Original Article

INFERIOR ALVEOLAR NERVE INJURY IN MANDIBULAR ANGLE FRACTURES- A STUDY

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ABSTRACT

Objective: *The purpose of this study is to determine displacement of inferior dental canal and associated inferior alveolar nerve injury in mandibular angle fractures.*

Meterial and Methods: *This study was carried on 117 patients with mandibular angle fractures in the Department of Oral & Maxillofacial surgery, Khyber College of Dentistry Peshawar from August 2012 to July 2013. The subjective complaint of lip numbness was noted preoperatively and light touch neurosensory testing was done objectively. Displacement of inferior dental canal was noted on Orthopantomogram (OPG) and categorized as nondisplaced, 1-3mm displacement, 4-6 mm and 6-9mm displacement.*

Results: *A total of 117 patients with mandibular angle fracture were included in the study. Amongst them 104 (88.9%) were males. The age ranged from 16 to 55 years with a mean age of 22.77± 6.704 years. Majority of the patients were in the age group of 16-25 years (78.6%). The inferior alveolar nerve injury was present in 75 patients (64.1%) while 42 patients (35.9%) had no symptoms of nerve injury. In 41 patient (35%) there was no displacement of inferior dental canal, out of which 12 patients had nerve injury while rest of 29 patients had no symptoms of nerve injury. In 40 patients (34.2 %) who had 1-3 mm of displacement of inferior dental canal only 28 patients had nerve injury while the nerve injury was present in all of the 13 patients (11.1 %) who presented with 7-9 mm of displacement of inferior dental canal on OPG.*

Conclusion: *Majority of patients having mandibular angle fractures and inferior dental nerve injury are young males. Inferior dental canal displacement of more than 3mm on OPG confirms inferior alveolar nerve injury. Non-displaced mandibular angle fractures on OPG do not exclude inferior dental nerve injury..*

Key words: *Mandibular angle fracture, Inferior dental nerve injury, displaced angle fracture.*

INTRODUCTION

Maxillofacial trauma frequently results in injuries to soft tissues and major skeletal components of the face[1]. Facial injuries range from 3.2% to 8% of all injuries and 79.7% of all facial injuries involve mandible. Angle of the mandible is the weakest region and account for about 18%-30% of mandible fracture. Injury is 8 times more frequent in men than women and majority of angle fractures occur in the age range of 20-29 years[2].

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Fracture mandible is frequently associated with inferior alveolar nerve injury and altered neurosensory function. Inferior alveolar nerve lies in a bony canal called inferior dental canal which is enclosed within a tube of dense bone. It appears as two parallel radiopaque lines on panoramic radiograph one representing roof of canal and other the floor of canal[3]. Fractures of the mandible are associated with displacement and disruption of the continuity of inferior alveolar canal and damage to the nerve which can be neuropraxia, axontmesis or neurotmesis[4,5]. It may present as paraesthesia, dysaesthesia and anesthesia[6]. It results either from direct traumatic injury, edema causing compression, or compression, traction and dislocation of nerve bundle by displaced or comminuted fracture. Depending upon the type and degree

of anatomic injury, loss of sensation can be permanent or temporary, severe or moderate, partial or complete[7].

Inferior alveolar nerve injury leads to abnormal sensory and functional consequences like numbness of ipsilateral lower lip, chin and lower teeth, difficulty in performing daily activities such as speech, mastication, shaving, tooth brushing, playing of wind instruments, and inability to maintain lip competence for retention and swallowing of liquid, foods and sometimes allodynia[8,9,10]. It also affects psycho-emotional status of the patient. Different methods used for neurosensory evaluation are static touch, two point discrimination, brush stroke direction and sharp blunt differentiation[2].

The prevalence of post injury pre treatment inferior alveolar nerve deficit range from 5.7% to 58.5% and post treatment range from 0.4% to 91.3%[11,12]. Permanent inferior alveolar nerve injury after fracture mandible range from 0.9% to 66.7%[12].There is lack of uniform data on the incidence and history of post trauma neurosensory dysfunction of inferior alveolar nerve. Poor documentation of pre-treatment nerve injury may be due to clinical situations in which sensory examination of inferior alveolar nerve is not possible, unreliable or overlooked. Further more fracture mandible is rarely followed up after achieving normal anatomical union and better function[13]. Depending upon the severity of injury most of the patients progressively regain normal sensation within few weeks or months[10].

The purpose of this study is to determine displacement of inferior dental canal and associated inferior alveolar nerve injury in mandibular angle fractures. We hypothesize that greater displacement of angle fracture passing through inferior dental canal may correlate with higher probability of inferior dental nerve injury and increased likelihood of permanent numbness of lower lip. Preoperative radiographic measurement may predict the risk of nerve injury and numbness that will be highly valuable to the clinician. The radiographic interpretation could assist the surgeon in decision making and an early reduction and fixation of the fracture.

MATERIALS AND METHODS

This study was carried in the Department of Oral & Maxillofacial Surgery, Khyber College of Dentistry Peshawar from August 2012 to July 2013. A total of 117 patients presented with mandibular angle fracture were included in the study. Approval of Hospital ethical review committee was taken. After taking consent, a thorough history was taken followed by clinical and radiological examination of the patients presenting with mandibular angle fracture. The subjective complaint of patient regarding lip numbness was noted preoperatively and light touch neurosensory testing was done objectively by the same operator in each patient to diagnose the inferior alveolar nerve injury. Displacement of inferior dental canal was noted on Orthopantomogram (OPG) and categorized as non-displaced, 1-3mm displacement, 4-6 mm and 6-9mm displacement. This displacement was measured using tramlines as guideline on OPG. The data was recorded on specifically designed proforma, evaluated and analyzed by applying descriptive statistics using SPSS version 17.

RESULTS

A total of 117 patients with mandibular angle fracture were included in the study. Amongst them 104 (88.9%) were males and 13 (11.1%) females. The male to female ratio was 8:1. Their ages ranged from 16 to 55 years with a mean age of 22.77± 6.704 years. Among these 78.6% were in the age group of 16-25 years followed by 16.2% in the age group of 26-35 years as shown in table 1.

Table - 1: Age distribution of mandibular angle fractures

S. No	Age group in years	n	%	Nerve injury	
				yes	no
1	16-25	92	78.6	62	30
2	26-35	19	16.2	11	8
3	36-45	5	4.3	2	3
4	46-55	1	0.9	0	1
Total		**117**	**100.0**	**75**	**42**

Table - 2: Displacement of inferior dental canal and nerve injury in mandibular anglefractures

S. No	Inferior dental canal displacement (mm)	n	%	Nerve injury	
				Yes	No
1	0	41	35	12	29
2	1-3	40	34.2	28	12
3	4-6	23	19.7	22	1
4	6-9	13	11.1	13	0
Total		**117**	**100.0**	**75**	**42**

The inferior alveolar nerve injury was present in 75 patients (64.1%) while 42 patients (35.9%) had no symptoms of nerve injury.

Table 2 shows the details of inferior dental canal displacement and associated nerve injury. In 41 (35%) patients there was no displacement of inferior dental canal, out of which 12 patients had nerve injury while rest of 29 patients had no symptoms of nerve injury. In 40 (34.2 %) patients who had 1-3 mm of displacement of inferior dental canal only 28 patients had nerve injury while the nerve injury was present in all of the 13 (11.1%) patients who presented with 7-9 mm of displacement of inferior dental canal on OPG (Fig 1).

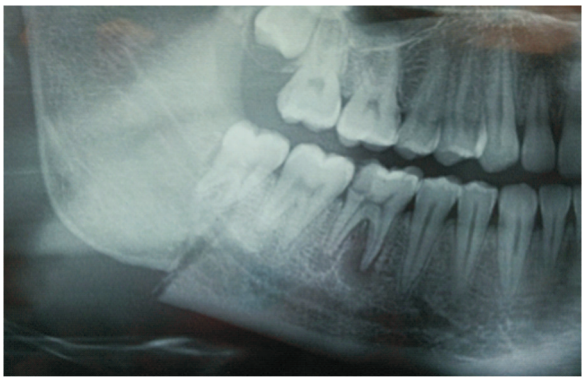

Fig - 1: Displacement of inferior dental canal

DISCUSSION

The incidence of post traumatic inferior alveolar nerve damage is poorly documented both in literature and standard oral and maxillofacial surgery text books. This may be due to a number of reasons like conditions in which sensory examination of inferior alveolar nerve is impossible, unreliable or overlooked after trauma. The natural history and recovery rate of sensory deficit after mandibular angle are also poorly documented. Most authors have reported sensory disturbances as incidental findings in patient's examination for other complications or in patients who subjectively complained about this problem[13]. Furthermore plain radiographs like orthopantomogram (OPG) is used for diagnosis and treatment planning of mandibular angle fracture which does not give any direct clue for nerve injury except the displacement of inferior dental canal. In the present study we have categorized the displacement of inferior dental canal as a predictor for inferior dental nerve injury on OPG.

In the present study inferior alveolar nerve injury in mandibular angle fracture was common in males (88.9%) as compared to females (11.1%).

Males are more involved in outdoor activities and exposed to risk for facial trauma like road traffic accidents and assaults. This finding is consistence with the result of previous studies conducted by Inaoka et al[14] and Chandel et al[15].

The age of patients in this study ranged from 16-55 with predominant age group of 16-25 years. These findings are similar with results of Rajandram et al[16]. This may be due to the fact that people in younger age group are involved in high speed transportation, assaults and sports.

In this study 65% fractures of mandibular angle were displaced and 35% were un-displaced. A total of 64.1% patients who had fracture mandibular angle had sustained nerve injury whether displaced or un-displaced which is consistence with the studies reported in the literature with post traumatic nerve injury in the range of 46%-81%%[17,18]. However study conducted by Thurmuller et al[11], post traumatic nerve injury incidencewas in the range of 5.7% to 58.5%.

In this study 35% angle fractures had no displacement of inferior dental canal and only 12 patients had symptoms of nerve injury which may indicate that nerve injury is either due to edema or displacement of the inferior dental canal that occurred at the time of impact which might have reduced back to its anatomical position. The amount of displacement that occurred at the time of impact might be significantly different from that measured on OPG following recoil of tissue and thus could account for why some non-displaced and minimally displaced fractures result in nerve injury. Forty patients who had fractures with inferior dental canal displacement on OPG between 1 to 3 mm, 28 had inferior dental nerve injury. Similarly 22 out of 23 patients who had inferior dental canal displacement between 4 to 6mm had nerve injury. All of the thirteen patients who had displacement on OPG between 6 to 9 mm had nerve injury. This shows that as the degree of displacement of inferior dental canal on OPG increases, the probability of inferior dental nerve injury increases. Long term follow up is required for patients with inferior dental nerve injury.

Measurement of neurosensory function in trauma patients is complicated. Edema and marked pain in the fracture site affects sensation and poor compliance

of patients could also make sensory testing difficult. In certain clinical situation having mandibular angle fracture associated with soft tissue edema, cheek and lip lacerations, head injury patients and children where inferior dental nerve injury cannot be determined clinically, the degree of displacement of inferior dental canal can be used as indirect clue or indicator to predict inferior alveolar nerve injury. A detailed assessment of the nerve injury by specialized imaging may be required. It may facilitate the surgeon in counseling of the patient about the nerve injury and its sequale. Furthermore it will facilitate the maxillofacial surgeon for an early reduction and fixation of mandibular angle fracture.

CONCLUSION

- Majority of patients having mandibular angle fractures and inferior dental nerve injury are young males.
- Inferior dental canal displacement of more than 3mm on OPG confirms inferior alveolar nerve injury.
- Non-displaced mandibular angle fractures on OPG do not exclude inferior dental nerve injury.

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