EFFICACY OF INFILTRATION VERSUS SURFACE APPLICATION OF BUPIVACAINE IN REDUCING EARLY POST-TONSILLECTOMY PAIN.

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ABSTRACT:

Objectives:

To compare the efficacy of infiltration with surface application of bupivacaine in reducing early post-tonsillectomy pain.

Materials and Methods:

Prospective, interventional, single blinded, comparative study was done at Ganesh Man Singh Memorial Academy of ENT, Head and Neck Studies, Tribhuvan University Teaching Hospital (TUTH), Institute of Medicine, Kathmandu, Nepal from 1st November 2014 and 31st April 2016. Patients aged 15 or more, of both genders, who underwent tonsillectomy under general anesthesia were enrolled in the study. Following tonsillectomy, 5ml of 0.25% of bupivacaine with 1:2,00,000 adrenaline was locally infiltrated in right tonsillar bed, while on the left side, a pack soaked with the same concentration and amount of bupivacaine was placed for 5 minutes. Post-tonsillectomy pain during swallowing was assessed using Numerical rating scale and also on the basis of analgesia demanded by patient during the first two postoperative days (POD).

Results:

Compared to surface application side, the mean pain score on infiltration side was lower on both 1st postoperative day (POD1) and 2nd postoperative day (POD2), however none were statistically significant (p value 0.58 on POD1 and 0.7 on POD2). Out of 23 patients who demanded intramuscular diclofenac sodium, higher number (n=18) required it on POD1. The mean pain scores for patients demanding analgesia was more on surface application side on both POD1 and POD2 although the difference was not statistically significant (p value 0.48 on POD1 and 0.08 in POD2)

Conclusion:

Following tonsillectomy, surface application of 0.25% of bupivacaine with 1:2,00,000 adrenaline in tonsillar bed is equally efficacious as local infiltration in reducing early post-tonsillectomy pain.

Keywords: Tonsillectomy, Bupivacaine infiltration, Surface application, Numerical rating scale, Post-tonsillectomy pain.

INTRODUCTION

Tonsillectomy is one of the most common otolaryngological procedure. Its postoperative morbidity mainly pain poses a significant clinical problem despite advances in anesthetic and surgical techniques.[1-4] Poorly managed pain can increase use of analgesics at a higher dose, delay oral intake which consequently can result in dehydration, infection leading to secondary hemorrhage needing longer hospital stay and increased expenses.[4,5] Although the pain doesn't subside even till 14 to 21 days which is the time taken for the pharyngeal muscles to be covered with mucosa, it heightens immediately after operation and in the first three postoperative days hence it is crucial to manage pain in the early post operative period.[1,5] To overcome the post-tonsillectomy pain, several peri-operative strategies like corticosteroids, gabapentin, pethidine have been attempted with local anesthetics (LA) being one of them.[3,6-9] Amongst LA, Bupivacaine is long acting and has better safety profile.[12] It can be used for infiltration, nerve block, epidural and intrathecal anesthesia.[4] For post-tonsillectomy pain, different modes of application namely preincisional peritonsillar infiltration, post tonsillar wound infiltration, post tonsillectomy packing with bupivacaine soaked

tonsillar gauze have been tried with differing results[1,4,7,9]

Hence this study was conducted to compare the efficacy of infiltration with surface application of bupivacaine in reducing early post-tonsillectomy pain.

MATERIALS AND METHODS

This study was conducted at Ganesh Man Singh Memorial Academy of ENT, Head and Neck Studies, Tribhuvan University Teaching Hospital (TUTH), Institute of Medicine, Kathmandu, Nepal after obtaining ethical clearance from institutional review board. It was a prospective, interventional, single blinded, comparative study conducted over 18 months from 1st November 2014 to 31st August 2016.

Fifty patients of both gender, aged 15 to 55 years, undergoing tonsillectomy for recurrent tonsillitis, papilloma tonsil, keratosis tonsil and recurrent peritonsillar abscess were enrolled for this study. Patients with known allergy to bupivacaine, current or regular use of oral steroid or NSAIDS, tonsillectomy for suspected malignancy, tonsillectomy as an approach to other procedure, unilateral tonsillectomy, adeno-tonsillectomy and intraoperative trauma to any other part of oropharynx apart from surgical site were excluded. All patients underwent cold dissection tonsillectomy under general anesthesia and bipolar cautery was used for hemostasis.

After completion of tonsillectomy, pack soaked in 5 ml of 0.25% of bupivacaine with 1:2,00,000 adrenaline was placed in the left tonsillar fossa for 5 minutes. On the side of infiltration i.e. the right tonsillar fossa, a total of 5ml of 0.25% of bupivacaine with 1: 2,00,000 adrenaline was infiltrated submucosally,1.5ml each in the anterior and posterior tonsillar pillar and 2ml in the tonsillar fossa. Patients were blinded in terms of side of infiltration and surface application of bupivacaine.

Postoperatively all the patients received oral amoxycillin 500mg 8 hourly and were asked to gargle with povidine iodine gargle for 7 days. For pain relief, a tablet containing Paracetamol with Ibuprofen (500mg+400mg) was given 8 hourly to all patients for first 3 post-operative days. Diclofenac sodium (75mg) was given intramuscularly to a maxium three doses per day as and when demanded by the patients. Post-operative pain on each side was assessed on the in the mornings of the 1st two post operative days prior to the intake of morning dose of analgesic. The pain was quantified using Numerical rating scale (NRS). The side of post-tonsillectomy pain needing the analgesic on demand was also noted. The outcomes measured were the mean score of post-operative pain during swallowing and the demand of analgesia on the first two post-operative days. The data was analyzed with SPSS 21 using paired-t test and Chi-square test with the p value less than 0.05 taken as significant.

RESULT

A total of 50 patients were included of which 22 were males and 28 females. Their age ranged from 15 to 55 years with mean age being 28 yrs. Tonsillectomy was done for recurrent tonsillitis in 46 patients, papilloma tonsil for 2 and one each for keratosis tonsil and recurrent peritonsillar abscess.

On the first post –operative day, the mean pain score in the infiltration side was 6.9 and 7.1 on the surface application side. The difference however was not statistically significant with the p value of 0.58. Similarly, the pain score on the second post-operative day reduced to 5.5 and 5.6 respectively for infiltration side and surface application side. The difference between the two sides again remained insignificant with the p value of 0.705 (Fig I).

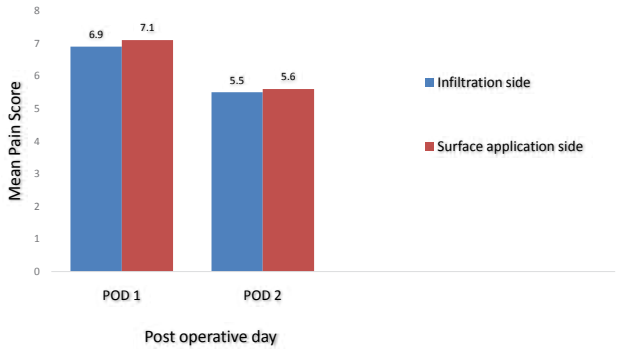

Fig I: Mean pain score of patients on POD1 and POD2 (n=50).

Out of the 50 patients, 23 patients needed additional analgesia of intramuscular diclofenac, of which 12 were males and 11 were females. 18 of them required it on POD1, amongst which eight had more pain on the surface application side, six had equal pain on both infiltration and

surface application sides whilst four had more pain on the infiltration side. The one patient needing on demand analgesia on POD2 had equal pain on both sides. Amongst four patients needing on demand analgesia on both POD1 and POD2, two had more pain at the infiltration side, one had more pain in surface application and one had equal pain on both sides (Fig II).

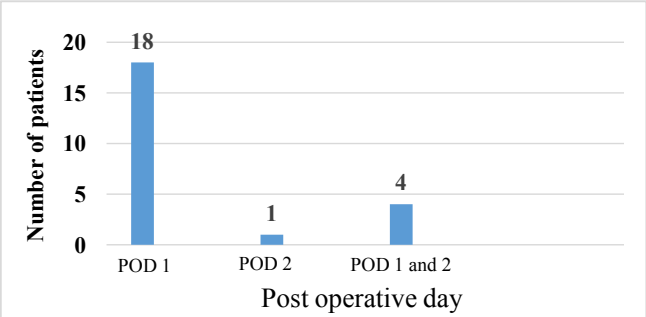

Fig II: Demand of analgesia on POD1 and POD2 (n=23).

The mean pain score for demanding analgesia on POD1 was 7.5 and 7.8 on the infiltration and surface application side respectively. Similarly, on POD2, it was 6.17 and 6.65 on the infiltration and surface application respectively. However, the difference was not statistically significant with p value of 0.48 on POD1 and 0.08 on POD2 (Fig III).

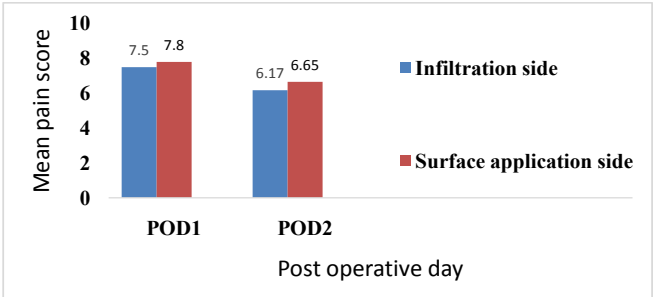

Fig III: Mean pain scores of patients demanding analgesia on POD1 and POD2 (n=23).

Patients demanding analgesia were analyzed based on gender. Almost equal number of male and female patients demanded analgesia (12 vs 11) with the difference not being statistically significant

DISCUSSION

Peripheral tissue damage changes neuronal excitability leading to reduced pain threshold and hypersensitivity to nociceptive stimuli. LA pre-emptively blocks this peripheral nociceptor transmission and prevents sensitization of the central nervous system hence reducing pain.[7,9] LA has been found to provide modest reduction of pain post tonsillectomy.[7] Different LA like lignocaine, ropivacaine or mepivacaine has been used for pain management, however, bupivacaine has superiority over others because of its long action and relative safety.[9-12] It gives sensory analgesia without profound motor blockade in 0.25% or 0.5% concentration used for infiltration.[13] Adding adrenaline to bupivacaine provides vasoconstrictor effect which decreases the intra-operative bleeding, providing better visualization and subsequently decreasing the duration of surgery.[3,11] Although the half life of bupivacaine is 4-7 hours, by virtue of pre-emptive analgesia, pain relief is longer than its normal pharmacological duration of action lasting 3 days.[1,10]

Bupivacaine has been used in the concentration of 0.25% or 0.5% with or without adrenaline for post tonsillectomy pain in several studies.[1-5,7,8,10,12,14,16] However the most effective method of bupivacaine application for post-tonsillectomy pain still remains controversial.

Stelter et al compared three methods namely preincisional peritonsillar infiltration, post tonsillectomy infiltration and post tonsillectomy fossa packing using 0.25% bupivacaine in 156 adults and paediatric patients.[1] The post tonsillectomy infiltration was found to be superior as compared to other methods with the analgesic effect lasting 3 days. The subsequent study in 30 patients by the same author assessed for any added benefit of combining long acting bupivacaine with fast acting mepivacaine along with vasoconstricting effect of epinephrine and found no significant difference.[11] A study in adults by Ginström et al found significantly less pain in the preincisional 0.5% bupivacaine group as compared to normal saline infiltration group in the recovery room however with no difference from post-operative day one to six.[2] Similar result was found by Somdas et al in 30 paediatric patients where one side tonsillar fossa was infiltrated with normal saline and the other side with bupivacaine post-tonsillectomy, although the pain relief lasted for 24 hours.[10] Bameshki et al found 0.5% bupivacaine with 1:200,000 adrenaline effective in the first 18 hours irrespective of it being infiltrated before tonsillectomy or after tonsillectomy in paediatric patients in reducing pain at rest and on swallowing.[14]

On the contrary, in a study done by Haksever et al, the packing group had better pain relief compared to the infiltration group and the normal saline application group.[4] It included 60 pediatric patients aged 3 to 15 years, grouped into 3 groups, who had pain score compared 5 times on the day of surgery and subsequent 6 post operative days. Each group of 20 had topical 0.5% bupivacaine for 2-3 minutes, topical normal saline and 3 ml of preincisional infiltration of 0.5% bupivacaine. The direct contact of bupivacaine with nerve endings in the tonsillar bed has been implicated as the mechanism of pain relief in this context.

Interestingly, Vasan et al found no statistical difference in pain reduction with preincisional bupivacaine versus normal saline infiltration in adult patients.[15] Hydri et al compared the 128 adult patients with one group packed with 0.5% bupivacaine and other with infiltration of bupivacaine in post tonsillectomy tonsillar bed with untreated fossa taken as control in both the groups.[12] There was no appreciable pain relief irrespective of the application method.

A systematic review and meta-analysis of 46 randomized control trial in 2008 concluded that topical local application of bupivacaine had analgesic effect similar to infiltration without the adverse effects associated with infiltration.[7] The current study findings tally with the findings of this meta-analysis.

In our study, NRS was used for pain scale as it is considered a valid and reliable tool of pain measurement.[1] The pain score was taken during swallowing as this indicates dynamic pain which directly correlates with patients' oral intake.

The mean pain scores on both POD1 and POD2 were more in the surface application side than infiltration side, however it was statistically not significant.

The mean pain score decreased on POD 2 as compared to POD 1 on both infiltration and surface application side. Amongst the 23 patients who needed on demand analgesia, 44% patients (22/50) needed it on POD1 whilst only 10% (5/50) needed it on POD2 with an overlap of 4 patients needing on demand analgesia on both days. There was nearly equal number of males and female patients (12 vs 11) needing additional analgesic hence indicating similar pain threshold for both genders. Hydri et al. also found similar pain score for both male and females.[12]

Bupivacaine infiltration has been associated with complications namely accidental intravascular injection leading to cardiac arrest and convulsion, inhibition of laryngeal reflex mechanism leading to upper airway obstruction, pulmonary oedema, facial palsy, vocal cord palsy, brain stroke.[1,4,8] There is additional risk of severe arrhythmia, tachycardia and allergic reactions from LA with epinephrine.[1] We however did not encounter any infiltration related complications.

This study had intra-individual design where the subject acted as own control, hence reducing the bias arising from inter- individual variation in pain perception, peri and post-operative administration of systemic analgesics.[1,10] The difference in the pain perception after intervention in the same patient could be well documented.[12] There are certain limitations to this study. There were multiple surgeons involved, however, all surgeons followed the same standardized operative protocol. Patients needing surgery were of different background and hence the ability to understand and rate the NRS could have been affected. However, to overcome this issue, all patients were familiarized with the NRS pre-operatively. The effect of the LA could have been masked by supplemental analgesic, but to reduce the masking effect to the minimum, the NRS was noted prior to the next dose of analgesic, similar to the method followed by Grainger et al.[7]

CONCLUSION:

Surface application of 0.25% of bupivacaine with 1:2,00,000 adrenaline in tonsillar bed is equally efficacious as local infiltration in reducing early post-tonsillectomy pain.

ACKNOWLEDGMENTS

We would like to thank Prof Bimal Kumar Sinha and Dr Pallavi Sinha for giving their valuable input whilst carrying out the study.

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