INCIDENCE OF LINGUAL NERVE INJURY FOLLOWING SURGICAL REMOVAL OF MANDIBULAR THIRD MOLAR-AN INSTITUTIONAL BASED STUDY

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ABSTRACT

The study aimed to evaluate the incidence of lingual nerve injury following mandibular third molar removal and to assess the possible factors responsible for the lingual nerve injury. A retrospective study was carried out on 176 patients who reported to the Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Chennai from June 2019 to April 2020. The incidence of lingual nerve paresthesia was documented for patients who were treated for the surgical removal of impacted mandibular third molar. Out of 176 patients, 5 patients were diagnosed with lingual nerve paresthesia. The overall incidence rate of lingual nerve injury was 2.84%, showing female predilection. The gender of the patient, depth of impaction and angulation of the impacted tooth are possible risk factors during mandibular third molar surgery. Greater care should be taken to avoid such a complication.

Keywords: Lingual nerve, impacted molar, mandibular third molar, lingual nerve injury


INTRODUCTION

Third molar surgery is one of the most frequently performed procedures by oral and maxillofacial surgeons. It is associated with minor complications like pain, swelling, hematoma and trismus. There are documented complications of inferior alveolar nerve and lingual nerve damage which produces impaired sensation or permanent sensation or permanent sensory loss of lower lip, chin and tongue. This complication occurs despite improvement in the preoperative assessment of impacted lower third molars and techniques of removal and is usually unexpected and unacceptable for the patients particularly if no prior warning has been given (Carmichael and McGowan, 1992). In previous studies, the prevalence of damage to the lingual nerve varied from almost 0% to 23% (Gomes et al.,...
The incidence of lingual nerve injury may occur because of surgeon’s inexperience, procedure methodology and certain specific factors such as raising a lingual mucoperiosteal flap with Howarth’s periosteal (Blackburn and Bramley, 1989).

The lingual nerve morphologically is very different in comparison to the inferior alveolar nerve because the nerve is covered with only a thin layer of soft tissue and mucosa instead of a bony canal. Therefore if sectioned, the cut nerve ends retract apart and become misaligned and get confined to the scar tissue (Loescher, Smith and Robinson, 2003). Nerve lesions can be classified as neurapraxia, axonotemesis and neurotmesis. Clinically, sensory disturbances can be presented as hypoesthesia, hyperesthesia, anaesthesia and dysesthesia (painful anaesthesia) (Gomes et al., 2005). Regeneration of axons across a gap will most often be unsuccessful in comparison if the nerve ends remain in approximation. Lingual nerve is the primary sensory nerve of the tongue, which is responsible for coordinating speech, mastication, deglutition and taste. Disturbance in the lingual nerve sensation can affect the patient functionally as well as psychologically (Babu et al., 2012).

Previously our team had conducted numerous studies which include in vitro studies (Marimuthu et al., 2018), review (Mp, 2017b; Packiri, Gurunathan and Selvarasu, 2017), surveys (Kumar and Sneha, 2016; Patturaja and Pradeep, 2016; Kumar and Rahman, 2017; Rahman and Mp, 2017) and clinical trials (Jesudasan, Wahab and Sekhar, 2015; Christabelet al., 2016; Mp, 2017a; Patil et al., 2017; Rao and Kumar, 2018; Abhinav et al., 2019; Sweta, Abhinav and Ramesh, 2019; Vijayakumar Jain et al., 2019) and now we are focusing on retrospective studies. The aim of this study is to determine the clinical incidence of lingual nerve injury following impacted mandibular third molar removal and to predict possible factors responsible for the same.

MATERIALS AND METHODS

Study set up

This retrospective study consisted of 176 patients who reported to the department of oral and maxillofacial surgery, Saveetha Dental College and Hospital, Chennai. A total of 86000 patient records were reviewed and analysed from June 2019 to March 2020 for the surgical removal of impacted mandibular third molar. Preoperative factors such as difficulty index and depth of impaction were assessed using orthopantomograph and periapical radiograph. Postoperatively, sensory disturbance was evaluated on the seventh postoperative day and any complaint regarding sensory disturbance of the lingual gingiva, mucosa of the floor of the mouth and primarily tongue was recorded. Assessment was carried out by standard questions, for example “Do you have a normal feeling in your tongue?”. Pin prick sensation, two point discrimination or taste stimulation tests were used to confirm the nerve injury.

Inclusion and exclusion criteria

Inclusion criteria:
- Healthy patients with non-restorable mandibular third molar
- History of pain
- Tenderness to percussion
- Periapical pathology radiographically
- Patients willing to continue their treatment

Exclusion criteria:
- Patients younger than 18 years of age
- Presence of any systemic disorders that prevented administration of the local anaesthetic agent
- Teeth which could be restored
Study parameters

- Age of the patient
- Gender of the patient
- Tooth number
- Angulation of the impacted tooth
- Pell and Gregory’s classification of impaction
- Difficulty index of the impacted tooth

Procedure

Surgical procedure was performed using local tissue infiltration and inferior alveolar nerve block (2% lignocaine with 200000 adrenaline). Standard Terence Ward’s incision or an envelope flap was raised in all cases and after reflecting the buccal flap, a gutter in the distobuccal bone was created to expose maximum contour of the tooth. Bone removal was done using a motor driven surgical bur under constant irrigation of normal saline. Odontectomy or odontomy procedure was performed depending on the path of removal of the impacted tooth (Lata and Tiwari, 2011). Wound was carefully irrigated and any bony spicules were removed, following which flap was repositioned and sutured using 2-0 silk. During the postoperative phase, all patients were given instructions about the wound and possible complications. All patients were prescribed the recommended analgesics and antimicrobials in the postoperative phase.

Data collection

The data related to the stay parameters were obtained from among the patients who reported to the Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Chennai from June 2019 to March 2020. An approval for the designed study was obtained from the Institutional Ethical Committee of Saveetha University (Ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320). An informed verbal and written consent was obtained after explaining the nature of the procedure and the potential complications involved.

Data analysis

The IBM SPSS (version 23.0) software was used to tabulate and analyse the collected data. Non parametric data was analysed using descriptive statistics measuring frequency and percentage. Pearson’s chi square test was used to assess the association between age of the patient and the incidence of lingual nerve injury.

RESULTS AND DISCUSSION

Out of 176 patients, 102 were males and 74 were females with an average age of 33.06 years. Out of all 176 patients, 5 were diagnosed with lingual nerve paresthesia on the seventh postoperative day evaluation. The overall incidence of lingual nerve injury was 2.84% [Figure 1]. The ratio for the iatrogenic lingual nerve injuries of males (80%) was higher than the females (20%) [Figure 2]. The mean age of patients with lingual nerve damage was 37.6 years. The side of lingual nerve injury was located on the left for 4 (80%) cases and right for 1(20%) case [Figure 3]. Patients in the age group of 21-30 years (1.14%) and 41-50 years (1.14%) showed lingual nerve injury more frequently in comparison to 31-40 years (0.57%). The test of association between age and incidence of lingual nerve injury was statistically significant (P<0.05) as seen in Figure 4. With respect to angulation of the longitudinal axis of the mandibular third molars, 40 % cases were horizontal, 20 % were mesioangular, distoangular and vertical each. With respect to the depth of the mandibular third molars, 60% were position A and 40% were position B. According

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to availability of space between the second molar and the mandibular ramus, 60% were Class I and 40% were Class II. In relation to the difficulty index, 60% were moderately difficult which showed more number of lingual nerve injuries in comparison to minimally difficult impactions (40%) [Table 1].

**Figure 1:** The pie chart depicts the incidence of lingual nerve injury. From this graph, we can infer the overall incidence of lingual nerve injury to be 2.84% depicted in pink.

**Figure 2:** The above bar graph depicts the gender frequently showing lingual nerve injury. X axis represents the gender, Y axis represents the percentage of patients affected. Males (80%) show more incidence of lingual nerve injury in comparison to females (20%). From this graph we can infer that the males show lingual nerve injury more frequently in comparison to females.
**Figure 3:** The pie chart depicts the side most commonly affected by lingual nerve injury. From the above chart, it can be inferred that the left side (80%) showed lingual nerve injury more commonly as depicted by blue, in comparison to the right side (20%) depicted by red.

**Figure 4:** The above bar graph represents the association between age of the patient and the frequency of patients with lingual nerve injury. X axis represents the age, Y axis represents the number of patients with lingual nerve injury. From this graph we can infer that patients in the age group of 21-30 years (1.14%) and 41-50 years (1.14%) showed lingual nerve injury more frequently. Chi square test was done showing statistical significance between age of the patient and the incidence of lingual nerve injury P=0.040 (P<0.05).
TABLE 1: The table represents the number of patients with paraesthesia and different factors involved. It can be inferred, that factors such as Horizontal angulation, Position A depth of impaction, Class I space availability and Moderately difficult index show greater incidence of lingual nerve injury.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Tooth number</th>
<th>Pattern of impaction</th>
<th>Depth of impaction</th>
<th>Space available</th>
<th>Difficulty index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>38</td>
<td>Horizontal</td>
<td>Position A</td>
<td>Class I</td>
<td>Minimal</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>38</td>
<td>Mesioangular</td>
<td>Position A</td>
<td>Class II</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
<td>48</td>
<td>Distoangular</td>
<td>Position A</td>
<td>Class I</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
<td>38</td>
<td>Horizontal</td>
<td>Position B</td>
<td>Class II</td>
<td>Moderate</td>
</tr>
<tr>
<td>5</td>
<td>49</td>
<td>38</td>
<td>Vertical</td>
<td>Position B</td>
<td>Class I</td>
<td>Minimal</td>
</tr>
</tbody>
</table>

Position of the lingual nerve is variable and although efforts have been made to avoid iatrogenic lingual injury during impacted third molar surgery, it sometimes might be inevitable (Jerjes et al., 2010). Kiesselbach and Chamberlain et al (Kiesselbach and Chamberlain, 1984) studied the variable position of the lingual nerve and found that in 17.6% of the dissections, the lingual nerve was found at the level of the alveolar crest or higher. Horizontally the nerve contacted the lingual plate in 62% of the specimens. These results present the probability of the lingual nerve being injured as it passes medial to the mandibular molar. Unpredictable position of the lingual nerve in the retromolar region makes it prone to damage throughout the procedure- incision, flap elevation, retraction, guttering and tooth sectioning, removal as well as closure (Jerjes et al., 2010). The incidence of lingual nerve injury compares favourably with previous studies (Greenwood, Langton and Rood, 1994; Robinson and Smith, 1996; Renton and McGurk, 2001). It is similar to studies done by Wofford et al (Wofford and Miller, 1987) showing 0.2-3.3% of lingual nerve injury. Absi et al (Absi and Shepherd, 1993) showed 2-4% lingual nerve injury which compares favourably to our study. In comparison, Lata et al (Lata and Tiwari, 2011) and Rood et al (Graff-Radford and Evans, 2003) showed higher incidence of lingual nerve injury.

We also observed the relationship of tooth position and incidence of paresthesia and found more lingual nerve injury with horizontal impacted molar. These findings go with the observations of previous studies (Gülicher and Gerlach, 2001; Renton and McGurk, 2001) whereas Wofford et al (Wofford and Miller, 1987) stated that dysesthesia was more common in complete bony and mesioangular impactions.

Our study shows higher incidence of lingual nerve injury in moderately difficult impactions which compared favourably with the study done by Singaram et al (Singaram et al., 2014). However, Jerjes et al (Jerjes et al., 2010) stated that very difficult indexed impactions were 95% more likely to develop paresthesia. Saurabh et al (Saurabh, 2015) suggested lingual nerve damage to be more in the 24-40 years age group while Bruce et al 1980 (Bruce, Frederickson and Small, 1980) stated that the incidence of lingual nerve damage increases with age. But in this study incidence was the same in other age groups as well.

Jerjes et al (Jerjes et al., 2010) stated that the prevalence of lingual nerve injury to be more in males in comparison to females which compared favourably to our study. However, Tojo et al (Tojo et al., 2019) showed the rate of female patients with iatrogenic lingual nerve injury to be higher. The present study suggests that no single factor can...
be responsible for the cause for the lingual nerve trauma. Complexity of the surgery, position, depth of the tooth, experience of the surgeon all together plays a role.

Limitations of our study were that longer periods of follow up were required with larger sample sizes. Also the surgeon's experience was not taken into consideration in the present study which needs to be further evaluated.

CONCLUSION
Assessment subsequent to diagnosis is crucial in the process of treatment plan and will render the patient symptom free since prevention is always better than cure. Hence for all the patients undergoing surgical removal of lower third molars with variable number of risk factors, care should be taken to avoid Lingual nerve injury. Within the limits of the study, clinical incidence of lingual nerve injury following mandibular third molar removal is 2.84% with factors like female gender predilection, moderate level difficulty index and horizontal pattern of impaction showing slightly higher chances of lingual nerve injury.

REFERENCES


