is declined or is contraindicated, and Pethidine is unsuitable. These women will usually have been identified antenatally and assessed by a Consultant Obstetric Anaesthetist.
Use of Remifentanil PCA should be agreed by the Consultant Anaesthetist on call for labour ward unless pre-arranged.

Examples of times when it may be appropriate, include;

- coagulopathy, thrombocytopenia or full anticoagulation or
- metalwork in the lumbar spine or
- sepsis
- concerns regarding pethidine (e.g. high anticipated total dose, neonatal effects in IUGR, maternal dislike of side-effects from previous experience).

4. Contraindications

- Allergy to opioids (however allergy specifically to remifentanil would be most unusual)
- No midwife available to provide one to one care for the woman

Caution should be exercised if

- Recent administration of pethidine (especially if in previous 4 hours) - patient must not be showing signs of sedation / drowsiness
- BMI >40, and multiple pregnancy (where epidural should be preferred option)

5. Criteria of use

- **Remifentanil PCA is only for use on labour ward**
- **There must be an assigned midwife to provide continuous one to one care**
- **Continuous pulse oximetry**
- **Continuous CTG monitoring**
- **Frequent observations of conscious/sedation level and respiratory rate**
- **Documentation of observations on the specific Remifentanil PCA observations sheet - (See Appendix A)**

Women should ideally be >36/40 gestation and be in established labour (see additional comments below).
If being used in cases of IUFD, the midwife **must** provide continuous monitoring in the room, as the risk of respiratory depression in these women is greater (due to altered drug distribution and metabolism).

6. Procedure

6.1 Patient preparation

When the woman arrives on labour suite, inform the anaesthetist on-call who will:

- Confirm with the coordinator whether there is a midwife available to provide one to one care for the woman
- Inform the Consultant Anaesthetist on call.
- *If woman is not yet in established labour and requesting analgesia, but is expected to be many hours before delivery, then consider a small dose of Pethidine first e.g. 25-50mg as this may allow her to get some rest before she is established in labour*.

- The woman should be informed of the common side effects, including drowsiness, nausea, dizziness, itch, the need for additional oxygen (and rarely respiratory depression).

- Site a dedicated cannula (20g (pink) or 22g (blue)) as proximally as possible on the arm to reduce arm-brain circulation time. If there is a vein above the elbow, then use it. **Do not administer any other drugs or fluids via this cannula.**
- Perform baseline observations – SpO_2, BP (cuff on **opposite** arm to Remifentanil PCA cannula), respiratory rate.
- Ensure continuous oxygen saturations via a SpO_2 probe, and continuous CTG monitoring is established.

6.2 Equipment preparation

- RDH: 50ml luer lock syringe with single lumen extension line
  Syramed SP6000 PCA pump from Labour Ward or gynae theatres
- QHB: CADD Solis cassette with extension line, 50ml luer lock syringe for mixing remifentanil and injecting into the cassette
  CADD Solis PCA pump from Labour Ward or main recovery

The following should be available in the room:

- Nasal oxygen cannula
- Non-rebreathe face mask
- Self-inflating bag-valve-mask (Ambu bag)
- Emergency drugs (atropine 600mcg, naloxone 400mcg, ephedrine 30mg) with syringes, filter needles, normal saline ampoules and labels.

6.3 Drug preparation

The anaesthetist is responsible for the preparation of the syringe

- The anaesthetist will obtain a 2mg remifentanil ampoule from labour ward drugs cupboard and mix the 2mg to a volume of 40ml normal saline, and label it appropriately (countersigned by another trained member of staff). This gives a concentration of 50 micrograms/ml, with a shelf life of 24 hours. One 2mg ampoule may last up to 12 hrs depending on usage.
- At QHB the anaesthetist will then need to inject this 40mls into the CADD Solis cassette (see Appendix C for guidance) and label appropriately
  - *Ensure timely re-ordering of replacement remifentanil ampoules from pharmacy once decision to start remifentanil PCA, to avoid running out of stock. (NB. At RDH there are additional remifentanil ampoules in labour suite theatre as back up emergency stock).*
- Anaesthetist will set up pump as follows;
  - Locate Remifentanil PCA programme on the pump (within 'maternity' folder)
  - Concentration 50.0 micrograms(μg)/ml
  - PCA Bolus Dose 20.0 micrograms(μg)(= 0.4ml)*This is the only adjustable parameter.*
  - PCA dose time – stat
  - Lockout Period – 2 minutes (read as '0:02 h'**)**
  - **There is <u>no</u> background infusion**

- Anaesthetist to attach the programmed PCA to the patient on the dedicated cannula and counsel the woman on how to push the button just before or at the start of the contraction, and not in-between contractions.
- Instruct the woman that only she can push the remifentanil PCA demand button. **The demand button must not be pushed by the midwife or the birth partner / family members.**
- The anaesthetist should remain in the room for the first 4 boluses to ensure the patient is not over-sedated or drops her oxygen saturations.

6.4 Monitoring

The midwife must remain in the room continuously – if they need to leave the room then they should remove the remifentanil PCA demand button from the woman until they return.

Essential monitoring:

- continuous CTG monitoring

- continuous pulse oximetry (recorded every 15 minutes)
- observation of sedation level using AVPU scale (see section 7.2 for details) (measured just after each contraction; recorded every 15mins)
- recording of the respiratory rate every 15 minutes (measured just after a contraction)
- measuring of BP every 15 minutes (consider reducing to 30 minutes if stable after 1 hour)
- use of the specific Remifentanil PCA observations sheet - (See Appendix A)
- hourly recording of the number of presses, and the number of doses received.

6.5 After delivery

Continue Remifentanil PCA up to and during delivery if required.

Although significant neonatal depression is unlikely, (and will be transient if it does occur), please inform paediatrician and ask to attend if baby is compromised at delivery. Explain that Remifentanil is an ultra-short acting opioid, which may have short-lived Pethidine-like effects. Naloxone is unlikely to be required.

Once the baby is delivered remove the PCA demand button from the woman.
Ensure the infusion line is disconnected from the dedicated cannula and then remove this cannula **without flushing**.
Dispose of the unused drug by emptying the syringe / cassette into a sharps bin – have a witness to observe this wastage and then countersign disposed amount in the controlled drugs book.

7. Troubleshooting

7.1 Inadequate analgesia

- If analgesia is inadequate, check that woman is pressing button as early as possible in the contraction, then increase bolus dose to 30micrograms (0.6ml), and then 40micrograms (0.8ml) if needed, at 10-minute intervals. Lockout remains at 2 mins.
- The dose may need to be increased as labour progresses (to maximum 40microgram bolus).
- When fully dilated and pushing, woman's requirements will usually be less, so if she is very drowsy between contractions or finding it difficult to cooperate, call anaesthetist to reduce bolus size or consider taking away the PCA demand button.
- Inadequate analgesia, followed by drowsiness between contractions, suggests either that the woman is pressing the button too late, or that the cannula needs to be re-sited more proximally.

7.2 Management of side-effects

Like any opioid (e.g. Pethidine), Remifentanil can cause respiratory depression and drowsiness, although fortunately, if these effects occur, they will only be transient (1-2 minutes).

Low oxygen saturations:

- If oxygen saturations fall to 94% or below (but respiratory rate is >8 bpm) then give 2-4 litres/min oxygen via nasal cannula, remove PCA demand button from patient and inform anaesthetist – they may need to reduce the remifentanil bolus dose.
- If SpO_2 improves to >94%, then continue with nasal oxygen and recommence PCA.
- If SpO_2 remains below 94% on 2-4L/min nasal oxygen, then change to non-rebreathe face mask at 15L/min oxygen and call for anaesthetist urgently.
- If SpO_2 falls below 90%, then pull emergency buzzer.

Respiratory depression:

- If respiratory rate falls to less than 8 breaths per minute, remove PCA demand button from patient and encourage patient to breathe. Apply non-rebreathe face mask at flow 15L/min oxygen; lie flat with full left lateral tilt. Call for help.
- Consider administering naloxone (200-400mcg).

- If patient is apnoeic and unresponsive (respiratory arrest) pull emergency buzzer and commence basic life support. Administer naloxone 400mcg.
- Anaesthetist to review PCA bolus dose with consideration to reducing if appropriate – if bolus dose is reduced, then the anaesthetist needs to remain in the room for the next 4 presses to ensure woman is stable.
- If further episode respiratory depression occurs on lowest remifentanil dose (20mcg), discuss with consultant anaesthetist and consider alternative analgesia options.

Over sedation:

- Sedation levels are measured using the **AVPU** score
  - **A**lert
  - Responds to **V**erbal command
  - Responds to **P**hysical/painful stimulation only
  - **U**nresponsive
- If woman shows signs of over-sedation – scoring P or U on AVPU scale, call for help (do not leave woman), remove PCA demand button and apply non-rebreathe face mask at flow 15L/min oxygen.
- Consider administering naloxone (200-400mcg).

Bradycardia / hypotension:

- If heart rate falls to below 50 beats per minute, and / or systolic blood pressure falls to below 90mmHg, call for help (do not leave woman) and remove PCA demand button.
- Apply non-rebreathe face mask at flow 15l oxygen.
- Give Hartmann's 500ml bolus if hypotensive.
- Consider giving atropine (up to 600mcg) and / or ephedrine (anaesthetist only).

Other side effects:

- If nausea and/or vomiting is a problem, ensure regular ondansetron is prescribed and given.
- For itching, try chlorphenamine 4mg PRN (or ondansetron).

In the event that the anaesthetist for labour ward is busy with other women, please contact Senior Registrar Anaesthetist or Consultant on call.

8. Monitoring Compliance and Effectiveness

To be audited as agreed in the Anaesthetics Audit Forward Programme

9. References

1. Ronel, I., Weiniger CF. A broadening choice for labor analgesia: remifentanil on the á la carte menu. Int J Obstet Anesth 2019; 39: 1-6.
2. Weiniger, CF., Carvalho, B., Stocki, D. et al. Analysis of physiological respiratory variable alarm alerts among laboring women receiving remifentanil. Anesth Analg 2017; 124: 1211-8.
3. Aaronson, J., Abramovitz, S., Smiley, R. et al. A survey of intravenous remifentanil use for labor analgesia at academic medical centers in the United States. Anesth Analg 2017; 124: 1208-10.
4. Wilson,M., McArthur, C., Hewitt, C. et al. Intravenous remifentanil patient-controlled analgesia versus intramuscular pethidine for pain relief in labour (RESPITE): an open-label multicentre, randomised controlled trial. Lancet 2018; 392: 662-72.
5. NICE. Intrapartum Care. NICE Guideline NG235; September 2023.

Documentation Control

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Version / Amendment	Version	Date	Author	Reason
	1	March 2006	Dr Ruth Broadbent, Consultant Obstetric Anaesthetist	New
	2	May 2011	Dr Ruth Broadbent, Consultant Obstetric Anaesthetist	Update
	3	May 2014	Dr R Caranza Consultant Obstetric Anaesthetist	Update
	4	April 2018	Dr R Caranza Consultant Obstetric Anaesthetist	Review
	5	July 2023	Dr Muhammed Elkhyat Speciality Doctor Anaesthetist Dr Jo Bland Consultant Obstetric Anaesthetist	Update
Intended Recipients: All staff with responsibility for care for women in labour				
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Development of Guideline:	Dr R Caranza - Consultant Obstetric Anaesthetist			
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Key Contact:	Jo Bland – Obstetric Anaesthetist			

Appendix A

Remifentanil PCA Prescription Chart & Observations Sheet

Name Address DOB Hosp. No.	Date Prescribers signature Print name

Analgesia used already in labour
(name, dose and time)

1……

2……

3……

Indications for starting remifentanil PCA

1……

2……

Arranged antenatally? Yes / No
Weight ……..kg

ROUTINE PRESCRIPTION

DRUG	**REMIFENTANIL**
CONCENTRATION	**50.0 mcg/ml**
PCA STARTING BOLUS DOSE	**20.0 mcg (0.4 ml)**
PCA DOSE TIME	**STAT**
LOCKOUT PERIOD	**00.02 hh.mm (2 mins)**

Time of starting Remifentanil PCA: ……..……

Alterations to PCA programme:

Time	New dose	cm dilated	Reason	Signed

Comments: …….

…….

Time Remifentanil stopped: …….

Reason: ……..…….

Time of delivery: ……..

Apgar 1min: …….. Apgar 5min: ……...

Please file in hospital notes, and record 'Set up PCA in labour' on obstetric anaesthetic database

Recordings every 15 minutes (just after a contraction) (Totals hourly)

Time	SpO_2	Respiratory rate	BP	Sedation level - circle one (See below)	Total number of presses	Total 'good'
				A / V / P / U		
				A / V / P / U		
				A / V / P / U		
				A / V / P / U		
				A / V / P / U		
				A / V / P / U		
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				A / V / P / U		

Conscious level score:

- **A**lert
- Responds to **V**erbal command
- Responds to **P**hysical/painful stimulation only
- **U**nresponsive

When to call anaesthetist:

- SpO2 <94% despite 2-4L/min oxygen via nasal cannula
- Respiratory rate <8 breaths per minute
- Sedation score P or U
- Heart rate <50 bpm and or systolic blood pressure <90mmHg
- Any other concerns

Appendix B

Remifentanil PCA Quick Reference Checklist

Before commencing:

- Confirm with labour suite co-ordinator that midwife available for continuous care
- Appropriate indication for remifentanil PCA and no contraindications
- Continuous SpO_2 and CTG monitoring applied
- Essential equipment in the room
    - Nasal cannula, non-rebreathe face mask, bag-valve-mask (Ambu-bag)
    - Drugs (naloxone, atropine, ephedrine) with syringes & labels
    - PCA pump with demand button
    - Remifentanil PCA observation sheet
- Dedicated cannula sited (with blood pressure cuff on opposite arm)

Midwife's role

- Remain with the patient all the time
- Ensure continuous SpO_2 and CTG monitoring
- Record observations (SpO_2, HR, BP, sedation score) every 15 minutes
- Do not flush cannula or use for administration of other drugs
- Only the patient is to push the PCA demand button (not to be pushed by staff or relatives)
- Once baby is delivered, remove PCA demand button from woman, disconnect PCA line from cannula and remove cannula without flushing.
- Discard unused remifentanil as per Trust Remifentanil PCA guideline and document in CD book.

Anaesthetist's role

- Liaise with labour suite co-ordinator to ensure midwifery staffing will allow continuous care
- Gain consent from patient
- Ensure dedicated cannula is sited and patent
- Prepare remifentanil syringe, programme pump and connect to dedicated cannula
- Counsel woman on how to use PCA demand button, and when to time it with her contractions
- Remain with woman until after first 4 uses of PCA to ensure she is stable
- Prescribe remifentanil PCA, ondansetron and chlorphenamine on Lorenzo
- Be available to troubleshoot problems

Troubleshooting remifentanil PCA side effects

Low oxygen saturations

SpO_2 less than 94%
(Respiratory rate >8)

Commence oxygen vis nasal cannula at 2-4L/min

Remove PCA handset

Inform anaesthetist

If SpO_2 improves >94% then recommence PCA

Continue oxygen via nasal cannula

If SpO_2 remains below 94% then call for anaesthetist urgently

Apply non-rebreathe face mask with oxygen at 15L/min

If SpO_2 falls below 90% in spite of oxygen therapy **pull emergency buzzer**

Respiratory depression

Respiratory rate falls to less than 8

Over sedation

Sedation score is P or U
(see scale below)

Bradycardia or hypotension

Heart rate is less than 50 bpm
and / or
Systolic blood pressure less than 90mmHg

Call for help – **do not leave woman**

Remove PCA handset

Apply non-rebreathe face mask with oxygen at 15L/min

Try to rouse woman – shake/shout

If no response or SpO_2 falls below 90% **pull emergency buzzer**

If hypotensive give Hartmanns 500ml bolus

Do not restart PCA until reviewed by anaesthetist

If respiratory rate remains <8 or sedation score P or U then **give naloxone up to 400mcg IV**

If heart rate remains <50 then **give atropine up to 600mcg IV**

Sedation score
Alert
Responds to **V**erbal command
Responds to **P**hysical/painful stimulation only
Unresponsive

For Anaesthetists:
Provide airway and respiratory support as indicated
Ensure PCA is withheld until patient fully awake and responsive
Consider reducing bolus dose
Ensure patient does not use PCA in-between contractions
If respiratory depression re-occurs on lowest bolius dose discuss with consultant – may need alternative analgesia

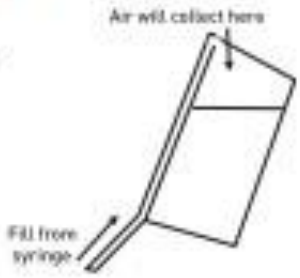
Appendix C

Guide to filling CADD Solis PCA Cassette

Filling the medication cassette reservoir

This should be a clean/aseptic technique.

1. Open and inspect the cassette to ensure that it is intact and sterile.
2. Attach a Luer lock syringe containing the medication to the end of the line.
3. Tilt the cassette to approx 70° angle and fill. When 3/4 of the fluid is inserted, clamp the line. Gently tap the cassette to collect air in the outlet point.



4. Open the clamp and withdraw the air into the syringe.
5. Hold the syringe with the tip downwards and finish filling the reservoir.
6. Clamp the line and disconnect the syringe. Cap the line with a sterile cap, or attach an extension line.