

Efficacy of Single Dose Perioperative Intravenous Steroid (Dexamethasone) for Postoperative Pain Relief in Tonsillectomy Patients

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ABSTRACT

Objective: To determine the efficacy of single dose perioperative intravenous steroid (dexamethasone) for postoperative pain relief in patients undergoing tonsillectomy.

Study Design: Quasi-experimental study.

Place and Duration of Study: Combined Military Hospital, Lahore, from November 2009 to June 2010.

Methodology: Sixty patients were divided into two equal groups. A single dose of dexamethasone was given to patients of group A during induction of anaesthesia, whereas no steroid was given to the patients in group B. Postoperative pain scores were assessed at 2, 6 and 12 hours in both groups using visual analogue scale (VAS). Pain was classified as mild (0-3), moderate (4-7) and severe (8-10) on visual analogue scale.

Results: There was no significant difference in pain scores after 2 hours postoperatively. Pain scores of Group A at 6 and 12 hours postoperatively were found to be significantly low than Group B.

Conclusion: Single dose perioperative intravenous injection of dexamethasone in tonsillectomy patients reduces postoperative tonsillectomy pain.

Key words: Tonsillectomy. Dexamethasone. Pain relief.

INTRODUCTION

Tonsillectomy is amongst the most commonly performed otolaryngological surgical procedures. Despite advancement in surgical and anaesthetic techniques the morbidity remains a significant area of concern. Most of the patients presenting for tonsillectomy are children and young adults.¹⁻⁴ The postoperative period is often protracted and characterized by throat pain, referred otalgia, temporary voice changes, intermittent fever, foul odour, poor oral intake and haemorrhage.⁵ Tonsillectomy in children is typically accompanied by 7-20 days of moderate to severe local pain with or without referred otalgia.⁶ Post-tonsillectomy pain is probably the result of muscle spasm caused by inflammation and irritation of the pharyngeal musculature.⁷ After the tonsillectomy, postoperative analgesia presents a problem.

For managing the pain, different modalities are available like use of intravenous opioids, NSAIDs, local anaesthetic agents, nerve blocks and steroids (both topical and intravenous).^{8,9}

The objective of this study was to determine whether administration of intravenous dexamethasone in tonsillectomy patients has got any beneficial effect on the postoperative pain. This study will help us to formulate a better guideline for the use of steroid in perioperative period in patients undergoing tonsillectomy.

METHODOLOGY

The study was quasi-experimental one, conducted at Combined Military Hospital, Lahore, from November 2009 to June 2010. Sixty patients were enrolled in the study and were randomly divided into two equal groups. Patients selected for the study were those having American Society of Anaesthesiology Physical status (ASA) I and II of either gender. Patients having history of peptic ulcer disease, hypertension, diabetes, tuberculosis, osteoporosis, heart diseases and open angle glaucoma were excluded from study. The study was conducted after approval from the Hospital Ethical Committee. Informed written consent was taken from all the patients undergoing study. Standard balanced general endotracheal anaesthesia, using calculated doses of nalbuphine, propofol and atracurium was administered to the patients. Anaesthesia was maintained with isoflurane, oxygen and nitrous oxide. Standard patient monitoring was observed. Patients in group A (n=30) were administered intravenous dexamethasone 0.15 mg/kg after the induction of anaesthesia. Group B patients (n=30) were not administered injection dexamethasone in addition to other drugs. Postoperatively, the pain was assessed in

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both the groups at 2, 6 and 12 hours using Visual Analogue Scale (VAS). Pain was classified as mild (0-3), moderate (4-7) and severe (8-10) on VAS. During this period of 12 hours if the patient required additional analgesia, it was provided in the form of intravenous Ketorolac 0.5 mg/kg body weight, with a maximum dose of 30 mg.

Student t-test was applied to compare the pain scores of both groups. A p-value of < 0.05 was considered as significant.

RESULTS

A total of 60 patients were included in this study over a period of 6 months. Thirty six patients were male and 24 patients were female. The age of the patients varied from 10 to 40 years with mean age of 18 ± 9.3 years. The weight of patients ranged from 27 to 80 kg with mean weight of 49.53 ± 19.6 kg. The patients were divided equally in two groups A and B.

The number of patients in mild, moderate and severe categories of two groups at different postoperative intervals is shown in Table I. The p-value was 0.093 for scores at 2 hours postoperatively hence, the difference between the two was not statistically significant.

The p-values of pain scores at 6 and 12 hours post-operatively were 0.028 and 0.020 respectively (Figures 1 and 2). Hence, the pain scores were found to be significantly lower in the group A which was given steroids per-operatively as compared to patients in group B, who did not receive the steroid.

Table I: Data showing number of patients categorized in different groups at 2, 6 and 12 hours.

Time	Group	Mild	Moderate	Severe	p-value
2 hours	Group A	10	12	08	0.093
	Group B	04	11	15	
6 hours	Group A	27	07	02	0.028
	Group B	12	09	09	
12 hours	Group A	24	05	01	0.020
	Group B	14	10	06	

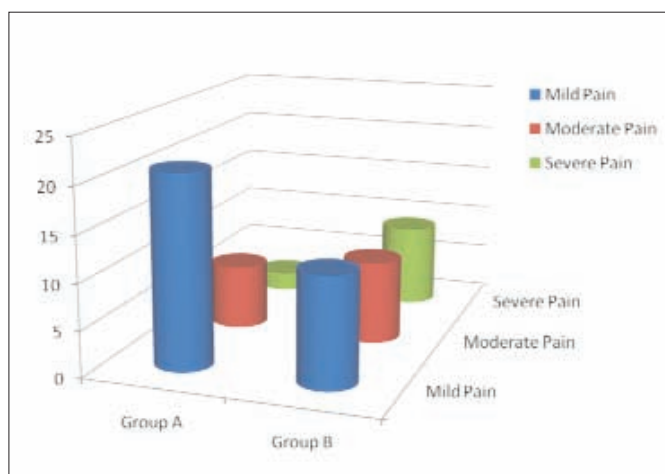


Figure 1: Pain scores after 6 hours.

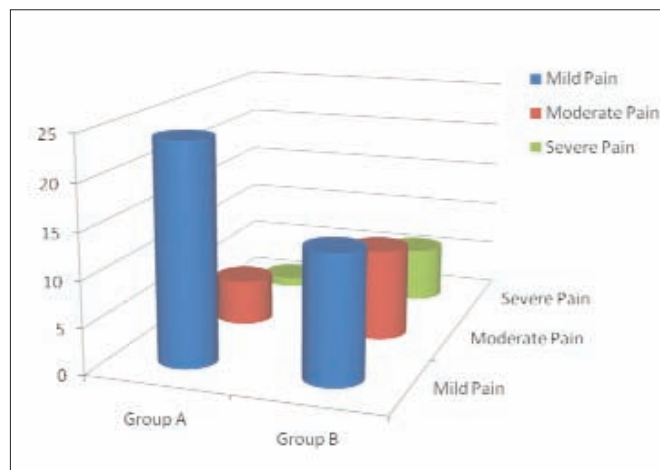


Figure 2: Pain scores after 12 hours.

DISCUSSION

Tonsillectomy is one of the most common surgical procedures performed worldwide. The procedure though simple has still got considerable morbidity like bleeding, pain, nausea, vomiting, poor oral intake and dehydration. Post-tonsillectomy pain is probably the result of muscle spasm caused by inflammation and irritation of the pharyngeal musculature. During surgery different modalities are available like use of intravenous opioids, non-steroidal anti-inflammatory drugs (NSAIDs), local anaesthetics agents, nerve blocks and steroids (topical and intravenous) to relief patients pain post-operatively. Administration of perioperative opioids is the most common method for pain relief but it has its own hazards especially pruritis, nausea and vomiting along with respiratory depression.¹⁰ Non-steroidal anti-inflammatory drugs are also used widely for post-operative analgesia. NSAIDs can be administered both intramuscularly and intravenously. Despite the ease of use of NSAIDs, they are not preferable agents mainly due to their inferior analgesia and anti-platelet activity which may promote bleeding in susceptible patients.¹¹

Infiltration of tonsillar fossa with local anaesthetics has been tried for post-tonsillectomy pain relief with varying results. Cryoanalgesia has also been tried for post-tonsillectomy pain relief but it is a comparatively newer technique and requires a lot of expertise and dexterity. Robinson and Purdie conceded that cryotherapy is a new technique that reduces post-tonsillectomy pain without causing additional complications.¹²

Glucocorticoids are naturally occurring hormones that prevent or suppress inflammation and immune responses when administered at pharmacological doses. At the molecular level, unbound glucocorticoids readily cross cell membranes and bind with high affinity to specific cytoplasmic receptors. This binding induces a response by modifying transcription and, ultimately, protein synthesis to achieve the steroid's intended

action. Such actions can include an inhibition of leukocyte infiltration at the site of inflammation, interference in the function of mediators of inflammatory response, and suppression of humoral immune responses. Some of the net effects include reduction in oedema or scar tissue and a general suppression in immune response. The degree of clinical effect is normally related to the dose administered. The anti-inflammatory actions of corticosteroids are thought to involve phospholipase A2 inhibitory proteins, collectively called lipocortins. Lipocortins, in turn, control the biosynthesis of potent mediators of inflammation such as prostaglandins and leukotrienes by inhibiting the release of the precursor molecule arachidonic acid. Likewise, the numerous adverse effects related to corticosteroid use usually depend on the dose administered and the duration of therapy. Dexamethasone inhibits the arachidonic acid cascade and thereby inhibits synthesis of prostaglandins and leukotrienes. Like NSAIDs and aspirin, the steroids block chemicals that sensitize the primary afferent neuron (PAN) and thereby raise the threshold at which the PAN is transduced. These drugs are powerful analgesics, particularly when there is a tissue injury such as that occurs with excessive peripheral oedema. The usual dose of dexamethasone is 0.15 - 0.5 mg/kg when administered as a single dose. The onset of action is 4-8 hours and duration of action is 48 - 72 hours. It has additional benefits of being a potent anti-inflammatory and antiemetic. Major side effects include peptic ulceration, immunosuppression, osteoporosis and fluid retention. Dexamethasone should be avoided with NSAIDs due to risk of gastrointestinal bleed.¹³

Mathew *et al.* studied the effect of single pre-operative dose of dexamethasone sodium phosphate in patients undergoing tonsillectomy by hot (electrocautery) and sharp (cold) dissection method and they found use of steroid with cold dissection method to be the most effective in reducing postoperative pain. Pain scores were significantly lowered, oral intake was improved in steroid group as compared to placebo group. These results were validated in the present study.

A study was conducted by Carr *et al.* in which effects of single peroperative intravenous dose of dexamethasone was studied on postoperative pain, in patients undergoing tonsillectomy.¹⁴ Pain was assessed by visual analogue scoring system for 10 days. The other group received a placebo. There was no statistically significant difference between the two groups, but the dexamethasone group had a trend to report less pain over first several days. Single dose was not associated with adverse effects, so the risk-benefit ratio may be favourable for this practice. Another study in which steroid was found to be effective in reducing postoperative morbidity in terms of pain, emesis, haemorrhage, halitosis and weight loss in patients undergoing tonsillectomy.

Perioperative dexamethasone administration improved pain scores, reduced analgesic requirements, allowed earlier oral fluid intake and improved postoperative swallowing and quality of oral intake. These results may be attributed to the anti-inflammatory effect produced by dexamethasone, which may reduce local oedema and pain. These results are similar to patients receiving steroids for acute pharyngitis where improvement in symptoms is mainly due to pain relief secondary to anti-inflammatory action of steroids.¹⁵⁻¹⁸

Though several preceding studies elsewhere supported the results we obtained from this study but some researchers like Tewary *et al.* found that steroids were found to have no appreciable effect on the amount of postoperative pain.¹⁹

The effect of tonsillar fossa steroid injection for reduction of post-tonsillectomy pain is well documented in a study by Kerekhanjanarong *et al.* from Bangkok University. In this study, the patients who underwent tonsillectomy were then treated with injection of steroid into the right tonsillar fossa after the operation. The left side was used as the control. Postoperative pain was assessed, graded and recorded daily as mild, moderate and severe pain on both sides of the throat. A significant reduction of pain in the tested side (right side) was noted in the majority of the patients. The duration of pain was shorter in the right side than the left. It seemed to significantly reduce the post-tonsillectomy pain.

There have been a number of studies conducted in various centers in which dexamethasone has been used intravenously to reduce post-tonsillectomy pain. Carr *et al.* after a double-blinded randomized controlled clinical trial concluded that there is evidence that a single dose of dexamethasone reduces pain after tonsillectomy. Stewart *et al.* also reported that dexamethasone given in this regime reduced postoperative pain and analgesic requirements after adult tonsillectomy.²⁰ No adverse events attributable to dexamethasone were reported in these trials. No reports in the literature have been found about the complications from the use of a single intravenous dose of corticosteroid during paediatric tonsillectomy.

CONCLUSION

Single dose per-operative intravenous injection of dexamethasone relieved post-tonsillectomy pain significantly at 6 and 12 hours after surgery. It is a suitable choice as postoperative analgesia in tonsillectomy patients along with other routinely prescribed NSAIDs.

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