THE PROPHYLACTIC EFFECT OF RECTAL ACETAMINOPHEN ON POSTOPERATIVE PAIN AND OPIOID REQUIREMENTS AFTER ADENOTONSILLECTOMY IN CHILDREN

Gholam Ali Dashti*, Shahram Amini**, and Elham Zanguee***

Abstract

Background: Postoperative pain in children is common after adenotonsillectomy. Rectal acetaminophen has been used effectively for postoperative pain management in small children. The aim of this randomized double blind study was to evaluate the prophylactic effect of rectal acetaminophen on postoperative pain management and opioid requirements in children undergoing adenotonsillectomy.

Materials and Methods: 104 children, 7 to 15 yr, ASA I or II scheduled for elective adenotonsillectomy were recruited for the study. Patients were randomized to receive either rectal acetaminophen 40 mg/kg or nothing after induction of standard anesthesia. The postoperative pain was assessed using visual analog scale (VAS) every 2 hours for the first 6 hours. The need for rescue analgesic, intravenous pethedine of 0.5 mg/kg, was recorded at 24 hours after surgery.

Results: Pain scores were significantly lower in acetaminophen group at different times (p<0.001) and needed less rescue analgesic (p<0.001).

Conclusion: We conclude that prophylactic rectal acetaminophen is effective in reducing pain after adenotonsillectomy and postoperative analgesic requirement.

Key words: acetaminophen, analgesia, adenotonsillectomy, suppository.
Introduction

Adenotonsillectomy is one of the most frequent ENT operations performed in children with over 2 million cases in the United States and 2.3/1000 for the population aged under 12 yr in the UK each year.

Postoperative pain may influence the child’s ability to tolerate oral pain medication and fluid intake, resulting in nausea and dehydration in a considerable number of children postoperatively. Operation is associated with pain in more than 80% of children on the first day after operation. It is assumed that pain is not adequately treated in one half of all surgical procedures.

Although opioids are used widely in the management of postoperative pain, their side effects especially respiratory depression, bradycardia, nausea and vomiting, have resulted in decreased use of these analgesics especially in children.

Both acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) have been used extensively with very good results in reducing pain and postoperative opioid requirements after adenotonsillectomy in children and adults. NSAIDs act on prostaglandin synthesis for pain reduction with adverse effects such as bleeding problems in both gastrointestinal tract and from the surgical site and potential renal dysfunction that have caused some concerns in their widespread application. Although some investigators have shown their preference alone or in combination with acetaminophen, other studies failed to reveal such an effect. Acetaminophen is the most commonly used analgesic in children. It is also frequently used as an adjuvant for postoperative pain management in pediatric patients. However, there are reports that failed to show any benefits in reducing postoperative opioid requirements of rectal acetaminophen in infants and small children undergoing elective cleft palate repair or have showed that only high doses of rectal acetaminophen of 40-60 mg/kg was effective in day care surgery in children.

The purpose of this randomized, double blind study was to investigate the efficacy of rectal acetaminophen on postoperative pain management after adenotonsillectomy.

Materials and Methods

After approval from Research Committee of Medical School and procuring parents informed consent, 104 children, 7 to 15 yr, ASA I or II, to undergo elective adenotonsillectomy at a teaching hospital, were recruited for the study. Exclusion criteria included a known allergy to acetaminophen, renal or hepatic dysfunction, ingestion of analgesics in the past 24 hours, drug abuse (because of high prevalence in the region), a known case of G6PD deficiency, diarrhea, dehydration, and bleeding disorders.

No premedication was used. After IV cannulation, patients received 5 ml/kg crystalloid, 0.05 mg/kg midazolam, and 1 µg/kg remifentanil. General anesthesia was induced using 5 mg/kg thiopental sodium. Atracurium (0.6 mg/kg) was used to facilitate endotracheal intubation.

Following induction, the children were randomized based on blocks of 10 to receive either nothing (control group) (n = 51) or rectal acetaminophen 40 mg/kg (n = 53), by a surgical nurse who was blinded to the study and did not participate in the postoperative care of the child. Patients received a total of 10 ml/kg of crystalloids intraoperatively. 0.2 mg/kg of IV dexamethasone was given to reduce postoperative nausea and vomiting. Anesthesia was maintained with halothane 0.5-1% and remifentanil was used in doses of 0.1-0.2 µg/kg/min to maintain heart rate and blood pressure within 20% range from the baseline. Patients were ventilated with 40% oxygen in nitrous oxide.

Standard monitoring included respiratory rate, pulse rate, noninvasive blood pressure, and pulse oximetry. At the end of the surgery, the residual neuromuscular block was reversed with neostigmine 0.05 mg/kg IV, and atropine 0.2 mg/kg IV. All the operations were performed by a single surgeon. Patients were extubated when fully awake and were transferred to postanesthetic care unit (PACU). No patients received local anesthetics at the tonsillar base and coagulation was achieved by electrocautery. Patients were transferred to the ward if they were alert and cooperative, with no or slight pain, no bleeding, hemodynamically stable, and without nausea and vomiting. They stayed in the hospital for 24 hours postoperatively.
Postoperative pain was assessed by using VAS by trained independent blinded nurses on the ward (based on a 0-100 scale) with 0 indicating no pain and 100 indicating the worst intolerable pain ever experienced. Parents were also blind to the study. A pain score of more than 40 was considered as unsatisfactory and resulted in administration of 0.5 mg/kg of pethedine IV (with the minimum interval of 4 hours).

Any adverse effects (nausea, vomiting, respiratory depression, and bleeding) were recorded during their stay in the hospital.

Differences between the groups were analyzed using Student’s t-test. The chi-square test was applied to non-parametric data. SPSS version 13 was used for statistical analysis. P value less than 0.05 was considered significant.

Results

There was no statistical difference in ASA status, mean age, weight, and sex between the groups (Table 1).

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<tr>
<th>Table 1: Demographic data</th>
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<tr>
<td>Acetaminophen</td>
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<tr>
<td>Age [year (SD)]</td>
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<td>Weight (kg) (SD)</td>
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<td>Sex (male/ female)</td>
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<td>ASA Status (I/II)</td>
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The pain scores were significantly lower after arrival at the ward in the acetaminophen group (63.83, SD = 25.30 vs. 77.98, SD = 17.94, P value <0.002). Patients in acetaminophen group experienced less pain at 2, 4, and 6 hours postoperatively compared with the control group (Table 2).

The number of patients who required rescue analgesic was significantly higher in the control compared with acetaminophen group (31 out of 51 vs 22 out of 53 P value <0.001). Opioid requirements were less in the acetaminophen group (6.48 mg SD = 8.52) compared with the control group (17.09 mg SD = 12.12), P value <0.001] (Table 3).

None of the patients in either group developed significant bleeding requiring reoperation. No one had respiratory depression, oxygen desaturation, and bradycardia after receiving pethedine. Two patients in the no acetaminophen group, developed nausea and vomiting in the postoperative period requiring intervention.

Discussion

Our study revealed that rectal acetaminophen reduces pain intensity and postoperative analgesic requirements compared to group without acetaminophen after adenotonsillectomy. Our study was in concordance with those using rectal acetaminophen for postoperative pain management after adenotonsillectomy.

Pain is a common complication after adenotonsillectomy in children and results in 80%
analgesic requirements. Nikanne et al showed that more than 20% of children experienced severe pain at home after adenotonsillectomy. Pain removal would result in less discomfort, nausea and vomiting, faster postoperative oral intake and discharge from the hospital.

It has been shown that postoperative oral pain medication is difficult because children refuse to take oral medication and may result in nausea, vomiting and altered gastrointestinal motility. On the other hand, preventing the initial neural cascade could lead to long term benefits by eliminating the hypersensitivity produced by noxious stimuli.

Although opioids are used widely in the management of postoperative pain, their adverse effects such as respiratory depression and nausea and vomiting have reduced their application. Non steroidal anti-inflammatory drugs (NSAIDS) have replaced opioids for postoperative pain management because of lack of respiratory depression and nausea and vomiting. However, their side effects such as increasing bleeding tendency from the surgical site and gastrointestinal tract, GI upset, and renal and hepatic dysfunction, may affect their liberal application.

Tawalbeh et al suggested that diclofenac was more effective than paracetamol in decreasing the pain associated with swallowing after adenotonsillectomy without considerable adverse effects. In contradistinction, Rusy et al showed that ketorolac was no more effective than high dose acetaminophen for analgesia in the patient after tonsillectomy.

Acetaminophen is the most commonly used analgesic in children. It is almost safe and effective in comparison to opioids and NSAIDS. Rectal acetaminophen has been shown to be a good alternative to oral administration in postoperative pediatric adenotonsillectomy patients. However, doses as high as 40-60 mg/kg could be satisfactorily effective. Bremerich et al reported that acetaminophen up to 40 mg/kg had no opioid sparing effect and did not result in analgesia.

In contrast to our findings, previous studies have found that rectal acetaminophen may provide erratic and inconsistent analgesia after tonsillectomy. This variation may be explained by differing analgesic requirements with different surgical techniques, different doses of acetaminophen, or the concurrent use of other analgesic agents. In addition is the type of surgery performed as adenotonsillectomy might be more painful than adenoidectomy alone.

Acetaminophen has been shown to be more effective when combined with NSAIDs in the postoperative pain management. Combination of NSAIDs and other analgesics have been proposed for pain management but there is not a general agreement on their efficacy. Issioui et al concluded that oral premedication with a combination of acetaminophen (2000 mg) and celecoxib (200 mg) was highly effective in decreasing pain and improving patient satisfaction after ambulatory ENT surgery. However, Hiler et al have shown that a combination of paracetamol and diclofenac was not more effective than paracetamol alone for analgesia after tonsillectomy.

In summary, we were able to show that rectal acetaminophen in dose of 40 mg/kg is effective in reducing pain intensity and postoperative analgesic requirements after adenotonsillectomy in children. It is recommended to administer prophylactic rectal acetaminophen in order to decrease the child’s postoperative discomfort and pain after adenotonsillectomy.
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