Original Article

Comparison of Bupivacaine and Lidocaine in the Treatment of Posttonsillectomy Pain in Pediatric Patients: Our Experiences

Santosh Kumar Swain, Ansuman Sahu

Department of Otorhinolaryngology and Head and Neck Surgery, IMS and SUM Hospital, Siksha "O" Anusandhan University, Bhubaneswar, Odisha, India

Abstract

Background: Tonsillectomy is one of the most common surgeries performed on children of all ages. Posttonsillectomy pain is frequently severe and long-lasting, increasing morbidity, and putting the patient, parents, relatives, and even hospital staffs under stress. **Objective:** The goal of this study was to see how effective topical bupivacaine and lidocaine in the tonsillar fossa are at controlling postoperative pain in pediatric tonsillectomy. **Materials and Methods:** This prospective study was done between May 2017 and June 2022 at a tertiary care teaching hospital. There were 126 patients enrolled in this study, with 77 boys and 49 girls. The age ranges of the patients were between 3 years and 16 years. All of the children were divided into three groups after their parents gave their informed consent. In Group 1, 42 patients received topical infiltration of 0.25% bupivacaine hydrochloride with 1:200,000 epinephrine at the tonsillar fossa just after the removal of the tonsil from the tonsillar bed. Group 2 included 42 children and received topical infiltration of lidocaine hydrochloride with 1:100,000 epinephrine in the tonsillar bed. Group 3 included 42 patients and received infiltration of 0.9% normal saline into the tonsillar bed just after tonsillectomy. **Results:** There was no statistically significant difference in the mean pain scores between the bupivacaine and lidocaine groups ($P > 0.001$). The difference between the two groups' mean pain scores compared to the saline group was statistically significant ($P < 0.001$). None of the participants in the two groups experienced reactionary and secondary hemorrhage. **Conclusion:** Bupivacaine and lidocaine infiltration into the tonsillar bed just after tonsillectomy is effective for controlling posttonsillectomy pain in the pediatric age group.

Keywords: Bupivacaine, lidocaine, posttonsillectomy pain, tonsillectomy, topical infiltration

Introduction

Tonsillectomy is a common surgical procedure in the pediatric age group and is often associated with postoperative pain which may challenge the clinician.[1] Children may become restless or crying due to pain, hunger, or fear after surgery, particularly tonsillectomy.[2] Pain after tonsillectomy is the major impediment to a patient's recovery, affecting the length of hospital stay and capacity to resume the normal activities. The important factors which decide the postoperative outcomes include pain, nausea, vomiting, anxiety before surgery, and discomfort by intravenous injection.[3] It has been seen that more than 60% of the pediatric patients those underwent tonsillectomy exhibit negative behavioral changes in the next weeks after surgery.[4] Hence, it is critical to administer appropriate postoperative analgesics. Many otolaryngologists believe that the discomfort is worst between days 3 and 5 after tonsillectomy.[5] However, there is no such evidence to support this. Severe posttonsillectomy throat pain has been described for more than a decade. Parents often worry about handling the pain of their children at home. Posttonsillectomy pain is often considered long-lasting and intense. Posttonsillectomy throat pain in children is still a hotly discussed clinical topic, as well as an active research area. Currently, very a smaller number of studies have been done for the management of posttonsillectomy pain in the pediatric age group. The objective of this study was to see if local injections of bupivacaine and lidocaine with epinephrine in the tonsillar bed may help reduce posttonsillectomy pain in children.

Address for correspondence: Prof. Santosh Kumar Swain, Department of Otorhinolaryngology and Head and Neck Surgery, IMS and SUM Hospital, Siksha "O" Anusandhan University, K8, Kalinga Nagar, Bhubaneswar - 751 003, Odisha, India.
E-mail: santoshvoltaire@yahoo.co.in

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Materials and Methods

The study was carried out at a tertiary care teaching hospital's department of otorhinolaryngology, head and neck surgery, from May 2017 to June 2022. A total of 126 children with recurrent tonsillitis, who had their tonsils removed, were included in this study. Patients with pulmonary, cardiac, liver, kidney, or hematological diseases, acute pharyngitis, abscess in peritonsillar space, bronchial asthma, and hypersensitive to any drug used in this study were excluded from this study. Informed consent was obtained from the parents of all children. The study was approved by our Institutional Ethical Committee (IEC) with reference number IEC/IMS/SOA/12/22.03.2017. Age, sex, surgical procedure indications, concomitant medical problems, and any surgical complication were among the demographic and clinical data collected. Before being taken to the operating room, all of the children were divided into three groups, and sealed envelopes were used to determine which solution was necessary (OR). Group 1 included 42 children who received infiltration of topical 0.25% bupivacaine hydrochloride with 1:200,000 epinephrine at the tonsillar fossa intraoperatively just after the removal of the tonsil. Group 2 included 42 patients who underwent topical infiltration of lidocaine hydrochloride with 1:100,000 epinephrine at the tonsillar fossa after the removal of the tonsil. Group 3 included 42 patients who received infiltration of topical 0.9% saline at the tonsillar fossa. Anesthesia and surgical techniques were the same for all the children by the same team of anesthesiologists and surgeons. Surgeons, anesthesiologists, patients, and parents were blinded to the solution used for topical infiltration into the tonsillar fossa. Each pediatric patient was positioned in the rose position on the OR table after anesthesia was administered, and a Boyle-Davis mouth gag supported by a Draffin Bipod Stand was introduced into the mouth. Coblation tonsillectomy was performed in all patients. Just after the tonsillectomy, the surgeon, who was blind to the drug, used a straight 23-G needle to inject the solutions into the tonsillar bed in the upper, lower, medial, lateral, and central parts of the tonsillar fossa. Those children underwent adenotonsillectomy; adenoidectomy was performed first and packed, followed by tonsillectomy. After tonsillectomy and in the wards, the patient took a cold liquid diet in the first 4 h after surgery. Children were asked to score their pain levels postoperatively with the help of a Visual Analog Scale of 0–10 correlating faces from happy to crying under the guidance of parents. The diary should be completed in the morning time of a given day before the administration of any analgesics. Postoperative data such as nausea, vomiting, fever, halitosis, hemorrhage, ear pain, and trismus were documented on each pediatric patient by the parent for 1 week following the surgery. For a week, all children were given an oral suspension of paracetamol (40 mg/kg/day) and an antibiotic suspension (amoxicillin-clavulanate, 40 mg/kg) twice-daily. After 10 days of surgery, another surgeon who was blinded to the surgical technique performed checked the children, and the condition of the tonsillar fossa was noted.

SPSS 20 for Windows (SPSS Inc, Chicago, IL, USA) was used to conduct the data analysis and all statistical tests. The Chi-square test and Student's *t*-test were used to examine the data, and $P < 0.05$ was considered statistically significant.

Results

There were 126 children enrolled in this study. Of 126 children, 77 (61.11%) were boys and 49 (38.88%) were girls with a male-to-female ratio of 1.57:1. The age ranges of the children who participated in this study were between 3 years and 16 years. There were two groups of age of the patients those participating in the study 3–8 years and 9–16 years. There were 72 (57.14%) patients in the age range of 3–8 years and 54 (42.85%) patients in the age range of 9–16 years [Table 1]. Of 126 patients, 64 (50.79%) underwent adenotonsillectomy, whereas 62 (49.20%) underwent tonsillectomy. The mean pain score in bupivacaine is 5.2 ± 1.2 (median 5, range 4–6), 5.4 ± 1.2 (median 5, range 3–7) in lidocaine, and 9.6 ± 1.6 (median 10, range 6–12) in saline group 1 h to 7 days posttonsillectomy period [Table 2]. The difference between the mean pain score between bupivacaine (Group 1) and lidocaine (Group 2) groups was not statistically significant ($P > 0.001$). The difference between the mean pain score of the two groups against the saline group (Group 3) was statistically significant ($P < 0.001$). None of the children in the three groups presented reactionary and secondary hemorrhage. No significant difference was found in the incidence of posttonsillectomy hemorrhage among the three groups ($P > 0.001$).

Discussion

Tonsillectomy is a common procedure performed by otolaryngologists that might leave you in a lot of pain afterward.[6] Many pediatric patients undergo adenotonsillectomies for recurrent tonsillitis and obstructive sleep apnea syndrome. Although tonsillectomy is a safe

Table 1: Demographic data of the patients

Patient parameters	Group 1 (*n*=42)	Group 2 (*n*=42)	Group 3 (*n*=42)
Age (years)			
3-8	24	25	23
9-16	18	17	19
Gender (male/female)			
Boys	27	24	26
Girls	15	18	16
T	20	18	24
AT	22	24	18

T: Tonsillectomy, AT: Adenotonsillectomy

Table 2: The mean posttonsillectomy pain score

Group	Posttonsillectomy pain score
Group 1	5.2±1.2 (median 5, range 4-6)
Group 2	5.4±1.2 (median 5, range 3-7)
Group 3	9.6±1.6 (median 10, range 6-12)

surgery, it is associated with significant postoperative pain which hampers the quality of life. Posttonsillectomy pain can result in significant morbidity among pediatric patients.[7] Analgesia after tonsillectomy is often inadequate. Pain is an unwanted and unpleasant emotional and sensory experience found in actual or potential tissue injury.[1] Surgical treatment may result in postoperative pain, which also triggers the physiological and biochemical stress responses. Tonsillectomy results in severe pain in the throat and ear and causes trismus until exposed, and inflamed muscle becomes covered with regenerated mucosal lining. Pain impulses infiltrate the central nervous system during surgery, causing a hyperexcitable state despite general anesthetic. Local infiltration or topical application of local anesthetic medications blocks these impulses, resulting in a preemptive analgesic effect.[8] Posttonsillectomy pain occurs from different causes, and the pain may occur simply from the positioning of the patient during tonsillectomy. The Boyle-Davis mouth gag can induce pressure and venous congestion of the tongue, as well as postoperative pain and swelling, as well as temporomandibular joint strain. Tonsillectomy creates a large area of the exposed muscle in the oropharynx, resulting in a considerable pain from the spasm of the muscles and irritation of the nerve endings.[9] Excessive dissection and use of cautery hemostasis during tonsillectomy may cause a greater incidence of inflammation and postoperative pain.[10] The posttonsillectomy patient often complains of ear pain or otalgia, presumably referred otalgia which occurs through the glossopharyngeal nerve. Tonsillectomy triggers the inflammatory process which enhances the healing process at the tonsillar fossa, but also leaves an open wound that exposes the nerve fibers and damaged muscle fibers.[11] This makes postoperative wounds vulnerable to mechanical injury at the time of eating or swallowing. The wound produced by tonsillectomy shows evidence of inflammation and infection by producing a thick fibrin layer which increases the size by the first 3–4 days postoperatively.[12] This fibrin layer begins to shed at approximately 7 days and then allows the tonsillar bed to remucosalize by the end of the 2nd week.[13]

The management of posttonsillectomy pain in pediatric patients is often challenging to the pediatricians or otolaryngologists. There are several analgesics available; each one has its risk profile and unique side effects when used in the pediatric age group in the posttonsillectomy period. When given topically to the tonsillar fossae, local anesthetics usually impede the transmission of electrical impulses. When given topically to the tonsillar fossae, lidocaine anesthetics can inhibit the transmission of electrical impulses. Lidocaine is a type of amide that is used as a local anesthetic. A combination of topical application and local infiltration of anesthetic with epinephrine is vasoconstrictive.[14] The majority of otolaryngologists advocate the use of submucosal infiltration of topical anesthetic containing epinephrine for getting hemostasis and decreasing postoperative pain in the majority of surgery.[15] The use of local anesthetics in the tonsillar fossa shortly after the tonsil removal has been suggested for postoperative analgesia and hemorrhage management, although the evidence is mixed.[16]

To manage posttonsillectomy discomfort, 0.25% bupivacaine with 1:200,000 epinephrine in a 3–5 ml dose is injected into the tonsillar bed.[17] Lidocaine is prepared as 0.5% lidocaine with 1:100,000 epinephrine. The topical infiltration has the risk of accidental intravascular injection, which may result in cardiac arrest and convulsion.[18] In this study, no such complications were found. In one study on bupivacaine, local injection after two out of the four children developed an obstruction in the upper airway and pulmonary edema.[19] A 16-year-old girl had cardiac asystole and a central medullopontine infarct after receiving bupivacaine and epinephrine injections into the tonsillar and adenoid beds, according to one case report.[20] In this study, no complications were found with bupivacaine infiltration at the tonsillar bed. One study demonstrated that bupivacaine with epinephrine infiltration in the tonsillar bed reduced the posttonsillectomy pain for 10 days following tonsillectomy.[21] Similar results were found in this study. The difference in the average pain scores between the two groups, such as bupivacaine and lidocaine against saline, was statistically significant in this study.

There are several factors associated with the intensity of posttonsillectomy pain. The minimal and precise dissection confined to the natural planes and minimal use of the electrocautery or coblation may reduce the pain in the posttonsillectomy period.[22] In this study, all the tonsillectomy was performed by the coblation technique. Infiltration of the anesthetic agent into the tonsillar fossa just after tonsillectomy intraoperatively provides relief of pain following tonsillectomy. The perioperative use of antibiotics may decrease the infection, which contributes to the inflammation and muscle spasms resulting in pain.

Conclusion

Tonsillectomy is a typical pediatric day-care surgical treatment that comes with a lot of pain thereafter. Posttonsillectomy pain can result in morbidity among pediatric patients which overstrains the patient, family members, and hospital staffs. There are several factors to be considered when treating pediatric posttonsillectomy pain. Infiltration of bupivacaine and lidocaine into tonsillar beds just after tonsillectomy is effective for controlling posttonsillectomy pain in children.

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Conflicts of interest

There are no conflicts of interest.

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