Section: Otorhinolaryngology

Original Research Article

# EFFECT OF POST TONSILLECTOMY PAIN CONTROL WITH INFILTRATED DEXAMETHASONE AND INFILTRATED BUPIVACAINE: A HOSPITAL BASED PROSPECTIVE STUDY

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*Received* : 26/04/2025
*Received in revised form* : 17/05/2025
*Accepted* : 05/06/2025

*Keywords:*
*Bupivacaine, Dexamethasone, Preincisional infiltration, VAS score.*

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DOI: 10.47009/jamp.2025.7.3.140

Source of Support: Nil,
Conflict of Interest: None declared

*Int J Acad Med Pharm*
2025; 7 (3); 720-725

## ABSTRACT

**Background:** Peritonsillar administration of local anesthetics are very effective in decreasing intraoperative bleeding and postoperative pain, without increasing any chance of side effects. The aim of this study to evaluate the efficacy of local administration of dexamethasone and local use of bupivacaine for better control of post-tonsillectomy pain in patients aged 4-40 years undergoing tonsillectomy. **Materials and Methods:** This is a hospital based prospective study done on 80 patients age between 4 to 40 years scheduled for elective tonsillectomy during 18 months period. The patients were randomly assigned using a sealed envelope technique into two groups (Group D and B) of 40 each in a purposive sampling technique. Post operatively patient's pain scores were assessed by means of a VAS at fixed intervals at 6 hours, 12 hours, 24 hours, 3 days and 5 days after extubation. The rescue analgesia was administered by nursing staff as needed in patients with a VAS score more than 7, over and above the routine analgesic. Statistical significance test was used for statistical analysis along with SPSS version 22.0v software. The P-Value<0.05 were considered for statistical significance. **Result:** Our study showed that the mean age of patients was 23.6 years in group D & 25.7 years in group B, which was statistically non-significant (P=0.312). Male to female ratio was 1.22:1 in group D & 1.5:1 in group B, which was statistical non-significant (P=1.0). The comparison of mean value was statistical non-significant (P=0.428). VAS score at 6 hours was lower (5.9±1.3) in group D as compared to group B (9.3±1.8) which was statistically significant (P<0.001**). At 12 hours the mean value of VAS score was 7.6±1.7 in group D & 8.9±2.3 in group B was statistically non-significant (P=0.048) but higher VAS score in group D and lower in group B when compared to 6$^{th}$ hours. **Conclusion:** We found that the local preincision infiltration of dexamethasone reduced post-tonsillectomy pain in high percentage of patients at 6$^{th}$ hours when compared to bupivacaine infiltration, but we observed after 12$^{th}$ hours same effect of both drugs in post-operative tonsillectomy pain. The use of dexamethasone can be a preferred choice in patients undergoing tonsillectomy because of its being inexpensive, safe, and easily applicable. These results can be further verified and confirmed in similar larger trials.

## INTRODUCTION

Tonsillectomy is defined as the surgical excision of the palatine tonsils, which are lymphoid tissue covered in respiratory epithelium and invaginated to create crypts. Tonsillectomy is one of the most frequent surgical procedures carried out in children who are commonly associated with increased risk of certain complications such as throat pain, referred otalgia, poor oral intake. The pain impulses at the entry of the central nervous system, despite general anesthesia create a hyperexcitable state during the surgery. The infiltration of preoperative analgesic drugs or topical administration of local anesthetic agents can have a preventive analgesic effect by blockage of these impulses. The pain after

tonsillectomy is caused by muscle spasm due to inflammation and irritation in muscles of pharyngeal structure.[1,2]

Opioids, Non-Steroidal Anti-Inflammatory Drugs (NSAID) and acetaminophen are used traditionally for posttonsillectomy pain relief. However, opioids can cause adverse effects such as sedation, nausea and vomiting, cough suppression, respiratory depression, while NSAIDs may increase bleeding tendencies.[3,4] Because of the lack of these side effects in Local Anaesthetics (LAs), there has been a renewed interest in their use for post-tonsillectomy pain relief.

The use of corticosteroid has been used to prevent and reduce complications after tonsillectomy. The use of steroid can prevent the production of inflammatory cell factors like cytokines in macrophages, monocytes, and lymphocytes.

The use of steroid also prevents the phospholipase enzyme resulting in blockade of pathways for cyclooxygenase & lipoxygenase and production of prostaglandin which results in pain relief.[5,6] Steroid has also been studied as anti-emetic drug as well, but its mechanism of action is not well understood. Theoretically, steroid effect on activation of parasympathetic nerves at operating site to reduce neurotransmitters linked with emetic center of brain stem causing vomiting.[7,8]

Peritonsillar administration of local anesthetics are very effective in decreasing intraoperative bleeding and postoperative pain, without increasing any chance of side effects.[9]

Bupivacaine, a long-acting local anaesthetic, is the most commonly reported local anaesthetic for paediatric regional anaesthesia by virtue of its lower toxic threshold compared with other local anaesthetics.[10,11] The application of bupivacaine may decrease the onset of post-operative pain by blocking afferent nerve endings through inhibition of voltage-gated Na+ channels.[12] Furthermore, the anesthetic agent inhibits synaptic N-methyl-D-aspartate receptors,[12,13] and has anti-inflammatory properties.[14,15] In 2013, Block et al,[14] also reported that bupivacaine reduces inflammatory activity by inhibiting Ca2+ ion signalling and the release of interleukin-1β in astrocytes, and by interacting with 5-hydroxytryptamine, opioid and glutamate receptors. Similarly, the reduction of vascular permeability by bupivacaine has also been reported to help reduce intra-operative and post-operative complications.[16,17] Bupivacaine has been deemed superior to other anesthetic agents such as lidocaine and ropivacaine due to its sustained effects, higher potency and lower toxicity profile.[18-20]

Managing post tonsillectomy pain remains a challenge to both the anaesthetist and the surgeon, as inadequate pain management often leads to delayed discharge, unplanned readmissions, dehydration, infection and secondary haemorrhage.[21] Different surgical and anaesthetic techniques have been developed for use during and after the surgery to reduce post-tonsillectomy pain, some of which have shown some positive outcomes in randomised trials.[21,22] The aim of this study to evaluate the efficacy of local administration of dexamethasone and local use of bupivacaine for better control of post-tonsillectomy pain in patients aged 4-40 years undergoing tonsillectomy.

## MATERIALS AND METHODS

This is a hospital based prospective study done on 80 patients age between 4 to 40 years scheduled for elective tonsillectomy in department of Otorhinolaryngology, Muzaffarnagar Medical College & Hospital, Muzaffarnagar, U.P. during 18 months period after approval by the Research and Ethics Committee of the hospital, informed consent was obtained from all patients after a thorough explanation of the purpose and scope of the study before the commencement of the study.

**Inclusion Criteria**

- Patients of age from 4 to 40 years who meet criteria for tonsillectomy and who were admitted for elective surgery.
- Patients of both sexes.

**Exclusion Criteria**

- Guardian refusing to give an informed written consent.
- Patients suffering from hypertension, diabetes mellitus, ischemic heart disease and peritonsillar abscess.
- Patients having bleeding disorders, kidney, liver, lung or cardiac disease, obesity.
- History of use of steroids or antihistamines with last 24 hours prior to admission.
- Overt/sub mucous cleft palate.
- Patients having allergy to steroid or any drugs.
- Malignancy, acute infection.

**Method:** Routine laboratory investigations including full blood count, Serum electrolytes, urine analysis, and when indicated electrocardiograph (ECG), chest radiograph and coagulation studies were conducted. The patients were randomly assigned using a sealed envelope technique into two groups (Group D and B) of 40 each in a purposive sampling technique. After careful history taking and examination, the patients admitted for tonsillectomy will be divided into 2 groups alternatively.

**Group D:** will be given local dexamethasone preincision infiltration in 2-4 ml saline (0.9% Nacl) in equivalent volume.

**Group B:** will be given 0.5% Bupivacaine solution in 2-4 ml saline (0.9% Nacl) in equivalent volume infiltration in one tonsiller bed.

**Procedure:** All patients were anaesthetised using standard protocol. Atropine was given as premedicants to both groups. General anaesthesia was induced with i.v. propofol, fentanyl and suxamethonium to facilitate orotracheal intubation. Correct tube placement was confirmed by capnography and chest auscultation. Anaesthesia was maintained with isoflurane and 100% oxygen to


ISSN (O): 2687-5365; ISSN (P): 2753-6556

maintain adequate anaesthetic depth. Muscle relaxation was maintained with top ups of atracurium while intraoperative analgesia was achieved with fentanyl. The oxygen saturation, pulse rate, blood pressure, ETCO2 and airway pressure were continuously monitored intraoperatively. Preincisional infiltration of dexamethasone in 2-4 ml saline (0.9% Nacl) was given in tonsillar bed in 40 cases. Another 40 cases were given 0.5% Bupivacaine solution in 2-4 ml saline (0.9% Nacl) in equivalent volume pre incisional infiltration in one tonsiller bed. Blood loss was assessed by counting the number of pieces of gauze used and estimating the amount of blood in the suction bottle. Isoflurane was discontinued at the end of the surgery and fresh gas flow increased to 4-6 L/min. Atropine and neostigmine were used to reverse the residual effect of muscle relaxant. Two surgeon's adjudged to be of equal proficiency performed the surgeries using a standardised cold knife dissection technique. The tonsillectomy was performed by a standardized blunt dissection and snare technique. Bleeding was controlled by bipolar diathermy.

Post operatively patient's pain scores were assessed by means of a VAS at fixed intervals at 6 hours, 12 hours, 24 hours, 3 days and 5 days after extubation. Patients were blinded to their previous VAS scores. Patients were given a new VAS at each testing interval and were instructed to mark on the line the approximate level of their pain at that moment. The VAS score was recorded by the on duty nursing staffs who were blinded to the study.

Postoperative analgesia was divided into regular medication and rescue analgesia. Regular medication was started 6 hours after premedication and consisted of single dose of injectable i.v. Diclofenac in its aqueous form followed by oral Ibuprofen and acetaminophene very 8 hourly. The rescue analgesia was administered by nursing staff as needed in patients with a VAS score more than 7, over and above the routine analgesic and consisted of another dose of iv Diclofenac. Every additional dose of rescue analgesia administered was recorded by the nursing staff.

**Statistical Analysis:** The data of the patients were collected in Case Record Form. The collected data were entered into Microsoft Excel spread sheet. Demographic information including age, weight, and gender, along with intraoperative and post-operative finding were noted. Postoperative pain based on VAS score of 10 points, 0 indicating no pain and 10 indicating worst possible pain, were recorded on a predesigned Performa after 6, 12, 24 hours, days 3 and day 5. Statistical significance test was used for statistical analysis along with SPSS version 22.0v software. The P-Value<0.05 was considered for statistical significance.

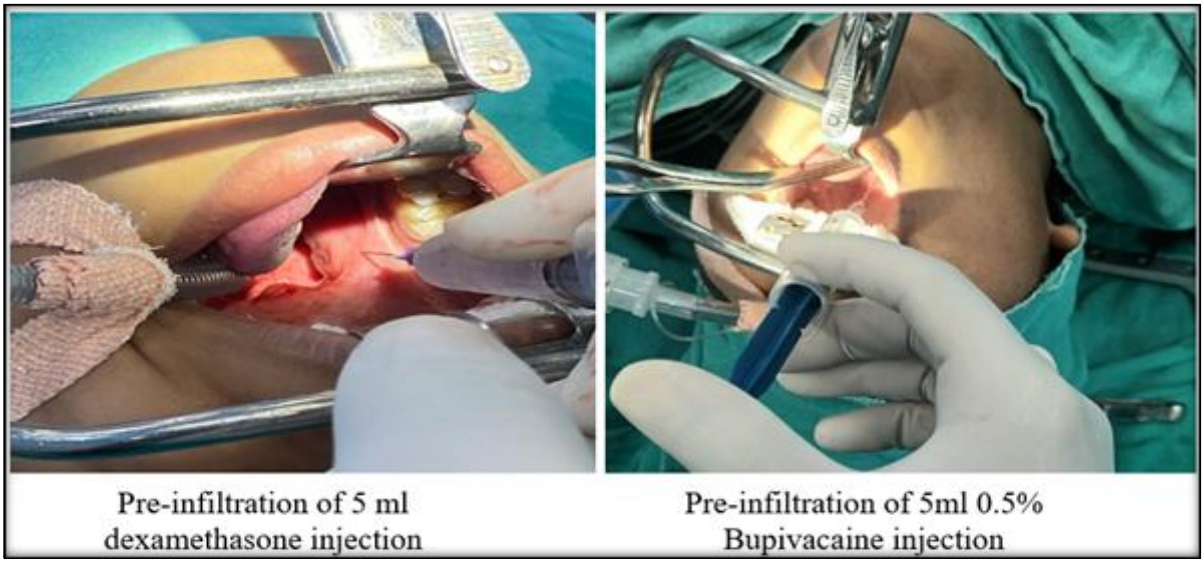


**Figure 1: Procedure of infiltration in peritonsillar space**

## RESULTS

Our study showed that the mean age of patients was 23.6 years in group D & 25.7 years in group B, which was statistically non-significant (P=0.312). Male to female ratio was 1.22:1 in group D & 1.5:1 in group B, which was statistical non-significant (P=1.0). The comparison of mean value was statistical non-significant (P=0.428). Most common symptom was sore throat (77.5%) followed by dysphagia (67.5%) in our study (Table 1).

Our study showed that VAS score at 6 hours was lower (5.9±1.3) in group D as compared to group B (9.3±1.8) which was statistically significant (P<0.001**). At 12 hours the mean value of VAS score was 7.6±1.7 in group D & 8.9±2.3 in group B was statistically non-significant (P=0.048) but higher VAS score in group D and lower in group B when compared to 6th hours. At 24 hours the mean value of VAS score was 6.8±1.1 in group D & 7.2±1.7 in group B was statistically non-significant (P=0.05). At 3rd day the mean value of VAS score was 3.4±1.2 in


ISSN (O): 2687-5365; ISSN (P): 2753-6556

group D & 4.3±1.5 in group B was statistically non-significant (P=0.042). At 5th day the mean value of VAS score was 1.3±0.8 in group D & 2.1±1.1 in group B was statistically non-significant (P=0.038) (table 2). The analgesic requirement was significantly lower in the group D compared with the group B (P=0.0412), with 18 and 25 patients requiring post-surgical oral/intramuscular analgesics in group D & group B respectively (Figure 1).

Our study showed that the complications such as intra operative bleeding (70%), vomiting (40%) & nausea (37.5%) was more in group D as compared to group B was intra operative bleeding (25%), vomiting (30%) & nausea (25%) respectively. Intra operative bleeding was statistically significant in group D as compared to group B (P<0.05*) (table 3).

**Table 1: Distribution of patients according to age groups**

| Demographic profile | | Group D | Group B | P-value |
|---|---|---|---|---|
| Age (Mean±SD) | | 23.6 ± 4.26 | 25.7±5.8 | >0.05 |
| Gender | Male | 22 (55%) | 24 (60%) | >0.05 |
| | Female | 18 (45%) | 16 (40%) | |
| Socioeconomic status | Low | 10 (25%) | 8 (20%) | >0.05 |
| | Middle | 24 (60%) | 25 (62.5%) | |
| | Upper | 6 (15%) | 7 (17.5%) | |
| BMI (Kg/m$^2$) (Mean±SD) | | 22.23±2.6 | 21.82±2.7 | >0.05 |

**Table 2: Comparison of Mean value of VAS score in between groups at different time interval**

| VAS Score (Post-op) | Group D | Group B | P-value |
|---|---|---|---|
| At 6 hours | 5.9±1.3 | 9.3±1.8 | <0.001 |
| At 12 hours | 7.6±1.7 | 8.9±2.3 | 0.048 |
| At 24 hours | 6.8±1.1 | 7.2±1.7 | 0.05 |
| 3$^{rd}$ day | 3.4±1.2 | 4.3±1.5 | 0.042 |
| 5$^{th}$ day | 1.3±0.8 | 2.1±1.1 | 0.038 |

**Student paired 't' test**

**Table 3: Complications**

| Complications | Group D | Group B | P-value |
|---|---|---|---|
| Nausea | 15 | 10 | >0.05 |
| Vomiting | 16 | 12 | >0.05 |
| Intra-op bleeding | 28 | 10 | <0.05* |

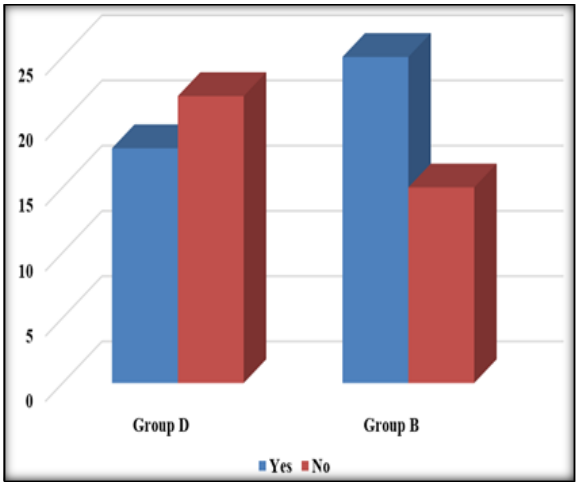


**Figure 1: Requirement of analgesics**

## DISCUSSION

Our hospital based prospective study done on 80 patients age between 4 to 40 years scheduled for elective tonsillectomy. Post operatively patient's pain scores were assessed by means of a VAS at fixed intervals at 6, 12, 24 hours, 3 days and 5 days after extubation. The mean age of patients was 23.6 years in group D & 25.7 years in group B, which was statistically non-significant (P=0.312). Some other studies have also used similar age group like El Daly A et al,[23] Ali Obaid Muthanna,[24] and Nuanprae Kitisin et al,[25] found the mean age was 19.79 years, 34.9 years respectively.

Male to female ratio was 1.22:1 in group D & 1.5:1 in group B, which was statistical non-significant (P=1.0) in our study, compatible with Ali Obaid Muthanna.24 Our study showed that mostly patients belonged to middle economic status in both groups (60% in group D & 62.5% in group B), similar results found by Nuanprae Kitisin et al,[25] and Michael E. Kubala.[26]

The mean value of BMI was 22.23±2.6 in group D and 21.82±32.7 in group B. The comparison of mean value was statistical non-significant (P=0.428). Nuanprae Kitisin et al,[25] found no significant difference between the groups with respect to age, gender and BMI. Most common symptom was sore throat (77.5%) followed by dysphagia (67.5%). Similar observation was found with Ali Obaid Muthanna,[24] and Michael E. Kubala.[26]

According to the study of Kokki et al,[27] the incidence of inadequate pain control during the first 24 hours after tonsillectomy is 28%. Tolska et al,[28] showed that during the first week of post tonsillectomy, the pain intensities ranging from 4 to 8 (NRS 0 to 10), and after that the pain score drop to less than 4 in most patients. In our study showed at 6th hours pain score was lower in group D as compared to group B, but at 12th, 24th, 3rd, and 5th


ISSN (O): 2687-5365; ISSN (P): 2753-6556

days which was no statistical significant in between groups. Tuhanioglu B et al9 found that intravenous dexamethasone, infiltrated dexamethasone and infiltrated bupivacaine were all found to be effective on postoperative pain.

İrfan Kaygusuz et al,[29] found the VAS score in the first postoperative day was statistically significant (P<0.05) in between groups. In the third postoperative day, the difference between bupivacaine and lidocaine group found to be statistically significant (P<0.05). In the seventh post-operative day the results of bupivacaine, dexamethasone, lidocaine and placebo groups were similar (P>0.05).

Suktara Sharma, Vishal Dave et30 conducted a study, patients were divided into group A in which topical Bupivacaine was used and group B in which topical Bupivacaine was not used. No statistically significant benefit was found by the use of topical Bupivacaine in post tonsillectomy pain relief among the two groups of patients.

Bayram A, Dogan M et al,[31] found all pain scores in the study group (pertonsillar levobupivacaine hydrochloride & dexamethasone infiltration) were lower than those in the control group (peritonsillar saline infiltration), the difference was significant at the second, 12th, and 16th hours, and the second and third day (P < 0.05).

Nadeem A, Baig MN et al,[32] concluded intravenous dexamethasone was found to be more effective for early postoperative pain control and reduction in requirement of analgesics. The use of dexamethasone can be a preferred choice in patients undergoing tonsillectomy.

The analgesic requirement was significantly lower in the group D compared with the group B (P=0.0412), with 18 and 25 patients requiring post-surgical oral/intramuscular analgesics in group D & group B respectively in our study. Bayram A et al,[31] found total amount of analgesic consumption in the study group was significantly lower than in the control group on each day of the week after tonsillectomy.

Nadeem A, Baig MN et al,[32] found the requirement of analgesics was significantly (p-value <0.05) different among four groups. Minimum number (22.86%) of patients who required the analgesic were in IV dexamethasone group and highest requirement rate (60%) was found in local dexamethasone group followed by bupivacaine (48.57%) group.

Our study showed that the complications such as intra operative bleeding (70%), vomiting (40%) & nausea (37.5%) was more in group D as compared to group B. Intra operative bleeding statistically significant in group D as compared to group B (P<0.05*). Vosdoganis F, Baines DB33 found dexamethasone significantly reduce the incidence of vomiting in the first 24 hours postoperatively (P = 0.02), the time to first intake of solids (P = 0.001), the need to administer a rescue antiemetic (P = 0.005) and intravenous fluid therapy requirements (P = 0.006) in the postoperative period.

A conflict our results with Shubham Dadoo et al34 found 43.2% experienced PONV in control group (normal saline), while only 10.8% had this occurrence in the dexamethasone group (p = 0.001).

## CONCLUSION

We found that the local preincision infiltration of dexamethasone reduced post-tonsillectomy pain in high percentage of patients at 6th hours when compared to bupivacaine infiltration, but we observed after 12th hours same effect of both drugs in post-operative tonsillectomy pain. The analgesic requirement was lower in dexamethasone group but nausea, vomiting & bleeding was more. The use of dexamethasone can be a preferred choice in patients undergoing tonsillectomy because of its being inexpensive, safe, and easily applicable. These results can be further verified and confirmed in similar larger trials.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556