Inferior alveolar nerve damage following removal of mandibular third molar teeth.

Yadav S.¹, Sachdeva A.², Verma A.³

Abstract:

Due to anatomical location, it is possible to traumatize inferior alveolar nerve. Inferior Alveolar Nerve (IAN) injury is a serious neurological complication which can result from a number of reasons, the most common of which is by performing oral and maxillofacial surgical procedures. These nerves can be damaged as the result of direct or indirect forces. Despite these complications, the removal of third molars associated with disease is generally justified. The purpose of this paper is to identify the incidence of IAN damage following the removal of mandibular third molar teeth.

Key words: Inferior alveolar nerve, impacted mandibular third molar, nerve injury.

Introduction:

The most serious and often discussed postoperative complications that arise from third molar surgery is trigeminal nerve injury, specifically, involvement of either the inferior alveolar or lingual nerve. These nerves can be damaged as a result of direct or indirect forces. Due to nerve's anatomical location, it may be possible to traumatize inferior alveolar nerve directly during various surgical procedures carried out for the management of trauma, cyst, tumors, pre-prosthetic problems, orthognathic surgery, placement of dental implants, or performing endodontic treatment, damage caused by the use of instruments and most commonly third molar removal. Local anesthetic injections also may lead to either transient or permanent dysfunction. Indirect injuries to nerves can be a result of physiologic phenomena, including root infections, pressure from hematomas, and postsurgical edema⁴. In addition the systemic diseases may also compromise the functionality of this nerve.

Almost all patients experience pain, swelling and difficulty in mouth opening after operation. Damage to the inferior alveolar nerve (IAN) during the third molar surgery is an important consideration. The overall risk of inferior alveolar nerve injury associated with third molar removal ranges from 0.5% to 5%². The reported rate of permanent inferior alveolar nerve injury is considerably less than 1%³,⁴.

Sensory loss lasting longer than 6 months is mostly permanent. The subsequent distorted sensory sensation can result in significant impairment in speech, chewing, socializing and patient’s psychological well being. Despite these complications, the removal of third molars associated with disease is generally justified⁵, but not if the teeth are free from any pathology. This paper identifies the incidence of IAN damage following the removal of mandibular third molar teeth.

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Material and methods:

In the present study, 300 patients were included, with both male and female patients between the age group of 18 to 45 years, for the removal of mandibular third molar teeth under local anesthesia. Patients with any neurological disorder were excluded from the study which might unfairly influence the outcome. In our study we had included only one side for the 3rd molar removal in each patient.

Prior to surgery, a panoramic and intra oral peri-apical radiograph was taken and a prediction was made for any change in sensation in the lower lip region postoperatively (Fig.1-3). The prediction categories are displayed (Table 1). Prior to the procedure the patients were explained the possible outcome in their own language; also they were informed that the data collected may be used for scientific deliberations. The ethical committee approval was taken. In the postoperative period, one week later (at the time of suture removal), the patients were questioned for any alteration in sensation and the scores were recorded (Table 1).

Fig 1 Radiograph reveals roots of horizontally impacted 3rd molar touching roof of mandibular canal.

Fig 2 Loss of canal cortical outline due to dentigerous cyst in relation to third molar and its roots.

Fig 3 Roots of mesioangular impacted 3rd molar in close relation to mandibular canal.

All the patients were treated with the same technique that is buccal approach using trapezoidal muco-periosteal flap. Guttering technique was used for bone cutting.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Alteration in sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No expected change</td>
</tr>
<tr>
<td>1</td>
<td>Hypoaesthesia</td>
</tr>
<tr>
<td>2</td>
<td>Hyperaesthesia</td>
</tr>
<tr>
<td>3</td>
<td>Dyssaesthesia or paraesthesia</td>
</tr>
<tr>
<td>4</td>
<td>Anaesthesia</td>
</tr>
</tbody>
</table>

Table 1 Prediction of alteration in sensation

Radiographic evaluation for IAN injury:

Out of 300 patient’s radiographs, 280 (93.3%) were predicted with normal outcomes. Out of 20 radiographic predictions of sensory nerve disturbances, only 8 (40%) patients had transient inferior alveolar nerve disturbance and only one (5%) patient had permanent IAN damage.

Results:

Out of 300 patients taken up for the procedure 9 patients (3%) showed inferior alveolar nerve disturbances of a transient nature. Within three weeks of post operative follow up only one (0.3%) patient out of 9 patients showed permanent residual neurological deficit.

Discussion:

Nerves consist of fasciculi held together by a protective areolar connective tissue that coalesces to form the nerve sheath. Linear
collagen bands give the strength to this nerve sheath. Therefore the outcome of damage to a nerve depends on the nature of the injury. Merrill[6] modified the classification given by Sneddon which is used as a standard for neurological assessment (Table 2).

<table>
<thead>
<tr>
<th>Injury</th>
<th>Type of damage</th>
<th>Prognosis</th>
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</thead>
<tbody>
<tr>
<td>Neuropraxia</td>
<td>No axonal degeneration</td>
<td>Excellent</td>
</tr>
<tr>
<td>Axonotmesis</td>
<td>Axonal degeneration and regeneration</td>
<td>Fair</td>
</tr>
<tr>
<td>Neurotmesis</td>
<td>Neural separation, healing with cicatrisation</td>
<td>Poor</td>
</tr>
</tbody>
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Table 2 Classification of nerve injury

Several studies have been carried out on the relationship of the IAN to third molar teeth in the past[3,6,7]. A panoramic radiograph and Intra oral peri-apical radiographs are frequently used as the radiological investigation prior to third molar surgery. We have used both radiological investigations in our study, but like other conventional radiographs it is unable to provide complete 3-dimensional information. Coronal computerized tomographic scans give a precise relationship of the tooth root to the IAN, so that alteration in surgical approaches can be attempted to minimize the potential for nerve injury. However, unnecessary radiation dosage and cost need to be considered. Radiographic features including a narrowing or deviation of the canal, a loss of the canal cortical outline (Fig 2) and increased radiolucency over the root increases the risk of nerve damage[4]. These features provide preliminary evidence that the nerve may be encountered during extraction, but the outcome of neurological deficit does not just necessarily depend on direct contact of IAN with tooth root.

There is no convincing evidence about the relationship with age, sex, race and the incidence of nerve injuries. One study suggested that there was an increased risk of IAN damage with advancing age and difficulty of extraction[3]. Surgical removal of horizontal and mesio-angular impacted teeth is more likely to result in nerve injuries, probably because of the increased surgical manipulation and exposure required to remove the teeth. In many studies it was concluded that there is high risk of injury to the IAN due to crushing or tearing of the nerve from movements of the teeth, particularly if the IAN was grooved or was perforated by the third molar tooth[3] and mechanical injury from chisels, burs or elevators. Post-operative hemorrhage from the extraction site also has been implicated in the onset of dysesthesias. Previous studies have reported a large inconsistency in outcome that may be more dependent on operative technique rather than the anatomical position of the tooth[9]. Our study was single centre study and the same technique was followed for the removal of third molars that is why we could overcome the several problems discussed above. No evidence was found in relationship between pathology prior to surgery and the incidence of nerve damage. In the same way, eruption status and age was found to have no significant relationship with the incidence of nerve damage.

Different surgical techniques for mandibular third molar removal have been felt to potentially affect the frequency of lingual nerve damage and as well the IAN. The "Lingual Split-Bone Technique" is considered to result in a higher frequency of nerve disturbances than the "Buccal Approach." The incidence of inferior alveolar nerve disturbance after third molar removal has been reported to vary widely from 0.04 percent to 8.0 percent when using the typical buccal approach[9,10]. Temporary disturbances, are by far more common, however; permanent problems have been reported in a frequency of 0.6 to 2.2 percent[9,10]. Our study has revealed the results which are in close conjugation with the studies performed previously. Many studies conducted till now showed large inconsistency in the results that might be explained that most of them were retrospective and with big variation in the data collection[9].

Conclusion:

There is still debate about the etiology, incidence and outcome of neurological damage during third molar surgery despite many studies in the literature. Patient’s age, radiologic
relationship between the roots of the third molar and the mandibular canal, ostectomy of the bone distal to the third molar and deflection of the mandibular canal increase the risk of IAN damage. Despite technologic advances, informed consent regarding the incidence of nerve injury is very important.

It is also improper to compare results stated by different clinicians using different methods and different sample sizes with different assessments and analyses. In spite of these drawbacks it seems clear that the skill of the operator is of great importance. Skill, coupled with anatomical, dental and patient factors will ultimately determine the potential for IAN nerve injury.

References:


