

Review Article

Post-tonsillectomy pain management in pediatric patients-a review

Santosh Kumar Swain*

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

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*Correspondence:

Dr. Santosh Kumar Swain,

E-mail: santoshvoltaire@yahoo.co.in

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ABSTRACT

Tonsillectomy is a common surgical procedure performed in the pediatric age group. Although tonsillectomy is a safe surgery, it is associated with significant post-operative pain. Analgesia after tonsillectomy is often inadequate. Severe post-tonsillectomy throat pain has been described for more than a decade. Parents often worry for handling the pain of their children in home. Post-tonsillectomy pain is often considered as a long lasting and intense in nature. Post-tonsillectomy pain in children is an important problem which overstrains the patient, family and hospital staff. Post-tonsillectomy pain in children is an important problem which overstrains the patient, family and hospital staff. Regulatory alteration in the analgesic armamentarium, particularly in pediatric patients are making the treatment of post-tonsillectomy pain more difficult. Post-tonsillectomy pain in pediatric patients continues to be highly debated clinical issue and also an area of active research. Post-tonsillectomy pain can result in significant morbidity among pediatric patients. There are several analgesics available; each one has its own risk profile and unique side effects when used in pediatric age group in post-tonsillectomy period. This review article provides an update on recent management of post-tonsillectomy pain in pediatric patients. This article reviews the epidemiology, pathophysiology, impact of post-tonsillectomy pain in children and details of medications used for controlling post-tonsillectomy pain.

Keywords: Tonsillectomy, Post-tonsillectomy pain, Pediatric patients, Analgesics

INTRODUCTION

Pain is an unwanted and unpleasant emotional and sensory experience found in actual or potential tissue injury.¹ Surgical treatment may result in post-operative pain which also triggers physiological and biochemical stress response. Tonsillectomy results in severe pain in throat, ear and cause trismus until exposed and inflamed muscle becomes covered with regenerated mucosal lining. Pain is an integral part of the post-tonsillectomy period and often considered intense and lasting for 7 to 10 days.² Children may produce restless or crying due to pain, hunger or fear after surgery particularly tonsillectomy. Tonsillectomy is a common surgical procedure in pediatric age group and often associated with postoperative pain which may challenge to the treatment. Inadequate treatment for post-tonsillectomy pain may lead to poor oral intake, dehydration, sleep

problem, behavioral changes and emesis.³ It was suggested that frequent and early oral intake in the post-tonsillectomy period significantly minimizes the post-operative pain.⁴ Oral analgesics used in post-tonsillectomy time are often insufficient, and despite parenteral opioids being effective, these may result in sedation, respiratory depression, constipation, nausea and vomiting.⁵ This review article describes details of epidemiology, pathophysiology, impact of post-tonsillectomy pain on children and therapy used for controlling post-tonsillectomy pain.

METHODS OF LITERATURE SEARCH

We performed a literature review of management of post-tonsillectomy pain in pediatric patients consisting data base of PubMed, Medline, Scopus and Google scholar search with terms post-tonsillectomy pain, pediatric

patients with post-tonsillectomy pain, pathophysiology of post-tonsillectomy pain and medications used for post-tonsillectomy pain. We reviewed different current articles published in national and international journals. This manuscript reviews the details of management of post-tonsillectomy pain its epidemiology, pathophysiology, impact of post-tonsillectomy on children and family, medications used for managing post-tonsillectomy pain. This review article surely makes a baseline from where further prospective studies can be designed for management of post-tonsillectomy pain which can help to prevent this morbid clinical entity among children.

EPIDEMIOLOGY

One study showed 250, 000 adenotonsillectomies were performed in the United States in every year.⁶ As per data from centers for disease control and prevention, over 737,000 ambulatory tonsillectomies were performed in the United States in 2006.⁷ There has been written about benefits of tonsillectomy in respect to postoperative improvement of the quality of life and behavior of the patient. Tonsillectomy is one of the most common surgery done by otolaryngologists which may cause severe pain following tonsillectomy.⁷ Post-tonsillectomy pain is an expected sequel of this procedure which typically lasts from 7 to 10 days.⁸ The post-tonsillectomy may be moderate to severe in intensity. Some patients with post-tonsillectomies often need readmission to hospital for management of their pain along with management of the dehydration due to poor oral intake of fluids because of such pain.⁹

PATHOPHYSIOLOGY OF POST-TONSILLECTOMY PAIN

Post-tonsillectomy pain can occur by different reasons and also pain can ensue simply from the positioning of the patient during tonsillectomy.¹⁰ The placement of the Boyle-Davis mouth gag itself can cause pressure and venous congestion of the tongue which result in post-operative pain and swelling as well as stretching of the temporomandibular joint. Tonsillectomy creates large areas of the exposed muscle in the oropharynx, leading to considerable pain from the spasm of the muscle and irritation of the nerve endings.¹¹ Excessive dissection and use of cautery hemostasis during tonsillectomy may produce greater incidence of inflammation and post-operative pain.¹² Patients with Post-tonsillectomies often complain ear pain, presumably referred otalgia which occur via glossopharyngeal nerve. Removal of the tonsil triggers the inflammatory process which facilitates the healing at the tonsillar fossa area but also leaves an open wound which exposes the nerve fibers and damaged muscle fibers.¹³ This make post-operative wound vulnerable to mechanical injury during eating or swallowing. Post-tonsillectomy wound shows evidence of inflammation and infection by producing a thick fibrin layer which increases in size by first 3 to 4days post-operatively.¹⁴ This fibrin layer begins to shed at

approximately 7days and then allow the bed to remucosalize by the end of the second weeks.¹⁵ By this healing process, post-operative pain can be manifested in a biphasic pattern with peak at around 3 to 7 days, but may persist for 2 to 3 weeks following surgery.¹⁵ Poorly treated post-tonsillectomy pain may result in distress for both child and parents. It also causes dehydration of the child because of less intake of fluid and food. The treatment of the post-tonsillectomy pain is always priority in children.

IMPACT OF POST-TONSILLECTOMY PAIN AMONG CHILDREN

Tonsillectomy is one of the most commonly performed surgical procedure in otorhinolaryngology. Post-tonsillectomy pain is the most significant obstacle for rehabilitation of a patient by influencing the period of hospital stay and ability to return to routine activity. The important factors which decide the post-operative outcomes are pain, nausea and vomiting, anxiety before surgery and discomfort by intravenous injection.¹⁶ post-tonsillectomy pain may result in poor oral intake and possibly an increased risk for secondary hemorrhage. It has been seen that more than 60% of the pediatric patients those underwent tonsillectomy exhibit negative behavioral changes in next weeks after surgery.¹⁷ So, it is important to prescribe effective postoperative analgesics in children. Many otolaryngologists think the severity of pain is worse between the day three and day five following tonsillectomy.¹⁸ However, there is no such evidence to support this.

PARACETAMOL

Paracetamol or acetaminophen is a commonly used analgesic in post-tonsillectomy period as analgesic and antipyretic. It is a very safe drug in pediatric patient and often associated with very few side effects than NSAIDs.¹⁹ Paracetamol is usually used as first line of treatment for any surgical pain and found to be effective analgesic for managing post-tonsillectomy pain.²⁰ However, for getting maximum pain control, the paracetamol is often used along with NSAID as combination.²¹ Intra-operative acetaminophen administrations give rise to adequate postoperative analgesia in pediatric age group those undergoing tonsillectomy. The intravenous paracetamol significantly improves the throat pain following tonsillectomy.²²

NSAIDS

Non-steroidal anti-inflammatory analgesic (NSAIDs) are highly effective for treatment of mild and moderate pain.²³ These are considered as potent analgesics by inhibiting cyclooxygenase enzymes which mediate the inflammation and pain.²⁴ These also block thromboxane, an important mediator in platelet aggregation, potentially leads to increase chance of bleeding. Many surgeons avoid the use of NSAIDs for relieving post-operative

pain. However, study is failed to prove the chance of bleeding when comparing the NSAIDs with other analgesics.²⁵ It has been documented that NSAIDs controlled post-operative pain similar to opioids.²⁶ NSAIDs also reduce the chance of post-operative vomiting in comparison to both opioids and non-opioids.²⁷ Overall, the use of the NSAIDs is increasing widely for post-operative tonsillectomy pain control and must be considered as first line treatment in respect to acetaminophen.

TRAMADOL

Tramadol is a centrally acting analgesic with weak opioid agonist activity. The safety of tramadol as well established with no evidence of respiratory depression, low dependence and abuse potential. All these properties are suitable for managing the post-tonsillectomy pain.²⁸ One study reported the analgesic effect of the topical tramadol for controlling postoperative pain in pediatric population after tonsillectomy where they concluded that topical 5% tramadol seems to be safe, easy and comfortable approach for pain management in children undergoing tonsillectomy.²⁹

ROLE OF INTRA-OPERATIVE STEROID

Intra-operative steroids often used to control postoperative nausea and vomiting, particularly in pediatric tonsillectomy.³⁰ Study shows that postoperative steroid can control pain and make pain free post-operative period by use of oral steroids.³¹ (RR) However there is controversy regarding postoperative bleeding from the tonsillar fossa by use of systemic steroids.³² One study from Japan stated that higher chance of bleeding and re-surgery for hemostasis after tonsillectomy in children those administered with systemic steroids for prophylaxis of nausea and vomiting after surgery.³³ However, larger prospective studies are required to determine the role of steroids and their safety profile in pediatric age group.

LIDOCAINE, KETAMINE AND MORPHINE TOPICAL SPRAY

Lidocaine, ketamine and morphine sprays are more effective than a placebo for controlling postoperative pain. However, these three medications have different actions of onset. At the beginning of the recovery time, lidocaine produces the best analgesia, ketamine gives lesser analgesia than lidocaine but morphine does not have any analgesic effect at this period.³⁴ So, combination of lidocaine with one of the morphine or ketamine sprays are useful to find better methods to produce post-tonsillectomy analgesia in children. Analgesic spray is an ideal method for post-operative pain control. This spray is delivered by a pump or pressurized container. The analgesic spray is topical and applied on the surface of the tonsillectomy fossa. Topical spray of morphine generates a localized analgesic effect in mucosa tissue.

Topical anesthetic or antiseptic medications like chlorhexidine gluconate (0.12%) and benzydamine HCL 0.15% spray is a topical agent which shows antiseptic, anti-inflammatory and analgesic effects. It can be used after tonsillectomy for reducing post-operative pain.³⁵ Topical anesthetics have not proven to decrease the post-tonsillectomy pain. It also hampers the oral intake of food by diminishing the sense of taste. One study showed benzocaine lozenge to placebo and shown no difference in pain or in the number of analgesics used.³⁶

ROPIVACAINE, BUPIVACAINE AND LIDOCAINE

A local anesthetic agent infiltrated to the peritonsillar space or tonsillar bed provides analgesia with minimal side effects. This is helpful for controlling post-tonsillectomy pain and intra-operative bleeding. During intra-operative period, pain impulses enter into the central nervous system which creates a hyperexcitable state in spite of general anesthesia. If these impulses are blocked by preoperative/intra-operative analgesic drugs by infiltration or topical administration of local anesthetic drugs result in adequate analgesia effect following tonsillectomy.³⁷ Ropivacaine is member of amino amide group of local anesthetics which blocks the generation and conduction of neural impulses similar to bupivacaine.³⁸ In tonsillectomy, 0.25% bupivacaine with 1:200,000 epinephrine, typically 3 to 5 ml is injected into the peritonsillar tissue before or after removal of the tonsils are helpful to control post-tonsillectomy.³⁹ However, 0.5% lidocaine with 1:100,000 epinephrine and ropivacaine with or without clonidine. Ropivacaine is 2 to 3 times less soluble and has a lesser volume of distribution, more clearance and shorter elimination half-life than bupivacaine in humans.⁴⁰

KETAMINE INFILTRATION

Ketamine infiltration into the tonsillar fossa just after tonsillectomy is found to be effective for post-operative pain control and without adverse effects. Ketamine, an N-methyl-D-aspartate (NMDA) receptor antagonist has potent analgesic effect with subanesthetic doses. Intra-operative intravenous ketamine with dose of 0.15 mg/kg is found to be effective in post-tonsillectomy pain management.⁴¹ Analgesia by ketamine differs from local anesthetics by blocking central perception of pain as in other NMDA antagonists. Bupivacaine infiltration along with ketamine prolongs local analgesia time and may stays for one week after infiltration.⁴²

SUCRALFATE

Sucralfate is a basic aluminum salt of a sulfated disaccharide which forms a barrier along with mucoproteinaceous layer at duodenal ulcers. This barrier usually protects the tissues from erosive and irritating effects of gastric acid and pepsin. Similarly, sucralfate forms a protective barrier in the wound in tonsillar fossa following tonsillectomy which reduce the painful

irritation and muscle spasm and also enhances the healing.⁴³ After completion of tonsillectomy, the oropharynx is irrigated with 60 ml solution containing one gram of sucralfate powder and then each patient is suggested to swallow same solution four times daily for 10 days.⁴³

HONEY

Tonsillectomy with or without adenoidectomy is a common surgical procedure done worldwide, particularly in children. Oral administration of honey following tonsillectomy in children may reduce the requirement of analgesics for relieving postoperative pain.⁴⁴ Honey speeds up the healing process in wound by stimulating production of inflammatory cytokines from monocytes and keratinocytes.⁴⁵ Nitric oxide and prostaglandins play an important role in the inflammation, microbial killing and healing process of wound. Honey was found to decrease prostaglandin levels and increase nitric oxide end products. These properties of the honey help to explain the therapeutic properties of honey as an antibacterial agent or wound healing.⁴⁶ The side effects of honey are almost negligible and so suggested for routine use along with analgesics in post-tonsillectomy period.

ANALGESICS FOR POST-TONSILLECTOMY PAIN AND OSAS

Many pediatric patients undergo adenotonsillectomies for obstructive sleep apnea syndrome (OSAS). Although adenotonsillectomies is the treatment in patients with OSAS, the respiratory parameters may not improve just after surgery. Consequently, these pediatric patients may be more sensitive to opioids and particularly vulnerable to respiratory complications due to opioid use.⁴⁷ Some pediatric patients may need opioids for post-tonsillectomy pain, but does not require to be adjusted downward to reflect this sensitivity to opioids. One study comparing the safety and efficacy of morphine to ibuprofen for treatment of post-tonsillectomy pain where approximately 86% of children with morphine had more desaturation on the night following surgery, with an average increase of eleven episodes of desaturation per hour.⁴⁷ Conversely, approximately 68% of the pediatric patients with ibuprofen shows fewer desaturation after surgery with an average improvement of two fewer desaturation per hour in comparison to pre-operative measurement. A child with morphine was seen to be unresponsive with features of cyanosis and required oxygen supplementation and intravenous naloxone before recuperating. However, morphine is no longer routinely used in post-tonsillectomy period, and if prescribed, the care takers/parents are given instruction about the risks and safety of this medication. In case of severe OSAS under the age of three, have associated craniofacial or medical issues or need more morphine for analgesia where they are often admitted to hospital for overnight oxygen monitoring.⁴⁸

TECHNIQUE FOR TONSILLECTOMY AND POST-TONSILLECTOMY PAIN

There are several factors associated with intensity of the post-tonsillectomy pain. The minimal and precise dissection confined to natural planes and minimal use of the electro-cautery or coblation may reduce the pain in post-tonsillectomy period.⁴⁹ Infiltration of anesthetic agent into the peritonsillar space provides a short-term relief of pain following tonsillectomy. Perioperative use of antibiotics may decrease the infection which contributes to the inflammation and muscle spasm resulting pain.

CONCLUSION

Tonsillectomy is a common pediatric day care surgical procedure and is associated with significant post-operative pain. There are several factors to be considered when treating the pediatric post-tonsillectomy pain. Patient's factors such as indications of tonsillectomy, comorbidities, caregiver circumstances and other related clinical history are required when taking decision for exact therapeutic agents. Acetaminophen should be considered as workhorse analgesic for treating post-tonsillectomy pain in pediatric age group. However, care should be taken and avoidance of NSAIDs is warranted for history of bleeding disorders, recurrent bleeding, kidney failure or peptic ulcer disease as well as asthmatic or allergic reactions to NSAIDs.

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