Ultra short acting opioid and Pediatric Anesthesia- Profound analgesia without profound side effects

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Learning Objectives:

- **To review the distinct pharmacologic characteristics of Remifentanil**
- **To consider the special applications of remifentanil in Pediatric Anesthesia**

Remifentanil has been approved for clinical use in the United States since July 1996 ー it is now becoming a frequently-used drug in pediatric anesthesia. Remifentanil is[1]:

- A typical μ-opioid receptor agonist with pharmacodynamic properties like those of fentanyl and its derivatives.
- Metabolized by nonspecific esterases, which gives remifentanil a pharmacokinetic profile unlike that of any other opioid.

The clinical advantage of the drug lies in its extremely rapid clearance, and therefore offset of effect, which is independent of excretory organ function.

Limitations of Fentanyl and other opioids

For opioids such as fentanyl and its derivatives, our ability to determine a well tolerated and effective dose is limited by variability in both pharmacokinetics and pharmacodynamics.

The effect of a small bolus of fentanyl is short-lived because it is terminated by rapid redistribution from the brain.

A prolonged infusion, however, depends more on hepatic metabolism and may seem quite long-acting.

Unpredictablility of dosing in individual patients results from:

- Different distribution volumes and rates of metabolic clearance
- Variable opioid sensitivity ― individual patients have a three- to fivefold range of sensitivity to a given concentration of opioid
- Inability to evaluate response ー the intraoperative overdosage with any opioid may not be apparent while ventilation is controlled.

Using Remifentanil

A reduction in pharmacokinetic variability is the primary advantage of remifentanil ― the drug is cleared by enzymatic hydrolysis with redistribution relegated to a minor role.

- Compared with other opioids, an infusion of remifentanil will produce a more consistent steady-state. Blood concentrations and the rate of disappearance will be more uniform within a patient population.
- With infusions of 0.025 ー 2.0 μg • kg^{-1} • min^{-1} during balanced anesthesia, the time to spontaneous

ventilation and tracheal extubation has averaged 3 ─ 7 min for all dose groups.[2]

- Infusions of 0.05 ─ 0.1 μg • kg^{-1} • min^{-1} with a small dose of benzodiazepine are effective and well tolerated in most cases

Clinical Utility of Remifentanil

In theory, remifentanil could be used in any clinical situation calling for a potent opioid analgesic.

Remifentanil may be administered in doses that would be impractical or hazardous with other fentanyl derivatives.

The use of a large opioid dose blunts the hemodynamic responses to painful stimuli and greatly reduces the need for other drugs such as propofol or volatile anesthetics.

given by continuous infusion because intermittent bolus doses are inconvenient for all but the shortest procedures

With remifentanil, postoperative pain is planned for as a separate event ─ Local and regional blocks are excellent choices when feasible

Use in Pediatric Anesthesia

Rapid clearance and potent action offer selective advantages in the following circumstances:

Oncology Lumbar Puncture and Bone Marrow aspiration ─ 1 mcg/kg followed by Propofol

MRI under GA ─ combined with Propofol

Short case intubation ─ given as 1 mcg /kg

Circumstances where postoperative sedation complicates care

References

1. Rosow CE. An Overview of Remifentanil. Anesth Analg 1999; Volume 89(Suppl): S1-S3.

2. Dershwitz M, Randel GI, Rosow CE, et al. Initial clinical experience with remifentanil, a new opioid metabolized by esterases. Anesth Analg 1995; 81: 619-23.

*The 1999 Supplement to Anesthesia and Analgesia is excellent.