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Pharmacokinetics and ventilatory effects of intravenous oxycodone in postoperative children

In a recent article 'Pharmacokinetics and ventilatory effects of intravenous oxycodone in postoperative children' [1] Olkkola *et al.* used an elegant combination of pharmacokinetic modelling and non-invasive monitoring of the ventilatory effects of oxycodone in children. Unfortunately they also drew some unjustified conclusions concerning the ventilatory depression of various opioids which need further comment.

Before any comparisons can be made concerning the ventilatory effects of different opioids the equianalgesic doses should be known. The authors have not conducted any studies on the equianalgesic doses of oxycodone as compared with morphine or the other opioids that they have used. Recent studies on adult surgical patients [2] indicate that the equianalgesic doses of oxycodone and morphine should be 10 mg and 15 mg, respectively, rather than 15 mg and 10 mg, a dose-ratio that the authors have found in the literature. All opioids will cause significant respiratory depression when given in too high doses to patients who are free of pain and still under halothane anaesthesia. Drawing conclusions from results from two different open studies [1, 3] one of them also being uncontrolled [1], with small numbers of patients but great interindividual variation and no statistics is not acceptable.

There are various reasons to indicate that the groups were not comparable even if the dose of oxycodone had been correct: the patients in the oxycodone study were somewhat younger, they were asleep after anaesthesia for longer (103 ± 27 min) than the patients receiving morphine (85 min, range 40–130 min). Further, the authors argue that oxycodone produced somewhat shorter analgesia than morphine. The mean durations of analgesia after the various opioids were: oxycodone 172 ± 112 min, morphine 191 ± 142, pethidine 171 ± 166 and methadone 211 ± 156. However, 33% of the oxycodone patients did not need further analgesics at all whereas 90% of the patients given either morphine or pethidine needed further analgesics. Only data from patients needing further doses were used for the calculation of 'analgesic times', which were then compared between the groups with the above mentioned conclusions.

It is also questionable whether this model for studying the pharmacodynamics of opioids in children is relevant. Thus, pain after minor ophthalmic surgery is known to be mild or non-existent, the children are premedicated with flunitrazepam and anaesthetised using pancuronium and halothane after which they arrive in the recovery room fully asleep with high expired halothane concentrations and hypercapnia.

Therefore, I would suggest that the conclusion 'oxycodone 0.1 mg kg^{-1} *appears* to cause greater ventilatory depression than *comparable* analgesic doses of other opioids' of the above mentioned paper is ignored until controlled, randomised double-blind studies are performed using equianalgesic doses.

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