INTRODUCTION

Exodontia is an important component of general dental practice and extractions in the maxilla are frequently required. A maxillary extraction usually requires administration of local anaesthesia in the buccal vestibule followed by a palatal infiltration. Palatal infiltration of local anaesthesia is given to anaesthetize free nerve endings of nasopalatine or the greater palatine nerves and is often regarded as a painful procedure as injecting anaesthetic solution causes separation of tightly bound mucoperiosteum from the underlying bone of the hard palate. Some degree of pain is also produced as a result of needle penetrating the mucosa.1,2

Various innovative techniques to reduce this discomfort have been described in the literature with varying degrees of efficacies. These include topical anaesthetic application,3 spray of vapo-coolant on the palate just prior to injection,1 withdrawing the needle a little bit before injecting so that solution does not go subperiosteally,4 pressure application on the mucosa by the handle of the mirror just prior to injecting,2 computerized injection systems,5 transcutaneous electronic nerve stimulation (TENS),6 avoiding palatal injection by using 4% Articaine HCl rather than Lignocaine1,2,7-9 and intraosseous injection in children.10,11 Transpapillary injection is also a means of avoiding palatal injection for maxillary extractions. Here an injection is given through the interdental papilla with the needle inserted from the buccal side to achieve anaesthesia on the palatal aspect. The buccal mucosa, including the site of insertion of needle i.e. the papilla, has already been anaesthetized by buccal infiltration thus completely eliminating the need for a palatal injection.4 The rationale for the study was to find a simple and pain free alternative to palatal injection for maxillary extractions.

METHODOLOGY

The study was carried out in outpatient department of Oral and Maxillofacial Surgery of Armed Forces Institute
of Dentistry, Rawalpindi, Pakistan. Permission to carry out study was taken from the ethical committee of the hospital and informed written consent was taken from all the patients. Patients requiring simple extraction in maxilla were divided into two groups randomly using lottery method. Each group consisted of 100 patients. Group 1 received the conventional buccal infiltration followed by palatal injection and served as a control while Group 2 received the buccal infiltration followed by transpapillary injection to anaesthetize the palatal mucosa for extraction. Standard 2.2 ml cartridge of 2% Lignocaine HCl with 1:100,000 Adrenalin was used for both groups; 1.0 ml solution was injected in the buccal sulcus in both groups and 0.3-0.4 ml of anaesthetic solution was given for the palatal and the transpapillary injection. A 2-minute time period was allowed to pass before giving the palatal or the transpapillary injection after the administration of buccal infiltration. This was done to anaesthetize the buccal papilla prior to needle insertion for the transpapillary injection making it a totally painless procedure. The same protocol was followed in the control group to eliminate bias. The extraction was carried out after a 3 minutes delay.

Patients under 10 years of age, patients requiring surgical extractions, those requiring extractions of second or third molars, patients having any contra-indication to the administration of local anaesthesia and patients having co morbidity conditions were excluded from the study. Patients under the age of 10 years were excluded as they could not perceive pain properly and second and third molar were excluded as it is considered a difficult extraction with difficulty to administer transpapillary injection in these teeth.

Pain of injection and pain experienced during the extraction for both the groups were recorded using the Visual Analogue Scale (VAS) and Faces Pain Scales (FPS). For VAS, zero was considered as no pain and 10 being the maximum imaginable pain. In case of FPS, again zero was regarded as no pain and 5 was regarded as maximum imaginable pain. Before administering anaesthesia, patients were explained how to use these scales at the end of the procedure. Patients who did not give consent and who were unable to understand the VAS and FPS were excluded from the study. The results were analyzed using Statistical Package for Social Sciences (SPSS) version 17.0. Descriptive statistics like mean, standard deviation and frequency were calculated for age and gender. Independent t-test was used to analyze pain between both groups and p-value of less than (0.05) was considered to be statistically significant.

RESULTS

Both groups consisted of 100 patients each. Group 1 (control) consisted of 61 males and 39 females with an age ranging from 11-73 years (mean = 39.92 ± 14.85 years) while Group 2 consisted of 59 males and 41 females with an age ranging from 10-70 years (mean = 39.31 ± 18.53 years). Results of FPS and VAS scores during injection and extraction procedure were analyzed using independent t-test. Difference of scores for pain during injection on VAS and FPS were found to be statistically significant (p < 0.05) while the scores for the extraction procedure on VAS and FPS were seen to be statistically insignificant (p > 0.05) showing that transpapillary injection is equally effective for maxillary extractions as palatal injection with a significantly less degree of pain during the administration of anaesthesia.

**Table I:** Comparison of FPS and VAS for the two injection techniques.

<table>
<thead>
<tr>
<th>Pain score</th>
<th>Injection technique</th>
<th>Total patients</th>
<th>Mean ± Std mean error</th>
<th>p-value (t-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPS for injection</td>
<td>Transpapillary injection</td>
<td>100</td>
<td>0.77 ± 0.07</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Palatal injection</td>
<td>100</td>
<td>2.52 ± 0.08</td>
<td></td>
</tr>
<tr>
<td>FPS for extraction</td>
<td>Transpapillary injection</td>
<td>100</td>
<td>0.26 ± 0.06</td>
<td>0.756</td>
</tr>
<tr>
<td></td>
<td>Palatal injection</td>
<td>100</td>
<td>0.29 ± 0.07</td>
<td></td>
</tr>
<tr>
<td>VAS for injection</td>
<td>Transpapillary injection</td>
<td>100</td>
<td>1.07 ± 0.09</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Palatal injection</td>
<td>100</td>
<td>4.14 ± 0.14</td>
<td></td>
</tr>
<tr>
<td>VAS for extraction</td>
<td>Transpapillary injection</td>
<td>100</td>
<td>0.38 ± 0.09</td>
<td>0.758</td>
</tr>
<tr>
<td></td>
<td>Palatal injection</td>
<td>100</td>
<td>0.34 ± 0.09</td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

Injection is something which is most dreaded in dental practice with a reported incidence of 5-25% of patients avoiding dental treatment just because of injection phobia. Among different dental injections that are given routinely for dental procedures, palatal infiltration is regarded as the most painful owing to the tight binding of mucoperiosteum with the bone. Various scales have been used to describe pain like VAS, FPS, VRS, Schmidt pain index, but a valid assessment of pain is always subjective and met with difficulties. Literature is full of techniques proposed by clinicians to overcome the pain of palatal infiltration but none of the techniques has been without some disadvantage. Application of topical anaesthesia (Eutectic mixture of local anaesthesia, Lignocaine, Benzocaine) on the palate using applicator stick prior to injection reduces the pain of needle penetration but fails to fight the pain of periosteal separation. Another problem that can be encountered with topical anaesthetic is unpleasant taste and smell for some patients. Regarding the use of computer assisted anaesthesia and TENS (Transcutaneous electronic nerve stimulation) to reduce pain of palatal infiltration, a complex, costly...
Transpapillary versus palatal injection technique for maxillary tooth extractions

and bulky equipment is required which is not easily available in most of the set-ups, especially in under-developed countries, and even then the results are not 100%.5,6

There are studies in literature showing that palatal injections may not be required at all for extraction in the maxilla.12,16 However, a survey conducted in Australia and New Zealand regarding clinicians giving palatal injections or not, showed that 91.6% of practitioners preferred to give palatal injections for maxillary tooth extractions.17 Numerous authors have discussed the use of 4% Articaine HCl1,2,7-9 in an attempt to abolish the need for palatal infiltration and they were able to show satisfactory results. The problem with Articaine is its availability and cost. Currently, Articaine is not easily available in Pakistan and it has to be imported. The cost difference between a cartridge of Articaine and a standard cartridge of Lignocaine is almost three times which can be significant for most of the practitioners. Various authors have used other techniques like intraligamentary injections18,19 and combinations of multiple anaesthetic solutions to achieve maxillary anaesthesia for tooth extraction.19-21

A simple and efficient technique which was used in this study to avoid palatal injection was transpapillary injection in which needle is inserted from the buccal interdental papilla, above the alveolar bone to achieve anaesthesia of the palatal papilla and the gingival collar around the tooth. Another modification which we used in this study was that we waited for 2 minutes after giving buccal infiltration. This allowed the buccal papilla to get anaesthetized which further reduced the pain of injection. The study showed that there was statistically significant (p < 0.01) difference regarding pain experienced during palatal injection and pain experienced during transpapillary injection and at the same time the pain experienced during the extraction procedure was insignificant (p = 0.07) between our control and study group making the technique as effective as the standard palatal injection.

The advantages of this technique, other than reduced pain, are that it does not require any special equipment and the technique can be easily mastered by any one. Another benefit, which was not part of the study, but was noted during the sample collection was that deposition of vasoconstrictor containing local anaesthesia in the gingival collar around the tooth produced better haemostasis than the ordinary palatal injection.

The problems that can be encountered during transpapillary injection are that it is slightly difficult to administer in posterior teeth especially in the molars and the needle has to be bent to allow administration. Another thing which can be problematic during anaesthesia administration is that if the palatal papilla is also pierced during needle introduction then it is difficult to achieve anaesthesia as solution leaks from that puncture and this leakage of anaesthetic solution in the oral cavity produces a bitter taste.

The transpapillary injection was not tested for second and third molars and for the teeth which require surgical removal but within the confines of the sample size there were excellent results with transpapillary injections for maxillary extractions.

CONCLUSION

Transpapillary injection is an effective painless alternative for the standard painful palatal injection for extractions of maxillary teeth and should be given wherever feasible so that the procedure can be made as comfortable as possible for the patient.

REFERENCES


