INTRODUCTION
Managing pain following tonsillectomy remains a confounding challenge for the anaesthetist and the treating surgeon as it impairs swallowing, which subsequently leads to infection, dehydration and secondary haemorrhage. The pain which peaks around the fourth or fifth postoperative day\(^1\) translates into delayed recovery following surgery, prolonged hospital stay and increased cost. Although adequate pain relief is achieved with the use of narcotic analgesics yet their use is fraught with adverse side effects. The patients often have to strike a balance between optimal pain control and the side effects of the analgesics used.\(^2\) This obviates the need to achieve adequate pain control using a local anaesthetic agent in conjunction with a general anaesthetic.

Bupivacaine, a long-acting local anaesthetic,\(^3\) is the most commonly reported local anaesthetic for paediatric regional anaesthesia by virtue of its lower toxic threshold compared with other local anaesthetics.\(^4\) Various studies have argued the effectiveness of topical application of 0.5% bupivacaine in reducing postoperative pain with conflicting results.\(^5,6\) Pain is a subjective feeling and the thresholds vary from person to person, therefore, this study was designed to assess whether an individual could appreciate the pain relief, if any, in either one of his/her tonsillar fossa topically suffused with a local anaesthetic (bupivacaine).

METHODOLOGY
Forty-six patients (92 tonsillar fossae) of either gender, aged 10-42 years undergoing tonsillectomy for recurrent tonsillitis were enrolled for this study. At the end of surgery, having secured haemostasis, one tonsillar fossa was randomly packed with a gauze piece soaked in 3 ml of 0.5% bupivacaine for 5 minutes, while the other was not. Effects of postoperative analgesia were assessed using visual analogue scale (VAS) up to 8 hours.

RESULTS: Majority of the patients (85%, n=39) failed to experience an appreciable pain relief on the side of local anaesthetic (bupivacaine) application (p=0.006).

CONCLUSION: Topical application of local anaesthetic (bupivacaine) confers no appreciable pain control in post-tonsillectomy patients.

Following surgery, and after recovery from the general anaesthetic, pain intensity in the throat, difficulty while talking and odynophagia, were assessed by asking patients to express their pain, on a VAS 100 mm scale (0 mm: no pain; 100 mm: maximum imaginable pain) and recorded at 1, 2, 4 and 8 hours after surgery. Separate recordings for each tonsillar fossa in the same patient were made by the recovery room/ward nursing staff and an intern, blinded to the side treated. Ibuprofen orally was given as a routine analgesic 6 hours following surgery. No additional analgesic supplement was given till the next 6 hours.

The statistical analysis was performed using “software package for statistical analysis” (SPSS-10). Pain scores using VAS were documented as mean ± standard deviation (SD). Student’s paired t-test was used for calculating p-values. A p-value of < 0.005 was considered significant.

RESULTS
The mean age was 18.2 years. Most of the patients (61% n= 28) in this study were in or around their teen ages, followed by those in their third decade (26% n=12). Male: female ratio was 1:1 (Table I).

At the first VAS pain recording, one hour postoperatively; all patients were too distraught to discriminate any pain difference between their respective tonsillar fossae or any change during swallowing. The VAS scores of pain intensity at rest and during speech were identical, however, VAS scores on the untreated side were lower than the fossae treated locally with bupivacaine (p=0.156, Table II).

The overall pain intensity increased on swallowing. The increase in VAS scores compared to pain at rest was statistically insignificant, (p=0.134) in the untreated fossae and (p=0.106) in the treated fossae. The treated side was more painful than the untreated side (Table III).

Table I: Age and gender distribution (n=46).

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 years</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11-20 years</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>21-30 years</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>31-40 years</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>41-50 years</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Table II: Mean scores ± (SD) for pain at rest and during speech (n=46).

<table>
<thead>
<tr>
<th></th>
<th>1 hour</th>
<th>2 hours</th>
<th>4 hours</th>
<th>8 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bupivacaine treated fossae</td>
<td>6.46 ± 0.50 (6-7)</td>
<td>7.17 ± 1.04 (5-8)</td>
<td>8.13 ± 1.02 (6-9)</td>
<td>5.67 ± 1.17 (4-7)</td>
</tr>
<tr>
<td>Untreated fossae</td>
<td>6.46 ± 0.50 (6-7)</td>
<td>6.48 ± 0.50 (6-7)</td>
<td>7.43 ± 0.50 (7-8)</td>
<td>5.61 ± 0.49 (5-6)</td>
</tr>
</tbody>
</table>

Table III: Mean scores ± (SD) for odynophagia (n=46).

<table>
<thead>
<tr>
<th></th>
<th>1 hour</th>
<th>2 hours</th>
<th>4 hours</th>
<th>8 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bupivacaine treated fossae</td>
<td>6.46 ± 0.50 (6-7)</td>
<td>7.86 ± 1.08 (6-9)</td>
<td>8.43 ± 0.74 (7-9)</td>
<td>5.97 ± 1.14 (4-7)</td>
</tr>
<tr>
<td>Untreated fossae</td>
<td>6.46 ± 0.50 (6-7)</td>
<td>7.71 ± 0.54 (7-9)</td>
<td>8.39 ± 0.49 (8-9)</td>
<td>5.82 ± 0.64 (5-7)</td>
</tr>
</tbody>
</table>

The cumulative mean VAS scores over the first 8 postoperative hours for odynophagia revealed greater discomfort than the scores for pain at rest and pain while speaking (p=0.095, Table IV).

Table IV: Mean pain scores ± (SD) for first 8 hours postoperatively (n=46).

<table>
<thead>
<tr>
<th></th>
<th>Pain at rest</th>
<th>Odynophagia</th>
<th>Pain while speaking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bupivacaine treated fossae</td>
<td>6.85 ± 1.04 (4-9)</td>
<td>7.18 ± 1.55 (4-9)</td>
<td>6.85 ± 1.04 (4-9)</td>
</tr>
<tr>
<td>Untreated fossae</td>
<td>6.49 ± 0.74 (5-8)</td>
<td>7.09 ± 1.16 (5-9)</td>
<td>6.49 ± 0.74 (5-8)</td>
</tr>
</tbody>
</table>

VAS scores for pain at rest, odynophagia and pain while speaking, increased gradually, albeit asymmetrically in both tonsillar fossae over the first 6 postoperative hours and receded after oral analgesia was routinely given 6 hours postoperatively. Thus the 8 hourly score was lower than the one hour score in all cases (p=0.132, Figure 1).

Only few patients [15%, n=7] experienced an appreciable pain relief on the side of topical bupivacaine application (p=0.006). An interesting observation was that majority of patients [85%, n=39] had significantly more pain on the side where bupivacaine packing of the tonsil fossa was done, compared to the side where no intervention took place (Figure 2). Age and gender had no bearing on this observation.
DISCUSSION

In a bid to reduce post-tonsillectomy pain, variations in surgical procedures, antibiotic injections and intraoperative injection of corticosteroid have been attempted.7-9 Perioperative local anaesthetics are often used to reduce the postoperative pain in tonsillectomy.10 There are different ways of applying local anaesthetics, include: pre-incisional peritonsillar infiltration, post-tonsillectomy wound infiltration and post-tonsillectomy packing with soaked gauze.

There is a multitude of studies both supporting and refuting the effectiveness of bupivacaine. Ginstrom claimed that intraoperative infiltration of bupivacaine/epinephrine resulted in only a marginal effect on pain and that too in the immediate postoperative period.11

Studies on bupivacaine infiltration in and around the tonsillar fossae have yielded conflicting results varying from no relief to appreciable pain control.12,13 Ventiocular tachycardia has been documented as an isolated complication of bupivacaine injection into the tonsillar bed.14 Wong concluded that postoperative bupivacaine injection provides better pain relief than topical application.15 To the contrary, Hung claimed that topical packing of bupivacaine-suffused packs confers pain relief.16

Since the sides of intervention were pre-determined and not randomly selected, an element of bias cannot be ruled out in these studies.

The pain threshold varies from person to person, yet almost all the published studies have compared the pain perception among different groups of individuals and not between the tonsillar fossae of an individual.

An exhaustive review of the Internet revealed only two studies that have an intra-individual design similar to ours. This is the only way to correctly document the difference in pain perception after intervention in the same individual.

The first study by Somdas found that 0.5% bupivacaine effectively relieves pain in children (patients aged 5-15), which is in contrast to the findings of this study.17 The two logical arguments are that considering the age group, most of the patients are too young to localize the side of maximum pain and appreciate its severity on a VAS scale. Secondly the side of intervention was not randomly selected and 0.5% bupivacaine solution was infiltrated on the right tonsillar bed in all cases. This can generate a biased result.

The only other intra-individual design study by Stelter also claimed that post-tonsillectomy infiltration of the wounds with bupivacaine is superior to pre-incisional infiltration technique as well as post-tonsillectomy packing of the wounds with a gauze swab.18 Pain recordings were continued for 6 postoperative days.

The arguments against this study are that the younger patients (age 3-45 years) are unable to respond accurately to pain intensity and variation between the two tonsillar fossae. Since the readings were objective, the result would surely be unreliable at best. Secondly bupivacaine is only effective locally up to 6-8 hours and surely the concept of prolonged pain relief due to the synergistic effect of a general/local anaesthetic is still hypothetical.

An interesting finding of this study that bupivacaine treated fossae were generally more painful is corroborated by a study by Warnock19 who also observed that children who had a bupivacaine infiltration of the tonsil fossa during surgery had significantly more pain in the evening of surgery than children who did not.

Another study by Nordahl concludes that bupivacaine is ineffective in relieving post-tonsillectomy pain in females and older patients who reported more pain and used more analgesics than males and younger patients.20 This corroborates the present findings, although in this study the discomfort on the treated side was not influenced by age or gender.

A review of Cochrane database encompassing thirty trials till September 1998 reveals that since the trials identified were of small size and several involved the perioperative co-administration of intravenous opiates which may have masked any beneficial effect of the local anaesthetic, there is no evidence that the use of perioperative local anaesthetic in patients undergoing tonsillectomy improves postoperative pain control.21 This commensurate with the findings of this study.

CONCLUSION

Most of the patients i.e. 85% (n=39), failed to experience an appreciable pain relief on the side of local anaesthetic (bupivacaine) application (p=0.006).

Large scale randomised controlled trials with an intra-individual design are needed to resolve the enigmatic role of topical bupivacaine in tonsillectomy.

Acknowledgement: The authors would like to thank Dr. Jehangir Ahmed Afridi, Senior Intern, ENT Department, Combined Military Hospital, Peshawar for his help in collecting and compiling the VAS score data.

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Post-tonsillectomy pain and bupivacaine, an intra individual design study


