



Comparison of the Effect of Acetaminophen Suppository in Children 7 to 15 years before and after Tonsillectomy on Pain Relief

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ABSTRACT

Introduction: tonsillectomy in children is associated with many complications such as severe postoperative pain. The analgesic effect of rectal acetaminophen has been demonstrated in various surgical procedures. The aim of this study was to compare the effect of acetaminophen suppository in children 7 to 15 years before and after tonsillectomy on pain relief.

Materials and Methods: In this clinical trial study, 100 children aged 7 to 15 years who were candidates for tonsillectomy were included in the study. Patients were randomly divided into two equal groups. After induction of anesthesia and intubation and 5 minutes before the start of surgery, group A received 40 mg / kg rectal acetaminophen suppository, and group B received the same dose of rectal acetaminophen suppository after surgery and just before extubation and immediately after discontinuation of anesthetic drugs. Patients were then compared in terms of pain and use of analgesic, 1, 3, 6, 12, and 24 hours after the surgery.

Results: In group A, 56% of patients were female and 44% male, and in group B, 52% were male and 48% female ($P = 0.688$). The mean age of patients in group A was 9.17 ± 2.90 years and in group B was 9.5 ± 2.49 years ($P = 0.543$). The mean pain score in each of 1, 3, 6, 12 and 24 hours was significantly lower in group A than in group B ($P < 0.05$ in all cases). Also, the mean changes in pain 24 hours after surgery were significantly lower in group A than group B ($P < 0.001$). Consumption of both oral ($P = 0.041$) and intravenous ($P = 0.008$) analgesics was significantly lower in group A than in group B.

Conclusion: Using rectal acetaminophen before tonsillectomy is a more effective way to reduce pain after tonsillectomy than using it after the surgery, which reduces the need for analgesics in these patients after surgery.

ARTICLE HISTORY

Received April 21, 2020,
Accepted May 21, 2020
Published October 5,
2020

KEYWORDS

Adenotonsillectomy,
Acetaminophen, Pain,
Tonsil, Rectal.

INTRODUCTION

The tonsils are one of the largest accumulations of lymphatic tissue in the Waldeyer's ring and are infected, inflamed and hypertrophied by various microorganisms [1]. There are several indications for tonsillectomy in children and it is one of the most common surgeries, especially in children [2]. Tonsillectomy with or without adenoidectomy (tonsillectomy/adenotonsillectomy) based on clinical

evidence is one of the best methods for the treatment of chronic tonsillitis and obstructive sleep apnea syndrome [3]. Both of these surgeries have their own complications.

Post-tonsillectomy/adenotonsillectomy problems include pain, bleeding, laryngospasm, airway obstruction, nausea, vomiting, and aspiration. The main complication of this surgery is postoperative pain, so that both surgeries are associated with significant pain [4].

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Pain causes suffering to the child for a relatively long time, and the child refuses to start oral feeding due to annoying sore throat, which causes dehydration, increase of body temperature and prolonged recovery period of the patient [5]. Many different therapies, including nonsteroidal anti-inflammatory drugs (NSAIDs), systemic drugs, and local anesthetics, have been used as effective methods for controlling post-tonsillectomy pain in children [6, 7].

Acetaminophen or paracetamol is one of the most common analgesics in children. Acetaminophen is a central cyclooxygenase inhibitor that has recently been shown to have weak peripheral effects. Its central analgesic effect is mediated by the activation of the serotonergic descending pathway [8]. Previous studies have reported the effects of acetaminophen and opioids in reducing the postoperative pain of the tonsillectomy in children and adults [9]. For instance, Liu C et al. Stated that the use of oral acetaminophen with ibuprofen could significantly reduce postoperative pain and there was no risk of bleeding [10]. In another study, Jabbari Moghaddam et al. compared the effects of acetaminophen suppositories with diclofenac and showed that the palliative effect of was better than acetaminophen, but acetaminophen could also control the pain in patients [11]. However, Thorneman et al. did not report a significant difference in the analgesic effect of diclofenac and acetaminophen, and stated that the regular use of the drug immediately after extubation was significantly more effective than use of the drug at the beginning of pain perception in the ward [12]. In general, considering acetaminophen as one of the safest and most effective drugs for reducing mild to moderate pain in children and also due to the importance of pain control after tonsillectomy in children, this study aims to compare the analgesic effect of acetaminophen suppository in children 7 to 15 years, before and after tonsillectomy.

MATERIALS AND METHODS

Selection of patients

In this randomized clinical trial, children aged 7 to 15 years who were candidates for adenotonsillectomy, referred to Zahedan medical centers in 2015, were examined. This study was approved by the University Ethics Committee with the code IR.ZAUMS.REC.1394.147.

Inclusion criteria: children with recurrent tonsillitis, chronic tonsillitis, obstructive sleep apnea syndrome, open mouth breathing, snoring, and dysphagia

Exclusion criteria: allergic to acetaminophen, renal or hepatic impairment, consumption of analgesic over the past 24 hours, drug abuse (due to high prevalence in the region), known favism, diarrhea, dehydration,

bleeding disorders and history of surgeries lasting more than 30 minutes.

Based on the formula for comparing the two means and the study by Issioui et al. (.) and according to similar articles, the sample size was considered at least 100 people (50 people in each group); Selection of patients was conducted through the simple and accessible method and based on the inclusion and exclusion criteria. Then, the patients were randomly divided into two groups, one group (A) receiving acetaminophen suppository 5 minutes before the surgery (after intubation) and the other group (B) after the surgery and before extubation.

THE METHOD OF STUDY

In this study, after vascularization, patients received 5 ml / kg of crystalloid solution, 0.05 mg / kg of midazolam and 1 µg/kg of fentanyl. General anesthesia was induced using 5 mg / kg sodium thiopental, and 0.6 mg/kg atracurium was used to facilitate endotracheal intubation. After induction of anesthesia and intubation and 5 minutes before surgery, group A received acetaminophen rectal suppository at a dose of 40 mg / kg and group B received the same dose of acetaminophen suppository after surgery and just before extubation and immediately after discontinuation of anesthetic drugs. All the suppositories were the product of Behuzan Pharmaceutical Company, and the suppositories were installed by a surgical nurse who was unaware of the study and did not participate in the postoperative child care. Patients received a total of 10 ml / kg of crystalloid solution during surgery and 0.2 mg / kg intravenous dexamethasone to reduce postoperative nausea and vomiting. Anesthesia was maintained at 150-100 µg / kg/min with propofol, and Remifentanyl at a dose of 0.1- 0.2 µg / kg/min was used to maintain heart rate and blood pressure in the 20% base range. Standard monitoring included respiration rate, heart rate, non-invasive blood pressure, and pulse oximetry. At the end of the surgery, the remaining neuromuscular block was removed using intravenous neostigmine 0.05 mg/kg and intravenous atropine 0.2 mg/kg. All surgeries were performed by a single surgical and anesthesia team with a fixed protocol. Patients were excised when fully awake and transferred to the PACU. None of the patients received local anesthesia at the base of the tonsils, and the coagulation was performed using an electrocautery. Patients who were conscious, had no pain or had mild pain, and had no bleeding or nausea and vomiting were taken to the ward.

Pain assessment

All patients remained in the hospital for 24 hours after the surgery. Postoperative pain was assessed using VAS at 1, 3, 6, 12, and 24 hours after the surgery and classified in scale of 0-10 by nurses, who were unaware of the study; 0 indicated no pain and 10 the worst unbearable pain that they ever experienced. Pain scores between 4 and 7 were considered unpleasant and resulted consumption of 10 mg/kg oral ibuprofen every 6 hours. At a pain score greater than 7, 0.5 mg / kg of pethidine was injected intravenously (at least 4 hours apart). Receipt of painkillers was also recorded during the hospital stay.

Statistical analysis

Statistical data were analyzed using SPSS version 16. Data were reported in frequency, frequency percentage, mean, and standard deviation in descriptive statistics methods such as tables and graphs. Also, t-test (for comparison of the two means) and Chi-square test (for comparison of qualitative variables) and Repeated measures ANOVA were used to examine the relationship between variables. The P value of the tests was considered less than 0.05.

RESULTS

The gender distribution of the patients participating in the study, in general and separately into two groups, showed that 54% (54 people) of the total participants in the study were male and 46% (46 people) were female. This ratio is 56% male and 44% female in group A, and 52% male and 48% female in group B. The two groups were not different in terms of in gender distribution (P =0.688).

Also, the mean age of the total participants in the study was 9.34 ± 2.69 years, in group A it was 9.17 ± 2.90 years, and in group B it was 9.5 ± 2.49 years. Based on statistical analysis, no significant difference was observed between the two groups in terms of mean age (P =0.543)

According to Table 1, the comparison of the mean pain score between the two groups in each of the 1, 3, 6, 12 and 24 hours after the surgery was performed and it was shown that the mean pain score in all hours in group A, that Acetaminophen suppositories were given before the surgery, was significantly lower than group B, who received acetaminophen suppositories after the surgery (in all cases P <0.05).

Table 1: Mean pain score of the two groups receiving acetaminophen suppositories before (group A) and after (group B) the surgery

Time	Group	Number	Min	Max	Mean± SD	p-value
1 h	A	50	0	10	3.34±2.17	0.02
	B	50	0	10	4.34±2.16	
3 h	A	50	0	9	3.66±1.89	0.004
	B	50	0	9	4.80±1.93	
6 h	A	50	0	10	3.82±2.03	0.001
	B	50	1	9	5.20±2.05	
12 h	A	50	0	9	3.44±1.96	0.001
	B	50	1	8	4.82±2.08	
24 h	A	50	0	9	3.00±2.00	0.001
	B	50	1	8	4.36±2.08	

In order to compare the changes in mean pain in the two groups, which were measured using the VAS scale in 1, 3, 6, 12, and 24 hours after the surgery, the repeated measures ANOVA showed that the mean Patients' pain intensity was significantly different at disparate times (regardless of group A or B) (P <0.001). In addition, pairwise comparison of the mean pain intensity between different times, for evaluating the effect of time, showed that there was a

significant difference in the mean pain intensity between 1 and 6 hours (P = 0.013), 6 and 24 (P <0.001) and 12 and 24 hours (P <0.001). On the other hand, the mean pain intensity was significantly different in groups A and B (P <0.001); the pain intensity was significantly lower in group A, who received acetaminophen suppository before the surgery, than in group B (Table 2, Figure 1).

Table 2: Comparison of the mean pain intensity in groups A and B

Time	Group A	Group B	P-value (Within groups)
	Mean± SD	Mean± SD	
1h	3.34±2.17	4.36±2.15	<0.001
3h	3.66±1.89	4.8±1.93	
6h	3.82±2.03	5.2±2.05	
12h	3.44±1.96	4.82±2.08	
24h	3±2	4.36±2.08	
P-value (between groups)		<0.001	

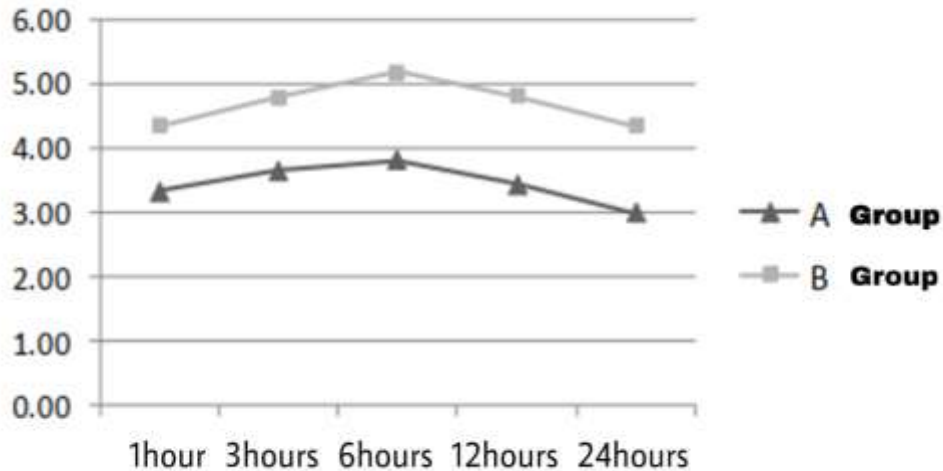


Figure 1: Comparison of the mean pain intensity in groups A and B

According to Table 3, the frequency of consumption of oral and intravenous analgesics after the surgery was evaluated between groups A and B. Our results showed that the two groups A and B had significant differences both in terms of the frequency of oral

analgesic consumption (P = 0.041) and the frequency of intravenous analgesic consumption (P = 0.008), thus the consumption of both types of analgesics in group A was significantly lower than group B.

Table 3: The frequency of consumption of oral and intravenous analgesics after the surgery in the two groups

		Group A (N/%)	Group B (N/%)	Total (N/%)	P-value
Oral analgesic consumption	Yes	15/30%	25/50%	40/40%	0.041
	No	35/70%	25/50%	60/60%	
	Total	50	50	100	
Intravenous analgesic consumption	Yes	8/16%	20/40%	28/28%	0.008
	No	42/84%	30/60%	72/72%	
	Total	50	50	100	

DISCUSSION

Tonsillectomy is one of the most common painful surgeries for children, and to prevent this pain and its complications, it is necessary to use analgesics [13]. Therefore, in this study, we compared the effect of acetaminophen suppositories in children 7 to 15 years before and after tonsillectomy on pain relief.

The findings of the present study showed that the use of acetaminophen rectal suppository at a dose of 40 mg/kg after induction of anesthesia and 5 minutes before the start of tonsillectomy in children, significantly reduced children's pain in the first 24 hours after surgery, in comparison with its use after the operation. Also, the use of acetaminophen rectal suppositories before the surgery, significantly

reduces the need for consumption of analgesics in the first 24 hours after surgery.

Concerns about the side effects of using analgesics to relieve postoperative pain in children, as well as the ineffectiveness of pain assessment methods in children who are unable to express pain, have led to insufficient pain control after surgeries in children, despite the increasing expert information, and many children still suffer from severe pain, especially after major and invasive surgeries [14, 15].

Acetaminophen, as a central cyclooxygenase inhibitor, is one of the safest and most effective drugs for reducing mild to moderate pain and is known to relieve pain or reduce fever in a wide range of patients [16, 17]. It is also the most common analgesic drug used in children, which has been widely used in reducing pain after tonsillectomy in children with very good results [18, 19]. In general, the goal of reducing postoperative pain is to improve the condition of patients by inhibiting pain impulses to reduce reflex responses to pain. Reducing postoperative pain improves breathing, faster movement of the patients, and faster return to normal function [20, 21]. Also, due to the unwillingness of the child to swallow and take oral medications in the early stages after recovery, the possibility of worsening nausea and vomiting with oral medications, and the risks of aspiration, the use of rectal compounds is preferable to oral at this stage [22]. Various studies have examined the effects of oral, rectal and injectable analgesics such as acetaminophen, corticosteroids and other opioids to control pain. In line with this study, Dashti et al. studied the preventive effects of acetaminophen suppositories on postoperative pain and the need for opioids and analgesics after adenotonsillectomy in 104 children. They indicated that patients who used acetaminophen suppositories before surgery had less pain at different times than the control group and the need for analgesia was reduced [23]. In a study by Owezarszak et al. On the effects of oral and rectal acetaminophen codeine in reducing the pain caused by tonsillectomy in children aged 1 to 5 years, it was observed that postoperative pain in children who received acetaminophen in suppository form was less than the group that received oral acetaminophen [24]. In general, postoperative pain can be assessed in three stages. The first stage involves the electrical transmission of pain impulses to the relevant centers and causes the sensation of pain. In the second stage, the necessary chemicals and neurotransmitters are produced from the nerve terminals, and in the third stage, the attack of phagocytes and fibroblasts occurs, which eventually decreases with the formation of wounds. It has been shown that if the first stage is

controlled even before the onset of the pain mechanism, the pain is significantly reduced [7, 25]; the significant reduction in mean postoperative pain in the children receiving preoperative acetaminophen rectal suppository, appears to have been caused by being affected by this phase. Liu et al. reported that an alternating regimen of ibuprofen and acetaminophen was an effective treatment for severe post-tonsillectomy pain in children and had no effect on increased bleeding [10]. Kelly et al. compared the effects of oral morphine, acetaminophen, and ibuprofen on pain intensity on the first day after tonsillectomy and stated that there was no difference in analgesic effect, tonsillar hemorrhage, or adverse drug reactions [26].

In general, rectal acetaminophen is a simple, safe, and effective way to relieve pain in pediatric tonsillectomy for postoperative analgesia. One of the limitations of the present study was the dissatisfaction of some families with their child entering the study, which was resolved by the explanation of the researcher about the benefits of the project and that this research has no cost for families and also the acetaminophen suppository is a pain control drug with no complication. Lastly, due to the fact that in the present study, it was not possible to follow up on probable complications after tonsillectomy, it is suggested that future studies be performed in this regard (for example, with a 7-day follow-up).

CONCLUSION

Using rectal acetaminophen at a dose of 40 mg/kg after induction of anesthesia and 5 minutes before the start of tonsillectomy, is a more effective way to reduce pain after tonsillectomy, than using it after the surgery; It also significantly reduces the use of analgesics after surgery. Therefore, the use of acetaminophen suppository before the surgery is recommended.

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