

EFFECT OF DEXAMETHASONE FOR REDUCING POST-TONSILLECTOMY MORBIDITY

D.A. Hiremath¹

HOW TO CITE THIS ARTICLE:

DA Hiremath. "Effect of Dexamethasone for reducing post-tonsillectomy morbidity". Journal of Evolution of Medical and Dental Sciences 2013; Vol2, Issue 41, October 14; Page: 7909-7915.

ABSTRACT: BACKGROUND SURVEY: Vital healthcare resources are devoted to caring patients with prolonged hospitalization after routine, moderate risk surgery. Complications are assessed using a postoperative morbidity. Methods for reducing pain, nausea and vomiting after tonsillectomy are important to improve the standard of care our patients receive. **OBJECTIVE:** To determine the effects of a single dose of dexamethasone on post operative morbidity in patients undergoing tonsillectomy/adenotonsillectomy. **DESIGN:** It is a prospective double-blind randomized placebo controlled clinical investigation with ethical approval. **METHODS:** 60 patients (41 male and 19 female) aged between 4-15 years of ASA I-II undergoing tonsillectomy/adenotonsillectomy were the participants in this study. Patients were randomized to receive a single dose of IV dexamethasone or Placebo (saline). Post operative pain was assessed using either objective pain scale (OPS) or visual analogue scale (VAS). Anesthetic and surgical techniques were standardized. **RESULTS:** Statistically significant relative decrease in incidence of post operative pain, nausea and vomiting was seen in those treated with dexamethasone. Even statistically significant differences were seen in tolerance to oral fluids and discharge from the hospital between two groups. Tramadol 1 mg/kg in the first 6 hours and oral paracetamol 10ug/kg in the next 6-24 hours were administered. If OPS > 6 or VAS > 40 occurred. Incidence of nausea, vomiting and tonsillar bed oedema was noted. Pain scores were significantly less in dexamethasone group compared to control group. **CONCLUSION:** Dexamethasone given as a single dose of 0.15mg/kg at the time of induction of anesthesia is an effective safe and inexpensive method of reducing morbidity in tonsillectomy.

KEYWORDS: Dexamethasone, post-tonsillectomy morbidity.

INTRODUCTION: Despite the evolution of anaesthetic and surgical techniques available, post tonsillectomy morbidity remains a significant clinical problem not only, for the patient, but the family and anaesthetist as well [1]. Morbidity is a cornerstone assessing surgical treatment. The term postoperative morbidity may be redefined as perioperative adverse incidents. The association between pain and PONV is also proved [2]. Post tonsillectomy can limit oral intake and prolong the hospital stay. The post operative nausea and vomiting (PONV) can in addition can cause tension on sutures and bleeding and pulmonary aspiration [3]. Dexamethasone has been used successfully as an anti-emetic for chemotherapy induced vomiting [4], and it is also proved to have anti-inflammatory effect [5]. It is also exerts analgesic action following the surgery [6, 7]. Dexamethasone reduces post operative oedema by its anti-inflammatory property. The results of various randomized studies using dexamethasone in post tonsillectomy morbidity have demonstrated conflicting results [8-12], with some showing no benefit [13-14]. The aim of this study was to investigate the efficacy of single dose of dexamethasone (0.15mg/kg IV) on controlling the post tonsillectomy morbidity, mainly pain, nausea, vomiting and edema, and its influence on other factors like, intolerance to oral fluids causing prolonged hospital stay and readmissions.

MATERIAL AND METHODS: After obtaining the institutional ethical committee approval and informed consent from the participants 60 patients (41 Male and 19 female) between the age group of 4 to 15 years posted for tonsillectomy were included in this study. All were ASA Grade I/II. Patients suffering from coagulopathy, hypertension, cardiovascular or renal diseases, patients on treatment with steroids, anti histamines or anti emetics and aspirin were excluded as they cause excessive bleeding, preoperative sedation, and interfere with the outcome of our study.

30 patients (20 males, 10 females) received single dose of intravenous dexamethasone (0.15mg/kg) intraoperatively and 30 patients (21 males, 9 females) received 5 ml saline IV as placebo. Patients were randomly allocated according to computer generated random table into control or dexamethasone group. All these patients fulfilled the routine pre-operative protocol for tonsillectomies and satisfied the basic investigations like complete blood count, prothrombin time and partial thromboplastin time. Preoperatively tonsillar size was graded into four gradients.

- I Tonsil within tonsillar fold
- II Just outside the tonsillar fold
- III Well outside the tonsillar fold
- IV Reaching uvula or past uvula

All patients were premedicated with IM injection Glycopyrrolate 0.004 mg/kg, 30 minutes before induction and inj. pentazocine 0.3mg/kg and injection midazolam 0.04 mg/kg was given IV. The anaesthetic protocol was standardized and did not include any other prophylactic anti-emetic, anti-inflammatory drugs. Before commencement of surgery, one blinded anesthesiologist was administered either saline 5ml or dexamethasone 0.15mg/kg diluted in 5ml saline. The surgical technique was standardized for all patients using dissection method.

The second anesthesiologist, who was unaware about the drug administered, monitored the patient for at least 24 hours and the stay was prolonged depending on the morbidity. Each patient was monitored for pain, nausea, vomiting, oedema of uvula and soft palate. Pain was assessed using objective pain scale (OPS Appendix 1) [15] in patients below 8 years of age and visual analogue scale (VAS, 0-100) above 8 years of age.

Recordings were done every 30 minutes for first two hours, hourly for next 4 hours and then at 10, 14 and 24 hours. If the OPS ≥ 6 or VAS ≥ 40 occurred, Tramadol 1 mg/kg in the first six hours or oral paracetamol 10mg/kg in 6-24 hours was given. If patient had more than two episodes of vomiting, metoclopramide was given and recorded. Tolerance to intake of 400 ml of oral fluids after 8 hours following tonsillectomy was recorded. Edema as visual impression of swelling and elongation of uvula and soft palate was noted at 6 hours and 24 hours post operatively. Temperature was recorded 6th hourly at 24 hours. Temperature more than 37.5C was considered as fever.

Patients were discharged after 24 hours if good oral intake was achieved and when there were no complications like bleeding, pain, fever etc.

Statistical analysis: The difference in various variables between study group and the control group were assessed by applying chi-square test and p value less than 0.05 was considered as significant. Data was analysed from OPEN-EPI software.

ORIGINAL ARTICLE

RESULTS: 60 patients between 4-15 years of age were randomized to receive dexamethasone (n=30) or placebo (n=30). No adverse effect of this drug was reported in our study. There was no significant difference in gender in the two groups; the male: female ratio was (66.67:33.33) in the study group and (70:30) in the control group. Also there was no significant difference in mean age between two groups (mean±SD= 8.4+ 2.86) in the study group Vs (mean±SD=8.8+ 3.14) in the control group. Hence groups were well matched and comparable.

Table 1 shows various post-operative events compared and analysed between the two groups. On the day of surgery, only 5 patients out of the 30 in the dexamethasone group needed extra analgesic whereas 15 of the 30 patients in the placebo control group required additional analgesics even after 48 hours (p=0.006). The chance of developing post-tonsillectomy pain in those patients who received dexamethasone was 16.67% but 50% among control group. The relationship between post-operative pain and use of single dose of intravenous dexamethasone is statistically highly significant. 22 (73.33%) patients in the placebo group had more than two episodes of vomiting after 6 hours post operatively compared to only 3(10%) patients in trial group (p.000006). This implies significant decrease in the dexamethasone group. The relationship between single dose of intravenous dexamethasone and PONV was statistically highly significant.

All patients receiving dexamethasone were able to tolerate 400 ml of oral fluids at 8 hours following surgery, whereas, none of the patients receiving the placebo could tolerate oral fluids at 8 hours post-operatively. The relationship between use of single dose of intravenous dexamethasone and oral fluid tolerance postoperatively was statistically highly significant (p<0.0000001, table 1). Thus dexamethasone significantly improves oral intake in the post-tonsillectomy.

The incidence of edema was significantly less in the study group (6 Vs 20 cases in control group, p<0.002650) at the end of 24 hours after surgery. The chance of developing fever following tonsillectomy in those who receive steroids was 6.67% among study group compared to 20% among the control group. On the day of surgery fever was recorded in only 2 patients from the study group compared to the 6 patients in the control group and relationship was statistically not significant (p 0.05).

Those patients who received dexamethasone were fit for discharge after 24 hours post operatively, but 6 patients in the placebo group had to prolong their hospital stay due to pain and dysphagia. Thus dexamethasone significantly promotes early discharge of post-tonsillectomy patients. (Table1). None of the patients from the study group got re-admitted signifying nil complications whereas 6 patients of the control group were re-admitted (P= 0.009823, Table1). Three out of them had secondary haemorrhage and remaining 3 patients had severe dysphagia and throat pain.

DISCUSSION: Tissue injury induced acute inflammation, nerve irritation and spasm of exposed pharyngeal muscle is known to play a role in the genesis of post tonsillectomy pain. The dexamethasone acts by inhibiting phospholipase enzyme, thereby blocking oxygenase and lipo-oxygenase pathway and reduce the synthesis of prostaglandins thereby reducing edema and pain [16].

Corticosteroids reduce oedema, whether the cause of inflammation is infection, trauma or allergy [17], and are extensively used in otorhinolaryngology in managing airway compromise as a result of laryngotracheal bronchitis, epiglottitis, laryngeal trauma, allergic laryngeal edema,

subglottic stenosis [18], when given IV dexamethasone prior to surgery, has been effective in reducing post operative edema, pain and trismus in patients who have undergone extractions for impacted third molars [19].

Oropharyngeal pain and irritation of gastric mucosa by swallowed blood are the main contributors for high incidence of PONV following tonsillectomy. Steroids exhibit anti-emetic property via prostaglandin antagonism, release of endorphins and tryptophan depletion [20].

Steward et al [10] did a meta-analysis of randomized double blind placebo controlled trials of a single dose of intravenous intra-operative steroid for paediatric patients who underwent tonsillectomy or adenotonsillectomy. Eight trials met their inclusion criteria. They concluded that routine use of steroids would prevent vomiting in one out of four children. In addition, it would result in earlier soft or solid diet intake, but because of missing data and varied outcome measures; pain could not be meaningfully analysed as a distinct end point.

Mckean et al [12]. in his double-blind randomized controlled trial of intravenous steroid for adult tonsillectomy, concluded that a single dose of 10mg dexamethasone given IV, at induction of anaesthesia for adult tonsillectomy significantly decreased the pain scores for the day of operation and the mean pain score for the week post operatively was significantly reduced in these patients. In this study, there was no difference noted in the time to first ingestion of food and drink.

Goldman et al [8] did a meta-analysis of dexamethasone use with tonsillectomy and six articles met their inclusion criteria. They also concluded that one out of four children was prevented from vomiting with peri-operative dexamethasone. An additional benefit was earlier tolerance of a soft/regular diet, but low precision and heterogeneity among studies have precluded definitive conclusion.

In our study we administered dexamethasone 0.15mg/kg, immediately after induction of anesthesia and the anesthetic and surgical techniques were standardized for tonsillectomy and /or adenoidectomy. Regarding the dosage of dexamethasone, doses ranging from 0.15 – 1 mg/kg with maximum doses ranging from 8-25mg have been commonly used in children (9). Dexamethasone was selected because it has a long half life of 36-48h (23) with glucocorticoid activity. A single dose of steroid lacks side effects like gastritis, adrenal suppression etc and also has low cost. In a large study involving 133 patients Splinter and Roberts have used 0.15mg/kg dexamethasone with good results (24). In our study dexamethasone IV was given before surgery to achieve the peak effect in the early post operative period. Pentazocine was used for intraoperative analgesia as it is a weak and short acting and therefore would not bias the result

We used two different pain scores for evaluation of pain as we had selected all patients above four years of age including adults. This was done so as to include a large enough number of patients to permit meaningful statistical analysis. There are no references providing equivalence of OPS 6 and VAS of 40. However in our opinion VAS of 40 signifies real pain as it is highly specific; whereas, OPS of 4 can be because of reasons other than pain also. OPS of 6 would better signify pain therefore we had chosen ops of >6 or VAS > 40 as significant pain.

In our study OPS and VAS scores were lower in dexamethasone group, throughout the post operative period. With increasing time after surgery the VAS scores difference between the two groups increased. Majority of dexamethasone treated patients were free from pain in 6-24h [10].

ORIGINAL ARTICLE

The over - all incidence of PONV was significantly less in our study perhaps also due to the avoidance of electrocautery. More severe pain and hence PONV are known to occur with electrocautery [27].

Pappas et al [28] showed decrease in incidence of PONV from 62%to 42% using 1mg/kg dexamethasone for adenotonsillectomy. In our study incidence of more than two episodes of vomiting 6h after surgery reduced significantly in dexamethasone patients. The incidence of edema of soft palate and uvula reduced significantly in dexamethasone treated patients at the end of 24h of surgery.

There was better quality of oral intake with dexamethasone due to less pain. Steward et al (9) in his meta analysis, showed that children receiving dexamethasone were more likely to switch over to soft or solid diet on post tonsillectomy day one (RR=1.69; 95%CI; 1.02-2.79, P=0.05).

Our study did not show that dexamethasone can be used to control fever in post tonsillectomy patients (P = 0.05).

All the patients who received dexamethasone were fit for discharge after 24 hours post operatively due to the reduced morbidity. Six patients from the controlled group were re-admitted (3 patients with secondary haemorrhage & 3 patients with pain and dysphagia)

Local infiltration of steroids and an oral four day course of steroids have `controversies about the type and dose of corticosteroids, whether to use single and multiple doses and whether to use alone or as adjunct to other drugs so the literature regarding the use of IV steroids for tonsillectomy is conflicting.

CONCLUSION: A single dose of IV dexamethasone of 0.15mg/kg, administered following induction of anesthesia, provided good and prolonged analgesia, reduced edema of uvula and palate, better and earlier oral intake and significant decrease in PONV.

Appendix 1- objective pain scale [15]		
Observation	Criteria	Points
Blood pressure	+ 10% of preoperative	0
	>20% of preoperative	1
	>30% of preoperative	2
Crying	Not Crying	0
	Crying but responding to tender loving care	1
	Crying and does not respond to tender loving care	2
Movement	None	0
	Restless	1
	Thrashing	2
Agitation	Patient asleep or calm	0
	Mild	1
	Hysterical	2
Verbalizes pain	Asleep or no verbalization of pain	0
	Cannot localize pain	1
	Localizes pain	2

ORIGINAL ARTICLE

Variables	Control group n=30	Study group n=30	Chi-square value	P value	conclusion
Pain	15 (50%)	5 (16.67%)	7.5	0.006170	Highly significant
PONV	22 (73.33%)	3 (10%)	24.75	0.000000651	Highly significant
Fever	6 (20%)	2 (6.67%)	2.308	0.1288	Not significant
Edema	20 (66.67%)	6 (20%)	13.3	0.002650	Highly significant
Oral fluid intolerance	30 (100%)	0 (0%)	60	0.0000001	Highly significant
Delay in discharge	6 (20%)	0 (0%)	6.667	0.009823	Highly significant
Readmission	6 (20%)	0 (0%)	6.667	0.009823	Highly significant

Table 1: Comparison of Post tonsillectomy morbidities in two groups

Chi-square test is applied

REFERENCES:

1. Anderson R, Krohg K. Pain as a major cause of postoperative nausea. *Can J Anaesth* 1976; 23: 366-9.
2. Randall D, Hoffer M. Complications of tonsillectomy and adenoidectomy. *Otolaryngol Head Neck Surg* 1998; 118:61-68.
3. Andersen R, Krohg K. Pain as a major cause of postoperative nausea. *Can J Anaesth* 1976; 23:366-369.
4. Cassileth PA, Lusk EJ, Torri S, DiNubile N, Gerson SL. Antiemetic efficacy of dexamethasone therapy in patients receiving cancer chemotherapy. *Arch Intern Med* 1983; 143:1347-1349.
5. Skjelbred P, Lokken P. Postoperative pain and inflammatory reaction reduced by injection of corticosteroid. *Eur J Clin Pharmac* 1982; 21:391-396.
6. Baxendale BR, Vater M, Lavery KM. Dexamethasone reduces pain and swelling following extraction of third molar teeth. *Anaesthesia* 1993; 48:961-964.
7. Aasboe V, Raeder JC, Groegaard B. Betamethasone reduces post operative pain and nausea after ambulatory surgery. *Anesth Analg* 1998; 87:319-23.
8. Goldman AC, Govindaraj S, Rosenfeld RM. A meta-analysis of dexamethasone use with tonsillectomy. *Arch Otolaryngol Head Neck Surg* 2000; 123:682-686.
9. Afman CE, Welge JA, Steward DL. Steroids for post tonsillectomy pain reduction: meta-analysis of randomized controlled trials. *Otolaryngol Head Neck Surg* 2006; 134:181-186.
10. Steward DL, Welge JA, Myer CM. Do steroids reduce morbidity of tonsillectomy? Meta-analysis of randomized trials. *Laryngoscope* 2001; 111:1712-1718.
11. Anila D, Vinod S, Sheetal R. Effect of dexamethasone on post tonsillectomy morbidities. *Indian J Anaesth* 200; 49:202-207.
12. McKean S, Kochilas X, Kelleher R, Dockery M. Use of intravenous steroids at induction of anesthesia for adult tonsillectomy to reduce postoperative nausea and vomiting and pain. *Clin Otolaryngol* 2006; 31:36-40.
13. Volk MS, Martin P, Brodsky L, Stanievich JF, Ballou M. The effects of preoperative steroids on tonsillectomy patients. *Otolaryngol Head Neck Surg* 1993; 109:726-730.
14. Ohlms LA, Wilder RT, Weston B. Use of intraoperative corticosteroids in pediatric tonsillectomy. *Arch Otolaryngol Head Neck Surg* 1995; 121:737-742.

ORIGINAL ARTICLE

15. Hannallah RS, Broadman LM, Belman B, Abramowitz MD, Epstein BS. Comparison of caudal and ilioinguinal/ iliohypogastric nerve blocks for control of post- orchiopexy pain in paediatric ambulatory surgery. *Anesthesiology* 1987; 66: 832-34.
16. Goodman LS, Gillman A. Editors. *The pharmacological basis of therapeutics*. 5th ed. New York: MacMillan Publishing Co.; 1975: 1487.
17. Melby JC. Systemic corticosteroid therapy: pharmacology and endocrinologic considerations. *Ann Intern Med* 1974; 81:505-512.
18. Hawkins DB, Crockett DM. Corticosteroid in airway management. *Otolaryngol Head Neck Surg* 1983; 91:593-596.
19. Hoffman CG. Use of methyl prednisolone sodium succinate to reduce post-operative edema after removal of impacted third molars. *J Oral Surg* 1977; 35:198-199.
20. Harris AL. Cytotoxic-therapy-induced vomiting is mediated via enkephalin pathways. *Lancet* 1982; 1:714-716.
21. Henzi I, Walder B, Tramer MR. Dexamethasone for the prevention of post-operative nausea and vomiting: A quantitative and systematic review. *Anesth Analg* 2000; 90:186-194.
22. Rundle FW. Post-tonsillectomy morbidity: A clinical trial of a local penicillin steroid – anesthetic mixture. *Ann Otol Rhinol Laryngol* 1967; 76:1060-1066.
23. Anderson HA, Rice BJ, Cantrell RW. Effects of injected depot steroid on post tonsillectomy morbidity: A double blind study. *Arch Otolaryngol* 1975; 101:8688.
24. Papangelou L. Steroid therapy in tonsillectomy. *Laryngoscope* 1972; 82:297-302.
25. Haynes R. Adrenocorticotrophic hormone: adrenocortical steroids and their synthetic analogues-inhibitors of the synthesis and actions of adrenocortical hormones. In: Goodman A, Gilman LS, Rall TW, Murad F, editors. *The pharmacological basis of therapeutics*. 8th ed. 1990:1447-1448.
26. Splinter WM, Roberts DJ. Dexamethasone decreases vomiting by children after tonsillectomy. *Anesth Analg* 1996; 83:913-916.
27. Hanasono MM, Lalakea MI, Mikulec AA, Shepard KG, Wellis V, Messner AH. Perioperative steroids in tonsillectomy using electro cautery and sharp dissection techniques. *Arch Otolaryngol Head Neck Surg* 2004; 130:917-921.
28. Pappas ALS, Sukhani R, Hotaling AJ, et al. The effect of preoperative Dexamethasone on the immediate and delayed post-operative morbidity in children undergoing adenotonsillectomy. *Anesth Analg* 1998; 87:57-61.

AUTHORS:

1. D.A. Hiremath

PARTICULARS OF CONTRIBUTORS:

1. Professor, Department of Anaesthesia, S.N. Medical College, Bagalkot, Karnataka.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. D.A. Hiremath,
Professor, Department of Anaesthesia,
S.N. Medical College, Bagalkot – 587102.
Email- dahiremath@yahoo.com

Date of Submission: 17/09/2013.
Date of Peer Review: 18/09/2013.
Date of Acceptance: 27/09/2013.
Date of Publishing: 09/10/2013.