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ASSESSMENT OF NEUROSENSORY DISTURBANCES AND RECOVERY FOLLOWING SURGICAL REMOVAL OF IMPACTED MANDIBULAR THIRD MOLAR – A PROSPECTIVE STUDY

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ABSTRACT

Aim: This prospective study aim to determine the incidence and pattern of recovery of IAN and LN deficits after surgery while comparing which nerve, site, side, age group and type of impaction was most likely to suffer from neurosensory disturbances and to evaluate the risk factors such as duration of surgery, proximity to inferior alveolar canal, excessive hemorrhage, clinical observation of neurovascular bundle, contributing to these postoperative neurosensory deficits.

Materials&Methods: This study was conducted on 30 patients who underwent surgical removal of impacted mandibular third molar between 2017-2019 in the Department of Oral and Maxillofacial Surgery, College of Dental Sciences, Davangere.
Clinically, all the patients underwent objective evaluation by using pin prick test, two-point discrimination and blunt test. Sensory function was evaluated 1 week, 1, 3 and 6 months post-operatively. The areas that were evaluated are those supplied by IAN and LN.

Result: The incidence of NSD in our study was 10%, the IAN 6.7% and LN deficit 3.3%. No permanent NSD was observed in this study. Statistically significant association was found between excessive hemorrhage from the socket and NSD (p=0.009). No significant association was found between gender, age, side, type, difficulty score and duration, observation of neurovascular bundle during surgery and proximity of roots to the inferior alveolar canal with NSD.

KEYWORDS : Impacted third molar; Inferior alveolar nerve; Lingual nerve; Neurosensory disturbances.

INTRODUCTION

Neurosensory deficit is the most serious complication following surgical removal of third molar which can affect the patient's quality of life negatively. Direct or indirect forces during the surgery may lead to inferior alveolar or lingual nerve injury which can cause anesthesia or paresthesia of chin, lower lip, and also gingivae of buccal vestibule and tongue numbness (anterior two third), taste disturbance respectively.[1]

Temporary neurosensory disturbance is relatively frequent, incidence being 20% in the first 24 hours postoperatively and 0.3% to 5.3% after 6 months.[2]

Factors like age of the patient, depth of impaction, proximity of the roots to the nerve, surgical experience and surgical technique have been proposed as being associated with an increased risk of inferior alveolar nerve injury.[4] The inconsistent position of the lingual nerve in the region of retromolar area makes it vulnerable to damage during incision, buccal flap elevation, flap retraction, tooth sectioning and removal, and suturing.[3]

AIM

- To evaluate the incidence and duration of recovery of neurosensory disturbances following surgical removal of impacted mandibular third molar and to compare which nerve, age group, side and gender is most likely to suffer from neurosensory disturbances.
- To study association of type of impaction and proximity to inferior alveolar canal, and duration of surgery with neurosensory disturbances, also association of excessive haemorrhage from extraction socket, and clinical observation of neurovascular bundle during surgery.

MATERIALS AND METHODS

This prospective study was conducted on 30 patients who underwent surgical removal of impacted mandibular third molar over a period of the year between 2017-2019 in the Dept of OMFS, CODS, Davangere.

Inclusion Criteria:

- Patients indicated for surgical extraction.
- All male and female patients from age group of 18-40 years.
- Difficulty level of 5-7 according to Pederson difficulty index.

Exclusion Criteria:

- Patients with systemic conditions altering the peripheral nerve conduction.
- Patients with bilateral affected side.

RESULTS

Sample Characteristics

The study included 7 males and 23 females with median age of 28yrs (Mean = 27.9±4.5yrs). There were right and left-sided cases 15 each. Among these 30 patients, 12 horizontal, 1 mesioangular, 13 distoangular and 4 vertical impaction.

Calculating the overall score, 11 patients had a difficulty score of 5, 8 patients had a score of 6 while 11 patients had a score of 7. According to Pederson's Difficulty Index all 30 cases were moderately difficult. **Table 1**.

Neurosensory Deficits

Pin-prick, Blunt and Two-point discrimination test were used to determine the extent and site of NSD. The incidence was 10% (IAN deficit 6.7% (n=2), LN was 3.3% (n=1)).

Pin Prick Test

In the Pin prick test **No pain** was felt in 2 and **Very Mild Pain** was felt in 1 case, by the end of 1st week remaining showed **Normal sensation**. After 1-month, **Mild Pain** remained in 1 case, while it became **Normal** for the others. At the end of 3 months, the remaining one case showed **Normal sensation**. Friedman's test showed that there was resolution over time ($p<0.001$).

Two-point Discrimination Test

There were 2 cases of **Numb** and 1 **Almost numb** observed by the end of 1st week. All 3 cases resolved by the end of 3 months. Friedman's test showed that there was significant resolution over time ($p<0.001$).

Blunt Test

By end of 1st week, in 3 cases touch was **Not Felt**, but resolved after 1 month. It shows that touch sensation regained much faster than Pin-prick and TPD test. McNemar's test showed statistically significant resolution of touch sensation ($p=0.001$). The incidence of IAN deficit was 6.7% ($n=2$) and LN was 3.3%($n=1$). In 2 patients the NSD resolved within 1 month while in 1 after 3 months. No permanent neurosensory deficit was observed in this study. The results with regards to neurosensory deficit and pattern of recovery of IAN and LN over a period of 6 months are depicted in **Table 2.**

Other Parameters And Comparisons:

Excessive Hemorrhage

Excessive hemorrhage was seen in 23.3% of our cases. Out of these 42.9% cases had neurosensory deficit. Chi-square test showed significantly increased chance of a neurosensory deficit in cases of excessive hemorrhage($p=0.009$) from the extraction socket following third molar surgery.

Observation of Neurovascular Bundle

Observation of neurovascular bundle was seen in 1 case, patient had neurosensory deficit. However, a Chi-square test showed that there was no significant increased risk of a neurosensory deficit($p=0.100$)

Proximity to Inferior Alveolar Canal

The distance of root apices from the inferior alveolar canal was measured in millimetres. 21 out of 30 cases were scored as 0mm (touching). In 6 cases the distance was 1mm and in 3 it was 2mm. Chi-square test showed no significant association between proximity to the inferior alveolar canal and neurosensory deficit($p=0.207$).

Radiographic Features

The most common radiographic feature was interruption of white lines of IAC which was observed in 11 cases. 3 showed root darkening, 5 diversion of roots and 2 divergent canal. But there was no significant association between radiographic features and neurosensory deficit ($p=0.756$). Graph 1

DISCUSSION

The risk of injury to the IAN may be assessed preoperatively, through examination of radiographic relationship of the third molar by using morphological and location characteristics.[3] To evaluate nerve dysfunction, objective data can be obtained by clinical neurosensory tests.[5]

Several studies have shown that age is associated with an increased risk of nerve damage.[4]

Here, no significant association was found between age, gender and NSD ($p=0.666$).

Duration of the procedure greatly influences the nerve damage.[6] In our study, there was no significant correlation. ($r=0.080$, $p=0.673$).

It was found that, the highest incidence of NSD was seen in distoangular impaction which was 15.4% followed by horizontal 8.3%. However, the test showed no statistically significant association($p=0.798$). Distoangular impactions are generally the most difficult to remove owing to the path of delivery into the ascending ramus.[7,8]

In our study, 36.7% patients had a difficulty score of 5, 26.6% score of 6 while 36.7had 7. According to Pederson's Difficulty Index all 30 cases were under Moderately Difficult category. We found no significant association between difficulty Score and NSD ($p=0.543$).

Many studies have reported the pattern of recovery from IAN and LN deficits are similar. In general, neurosensory deficits after third molar surgery spontaneously recover in the first 6 postoperative months.[4]

W.P. Smith reported 3.9% cases of neurosensory disturbance over distribution of the IAN, few patients sustained permanent sensory loss and lingual anaesthesia occurred in 5 of the 1,589 procedures.[9] In the present study, incidence of neurosensory deficits was 10% and all resolved by the end of 3 months. Possible cause of trauma to the IAN include clinical observation of the neurovascular bundle during surgery and excessive haemorrhage into the socket.[3]Anatomically the inferior alveolar vein is the most superior structure in the canal. When rotary instruments penetrate the canal, bleeding will indicate that superior aspect of the bony canal has been breached and the vein is injured, profuse bleeding usually indicates damaged inferior alveolar artery, which lies underneath the vein and superior to the nerve.[3]

In our study, there was significantly increased chance of a neurosensory deficit in cases of excessive hemorrhage from the extraction socket ($p=0.009$).

Panoramic radiographs are the most commonly employed pre-operative radiographs.[10] The most common feature was interruption of white lines of IAC which was observed in 36.7% cases, 10% cases showed root darkening,16.7% showed diversion of roots and 6.7% showed divergent canal.

CONCLUSION

The incidence of neurosensory deficits in our study was 10%, with inferior alveolar nerve 6.7% and lingual nerve deficit 3.3%. In 66.6% patients the NSD resolved within 1 month while in 33.3% case of IAN it resolved after 3 months. No permanent neurosensory deficit was observed and no significant association between age group, gender, side and duration, type of impaction and proximity to the inferior alveolar canal with NSD. Statistically significant association was found between excessive haemorrhage from the socket and NSD($p=0.009$).

However, no statistical significance was noted between clinical observation of neurovascular bundle during surgery with neurosensory disturbances.

Table: 1

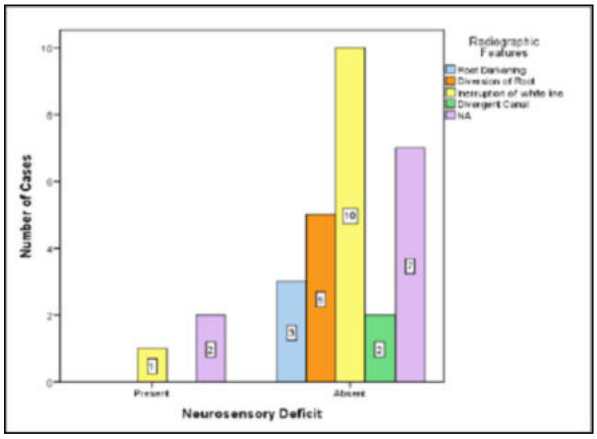
Correlations of Neurosensory Deficit to Different Parameters

	Neurosensory Deficit Present N (%)	Neurosensory Deficit Absent N (%)	p-value
Gender			
Male (7)	1 (14.3)	6 (85.7)	
Female (23)	2 (8.7)	21 (91.3)	0.666
Age	Mean age	Mean age	
(In Years)	25.3	28.1	0.314
Side			
Right (15)	1 (6.7)	14 (93.3)	
Left (15)	2 (13.3)	13 (86.7)	0.543

Pederson's Difficulty Index Score			
Score			
Score 5 (11)	1 (9.1)	10 (90.9)	
Score 6 (8)	1 (12.5)	7 (87.5)	
Score 7 (11)	1 (9.1)	10 (90.9)	0.963
Type of Impaction			
Mesioangular (1)	0 (0)	1 (100)	
Horizontal (12)	1 (8.3)	11 (91.7)	
Vertical (4)	0 (0)	4 (100)	
Distoangular (13)	2 (15.4)	11 (84.6)	0.798

Table: 2

Neurosensory Deficits and Pattern of Recovery of IAN and LN				n (%)	p-value
Site					
Lingual Nerve				1 (3.3)	
Inferior Alveolar Nerve				2 (6.7)	
					-
Pin Prick Test	1 week	1 month	3 months	6months	
No pain	2 (6.7)	0 (0)	0 (0)	0 (0)	
Very mild pain	1 (3.3)	0 (0)	0 (0)	0 (0)	
Mild pain	0 (0)	1 (3.3)	0 (0)	0 (0)	
Moderate pain	0 (0)	0 (0)	0 (0)	0 (0)	
Normal	27 (90.0)	2 (6.7)	1 (3.3)	0 (0)	
Not Recorded	0 (0)	27 (90.0)	29 (96.7)	30 (100)	<0.001
Two-Point Discrimination Test					
Numb	2 (6.7)	0 (0)	0 (0)	0 (0)	
Almost numb	1 (3.3)	0 (0)	0 (0)	0 (0)	
Reduced	0 (0)	1 (3.3)	0 (0)	0 (0)	
Almost normal	0 (0)	0 (0)	0 (0)	0 (0)	
Normal	27 (90.0)	2 (6.7)	1 (3.3)	0 (0)	
Not Recorded	0 (0)	27 (90.0)	29 (96.7)	30 (100)	<0.001
Blunt Test					
Not Felt	3 (10.0)	0 (0)	0 (0)	0 (0)	
Felt	27 (90.0)	3 (10.0)	0 (0)	0 (0)	
Not Recorded	0 (0)	27 (90.0)	30 (100)	30 (100)	0.001



Graph 1: Correlation between Radiographic Features and Neurosensory Deficit

Abbreviations: NSD: Neurosensory Deficit, IAN: Inferior Alveolar Nerve, LN: Lingual Nerve, IAC: Inferior Alveolar Canal

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