The Efficacy of Injection of 0.25 mg/kg Dexamethasone after Induction of Anesthesia on Reducing Tonsillectomy Morbidities

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Abstract
Tonsillectomy is one of the most commonly performed surgical procedures in otolaryngology practice. Nausea, vomiting, pain, decreased oral intake and dehydration are frequently associated with tonsillectomy. This study demonstrates the effect of prophylactic administration of dexamethasone as a single dose on post-tonsillectomy morbidities. This was a comparative cross-sectional study of pediatric patients (3-15 years) attending the otolaryngology outpatient clinics at King Abdulaziz University Hospital between October 2010 – December 2012. A sample of 100 patients, divided into two groups of 50 patients was included for analysis. The first group received intravenous dexamethasone (0.25 mg/kg) as a single dose with induction of anesthesia. In the second, control, group, no pre-operative dexamethasone was administered. The outcome was assessed by a questionnaire distributed to both groups to evaluate post-operative nausea, vomiting, pain and early oral feeding. Pain score was assessed using a visual analogue scale (ranging from 0 to 10. Our results showed a statistically significant reduction in morbidity associated with tonsillectomy, supporting the administration of single dose intravenous dexamethasone during tonsillectomy.

Keywords
Tonsillectomy; Post-operative; Morbidity; Dexamethasone

Introduction
Tonsillectomy is one of the most commonly performed ear, nose, and throat surgeries worldwide. It is associated with several morbidities, including pain, nausea, vomiting, oropharyngeal edema and poor oral intake. Despite advances in anesthetic care and surgical techniques, post tonsillectomy pain, malaise, nausea, vomiting and decreased oral intake remain a significant concern for patients and their family members.

According to one meta-analysis, a single dose of dexamethasone administered during tonsillectomy was associated with a statistically significant reduction in post-tonsillectomy morbidity. Others authors have also shown that prophylactic dexamethasone reduced post-tonsillectomy nausea and vomiting, suggesting that it is an effective 5-HT3 antagonist. It also decreases...
post-tonsillectomy pain and increases in oral intake and earlier tolerance to soft and regular foods\(^{[4]}\).

The objective of this study is to determine the role of dexamethasone (steroid) in decreasing morbidity associated with tonsillectomy.

**Subjects and Methods**

This study was a comparative cross-sectional study conducted at the outpatient clinics of the Ear, Nose and Throat (ENT) Department at King Abdulaziz University Hospital between October 2010 – December 2012 on patients who required tonsillectomy. Patients were informed about the study, including the medication administered, as well as the benefits and risks involved. Informed consent was taken with operative consent. The demographic data of the patients are shown in Table 1.

One hundred patients with a diagnosis of chronic tonsillitis were included in the study, age 3 – 15 years, both genders. The exclusion criteria were patients with hypertension, diabetes mellitus, psychotic illness and bleeding disorders.

All patients were examined, and their medical history was documented prior to surgery; baseline investigations, such as a complete blood count were performed for all included patients. Tonsillectomy was performed by the same surgeon who applied the same technique. Patients were divided into two groups:

- The first group: received 0.25 mg/kg intravenous dexamethasone after induction of anesthesia. Up to maximum 12 mg.
- The second group: did not receive pre-operative dexamethasone.

All patients were assessed in the three parameters which included the following:

1. Pain score
2. Difference in oral intake
3. Nausea and vomiting

**Table 1.** Age and gender of the studied groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Steroid N = 50</th>
<th>Control N = 50</th>
<th>Test of Significance of P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>5.2 ± 2.71</td>
<td>5.4 ± 1.92</td>
<td>0.55</td>
</tr>
<tr>
<td>Range</td>
<td>(3-15)</td>
<td>(4-15)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29</td>
<td>27</td>
<td>0.68</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1.** Age of both control and steroid group.

**Figure 2.** The gender of steroid and control group.
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The main outcome measures included: the pain score using the visual analogue scale with 0 corresponding to no pain and 10 to severe pain (Table 2). The difference in starting post-operative feeding in the two groups is shown in Table 3, while the incidence of post-operative nausea and vomiting in both groups is shown in Table 4.

Sample size calculation was done at alpha error 0.05 and confidence level 0.95. Beta error was 0.20 and the power of the study was 0.80. The sample was decided at 50 patients in each group.

Statistical Analysis

The data were collected and analyzed using the IBM SPSS Statistics for Windows, Version 22 (IBM Corp., Armonk, NY USA).

Quantitative data were presented as mean and standard deviation. “Student’s” t test was utilized as a test of significance to compare the two groups. Qualitative data were presented as frequencies and percentages. A chi-square ($\chi^2$) test was used as a test of comparison between each of the two groups. Significance was considered at $p$ value less than 0.05.

Results

The mean age of the patients was 5.2 years and 5.4 years for the steroid and control groups, respectively. When categorized by gender, the frequency of patients in both groups was as follows: 29 males in the steroid group versus 27 in the control group and 21 females in the steroid group versus 23 in the control group (Table 1, Figs. 1 and 2).

There was significant difference in the level of pain in the steroid group compared with the control group ($P < 0.001$): 50% of patients in the steroid group complained of no or only mild pain compared with 10% in the control group. In the steroid group 15 (30%) and 10 (20%) of the patients suffered from moderate and severe pain, respectively; compared with the control

Table 2. Visual analogue score of the studied groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Steroid N = 50</th>
<th>Control N = 50</th>
<th>Test of Significance P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild or No Pain</td>
<td>25 (50.00%)</td>
<td>5 (10.00%)</td>
<td></td>
</tr>
<tr>
<td>Moderate Pain</td>
<td>15 (30.00%)</td>
<td>25 (50.00%)</td>
<td></td>
</tr>
<tr>
<td>Severe Pain</td>
<td>10 (20.00%)</td>
<td>20 (40.00%)</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

*Significant at alpha <0.05

Figure 3. Comparison of the degree of pain in steroid and control group.
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Table 3. Post-operative start of feeding of the studied groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Steroid</th>
<th>Control</th>
<th>Test of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early start of feeding</td>
<td>35 (70.00%)</td>
<td>20 (40.00%)</td>
<td>P = 0.002 *</td>
</tr>
</tbody>
</table>

* Significant at alpha <0.05

Figure 4. The difference in post-operative start of oral feeding between the steroid and control group.

Table 4. Post-operative nausea and vomiting of the studied groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Steroid</th>
<th>Control</th>
<th>Test of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea and Vomiting</td>
<td>10 (20.00%)</td>
<td>20 (40.00%)</td>
<td>P = 0.015 *</td>
</tr>
</tbody>
</table>

* Significant at alpha <0.05

Figure 5. The difference in post-operative nausea and vomiting between the steroid and control group.
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Table 3 shows post-operative outcomes related to feeding. There was significant difference between the two groups (P = 0.002), with 35 (70%) patients from the steroid group starting early feeding compared to only 20 (40%) in the control group as in Figure 4.

Table 4 shows a significant different in the improvement of post-operative outcomes (nausea and vomiting morbidities) between the steroid and control group. Only 10 (20%) patients in the steroid group had nausea and vomiting compared with 20 (40%) in the control group (P=0.015), as in Figure 5.

Discussion
Post-tonsillectomy morbidities including pain, decreased oral intake, fever, dehydration, nausea and vomiting continue to be significant. In spite of advances in surgical and anesthetic technique as well as the use of pharmacological agents to control pain and nausea, patients and their family are still concerned about post-operative symptoms. Our study showed a decrease in the incidence of post-operative pain scores and improvement in the quality of early oral intake after administration of single–dose intravenous dexamethasone (0.25 mg/kg/body weight), administered after anesthesia induction. Several recent publications supported the use of steroids for reducing tonsillectomy symptoms[6-8]. Steroids are thought to reduce tissue damage as well as post-operative pain and edema by suppressing the deposition of fibrin, dilating capillaries causing leukocyte migration, increasing the capillary permeability and reduce post-operative edema formation.

Steroids also have an anti-emetic effect and have been used in patients undergoing chemotherapy[9]. Steroids may exert an anti-emetic action by antagonizing prostaglandins, inhibiting isonotonin in the gut and releasing endorphins. In a study conducted on a small sample of patients, Carr et al.[10] found that single-dose intravenous dexamethasone administrated during tonsillectomy reduced pain post-surgery over 10 days. Malde et al.[11] studied the effectiveness of single-dose intravenous dexamethasone (0.15 mg/kg) in patients above 3 years of age and showed that dexamethasone provided significant analgesia, reduced post-operative edema and improved the quality of oral intake.

Samarkandi et al.[12] showed that in pediatric patients, the administration of dexamethasone reduced post-tonsillectomy vomiting and pain. In a case-control of 30 adult tonsillectomies, Al-Shehri[13] showed that frequency of pain, nausea and vomiting was lower in the pre-operative dexamethasone group. Furthermore, patients in the pre-operative dexamethasone group had better healing and less slough and granulation than controls; no adverse effects were reported.

In another study conducted by Splinter and Roberts[14] it was shown that dexamethasone reduced post-tonsillectomy vomiting.

Steward et al.[15], performed a meta-analysis, which included eight double-blinded, randomized, placebo controlled studies, and recommended single intravenous dose of dexamethasone keeping its efficacy, safety and its cost effectiveness. Their findings are consistent with the results of our study.

Conclusion
Overall, a single intravenous dose of dexamethasone (0.25 mg/kg) administered before tonsillectomy in an otherwise healthy child was safe and resulted in a statistically significant reduction in post-operative pain, nausea, and vomiting and improved oral intake in the first 24 hours following tonsillectomy. Owing to the absences of side effects in our sample, we highly recommend administration of a single intravenous dose of dexamethasone in the pre-operative protocol for tonsillectomy.

Conflict of Interest
The author has no conflict of interest.

Disclosure
The author did not received any type of commercial support either in forms of compensation or financial for this study. The author has no financial interest in any of the products or devices, or drugs mentioned in this article.

Ethical Approval
Obtained.
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Reference

تأثير مدى فعالية إعطاء جرعة 0.25 مليجرام/كيلوجرام ديساميثاسون المساحبة للتخدير في تخفيف مضاعفات عملية استئصال اللوزتين

سعد محمد صلاح المحياوي
قسم الأنف والأنف الحنجرة، كلية الطب، جامعة الملك عبد العزيز
المملكة العربية السعودية

المستخلص. الهدف من هذه الدراسة هو معرفة مدى تأثير فعالية إعطاء جرعة (0.25 مليجرام/كيلوجرام) من ديساميثاسون خلال التخدير لتخفيف المضاعفات المساحبة لعملية استئصال اللوزتين. تم عمل دراسة مقارنة بين 100 مريض يتبعون بعديا الأنف والأنف الحنجرة ويحتاجون لاستئصال اللوزتين في الفئة العمرية بين (3 سنوات - 15 سنة). تم تقسيم المرضى إلى مجموعتين. المجموعة الأولى أعطيت جرعة 0.25 مليجرام/كيلوجرام ديساميثاسون عند إعطاء التخدير. والمجموعة الثانية لم تتعرض هذه الجرعة. تم تقييم المضاعفات المساحبة لعملية استئصال اللوزتين إلى الأمام بعد العملية، سرعة الاحترش على الطعام، النقيب، وقد أثبتت نتائج هذه الدراسة فعالية إعطاء جرعة 0.25 مليجرام/كيلوجرام ديساميثاسون خلال العملية في تخفيف المضاعفات المساحبة لاستئصال اللوزتين.