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Effect of dexamethasone on post tonsillectomy pain and vomiting in adults. A randomized controlled trial

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Abstract

Tonsillectomy with or without adenoidectomy is one of the most commonly performed ear, nose, and throat surgeries worldwide. After this intervention, many patients develop nausea, vomiting, and pain Dexamethasone has recently been used as prophylaxis for postoperative nausea and vomiting in children undergoing tonsillectomy. The aim of the work is to evaluate the effect of dexamethasone on postoperative pain and vomiting in adult patients undergoing tonsillectomy. This randomized control study conducted on 120 patients who underwent elective tonsillectomy and divided into two groups. Study group (Group A): included 60 patients who received intravenous dexamethasone 0.5 mg/kg (maximum 16mg) once daily for 3 days. The first dose was with induction of anesthesia. Control group (Group B): included the same number of patients with age and sex match who received equivalent volume of saline for 3 days. The first dose was also with induction of anesthesia. Detailed history was taken from the patients. General examination including vital signs, chest, heart and abdominal examination. Full ENT examination, Oral and oropharyngeal examination, Nasal examination, Ear examination, Neck examination, Preoperative Investigations and assessment, operative workup, post-operative follow up including post- tonsillectomy pain assessment by Visual Analogue Scale (VAS) score, post-tonsillectomy vomiting assessment, the frequency of early vomiting (within 4 hours postoperatively) and late vomiting (beyond 4 hours postoperatively up to 3 days) was assessed in all patients. There was a significant reduction of post tonsillectomy pain in the first post operative day and highly significant reduction of post tonsillectomy pain in the second & third post operative day with dexamethasone use. Post operative vomiting was significantly less late in the first as well as second post operative day with dexamethasone use. Post operative vomiting early in the first as well as third post operative day was not affected by dexamethasone. Application of 3 doses of 0.5 mg/kg I V dexamethasone once daily for 3 days post tonsillectomy resulted in reduction of postoperative pain and vomiting.

Keywords: Tonsillitis, Tonsillectomy, Postoperative vomiting, Dexamethasone.

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1. Introduction

Tonsillitis is an infection of the tonsils that can make the tonsils swell and give sore throat. Frequent episodes of tonsillitis might be a reason to have a tonsillectomy. Other symptoms of tonsillitis include fever, trouble swallowing, and swollen glands around the neck. Tonsillitis and the need for tonsillectomies are more common in children than adults. However, people of any age can experience trouble with their tonsils and require surgery. One case of tonsillitis is not enough to warrant a tonsillectomy. Usually, the surgery is a treatment option for those who are often sick with tonsillitis or strep throat. At least seven cases of tonsillitis or strep in the last year (or five cases or more over each of the last two years), a tonsillectomy is an option [1]. There are several different ways to remove tonsils. One common method is called ―cold knife (steel) dissection. In this case, surgeon removes tonsils with a scalpel or other steel instrument like suitors. Another common method for tonsillectomy involves burning away the tissues through a process called cauterization. Ultrasonic vibration (using sound waves) is also used in some tonsillectomy procedures. Laser and radio waves are also used by some surgeons [2]. Numerous studies have compared surgical techniques, and analyzed perioperative morbidity and recovery after partial versus total tonsillectomy. The evidence consistently shows that partial tonsillectomy—whatever technique is used—has lower morbidity and equivalent or easier recovery than total tonsillectomy [3]. The recovery period after tonsillectomy in children is usually 4 days to a week, while adults may have symptoms up to 2 weeks [4]. The odynophagia can be severe enough to limit oral intake and patients on occasion

may become dehydrated requiring admission for intravenous fluid administration [5].

The intensity of postoperative pain remains underestimated and undertreated**.** Pain relief after tonsillectomy is often brushed aside as trivial. Patients suffer from dysphagia, otalgia, and inability to speak properly in the period after operation [6]. The incidence of postoperative nausea and vomiting (PONV) ranges between 40–73% High incidence of postoperative nausea and vomiting (PONV) along with tempro mandibular joint problems and delayed oral starts always posed a challenge for otolaryngologist and anaesthesiologist after tonsillectomy. Heavy dose of antibiotics along with steroids and analgesics have been used, but with controversial results [7]. Although nausea and vomiting are considered a minor postoperative complication, yet it may assume significance in short stay and day care surgery like tonsillectomy. PONV can be very distressing, resulting in bleeding, dehydration, electrolytes and acid base imbalance. Persistent retching and vomiting can impair the results of various surgical procedures and increase the risk of pulmonary aspiration of vomitus. It also prolongs stay in the post-anaesthesia care unit (PACU), delays discharge and increase hospital admission rate [8]. Several studies have examined the use of peri-operative dexamethasone to reduce post-tonsillectomy morbidity; however, there has been no consensus regarding their routine use [9]. Dexamethasone has antiemetic properties in the surgical setting. An international expert panel recommended dexamethasone, alone or as part of a multimodal regimen, for PONV prophylaxis in adults. It has been suggested that, especially in children undergoing tonsillectomy, dexamethasone is useful, not only for its antiemetic but also for its analgesic effects, and that it should be used routinely because the adverse effects and cost appear negligible. Indeed, dexamethasone for tonsillectomy has become standard care in many institutions [10]. It was found that dexamethasone uses in children resulted in a significant reduction in post-tonsillectomy nausea and vomiting, and a statistically significant pain reduction during the first 24 h, with an increase in the number of children being able to take a soft or solid diet on the first post-operative day [11]. Steroids also reduces oedema and sensitization on pain nerve terminals at the operation site. Tissue-injury induced acute inflammation, nerve irritation and spasm of exposed pharyngeal muscle are known to play a role in the genesis of post-tonsillectomy pain. By inhibiting phospholipase enzyme, corticosteroids block both the cyclo-oxygenase and lipo-oxygenase pathways and thus prostaglandin production, thereby leading to pain relief [12]. Peri-operative dexamethasone reduces PONV, which can be distressing for patients if uncontrolled and could also trigger postoperative bleeding. Patients experiencing uncontrolled PONV may require unplanned overnight admission [13]. Systemic steroids have been shown to be as efficient as 5-HT3 antagonists and droperidol in reducing postoperative nausea and vomiting. Their use is increasing and currently recommended in recent guidelines of the American Academy of Otolaryngology-Head and Neck Surgery Foundation for tonsillectomy in children [14]. The mechanism by which, dexamethasone exerts an analgesic effect is not fully understood. Glucocorticoids have strong anti-inflammatory action and have demonstrated reduced pain and swelling after oral surgery [12].

2. Patients and Methods

This randomized control study conducted on 120 patients who underwent elective tonsillectomy and divided into two groups. Study group (Group A): included 60 patients who received intravenous dexamethasone 0.5 mg/kg (maximum 16mg) once daily for 3 days. The first dose was with induction of anesthesia. Control group (Group B): included the same number of patients with age and sex match who received equivalent volume of saline for 3 days. The first dose was also with induction of anesthesia. This study was conducted in the department of Otorhinolaryngology at Dairut general Hospital from July 2017 to July 2019 after obtaining approval from the Medical Ethics Committee in faculty of Medicine at Assiut University. The study participants were not identified by name in any report or publication resulting from data collected in this study. An informed consent was obtained from all the patients or their parents. Detailed history was taken from the patients. General examination including vital signs, chest, heart and abdominal examination. Full ENT examination, Oral and oropharyngeal examination, Nasal examination, Ear examination, Neck examination, Preoperative Investigations and assessment, operative workup, post-operative follow up including post-tonsillectomy pain assessment by Visual Analogue Scale (VAS) score, post- tonsillectomy vomiting assessment, the frequency of early vomiting (within 4 hours postoperatively) and late vomiting (beyond 4 hours postoperatively up to 3 days) was assessed in all patients.

2.1. Statistical analysis

Data were analyzed using IBM SPSS software package version 20 (Armonk, NY, IBM Corp.). Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution. Quantitative data were described using range (minimum and maximum), mean, and standard deviation. Chi-squared test was used to compare the three groups according to categorical variables. Significance of the obtained results (P value) was judged at the 5% level.

3. Results

The age of our patients ranged from 18 to 35 years with a mean age around 25.5 years (Table 1). Males and females were almost equally distributed in the study (Table 2). The mean duration of surgery between the 2 groups was less than 1.5 minute different. The mean BMI was almost identical (Table 3). When we grouped the duration of surgery into 3 groups, the individual group of surgery duration included almost similar number of patients in both groups (Table 4). The difference – however- was insignificant, in the other degrees of pain, namely the moderate, sever, worst, and the no-pain group (Table 5). The other degrees of pain namely, moderate, worst and no-pain showed no significant difference between the 2 groups (Table 6). By the 3rd postoperative day, there was significantly larger number of patients with no-pain and mild degree of pain in group A than in group B, ($p<0.01$). Also, there was significantly a smaller number of patients expressing moderate and severe degree of pain in group A than in group B. Although the worst degree of pain was present in a smaller number of patients in group A than B, the difference was statistically insignificant (Table 7).

In the first post operative day, there were fewer patients in group A suffered vomiting compared with group B. Dexamethasone has decreased the number of patients with vomiting to the half in the 2nd day. The antiemetic effect of dexamethasone which was obvious in the late 1st day and 2nd day faded away by the 3rd postoperative day (Table 8). This difference was however statistically insignificant. Dividing the results of vomiting in the first day into early and late results showed that vomiting in the early postoperative hours was very much similar in the 2 groups (Table 9).

4. Discussion

Although tonsillectomy is one of the most common surgical procedures performed worldwide, postoperative morbidity is still remaining a significant clinical problem despite the advances made in anesthetic and surgical techniques. The most common complications after tonsillectomy are pain and bleeding. Other less common complications include nausea and vomiting, pulmonary complications and tempromandibular joint dislocation [15]. Dehydration is however the most common reason for return to the hospital or clinic. The reasons responsible for dehydration include nausea and vomiting and more importantly pain. Pain can lead to poor oral intake in many patients with subsequent dehydration. Significant pain is to be expected for at least a week in children and two weeks in adults, and may last longer. Appropriate analgesia is important in allowing patients to eat adequately. The effect of systemic corticosteroids on the course of post-tonsillectomy pain and vomiting as well as on healing process has been investigated in children in numerous studies. Data in adult patients undergoing tonsillectomy are rare [16]. Some studies have shown that younger ages and female patients were more vulnerable for post-operative nausea and vomiting than older ages and male gender. Other factors mentioned in the same study were duration of anesthesia, inhalation-type anesthetics, and the intra-operative use of opioids [11]. The age of our patients ranged from 18 to 35 years with a mean age around 25.5 years. More than 3/4 of these patients were 25 years or less and the remaining quarter was above 25 years. We have chosen our patient to be adults because the English literature is crowded with similar studies in children while it is relatively lacking studies addressing this issue in adults. Adults suffer more pain for longer time than children do although dehydration and return to hospital is far-less likely in adults [16]. Males and females were almost equally distributed in the study. The demographic data of patients in the study group and control group were very much similar for the sake of validating the comparison. The mean duration of surgery between the 2 groups was less than 1.5 minute different. The mean BMI was almost identical. This reflects the close similarity between the dose and duration of anesthesia between the 2 groups. When we grouped the duration of surgery into 3 groups, the individual group of surgery duration included almost similar number of patients in both groups. Such similarity reflects the standardized surgical and anesthesia factors in the 2 groups because the anesthetic dose and duration both have impact on the postoperative nausea and vomiting [17]. On comparing the degree of pain in the first postoperative day, significantly larger number of patients felt mild degree of pain in group A (dexamethazone group) than in group B (control group). The difference – however- was insignificant, in the other degrees of pain, namely the moderate, sever, worst, and the no-pain group. It is important here to mention that although the difference in mild degree of pain between the 2 groups was significant, the number of patients in this sector of pain degree was too small {only 6 patients (10 %) in group A and only 3 patients in group B (5%)}. By the 3rd postoperative day, there was significantly larger number of patients with no-pain and mild degree of pain in group A than in group B, ($p<0.01$). Also, there was significantly a smaller number of patients expressing moderate and severe degree of pain in group A than in group B. Although the worst degree of pain was present in a smaller number of patients in group A than B, the difference was statistically insignificant. The worst degree of pain was present in around 8% of patients in average. This degree of pain showed no statistically significant differences between the 2 groups of patients in any day of the ttuyiey days. The reason for that is not clear to us. It might- however- be a kind of patient variability in the pain perception or in their response to the VAS scale. It is sure that the VAS is not a 100% accurate assessment method because it is a quite subjective assessment. Patients might respond to the VAS siore differently to the same degree of pain. Local factors in these patients, like the size of the tonsils, the degree and depth of dissection might play some role in this response. The study - for many reasons which were out of our hands, - could not consider these factors. Using subjective methods of assessment of postoperative pain and the number of vomiting attacks in the 1st postoperative day to assess the effect of dexamethasone on vomiting after pediatric tonsillectomy, Elhakim et al., (2003) in Egypt found similar results to ours in both pain and vomiting. Despite the fact that they used hot tonsillectomy not the dissection method we used and their assessment duration was shorter (6 hours for pain and a day for vomiting) [10]. Tewary et al., in 1993 failed to find any added significant improvement in post operative pain in their adult patients having tonsillectomy [18]. They used both the VAS as well as the number of patients requiring more hospital stay days because of pain as their predictors for analgesia. It is important here to mention that they used intropeative as well as postoperative opioids together with paracetamol to achieve proper analgesia in their patients. The type of anesthetic used for induction, maintenance and premedications used were different from ours. In our study Post operative vomiting was compared in both dexamethasone and control groups in the 3 post operative days. In the first post operative day, there were fewer patients in group A suffered vomiting compared with group B. Around 15 % of patients suffered vomiting in both groups. With the passage of hours, 80% of patients in the control group continued to have vomiting in the first day, while only 22% of the dexamethasone group did the same thing. The difference here was statistically significant. It looks to us that the local throat irritation augmented by the emetic effect of the inhalation anesthetic has overcome the antiemetic effect of dexamethasone. When the effect of the anesthetic faded away dexamethasone exerted its antiemetic effect. The antiemetic effect of dexamethasone continued to be present in the second day where significantly a smaller number of patients in group A had vomiting relative to group B.

McKean et al., (2006) in Scotland, evaluated dexamethasone taken with induction of anesthesia for adult patients having cold tonsillectomy. Statistically significant reduction in both postoperative nausea and vomiting as well as postoperative pain was recorded. The surprising thing in this study was that the better pain control with dexamethasone continued to be observed for a week long despite the only single dose of the drug used with induction. It is to be mentioned here that their postoperative pain control regimen included paracetamoo, diclofenac, morphine, dihydrocodeine, together with cyclizine [19]. Using different concentrations of dexamethasone at the time of induction of anesthesia, and using the stoppage of postoperative nausea and vomiting at one side and the need for ibuprofen at the other, Czarnetzki et al., (2008) have evaluated the value and adverse effects of dexamethasone in postoperative pain and nausea/vomiting. Their target patients were children having tonsillectomy. They found that using postoperative dexamethasone was associated with significantly less chance for postoperative nausea/vomiting. Also, children used the drug needed less ibuprofen. The antiemetic effect of dexamethasone was dose dependent. The use of dexamethasone showed to them an increased risk of post-tonsillectomy bleeding [20].

Table 1: Age groups, range, median, mean ± SD of the whole studied patients.

Age (years)	No.(120)	%
18-25	92	76.7
>25	28	23.3
Range 18-35 years, Median 25.5 years & Mean± SD 25.55 ± 1.46		

Table 2: Sex distribution of the studied patients.

Sex	No. (120)	%
Males	57	47.5
Females	63	52.5

Table 3: Difference between both groups in terms of mean duration of surgery and BMI.

	Group A (n = 60)	Group B (n = 60)	P value
Mean duration of surgery (min)	38.84	37.56	0.638
Mean BMI	27.67	27.34	0.941

Table 4: Different length of surgery in both groups.

Duration of surgery (min)	Group A		Group B		P
	No.	%	No.	%	
20-30min	21	35.0	19	31.6	**0.654**
31-40 min	24	40.0	23	38.3	**0.836**
41-50 min	15	25.0	18	30.0	**0.460**

Table 5: Group A versus group B in the degree of pain in the first day.

Degree of pain:	Group A		Group B		P
	No.	%	No.	%	
No pain	1	1.7	1	1.7	1
Mild	6	10.0	2	3.3	**0.045**
Moderate	26	43.3	27	45	**0.846**
Sever	26	43.3	28	46.7	**0.7**
Worst	1	1.7	2	3.3	**0.414**

Table 6: Group A versus group B in the degree of pain in the second day.

Degree of pain:	Group A		Group B		p
	No.	%	No.	%	
No pain	3	5	2	3.3	**0.527**
Mild	23	38.3	6	10	0.000*
Moderate	19	31.7	23	38.3	**0.382**
Sever	9	15	19	31.7	**0.007**
Worst	6	10	10	16.7	**0.157**

Table 7: Relation between group A versus group B and degree of pain in the 3rd day.

Degree of pain:	Group A		Group B		P
	No.	%	No.	%	
No pain	8	13.3	1	1.6	**0.000***
Mild	23	38.3	3	5	0.000*
Moderate	14	23.3	29	48.3	**0.001***
Sever	11	18.3	20	33.3	**0.022**
Worst	4	6.7	7	11.7	**0.2**

Table 8: Group A versus group B in terms of vomiting in the 3 postoperative days.

Patients with Vomiting	Group A (60 pts)	Group B (60 pts)	P value
Ist day	11	18	0.066
2nd day	7	14	0.030
3rd day	5	6	0.669

Table 9: Group A versus Group B in early & late 1st day vomiting.

Vomiting :	Group A		Group B		p
	No.	%	No.	%	
Early	9	15.0	10	16.7	**0.745**
Late	2	3.3	8	13.3	**0.007**

In our study dexamethatoie at a dose of 0.5mg/kg for 3 days did not result in negative effects in term of increased bleeding or infection. In their excellent systematic review of different analgesics and dexamethasone for post-tonsillectomy pain in adults, Tolska et al., (2019) concluded that 1st day post-tonsillectomy pain was 17-23% less with single intraoperative dose of dexamethasone. They also recorded reduction in pain intensity lasted beyond the 1st postoperative day in all multiple-dose studies [21].

5. Conclusions

Post operative vomiting early in the first as well as third post operative day was not affected by dexamethasone. Application of 3 doses of 0.5 mg/kg I V dexamethasone once daily for 3 days post tonsillectomy resulted in reduction of postoperative pain and vomiting

Conflict of interest

There is no conflict of interest.

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