

Recovery Following Tonsillectomy A Comparison Between Tramadol and Morphine for Analgesia

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ABSTRACT

Background: The optimal method of intra-operative analgesia for adult tonsillectomy is uncertain. It is important that recovery should be rapid so that the airway is not compromised. Tramadol hydrochloride is an analgesic with mixed μ and non-opioid activities which has less respiratory depression effects compared to morphine.

Patients and Methods: We compared the recovery characteristics of patients undergoing tonsillectomy after they were given either morphine or tramadol for intra-operative analgesia. Seventy-nine ASA (American Society of Anesthesiologists) I patients were randomised to receive either tramadol 1.5 mg/kg (n=44) or morphine 0.1 mg/kg (n=35). A standard propofol-desflurane based general anaesthetic technique was used.

Results: Patients given tramadol recovered faster compared to morphine as demonstrated by the earlier eye opening at reversal (mean \pm SD, 4.7 \pm 1.5 min versus 5.6 \pm 1.8 min, p=0.04). There was also significantly less nausea and vomiting in the patients given tramadol as compared to those given morphine (6.8% versus 28.6%, p=0.01). There were no other clinically important adverse effects in either group.

Conclusion: We conclude that tramadol given for intra-operative analgesia during tonsillectomy results in faster recovery with significantly less nausea and vomiting in the early postoperative period.

Keywords: Tonsillectomy, Analgesia, morphine, tramadol

Singapore Med J 2003 Vol 44(6):296-298

INTRODUCTION

Significant complications, including airway obstruction, protracted vomiting and bleeding can occur after tonsillectomy⁽¹⁻³⁾. In view of this, it is important that the patient is awake and able to protect the airway as

soon as possible after the surgery. Opioids, due to their associated somnolence, respiratory depression and nausea may contribute to significant post-operative morbidity^(4,5).

Tramadol is an analgesic with mixed-opioid and non-opioid activities^(5,6). The non-opioid component is mediated through α 2-agonist and serotonergic activity, which it exerts by inhibiting the reuptake of norepinephrine and 5-hydroxytryptamine in the central nervous system, and possibly displacing stored 5-hydroxytryptamine from nerve endings^(7,8). Tramadol offers similar analgesic potential to morphine, but is one-fifth to one-tenth as potent as morphine on a per milligram basis⁽⁹⁾. However, it has significantly less respiratory depression effects compared to morphine, partly due to its weak μ -receptor binding and also due to its monoaminergic action, which partially antagonises the μ -receptor opioid effect^(9,10).

It is hypothesised that tramadol given for intra-operative analgesia during tonsillectomy will result in faster recovery and discharge and lower incidence of respiratory depression post-operatively, while giving comparable pain relief at equipotent dosage.

PATIENTS AND METHODS

After local ethics committee approval and informed consent, 79 patients of ASA (American Society of Anesthesiologists) 1 status admitted for elective tonsillectomy were entered into the study. Patients were excluded from the study if they had significant underlying medical conditions, airway abnormalities, asthma or allergy to morphine or tramadol.

Premedication was not ordered. Anaesthesia was induced with propofol 2 mg/kg and patient intubated following atracurium 0.5 mg/kg. After intubation, the patients were maintained on 66% N₂O in O₂ and desflurane at 3-4%. Mechanical ventilation was adjusted to maintain end-tidal CO₂ levels at 30-35 mm Hg and end-tidal desflurane level of 3%.

Patients were randomly assigned to two groups. In group M, the patient received 0.1 mg/kg of morphine IV after intubation. In group T, the patient received 1.5 mg/kg of tramadol IV after intubation.

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The two study drugs were identically packaged and coded in a manner suitable for randomised treatment and the drug sequence was only identified for each patient at the end of surgery.

At the termination of surgery, desflurane and N₂O were discontinued and residual neuromuscular blockade antagonised with neostigmine 0.05 mg/kg and atropine 0.02 mg/kg. The trachea was extubated when the patient was awake.

The time from reversal to spontaneous eye-opening was compared between the two groups. After the surgery, the patient's vital signs including blood pressure, SpO₂ and heart rate were recorded at 5-minute intervals. At the end of 30 minutes in the recovery room, the patient was assessed for their conscious level (awake, slightly drowsy, drowsy, very drowsy); pain (no pain, mild pain, moderate pain, severe pain); side effects (nausea or vomiting, bleeding, need for supplemental analgesia) and respiratory rate.

An arterial blood sample was analysed for oxygen tension (pO₂), carbon dioxide tension (pCO₂), oxygen saturation (SpO₂) and base excess (B.E.). Statistical analyses (SPSS software) were performed using Student's t-test and chi-square as appropriate and statistical significance accepted at p<0.05.

RESULTS

The treatment groups were comparable in terms of age, weight and sex. The patients in the tramadol group demonstrated a faster eye opening (4.7 ± 1.5 min) upon reversal as compared to the Morphine group (5.6 ± 1.8 min) (p=0.04).

Ten patients out of the 35 patients given morphine had nausea or vomiting as compared to three patients out of the 44 patients given tramadol and this is statistically significant (p=0.01). There were no

differences in level of analgesia, sedation, pCO₂, pO₂ and respiratory rates.

DISCUSSION

Our study demonstrates that tramadol given for intraoperative analgesia during tonsillectomy results in faster recovery of the patient as demonstrated by the earlier eye opening upon reversal. There was also significant less nausea and vomiting in the patients given tramadol as compared to the morphine group.

The study demonstrates that patients given equipotent doses of morphine or tramadol had similar pain scores in the postoperative period without significant respiratory depression. Tramadol has mixed μ -opioid and non-opioid activity. As such, respiratory depression with tramadol is less than with morphine, and has features that differ clinically from those of opioid respiratory depression. One study demonstrated that patients breathing spontaneously under halothane anaesthesia had a transient fall in respiratory rate without change in the end-tidal carbon dioxide concentration after tramadol 0.5-2 mg/kg iv but demonstrated apnoea or considerable respiratory depression after morphine sulfate 0.143 mg/kg iv⁽¹⁰⁾. It was concluded that tramadol had no clinically relevant respiratory depression. Due to its mixed activity at the μ -receptor, it can also explain the faster awakening of the patients given tramadol in this study. Since the discharge time was not studied here, we were not able to demonstrate the relevance of the use of tramadol in the ambulatory setting, which may be another area where the drug may be particularly useful. In the post-operative period, the combination of tramadol retard and naproxen offers better analgesia than diclofenac monotherapy⁽¹¹⁾. Furthermore, the availability of oral tramadol offers the flexibility of continuous therapy⁽¹²⁾.

Table 1. Patient characteristics, eye opening time, incidence of post-operative nausea and vomiting and arterial blood gases.

| | Morphine group (n=35) | Tramadol group (n=44) | P value |
|---|--------------------------|--------------------------|---------|
| Age (year) – mean (range) | 29 (14-57) | 30 (13-58) | NS |
| Sex (M:F) ratio | 1:0.6 | 1:1 | NS |
| Weight (kg) mean \pm SD | 68 \pm 14.4 | 63.3 \pm 14.5 | NS |
| Duration of surgery (min) mean \pm SD | 58.9 \pm 5.2 | 68 \pm 9.6 | NS |
| Eye opening (min) mean \pm SD | 5.6 \pm 1.8 | 4.7 \pm 1.5 | 0.038 |
| Postoperative nausea | 10/35 (29%) | 3/44 (7%) | 0.01 |
| Arterial Blood Gas | | | |
| pH | 7.3 \pm 0.06 | 7.3 \pm 0.09 | NS |
| pCO ₂ (mmHg) mean \pm SD | 43.3 \pm 6.8 | 42.5 \pm 5.5 | NS |
| Base Excess | -2.0 \pm 3.3 | -2.7 \pm 4.4 | NS |

Clinical experience in the use of tramadol reflects mostly paediatric tonsillectomies. Macarone and colleagues⁽¹²⁾ found that tramadol 2 mg/kg IV provided satisfactory intra-operative analgesia in a series of 110 patients aged 4-10. Ozkose et al⁽¹³⁾ evaluated low dosage tramadol (1 and 0.5 mg/kg) and placebo in 45 children undergoing tonsillectomy. It was concluded that low dose tramadol given at induction, provided efficient preemptive analgesia for the intra- and immediate post-operative periods. In contrast, Pendeville et al⁽¹⁴⁾ used tramadol dosage 3 mg/kg in 50 children. Van den Berg et al⁽¹⁵⁾ compared the use of tramadol, pethidine and nalbuphine (3.0 mg/kg, 1.5 mg/kg and 0.3 mg/kg respectively) with placebo (saline 0.02 ml/kg) in 152 ASA 1 children and young adults undergoing adeno-tonsillectomy. The results suggested pethidine 1.5 mg/kg and nalbuphine 0.3 mg/kg provided better intraoperative analgesia compared to tramadol 3.0 mg/kg, although the use of pethidine was associated with prolonged time to recovery of spontaneous ventilation at the end of anaesthesia.

Patients given tramadol in our study demonstrated significantly less nausea and vomiting as compared to the morphine group. Engelhardt, Steel and Johnston⁽¹⁶⁾ found a higher incidence of vomiting (75%) in children given morphine 0.1 mg/kg compared to tramadol (40%) 1 and 2 mg/kg) following tonsillectomy. Reported gastrointestinal effects of tramadol include nausea, vomiting and constipation, but to a lesser extent than with opioids. There was no increase in the baseline pressure or duration, frequency and amplitude of contractions of the bile duct sphincter when tramadol was given iv to patients during endoscopic retrograde cholangiopancreatography (ERCP). This is again of relevance in patients who may undergo surgery in the ambulatory setting.

In conclusion, our study demonstrates that tramadol in the dose of 1.5 mg/kg iv for patients undergoing tonsillectomy has similar analgesic properties to morphine and results in faster awakening of patients with significantly fewer side effect of nausea and vomiting.

ACKNOWLEDGEMENT

We are grateful to the recovery ward staff at Singapore General Hospital main operating theatre for their cooperation during this study.

An abstract of this article has been presented in poster form at the 12th World Congress of Anaesthesiologists in Montreal in June 2000.

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