

Effect on postoperative pain after local application of Bupivacaine in the Tonsillar Fossa; a prospective single blind controlled trial

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Abstract

Objective: To assess the effect on postoperative pain after local application of bupivacaine in the tonsillar fossa.

Methods: Seventy two patients were recruited in this prospective single blind controlled trial. There were 45 females and 27 males between the ages of 7 and 35 years. After tonsillectomy the right tonsillar fossae (subject fossae) were packed with tonsillar gauze soaked in 2mls of 0.5 % Abbocaine (bupivacaine) solution and kept in situ for five minutes. The left fossae (control fossae) were packed with the similar tonsillar swab soaked in 0.9 % normal saline.

Results: The main outcome measure was severity of pain by using visual analogue score. The measurements were taken at various intervals, i.e. after 4 hours, before bed, before breakfast, before lunch and before discharge. The mean post-operative pain scores for the subject fossa after 4 hours, before bed, before breakfast, before lunch and before discharge were 3.09 (± 0.85), 3.25 (± 0.64), 2.89 (± 0.72), 2.47 (± 0.67) and 2.37 (± 0.57) respectively. The mean post-operative pain scores for control fossa after 4 hours, before bed, before breakfast, before lunch and before discharge were 5.78 (± 1.51), 5.50 (± 1.29), 4.34 (± 1.13), 3.29 (± 0.91) and 2.73 (± 0.81) respectively. There was significant difference between subject and control fossae scores at all the stages up to discharge of patients, showing better pain relief with bupivacaine.

Conclusion: Topical application of bupivacaine to the tonsillar fossa can reduce post-operative pain and facilitate early eating and drinking during the post-operative period (JPMA 53:422;2003).

Pain after tonsillectomy has been regarded as a major morbidity in the early post-operative period. It delays the early resumption to oral intake and therefore late discharge from the ward.¹ Pain occurs due to trauma to the local tissue, releasing inflammatory mediators. These mediators cause generation of action potentials which are conducted by A delta fibres and C fibres to the spinal cord. Application of the local anaesthetic at the site of injury soon after trauma can reduce this barrage of action potential traveling to the spinal cord and hence reduce the post-operative pain. Less post-operative pain will result in early response to oral intake and early discharge.

There are numerous studies in which a local anaesthetic has been applied to the tonsillar fossae after tonsillectomy either by infiltration or topical spray. There are risks with infiltration technique such as accidental intravascular injection leading to life threatening arrhythmias. Life threatening upper airway obstruction after infiltration of bupivacaine has been reported in children.² Visual loss³, cervical osteomyelitis⁴ and bilateral vocal cord paralysis⁵ has been associated with local infiltration.

In the study, we used Abbocaine (bupivacaine by Abbott Laboratories) soaked tonsillar pack applied to tonsillar fossa for 5 minutes, as a safer and reliable alternative to local infiltration.

Patients and Methods

The study was conducted at ENT department, Jinnah Postgraduate Medical Centre, Karachi. Seventy two consecutive patients, which were listed for routine elective tonsillectomy, were recruited in this prospective single blind controlled trial. There were 45 females and 27 males between the ages of 7 and 35 years. After taking informed consent these patients were scheduled for tonsillectomy. All the operations were performed by one surgeon employing the standard dissection technique. The bleeding was controlled by unipolar diathermy or ligation. At the end of procedure right tonsillar fossa (subject fossa) was packed with a tonsillar swab soaked in 2 milliliters of 0.5 % Abbocaine (bupivacaine) solution and kept in situ for five minutes, the left fossa (control fossa) was packed with the similar tonsillar swab soaked in 0.9 % normal saline.

The main outcome measure was severity of pain. The pain severity was measured by visual analogue score 1 to 10 (1 = no pain and 10 = worst pain possible). The measurements were taken at various intervals, i.e. after 4 hours, before bed, before breakfast, before lunch and before discharge. This data was recorded by the on call duty doctor. All the patients were given routine analgesia.

Results

Seventy two patients entered the study; the right and left tonsillar fossae were labeled as subject and control fossae respectively. A tow-tailed, paired Student t test was used for comparison of two

lunch and before discharge were 3.09 ($\pm$ 0.85), 3.25 ($\pm$ 0.64), 2.89 ($\pm$ 0.72), 2.47 ($\pm$ 0.67) and 2.37 ($\pm$ 0.57) respectively. The mean post-operative pain scores for control fossa after 4 hours, before bed, before breakfast, before lunch and before discharge were 5.78 ($\pm$ 1.51), 5.50 ($\pm$ 1.29), 4.34 ($\pm$ 1.13), 3.29 ($\pm$ 0.91) and 2.73 ($\pm$ 0.81) respectively.

There was significant difference between subject and control fossae scores at all the stages up to discharge of patients (Table, Figures 1-5). None of the seventy two patients had any complication related to bupivacaine.

Discussion

The reduction of post-tonsillectomy pain is important not only for the patient comfort, but also because reducing pain improves oral intake, reduces the risk of dehydration, infection and post surgery haemorrhage.

Pain is a subjective and complex expression depending on factors such as age, social and ethnic background, anxiety level, personal experience, perceptual abilities and the ability to describe pain based on certain frames of references. Pain questionnaires and pain scales have been used to categorize and quantify pain experience, however, the visual analogue score (VAS) has shown to be both realistic and reproducible.⁶ The absolute visual analogue scores can be difficult to interpret, but when focusing mainly on the repeated measures in the same patients, interpretable comparisons between different stages can be made.

The efficacy of local bupivacaine application in post-tonsillectomy pain has been extensively studied.⁷⁻¹⁸ Some recent studies¹⁹⁻²¹ have shown that use of bupivacaine has no role in relieving post-tonsillectomy pain, however, scores of studies have shown the efficacy of bupivacaine in relieving post-tonsillectomy pain. Bupivacaine is an amide-linked local analgesic. It was synthesized by Ekenstan in 1957 and has been used extensively in obstetric practice to produce epidural analgesia and peripheral nerve blockade in the management of intractable pain. Its high lipid solubility and protein binding results in rapid onset of action and prolonged duration (6-9 hours). Bupivacaine 0.5% needs to be in contact with a raw area for about 10 seconds to be effective.²² The recommended upper limit of safe dosage of bupivacaine is 2mg/kg body weight.²³ This is equivalent to 25-30 ml of 0.5% solution. Systemic toxicity produces arrhythmia, drowsiness, convulsions, paraesthesia, disorientation and nystagmus.

In our study we chose to use tonsillar swab soaked in bupivacaine kept in tonsillar fossa for 5 minutes because we believe this to be a safer alternative to topical infiltration.

This study convincingly demonstrates that topical application of bupivacaine in tonsillar fossa after surgery, reduces post-operative pain at all stages of the trial up to the discharge of the patients. Although the local effect of bupivacaine can last only for 6-9 hours, we have noticed in our study and also seen in other trials^{10,24,25} that analgesia effects last beyond the expected duration of the local anaesthesia. This protracted pain relief resulting by a single use of bupivacaine cannot be explained by prolonged presence of the local anaesthetic in the area of surgery. An explanation for this long lasting pain relief might be that neural blockade

prevents nociceptive impulses from entering the central nervous system during and immediately after surgery and this suppresses formation of the sustained hyperexcitable state responsible for the maintenance of post-operative pain. Local anaesthetic induces the antinociceptive effect by acting on the nerve membranes; however, these affect many membrane-associated proteins in any tissue. They can inhibit the release and action of agents (prostaglandins, lysosomal enzymes, etc.) sensitizing or stimulating the nociceptors and participating in inflammation.²⁶

In conclusion, topical application of bupivacaine to the tonsillar fossa can reduce post-operative pain and facilitate eating and drinking during the post-operative period. We suggest that any procedure resulting in shorter hospitalization time, rapid recovery and smooth convalescence should be employed.

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