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Assessment of lingual nerve injury using different surgical variables for mandibular third molar surgery: a clinical study

S. Yadav[1], A. Verma[2], A. Sachdeva[3]
[1]Department of Dentistry, BPS Government Medical College, Khanpur Kalan, Sonepat, Haryana, India; [2]Department of Oral and Maxillofacial Surgery, PDM Dental College, Bahadurgarh, Haryana, India; [3]Department of Oral and Maxillofacial Surgery, IP Dental College, Ghaziabad, Uttar Pradesh, India

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Abstract. The objective of this study was to investigate the incidence of sensory impairment of the lingual nerves following lower third molar removal and to compare the outcome with various operative variables. A total of 1200 mandibular third molars were removed under local anaesthesia. Predictor variables were categorized as lingual flap retraction, tooth sectioning, and buccal guttering. The outcome variable was the presence or absence of lingual nerve impairment. Different operative techniques were performed to identify independent predictors. Of the 1200 patients, 67 (5.6%) experienced transient sensory impairment at the 1-week follow-up. In all cases this resolved completely during the study period, except for four (0.3%) patients who suffered permanent impairment of lingual nerve function. Factors that predicted lingual nerve injury were lingual flap retraction, tooth sectioning, and buccal guttering. The incidence of lingual nerve injury was greater when combinations of these operative variables were used.

Key words: lingual nerve; sensory impairment; third molars.

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Impacted mandibular third molar teeth are in close proximity to the lingual, inferior alveolar, mylohyoid, and buccal nerves. The most serious and often discussed post-operative complication that arises from third molar surgery is trigeminal nerve injury, specifically with involvement of either the lingual or inferior alveolar nerve. The majority of injuries result in transient sensory disturbances, but in some cases permanent paraesthesia (abnormal sensation), hypoaesthesia (reduced sensation), or, even worse, some form of dysaesthesia (unpleasant abnormal sensation) can occur. Sensory loss lasting longer than 6 months is mostly permanent. The subsequent distorted sensory sensation can result in significant impairment in speech and chewing, and taste loss from the ipsilateral anterior segment of the tongue, which has a negative impact on socializing and the patient's psychological well-being.

These nerves can be damaged as a result of direct or indirect forces. Due to the anatomical location of the nerve, direct trauma to the lingual nerve may occur during various surgical procedures, e.g. those carried out for the management of trauma, cysts, tumours, and pre-prosthetic problems, orthognathic surgery, damage caused by the use of instruments, and most commonly removal of the third molars. Indirect injury to the nerves can also be a result of physiological phenomena, including pressure from hematomas and postsurgical edema.[1]

The overall risk of lingual nerve injury associated with third molar removal ranges from 0.2% (permanent disturbance) to 22% (sensory disturbances in the early postoperative period).[2,3] The

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reported rate of permanent lingual nerve injury is generally in the range of 0–2%.

This study sought to identify the incidence of lingual nerve damage following the removal of mandibular third molars.

Materials and methods

The present prospective hospital-based study included 1200 patients who underwent the removal of mandibular third molar teeth under local anaesthesia; both male and female patients were included, and they ranged in age from 18 to 45 years. The study design was quasi-experimental. Patients with any neurological disorder were excluded from the study as they might have unfairly influenced the outcome. The third molar on only one side was removed for each patient. All mandibular third molar surgeries were performed by a senior surgeon with more than 5 years of experience. Ethical clearance was obtained for this clinical study.

Prior to surgery, a panoramic and intraoral peri-apical radiograph was taken. Assessment of the impacted tooth was done for determination of the angulation and of the position of the tooth in relation to the ramus of the mandible and the second molar (based on Winter's classification and the Pell and Gregory classification[4]; Table 1). Mandibular third molar teeth with a class III relation and position C depth were not included in the study. Prior to the procedure, the patients were informed of the possible outcome in their own language and written consent was obtained. At 1 week following surgery (at the time of suture removal), the patient was questioned regarding any alteration in sensation and underwent a clinical examination.

Statistical analysis

The statistical analysis was performed using SPSS version 17 software (SPSS Inc., Chicago, IL, USA). The χ^2 test of significance was used for qualitative data and the *P*-value calculated; $P < 0.05$ was considered significant and $P < 0.001$ as highly significant. For the analysis, impairment of the lingual nerve was considered the dependant variable. We determined the significance of overall temporary and permanent lingual nerve impairment at 1 week and at 6 months following the surgery. The significance of different operative variables in relation to lingual nerve impairment, including buccal guttering, tooth sectioning, and lingual flap retraction, was also determined.

Surgical procedure

The choice of surgical procedure was made after proper clinical and radiographic assessment of the impacted tooth regarding position, depth, and any other surgical difficulty. Three surgeons were involved in this study, all having more than 5 years of surgical experience. The surgical procedure planned for each patient was also discussed among the surgeons. The buccal approach with a trapezoidal mucoperiosteal flap was used in all cases. All procedures were performed with the same surgical instruments under local anaesthesia (2% lidocaine hydrochloride with adrenaline 1:80,000) using inferior alveolar nerve block and local tissue infiltration. Different surgical techniques were used for removal of the tooth, including buccal flap and elevation; buccal guttering with or without lingual flap retraction; and buccal guttering with tooth sectioning with or without lingual flap retraction.

A buccal mucoperiosteal flap was employed. Buccal guttering was performed with a straight fissure bur in a straight hand piece under normal saline irrigation. For tooth sectioning, a round and straight fissure bur was used. A Howarth periosteal elevator was carefully used to retract the lingual flap as and when required, and was not pushed deep down. Elevators and extraction forceps were used to deliver the tooth from the socket.

After removal of the third molar, the socket was inspected and irrigated with normal saline and the flap repositioned and sutured with a 3–0 silk suture. A gauze pack was pressed against the surgical site for the patient to bite on. The surgical sites of all patients were reviewed 7 days after the operation by an independent observer. All patients were asked to report any subjective alteration in lingual sensation; sensory deficits were also identified by clinical examination, carried out bilaterally.

Tactile perception of the following stimuli was assessed: light touch sensation using a wisp of cotton wool, pin prick with the point of a dental probe, and two-point discrimination.[5–7] Any positive results were recorded; these patients were seen again on a monthly basis for about 6 months.

The incidence of lingual nerve impairment at 1 week postoperatively (temporary) and at 6 months postoperatively (permanent) was related to the different surgical techniques used for the third molar removal. Various operative variables such as buccal guttering, tooth sectioning, and lingual flap retraction were also assessed for their relation to lingual nerve impairment.

Table 1. Number of patients according to the classifications of Pell and Gregory and Winter.

Variables	No. of patients	Percentage
Angulation (Winter's classification)		
Mesioangular	558	46.5%
Horizontal	252	21%
Vertical	96	8%
Distoangular	294	24.5%
Pell and Gregory classification		
I A	108	9%
I B	210	17.5%
II A	630	52.5%
II B	252	21%
Degree of impaction		
Soft tissue impaction	216	18%
Partial bony impaction	882	73.5%
Total bony impaction	102	8.5%

Results

Tables 2 and 3 show the lingual nerve sensory impairment related to the different surgical procedures at the 1-week and 6-month postoperative follow-ups, respectively. The overall incidence of temporary lingual nerve impairment at the 1-week follow-up was 5.6% (67/1200 patients), which was highly significant ($P < 0.001$). Lingual nerve impairment at the 1-week follow-up was higher in patients for whom buccal guttering, lingual flap retraction, and tooth sectioning were done (11.9%; 44/368) compared to patients in whom buccal guttering and lingual flap retraction were done (5.1%; 13/256).

The overall incidence of permanent sensory impairment of the lingual nerve at the 6-month follow-up was 0.3% (4/1200 patients), which was not significant ($P = 0.85$). Permanent lingual nerve impairment was seen in two of the 368 patients (0.5%) who underwent the buccal guttering, lingual flap retraction, and tooth sectioning technique. No incidence of