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ORIGINAL ARTICLE

The Effect Of Dexamethasone On Morbidity Related To Vomiting, Pain and Oral Intake In Children After Tonsillectomy

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ABSTRACT

Background and Aim: Morbidity related to postoperative nausea and vomiting, pain, poor oral intake, dehydration and fever is a concern in children undergoing tonsillectomy. The aim of this study was to investigate the effects of preoperative 0.5 mg/kg i.v. dexamethasone on postoperative quality oral intake, vomiting and pain in paediatric patients undergoing tonsillectomy with or without adenoidectomy, during the first 8 hours of the postoperative period.
Material and Methods: This is a quasi-experimental study that was performed at the Ilam Imam Khomeini hospital, IR, during the year 2008-2009. In a randomized, double-blind trial, 66 paediatric patients undergoing tonsillectomy received IV placebo (saline) or 0.5mg/kg IV dexamethasone, after the induction of anaesthesia before surgery. The incidence of vomiting, the time to the first oral intake, the quality of oral intake and the pain score were compared in both groups during the first 8 hours of the postoperative period. Pain was assessed using a five-point ''faces'' scale (1 = smiling face: no pain, 5 = crying face: highest pain score). The quality of the oral intake was judged as follows: excellent = child requests it, good = child accepts it when offered, fair = child accepts it when coaxed, and poor = child refuses. All collected data were analyzed using the statistical software (SPSS, Ver.11.5), descriptive statistics, Student t test, Mann-Whitney test and the x2 or Fisher's exact tests. $p < 0.05$ was considered significant.
Results: The overall incidence of vomiting was significantly less in the Dexamethasone group as compared to the Saline group ($p<0.001$). The time of the first oral intake was shorter in the Dexamethasone group as compared to the Saline group ($P<0.05$). The quality of oral intake was better in the Dexamethasone group than in the Saline group ($P<0.001$). When compared with placebo, the patients who received preoperative dexamethasone had a significantly less pain score during the first 8 hours postoperatively ($p < 0.05$).
Discussion and conclusion: In the paediatric patients undergoing tonsillectomy, preoperative dexamethasone use significantly reduced posttonsillectomy pain, improved oral intake and decreased vomiting without any significant side effects. This report confirms the beneficial effect of IV dexamethasone on postoperative morbidity related to vomiting, pain and oral intake in children after tonsillectomy and is recommended for routine use.

Key word: Dexamethasone, vomiting, pain, children , tonsillectomy

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Introduction

Tonsillectomy with or without adenoidectomy is one of the most frequently performed surgical operations in children and is associated with an incidence of postoperative vomiting ranging between 40% and 73% [1],[2],[3],[4],[5],[6],[7]. Morbidity related to postoperative nausea and vomiting (PONV), pain, poor oral intake, dehydration and fever, however, continues to be a concern in children undergoing tonsillectomy in ambulatory setting [2],[7]. The delay in postoperative oral fluid intake and also inadequate oral feeding because of the nausea, vomiting and pain prolongs the discharge period, and also increases dehydration risk in the early or late postoperative period. Because of these reasons, it is extremely important in paediatric patients to bring pain, nausea and vomiting under control and also to start oral fluid intake in the earliest postoperative period [7]. Sutters et al. (2005) reported that 33% of the children in their sample experienced moderate to- severe nausea on the first evening after the procedure and 25% reported moderate-to-severe vomiting [8].

Splinter reported that each vomiting episode prolonged the hospital stay approximately by 13.2 min [9]. In children, postoperative vomiting causes distress and anxiety and may result in dehydration, metabolic disturbances, delayed discharge from the hospital, as well as unplanned hospital admission [4].The incidence of postoperative emesis is more frequent in paediatric patients than in adults [10]. Anaesthesiologists and otolaryngologists are seeking methods that will minimize this problem, especially in day care surgical programs [9]. Research has consistently reported children's pain during home recovery from tonsillectomy and adenoidectomy as moderate to severe in nature, and lasting more than 7 days[11],[12],[13],[14]. In one study, children described the passage of time and medication as contributors to pain relief [15].

Severe pain in tonsillectomy is reported in 25–50% of children and has traditionally been controlled with morphine, resulting in a high incidence of PONV as compared to other forms of analgesia. Respiratory depression and sedation from morphine may also be hazardous after pharyngeal surgery [3]. In one study, children with higher pain intensity ratings also reported less fluid intake, significantly more sleep disturbances and more behavioural changes than children with intensity scores of 0 or 1. The literature provides evidence of the inadequate treatment of postoperative pain after tonsillectomy and adenoidectomy and supports the need for further research [15]. In view of these side effects, alternative analgesic strategies have been suggested.

In children undergoing tonsillectomy, dexamethasone and other steroid preparations have been used to minimize tissue injury and oedema and related morbidity such as pain, fever and poor oral intake [2]. The antiemetic effect of dexamethasone has been demonstrated in cancer patients receiving chemotherapy and also after gynaecological , laparoscopic and caesarean operations [16],[1],[2],[17]. Dexamethasone lacks side effects when used as a single injection and has a low cost and a prolonged biological half-life of 36 to 48 hours. Also, it has combined antiemetic and anti-inflammatory effects that may decrease postoperative oedema and subsequently may

improve oral intake after tonsillectomy. However, many reports have questioned the efficacy of dexamethasone as an antiemetic as well as its beneficial effect on the quality of oral intake after tonsillectomy. This controversy may be attributed to the wide range of dosages of dexamethasone as well as the wide variety of anaesthetic techniques used [1].

The effect of dexamethasone in tonsillectomy-associated PONV, pain and oral intake however, is controversial [2]. Therefore, the aim of this study was to investigate the effect of 0.5 mg/kg i.v. dexamethasone given before the induction of anaesthesia on quality oral intake and vomiting and pain in paediatric patients undergoing tonsillectomy with or without adenoidectomy during the first 8 hours of the postoperative period.

Material and Methods

This is a quasi-experimental study that was performed at the Ilam Imam Khomeini hospital, IR, during the year 2008-2009. After approval from the institution's ethical committee and informed consent from the parents, 66 patients who were 4—12 years old, undergoing tonsillectomy with or without adenoidectomy, were enrolled in the study.

The study design was randomized, double-blinded and placebo-controlled. Children who received antiemetics, steroids, antihistaminics, or phychoactive drugs within 24 hours before surgery were excluded from the study. Additionally, children in whom i.v. induction was indicated or steroid administration was contraindicated, and patients with diabetes and mental retardation were not included in the study. Oral intake was stopped 8 hours and clear fluids were stopped 4 hours preoperatively [1],[2],[8].

After establishing standard monitoring, general anaesthesia was induced using halothane and a gas mixture of 50% nitrous oxide and oxygen. Each child received 1 µg/kg of fentanyl before surgery. 0.5 mg/kg of Dexamethasone (maximal dose 8 mg, Dexamethasone group) or an equal volume of saline (control group) was administered as IV in a randomized double-blind fashion after the induction of anaesthesia before surgery. Randomization was guided by a computer-generated number table. Age, weight, surgery time, anaesthesia time, need for requirement opioids in the PACU, incidence of PONV, need for rescue antiemetics and the quality of oral intake were documented for each patient.

The patients were closely observed for their vomiting, pain and for possible agitation status in the post anaesthesia care unit. The incidence of vomiting was recorded by the PACU nurse. The patients who met the criteria (stable vital signs, adequate pain control and absence of vomiting) were transferred to floor after 2 hours.

Pain, vomiting and oral intake were assessed by an independent observer at hourly intervals. Postoperative variables including vomiting, pain and the quality of oral intake were recorded in the ward at the 1, 3, 6 and 8 hrs, postoperatively. Pain was assessed using a five-point ''faces'' scale (1 = smiling face: no pain, 5 = crying face: highest pain score)[7]. After the parents and the nurse caring for the child were informed about the procedure, oral fluids were offered duing the second postoperative hour. The quality of oral intake was judged as follows: excellent = child requests it, good = child accepts it when offered, fair = child accepts it when coaxed, and poor = child refuses [2],[7]. Vomiting was defined as the forceful expulsion of liquid gastric contents. Nausea was not recorded because it is difficult to assess in children [9]. Vomiting was treated with 0.15 mg/kg metoclopramide IV when it occurred more than twice. Postoperative analgesia was provided with a morphine (50 µg/kg IV) – the routine analgesic treatment in our institution. All collected data were analyzed using the statistical software

(SPSS, Ver.11.5), descriptive statistics, Student t test, Mann-Whitney test and the $\chi 2$ or Fisher's exact tests. $p < 0.05$ was considered significant.

Result

None of the 66 enrolled patients was withdrawn for any reason. Baseline patient characteristics and the duration of surgery and anaesthesia are shown in [Table/Fig 1]. Demographic details and the duration of anaesthesia and the operation were not significantly different between the two groups [Table /Fig 1]. The incidence of postoperative vomiting was not significantly different between the two groups before PACU discharge (12.1% in the Dexamethasone group versus 15.1% in the Saline group, P> 0.05). The incidence of late vomiting, as well as the overall incidence of vomiting during both the PACU and the floor stay, was significantly more frequent in the control group (6% versus 36.3%, P < 0.05 for late vomiting and 18.1% versus 51.5%, P < 0.001 for the overall incidence of vomiting). Also, the total antiemetic requirement was lower in the Dexamethasone group (p<0.001) [Table /Fig 2]. The time for the first oral intake was significantly shorter, and the quality of oral intake was significantly better in the Dexamethasone group (P <0.05 and p<0.001, respectively) [Table /Fig 2]. Patients in the dexamethasone group had significantly lower pain after tonsillectomy and the total consumption of the analgesic was lower in this group than in the placebo group (P < 0.05 and p<0.05, respectively) [Table/Fig 2].

(Table/Fig 1) Patient characteristics

Characteristics	Treatment group		
	Dexamethasone (n=33)	placebo (n=33)	Pv
Age (years)	6.4 ± 2.2	6.1±2.8	> .05
Weight (kg)	19.2± 5.3	20.3±6.8	> .05
Sex (F/M)	18/15	16/17	> .05
Duration of surgery (min)	40.7±6.7	42.3±8.4	> .05
Duration of anesthesia (min)	57.4±7.4	55.6±4.8	> .05

(Table/Fig 2) outcome parameters according to randomization group

Outcome parameters	Treatment group		
	Dexamethasone (n=33)	placebo (n=33)	Pv
Vomiting [(n)%]			
PACU	[4 (12.1%)]	[5 (15.1%)]	>.05
Floor	[2 (6%)]	[12(36.3%)]	<.05
Overall	[6(18.1%)]	[17(51.5%)]	<.001
Overall Antiemetic requirement [(n)%]	[6(18.1%)]	[17(51.5%)]	<.001
Overall Analgesic requirement [(n)%]	[5(15.1%)]	[16(48.4%)]	<.05
Time to first oral intake (hr) (mean ± SD)	(4.33±3.1)	(8.2±5.2)	<.05
Good to excellent oral intake (%)	78%	33%	<.001
Pain score after 1h of treatment (mean ± SD)	(3.2±1.2)	(4.3±1.3)	<.05
Pain score after 3h of treatment (mean ± SD)	(2.8±1)	(3.6±1.2)	<.05
Pain score after 6h of treatment (mean ± SD)	(1.8±.5)	(2.7±.7)	<.05
Pain score after 8h of treatment (mean ± SD)	(1± 2)	(2=.5)	<.05

Discussion and Conclusion

The aim of this study was to investigate the effects of 0.5 mg/kg i.v. dexamethasone given before the induction of anaesthesia on the quality of oral intake, vomiting and pain in paediatric patients undergoing tonsillectomy with or without adenoidectomy during the first 8 hours of the postoperative period. The efficacy of dexamethasone as an antiemetic has been well established in chemotherapy induced nausea and vomiting, but studies of its antiemetic potential in children undergoing tonsillectomy have produced conflicting results [2].

In this present study, the administration of preoperative dexamethasone at a dose of 0.5 mg/kg in patients undergoing tonsillectomy with or without adenoidectomy in the sharp dissection technique was associated with a reduced postoperative pain score, reduced vomiting and an increased quality of oral intake during the hospital stay.

Although some studies failed to show any significant effect of dexamethasone on the incidence of postoperative vomiting, there have been a quite number of randomized, placebo-controlled studies revealing a decrease in vomiting incidence [7]. Aouad et al. found that the vomiting incidence in patients undergoing tonsillectomy or adenotonsillectomy and in those who were administered 0.5 mg/kg of dexamethasone preoperatively was 10% and in the placebo group, it was was 30% ($p < 0.05$) [1]. In a similar study, Elhakim et al. demonstrated that the vomiting incidence was 30% and 56%, respectively in both the groups ($p < 0.05$) [19].

Volk et al, in a prospective, randomized, double-blind study, observed no differences in postoperative recovery variables such as oral intake, level of activity and analgesic use in children who received a single dose of 10 mg of dexamethasone IV versus placebo, although they did not specifically examine PONV. Catlin and Grimes examined the incidence of vomiting in addition to pain, fever, and oral intake in 25 children (4-12 yrs of age) who received placebo or dexamethasone (8mg) IV before tonsillectomy. The only difference they observed was after returning to a full diet, which was faster after the intake of dexamethasone [1].

In the meta-analysis of eight published studies, Steward et al reported that in patients undergoing tonsillectomy, preoperative dexamethasone decreased the vomiting incidence two times and improved the oral intake of clear fluids and a soft diet within the first 24 hours when compared with the placebo group. On the other hand, when pain scores were compared, these studies failed to show any significant difference because of missing data and differences in the evaluation methods. [20]. The antiemetic action of dexamethasone occurs via prostaglandin antagonism and by the release of endorphins and tryptophan depletion. But it is not clear whether dexamethasone shows its effect by a central or peripheral mechanism in this procedure [7]. The efficacy of dexamethasone in minimizing late PONV in this study and several other published studies is consistent with its biological half-life of 36-48 hrs.[7],[2]. Factors that may influence vomiting include age, surgical procedures, anaesthetic care, postoperative management, and concurrent drugs [9]. Unlike the studies that demonstrate the positive effects of dexamethasone on pain in patients undergoing adenotonsillectomy, some published papers could not reach the same results [7]. In our study, the pain score in the first 8 hrs of the postoperative period was lower in the dexamethasone group as compared to the control group ($p < 0.05$). These results may be attributed to the anti-inflammatory effect produced by dexamethasone, which may reduce local oedema and pain [7].

The time for the first oral intake was shorter in the Dexamethasone group as compared to the Saline group. The quality of oral intake was better in the Dexamethasone group as compared to the Saline group. These results may be attributed to the antiinflammatory effect produced by corticosteroids, which may reduce oedema and pain [1]. Aouad et al. noted that the first oral intake time in the dexamethasone group was 5.3 hrs and that in the placebo group was 10.9 hrs ($p < 0.05$), and also oral intake quality was higher at 24 hrs postoperatively in the dexamethasone group [1]. Pappas et al. found no significant difference while comparing the pain scores and the quality of oral intake within the first 3 hrs between the two groups postoperatively; however, when examining the 24 hr quality of oral intake, the dexamethasone group showed significant improvement [2]. Complications from corticosteroids therapy such as an increased rate of infection, peptic ulceration, and adrenal suppression, are usually related to its long term use. The risks of steroid therapy of 24 hours are negligible [1],[2],[7].

In conclusion, our results showed that the use of dexamethasone 0.5 mg/kg IV up to 8 mg after the induction of anaesthesia in children undergoing tonsillectomy with or without adenoidectomy significantly decreases the incidence of postoperative vomiting, mainly after discharge from the PACU. Also, it improves the quality of oral intake, shortens the time to the first oral intake and decreases the postoperative pain.

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