Remifentanil patient-controlled analgesia (PCA): a service evaluation in a tertiary hospital

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Introduction

Remifentanil PCA is widely used for labour analgesia where neuraxial analgesia is contraindicated or undesired. In our institution, the use of Remifentanil PCA is limited to women who are unable to have epidural analgesia for medical reasons; it is not offered in the context of maternal request alone. As a result, cases are infrequent.

We were concerned that staff inexperience with the use of Remifentanil PCA could result in poorer safety outcomes for both mother and fetus. We also worried that lack of staff familiarity with the technique might impair successful maternal "coaching" of the ideal timing of bolus administration with each contraction, so reducing analgesic efficacy and maternal satisfaction. A retrospective evaluation of Remifentanil PCA use on our unit was thus undertaken.

Methods

All women who used a Remifentanil PCA in labour between September 2019 and August 2021 (24 months) were identified. A retrospective review of each electronic patient record was undertaken.

Data was collected to:

1. Determine compliance with our local guideline for the use of Remifentanil PCA [1].
2. Assess maternal safety outcomes (requirement for oxygen supplementation, and the presence of respiratory depression or other significant maternal complications).
3. Assess fetal safety outcomes (mode of delivery, APGARs and requirement for neonatal resuscitation).
4. Assess the analgesic effect of each woman's Remifentanil PCA by review of pain scores, midwifery documentation, supplemental analgesic requirements and the outcome of formal anaesthetic follow-up.

Results

- During this two-year period, 21 women received Remifentanil PCA.
- The most common indication was coagulation disturbance (48%).

Maternal safety standards and outcomes

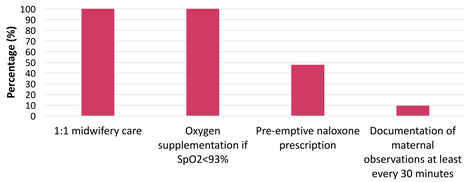


Fig 1: Maternal safety standards for Remifentanil PCA use, as per Trust guideline. These standards should be met in 100% of cases.

- 19% of women required oxygen supplementation.
- No women experienced respiratory depression or other serious complication secondary to Remifentanil PCA, though lack of capnography monitoring in our delivery rooms means significant maternal apneas may go unnoticed.

Fetal safety standards and outcomes

- Continuous fetal monitoring was performed in 100% of cases.
- Mode of delivery for women using Remifentanil PCA in labour was consistent with data for all births in our Trust at the time: 57% spontaneous vaginal delivery, 14% assisted vaginal delivery and 29% delivery by caesarean section.
- Median APGARs at 1 and 5 minutes were 8.5 and 10 respectively.
- Following exclusion of premature deliveries and those under GA, 7% of neonates required ventilation breaths at delivery. None required oxygen supplementation.

Analgesic effect and patient satisfaction

- Pain scores were documented in 19% of cases.
- Formal anaesthetic follow-up was completed in only 4.8% of cases – women receiving Remifentanil PCA are not automatically flagged for follow-up by our electronic patient record system.
- Adequacy of analgesia was predominantly determined by review of midwifery notes. Pain scores and anaesthetic follow-up were included where available.

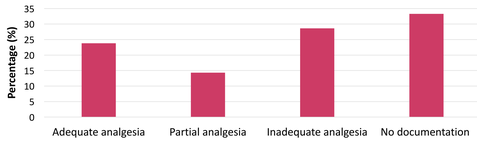


Fig 2: Adequacy of analgesic effect of Remifentanil PCA. In 33% of cases there was no documentation about analgesic adequacy at all.

- 48% of women used supplemental nitrous oxide/oxygen, 14% required an increased PCA dosing regimen and 4.8% required conversion to epidural.

Discussion

- Remifentanil PCA use in labour is relatively infrequent in our unit (0.2% of deliveries, compared with epidural analgesia 30%). Use has not increased since the publication of the RESPITE trial [2].
- Despite infrequent use of Remifentanil PCA, there were no significant maternal or neonatal complications during this two-year period.

Key areas for improvement:

1. Documentation of pain scores and maternal observations at least every 30 minutes.
2. Routine pre-emptive prescription of naloxone.
3. Routine formal anaesthetic follow-up.

Interventions:

1. Multidisciplinary training for maternity staff to ensure safe and effective use of Remifentanil PCA, with appropriate documentation and rescue prescriptions.
2. Update to our Trust's electronic patient record system to ensure patients receiving Remifentanil PCA are flagged for postnatal follow-up.
3. A review of the literature shows 60% of maternal apneas during Remifentanil PCA occur despite SpO_2>94% [3]; in our next guideline review the threshold for delivering supplemental oxygen will be increased from 93% to 95%.

References:

1. Cambridge University Hospitals NHS Foundation Trust. *Guideline: Patient controlled analgesia (PCA) in labour using remifentanil.* 2020. Available on Trust intranet.
2. Wilson MJA, MacArthur C, Hewitt CA *et al*. Intravenous remifentanil patient-controlled analgesia versus intramuscular pethidine for pain relief in labour (RESPITE): an open-label, multicentre, randomised controlled trial. *The Lancet*. 2018; 392: 662-72.
3. Stocki D, Matot I, Einav S *et al.* A randomized controlled trial of the efficacy and respiratory effects of patient-controlled intravenous remifentanil analgesia and patient controlled epidural analgesia in laboring women. *Anesth Analg*. 2014; 118: 589-97.