ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: www.ijmacr.com

Volume – 4, Issue – 6, November – December - 2021, Page No. : 267 – 273

Post-operative neurosensory evaluation in mandibular angle fracture treated with 2 plate fixation technique

[1]Dr. Suhas Kiran K, Junior Resident, Dept. of Oral & Maxillofacial Surgery, KD Dental College & Hospital ,Mathura

[2]Dr.Hasti Kankariya, Head of Dept., Dept. of Oral & Maxillofacial Surgery, KD Dental College & Hospital, Mathura

[3]Dr.Swati Srivastava, Junior Resident, Dept. of Oral & Maxillofacial Surgery, KD Dental College & Hospital, Mathura

[4]Dr. Shrey Srivastava, Senior Lecturer, Dept. of Oral & Maxillofacial Surgery, KD Dental College & Hospital, Mathura

[5]Dr.Venkatesh Hange, Senior Lecturer, Dept. of Oral & Maxillofacial Surgery, MIDSR Dental College & Hospital, Latur Hospital, Mathura

Corresponding Author: Dr. Suhas Kiran K, Junior Resident, Dept. of Oral & Maxillofacial Surgery, KD Dental College & Hospital, Mathura

How to citation this article: Dr. Suhas Kiran K, Dr. Hasti Kankariya, Dr. Swati Srivastava, Dr. Shrey Srivastava, Dr.Venkatesh Hange, "Post-operative neurosensory evaluation in mandibular angle fracture treated with 2 plate fixation technique", IJMACR- November – December - 2021, Vol – 4, Issue - 6, P. No. 267 – 273.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

The study was performed on patients with angle fractures who reported the department of oral & maxillofacial surgery K.D. Dental College & Hospital, Mathura with trauma sustaining mandible, mid face injuries .Those patients were selected who had mandibular angle fracture.. Neurosensory deficit due to inferior alveolar nerve damage was compared using various neurosensory tests postoperatively with other normal side. The aim of this study was to find out response of inferior alveolar nerve to mandible angle fracture & neurosensory changes observed during follow up period.

Keywords: Maxillofacial Trauma, Angle Fracture, Inferior Alveolar Nerve, Neurosensory.

Introduction

Mandibular fractures frequently result in inferior alveolar nerve injury and altered neurosensory function. This may be due to primary injury when the inferior alveolar nerve lies in the fracture line or a secondary insult due to manipulation and fixation of the fracture. As a consequence of inferior alveolar nerve injury, patients experience subjective disturbances of various intensities, but clinical experience shows that this condition gradually recovers after a certain period of time. The primary goal of trauma management is restoration of anatomic form and function but neurosensory deficits cannot be neglected in maxillofacial trauma. For example, teeth anterior to a fracture line can demonstrate disturbed sensitivity; however, the problem has not been addressed sufficiently in the literature. The incidence and long-

term outcomes of inferior alveolar nerve neurosensory deficits associated with mandibular fractures are insufficiently documented in the literature. Reports reveal that the prevalence of post-trauma inferior alveolar nerve deficit ranges from 5.7% to 58.5%7. The prevalence of inferior alveolar nerve neurosensory deficit after fracture treatment ranges from 0.4% to 91.3%5,7,8,9. Permanent inferior alveolar nerve neurosensory deficits after mandibular fracture range from 0.9% to 66.7%7,9..Whatever the cause, damage to the inferior alveolar nerve negatively affects the quality of facial sensibility as well as the patient's ability to translate patterns of altered nerve activity into functionally meaningful motor behaviour.. Thus after a nerve injury, the same stimulation of face, lip or skin elicits a different response ,which affects the patients symptoms. These symptoms range from complete or partial loss of sensation, to non-painful tingling sensation, to increased sensitivity to touch or pressure with or without numbness & pain. In the normal state stimulation of face or lips through facial expression or eating, other contact with external environment stimulates the sensory receptors of the skin & profile of neural impulse which describe pattern of stimulation. The majority of injuries result in transient sensory disturbance but in some cases, permanent parasthesia, hypoesthesia or even worse some form of dysesthesia can occur. These sensory disturbances can be troublesome, causing problems with speech & mastication & may adversely affect the patient's quality of life & also contribute as one of the most frequent cause of litigation & complaint. There is generally no accepted standard method of estimating sensory disturbances in the distribution of the inferior alveolar nerve following injury. we have evaluated post-traumatic and postoperative sensory disturbances of the IAN in mandibular angle fractures treated with 2 plate fixation technique using various neurosensory tests in order to identify associated risk factors.

Objective

We have recorded the post-operative neurosensory changes of the Inferior Alveolar Nerve in mandibular angle fracture in 20 cases treated with 2 plate fixation technique to identify the post-operative complications associated with the same.

Method

Patients with maxillofacial trauma having mandibular angle fractures are included in the study function of the inferior alveolar nerve is assessed during follow-up periods i.e. 1 week,2 week,3rd week & 1 month follow up. Various clinical tests are used for neurosensory testing. In literature there are basically 2 methods of neurosensory testing given based on specific receptors stimulated through cutaneous contact i.e. Mechanoceptive & Nociceptive .We have used total 6 tests for cheching neurosensory stability.

1. Direct Face To Face Questionnaire
2. Two Point Description
3. Pinprick Test
4. Temperature Sensation
5. Direct Discrimination
6. Sharp or Blunt Discrimination

Inclusion Criteria

Patient having angle fracture

Patient above 18 years

Patient fit for surgery under General Anaesthesia

Patient who is medically and psychologically fit

Exclusion Criteria

Patient indicated for conservative management

Patient with any systemic disease

Patient unfit for surgery under General Anaesthesia

Procedure

Patients reporting to oral and maxillofacial surgery department in KD Dental College & Hospital,Mathura with angle fracture. Patient should fulfill the inclusion criteria. After taking proper case history ,radiographs & investigations are advised. Operative procedure is planned for open reduction & internal fixation under General Anesthesia.Two plate fixation done at the angle region (Fig.1A,B,C)After operation patient followup is done at weekly interval till 1 month followed by montly observation till 6 months.

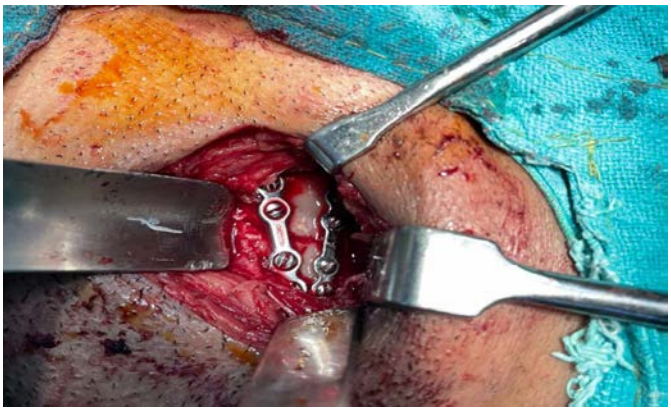
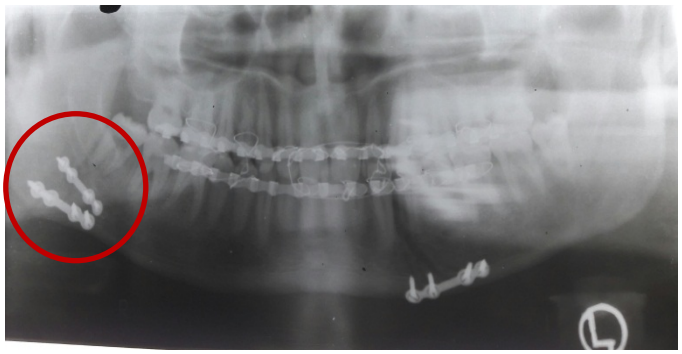


Fig.1: A) Two plate fixation at angle region

B) Pre-Operative Radiograph



C) Post-Operative Radiograph

Tests Used

Neurosensory testing can be divided into 2 basic categories Mechanoceptive and nociceptive testing—based on the specific receptors stimulated through cutaneous contact. Mechanoceptive testing can be divided based on 2-point discrimination (TPD), static light touch and brush directional stroke. Nociceptive testing is subdivided into pinprick and thermal discrimination. The most used method for the interpretation of the neurosensory deficit was subjective evaluation, sometimes aided by touching the skin.

Questionnaire

Direct face to face questions are asked to the patient whether patient has lost any sensation after surgery. The patients operated in our department haven't experienced any neurosensory loss during followup period.

Two Point Discrimination

Two point discrimination tests are done with the help of divider and scale (Fig.2). The point is marked with the help of pen/marker on midline region or symphysis region (Fig.3)

2 point discrimination done at 5mm, 8mm, 10mm distance and sensation difference is noted. There is no difference in sensation noted in all the patients. Patient was able to notice and discriminate in between 2 points. This indirectly predicts patient is having stable neurosensory function.

Pinprick test

Pinprick test is done with the help of needle .The is done by gently touching the skin with pin/needle on both sides of the face on mandibular region extra orally on right side followed by left side of face(Fig 5).This allows the patient to compare sensation on both sides of face

Fig. 2: Two point discrimination with divider, measurement is taken on scale

Fig.3: Point is marked on symphysis region

Temperature Sensation Test

This test is done to differentiate in between hot and cold. The both sensation were tested with the help of heated probe tip/tip of mouth mirror.

Gentle application of ice cube is done while for heat test mouth mirror handle is heated on burner and with maintained heat without overheating, gently applied to the patient.(Fig.6)

Fig. 4: Two Point Discrimination with the help of divider.

Fig.5: Pinprick Test with needle

Fig. 6: Temperature Sensation Test

Direct Discrimination Test

Direct discrimination test is done by cotton swab or soft brush. It is done by swiping a soft brush from right to left and in reverse direction, asking the patient the direction of the stimulus (Fig.7)

Fig.7: Direct Discrimination Test

Light Touch

The sixth method described is the light touch (LT) test, which is used to test tactile stimulation by gently touching the skin and evaluating the detection threshold of the patient.

Results

No neurologic deficiencies were noted. All the patients reported normal response to all the tests. For these tests, there were thus no differences between the observations at weekly interval till 1 month followed by monthly interval till 6 months.

Discussion

The incidence of neurosensory deficit in the IAN distribution after mandibular angle fractures is not well documented. There is inadequate information regarding prognosis for recovery of IAN neurosensory function. Other retrospective reviews of mandibular fractures do not address sensory changes. Iizuka and Lindqvist published the most relevant data available on the incidence of sensory deficit after mandibular fractures involving the mandibular canal. This was a study of sensory disturbances associated with rigid internal fixation of mandibular fractures. In the present study, the age of the patient was 35 years. There was no significant association between neurosensory outcome and age or gender. An immediate post-traumatic sensory deficit was not found in this case. Post-traumatic neurosensory deficits due to indirect injury were not evaluated in the present study as it only considered direct injury to the IAN involved in fracture line during open reduction & internal fixation. In our study, fracture location was not found to affect post-traumatic neurosensory deficit, and postoperative neurosensory outcomes were not affected by post-traumatic score.

Most authors have reported sensory disturbances as an incidental finding or only in patients who subjectively complained about this problem. Furthermore, many of these studies included fractures not involving the mandibular canal and others did not address direct injury to the IAN. According to Queral-Godoy et al.22, quicker healing of the IAN and favorable long-term outcomes are often seen because the nerve is encased within a bony canal. The results suggest that fracture displacement and location are the key variables associated with worsening of the IAN sensory score. Post-trauma IAN neurosensory status and treatment were not found to be associated with worsening of the IAN sensory score. When displacement of the fracture line was present, a greater incidence of neurosensory deficit and more prolonged recovery should be expected. The suspected reasons for this are trauma to the nerve by the displacement itself and additional trauma during surgical reduction and repair. Patients with a fracture displaced more than 5 mm had increased risk of an adverse effect

on the neurosensory score after treatment compared with patients with fractures displaced 5 mm or less. As all patients were treated with ORIF with mini-plates, mono-cortical screws, and anatomical placement, the risk of a worsening of the IAN sensory score after treatment was low. Stacey et al. reported that the use of non-compressive mini plate fixation of mandibular fractures is effective due to its low morbidity and complications. The strengths of the current study are its prospective design and consistency of collection of IAN sensory data during the postoperative period. The method of neurosensory measurement used is well documented, suitable for perioperative evaluations, and commonly used in follow-up studies of mandibular fracture treatment. We may hypothesize that the duration between injury and management could play an important role in neurosensory outcome. In our study, the duration between injury and presentation for treatment was restricted by only recruiting patients reporting within 24 hours of injury. The neurosensory deficit examination was conducted on the seventh postoperative day followed by monthly till 6 months postoperatively. The results of the present study suggest that the IAN neurosensory status is recovered after mandibular fracture treatment in most patients. IAN neurosensory status worsening was not observed after treatment. This is consistent with the results of a study by Schultze-Mosgau et al., in which there was no increase in neurosensory deficits after surgical treatment.

In the present study, there are no neurosensory changes noted postoperatively during the follow up period.

References

1. Halpern LR, Kaban LB, Dodson TB. Perioperative neurosensory changes associated with treatment of mandibular fractures. J Oral Maxillofac Surg. 2004;62:576–581.
2. Iizuka T, Lindqvist C. Sensory disturbances associated with rigid internal fixation of mandibular fractures. J Oral Maxillofac Surg. 1991;49:1264–1268.
3. Sunil Yadav, Hitesh Chander Mittal, Sunita Malik, Vikas Dhupar, Akash Sachdeva, Vijaylaxmy Malhotra, Gurdarshan Singh Post-traumatic and postoperative neurosensory deficits of the inferior alveolar nerve in mandibular fracture: a prospective study J Korean Assoc Oral Maxillofac Surg. 2016 Oct; 42(5): 259–264. Published online 2016 Oct 25. doi: 10.5125/jkaoms.2016.42.5.25
4. Campbell RL, Shamaskin RG, Harkins SW. Assessment of recovery from injury to inferior alveolar and mental nerves. Oral Surg Oral Med Oral Pathol. 1987;64:519–526
5. Marchena JM, Padwa BL, Kaban LB. Sensory abnormalities associated with mandibular fractures: incidence and natural history. J Oral Maxillofac Surg. 1998;56:822–825. discussion 825-6.
6. Dodson TB, Perrott DH, Kaban LB, Gordon NC. Fixation of mandibular fractures: a comparative analysis of rigid internal fixation and standard fixation techniques. J Oral Maxillofac Surg. 1990;48:362–366.
7. Akal UK, Sayan NB, Aydoğan S, Yaman Z. Evaluation of the neurosensory deficiencies of oral and maxillofacial region following surgery. Int J Oral Maxillofac Surg. 2000;29:331–336.
8. Thurmüller P, Dodson TB, Kaban LB. Nerve injuries associated with facial trauma: natural history, management, and outcomes of repair. Oral Maxillofac Surg Clin North Am. 2001;13:283–294.

9. Iizuka T, Lindqvist C. Rigid internal fixation of mandibular fractures. An analysis of 270 fractures treated using the AO/ASIF method. Int J Oral Maxillofac Surg. 1992;21:65–69.
10. Iizuka T, Lindqvist C. Rigid internal fixation of fractures in the angular region of the mandible: an analysis of factors contributing to different complications. Plast Reconstr Surg. 1993;91:265–271. discussion 272-3.
11. Bochlogyros PN. A retrospective study of 1,521 mandibular fractures. J Oral Maxillofac Surg. 1985;43:597–599.
12. Zuniga JR, Essick GK. A contemporary approach to the clinical evaluation of trigeminal nerve injuries. Oral Maxillofac Surg Clin North Am. 1992;4:353–367.
13. Zuniga JR, Meyer RA, Gregg JM, Miloro M, Davis LF. The accuracy of clinical neurosensory testing for nerve injury diagnosis. J Oral Maxillofac Surg. 1998;56:2–8
14. Dodson TB, Kaban LB. Recommendations for management of trigeminal nerve defects based on a critical appraisal of the literature. J Oral Maxillofac Surg. 1997;55:1380–1386.
15. Chuong R, Donoff RB, Guralnick WC. A retrospective analysis of 327 mandibular fractures. J Oral Maxillofac Surg. 1983;41:305–309.
16. Melmed EP, Koonin AJ. Fractures of the mandible. A review of 909 cases. Plast Reconstr Surg. 1975;56:323–327.
17. Luhr HG, Reidick T, Merten HA. Results of treatment of fractures of the atrophic edentulous mandible by compression plating: a retrospective evaluation of 84 consecutive cases. J Oral Maxillofac Surg. 1996;54:250–254. discussion 254-5.
18. Kearns GJ, Perrott DH, Kaban LB. Rigid fixation of mandibular fractures: does operator experience reduce complications? J Oral Maxillofac Surg. 1994;52:226–231.
19. Stacey DH, Doyle JF, Mount DL, Snyder MC, Gutowski KA. Management of mandible fractures. Plast Reconstr Surg. 2006;117:48e–60e.
20. Schultze-Mosgau S, Erbe M, Rudolph D, Ott R, Neukam FW. Prospective study on post-traumatic and postoperative sensory disturbances of the inferior alveolar nerve and infraorbital nerve in mandibular and midfacial fractures. J Craniomaxillofac Surg. 1999;27:86–93.