

ANATOMICAL LOCATION AND RELATIONSHIP OF MENTAL FORAMEN IN MANDIBULAR FRACTURES

¹MUHAMMAD DILSHAD, ²SHAHID ALI, ³IQRA AMIN

ABSTRACT

The widespread morbidity and mortality associated with maxillofacial trauma have made it an interesting topic for researchers for several years. The mental foramen is situated on the anterolateral aspect of the body of mandible. There is scarce study for the position of mental foramen and its relation to mandibular fracture site in Pakistani population. The aim of this study was to determine the frequency of various anatomical positions of mental foramen, in patients with mandibular fracture and to detect relationship (fracture line passing through mental foramen or not) of mandibular fracture line with mental foramen.

This Cross sectional study was conducted at the Department of Oral & Maxillofacial Surgery, Punjab Dental Hospital, Lahore for 6 months. After meeting the inclusion criteria 107 patients were enrolled. Mental foramen position was noted as Position 1 if it was in line with the long axis of 1st premolar, as Position 2 if it was between 1st & 2nd premolar, as Position 3 if it was in line with the 2nd premolar and Position 4 if it was anterior to 1st premolar or distal to second premolar. Mandibular fracture line was noted in relation to mental foramen; either fracture line is passing through the mental foramen or not.

In this study the average age of patients was 36.64±13.60 years. Parasymphyseal site of fracture noted in 49(45.8%) patients. The mental nerve foramen position between 1st and 2nd premolar was noted in 75(70.09%) patients, while the fracture line passing through the mental nerve foramen was observed in 13(12.15%) patients. According to the present study the most common anatomical positions of mental foramen was between 1st & 2nd Premolar and approximately 10% of the patients appeared with line passing through the mental foramen.

Keywords: Anatomical Position, Mental Foramen, Mandibular Fractures

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INTRODUCTION

The widespread morbidity and mortality associated with maxillofacial trauma have been an interesting topic for researchers for years. Mandibular fractures are most common among maxillofacial fractures, after nasal fracture.¹ Mandible is important for functions as biting, chewing and speaking.² Optimum treatment for mandibular fractures is open reduction and internal

fixation in most cases.^{1,2} Mental foramen is an important anatomical structure which is present bilaterally in mandible and is present in buccal cortical plate at the terminus of mental canal. Mental nerve passes through mental foramen and is responsible for sensation on chin, lower lip and gingiva on ipsilateral side of mandible.³

Anatomical position of mental nerve foramen has significant importance in giving local anesthesia, treatment of mandibular body and parasymphysis fractures, implant placement and orthognathic surgery.^{3,4} Some studies have described mental nerve foramen location using dried skulls or radiographs, but reports on live human beings and in patients with fractured mandible are few.^{3,4} In 2015, Navya N, Swamy et al. described the radiographic study of mental foramen type and position in Bangalore population, India. In this study, most common position of mental nerve foramen was in line with second premolar (63.5%), second common position was between first and second premolar (23%),

¹ Dr Muhammad Dilshad, Postgraduate Resident Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry, Lahore. House #42 Hussain Park Harbanspura, Lahore E-mail: Dilug786@gmail.com Cell: 03317863896 - 03467180786

² Dr Shahid Ali: Associate Professor Oral And Maxillofacial Surgery, de'Montmorency College of Dentistry, Lahore. E-mail: docshahidali@gmail.com

³ Dr Iqra Amin: Postgraduate Resident Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry, Lahore. E-mail: Iqraamin726@gmail.com

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3.5% in line with first premolar and 9% other position.⁴

Numerous investigators have reported studies on populations on all continents; fractures of the mandible have been reported to account for 36-70% of all maxillofacial fractures. All reports apparently show a higher frequency in males aged 21-30 y. Other contributing factors, such as socioeconomic status, environment, alcohol use, and mechanisms, show greater variability.⁵

Mental foramen position has been reported to vary in different studies and ethnic groups'. There is scarce study for the position of mental foramen and its relation to mandibular fracture site in Pakistani population. The aim of this study was to find out most common position of mental foramen in relation to standing teeth and relationship of mandibular fracture line with the mental foramen. This study will provide operative findings for the surgeons, anesthetists and dentists to carry out procedures without complications.^{1,4}

OBJECTIVE

Of the study was to detect the frequency of various anatomical positions of mental foramen in patients with mandibular fracture and to detect relationship (fracture line passing through mental foramen or not) of mandibular fracture line with mental foramen.

MATERIALS AND METHODS

It was a cross sectional survey, and was carried out at the department of Oral and Maxillofacial Surgery, Punjab Dental Hospital, Lahore. The duration was six months i.e. 4th May, 2019 to 4th November, 2019. It was estimated as one hundred seven cases using 95% confidence level, 5% margin of error, taking 23% anatomical position of mental foramen between first and the second premolar. Non-probability consecutive sampling.

Inclusion Criteria

Patients of both gender of 16 to 60 years of age. Intact molar and premolar teeth. Patients of mandibular fracture to be treated by open reduction and internal fixation under general anesthesia and local anesthesia.

Exclusion Criteria

Coagulation profile defects as revealed by the medical history and coagulation profile screening. Pathological fractures as revealed by history and radiographic examination. Radiolucent or radiopaque bony pathological lesion in mental foramen area.

Consecutive non-probable sampling was done and patients were selected from the out-patient department of Oral and Maxillofacial Surgery Unit. They were evaluated on the basis of history, clinical and radiographic assessment and were included in the study once it was

confirmed that they fulfill the inclusion criteria. After explaining the study protocol, use of data for research and risk-benefit ratio, an informed consent was taken from the patient. The patients' demographic details like name, age, gender were recorded on a structured proforma. A surgical team headed by a consultant carried out the surgical procedure under general and local anaesthesia. Strict aseptic measures were taken. During open reduction and internal fixation fractured mandible, anatomical position of mental foramen was noted under direct observation. Mandibular fracture line was noted in relation to mental foramen i.e. whether fracture line is passing through the mental foramen or not.

Data Analysis

All the data collected was entered in SPSS v. 21.0 and results were analyzed. The quantitative variables like age was presented as mean with standard deviation. The qualitative variables in data like gender and anatomic location and relationship to fracture site was presented as frequency and percentages.

RESULTS

In this study total 107 patients participated. The mean age of the patients was 36.64±13.60 years. Among 107 patients, 68(63.55%) patients were males while 39(36.45%) patients were females. Male to female ratio of the patients was 1.7:1. In this study para-symphyseal site of fracture was noted in 49(45.8%) patients, body fracture recorded in 43(40.2%) patients and 15(14%) patients appeared with sub condylar fracture. The average BMI of the patients was 23.27±2.93 kg/m². Table 1.

In the present study mental foramen position in line with 1st premolar noted in 18(16.82%) patients, between 1st and 2nd premolar position was noted in 75(70.09%) patients and in line with 2nd premolar position was recorded in 14(13.08%) patients. Fig 1.

The study results showed that the fracture line passing through the foramen was observed in 13(12.15%) patients while in 94(87.85%) patients fracture line did not pass through the mental foramen (in 54.2% patients fracture line passed posterior and in 33.65% patients fracture line passed anterior to mental foramen). Fig 2.

DISCUSSION

Mental foramen is usually located at the apex of the second mandibular premolar or between the apices of the premolars. The mental foramen position has been reported to vary in position in different ethnic groups. For instance, the mental foramen is usually located apical to the second premolar in Chinese subjects,

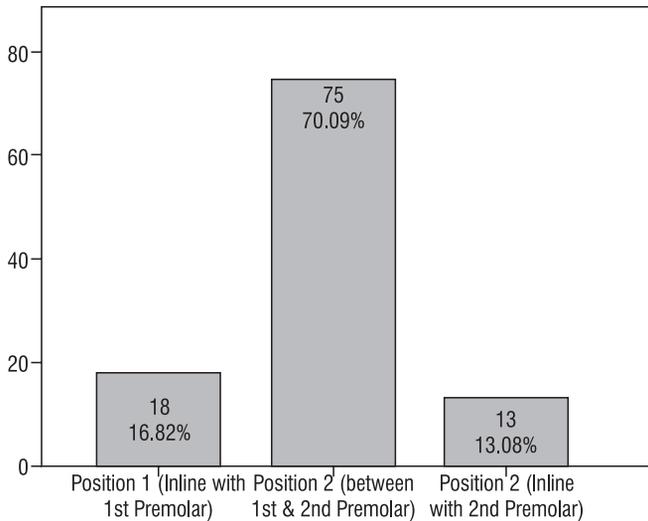


Fig 1: Distribution of anatomical location

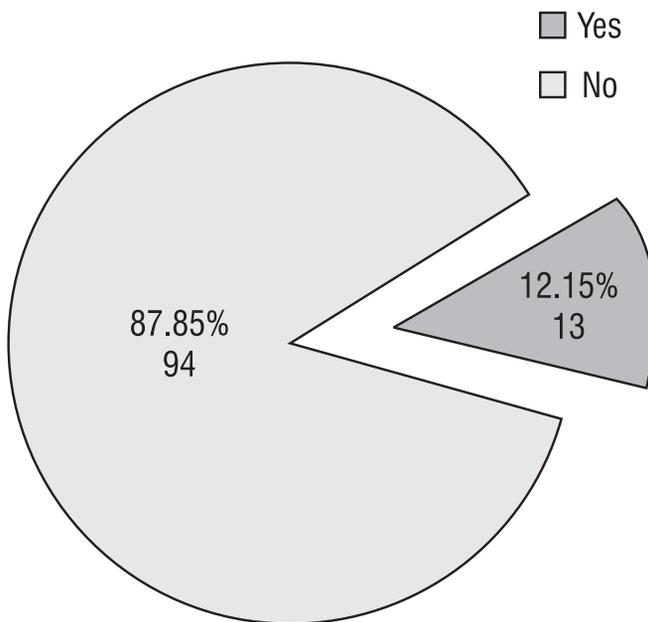


Fig 2: Distribution of fracture line passing through the foramen

TABLE 1: DEMOGRAPHICS OF PATIENTS

n	107
Age (years)	36.64±13.60
Gender	
Male	68 (63.6%)
Female	39 (36.5%)
Site of fracture	
Parasymphyseal	49 (45.8%)
Body	43 (40.2%)
Sub condylar	15 (14.0%)
BMI (kg/m2)	23.27±2.93

whereas it is usually found between the premolars in Caucasian subjects.^{6,7} In this study in line with 1st premolar position noted in 18(16.82%) patients, between 1st and 2nd premolar position was recorded in 75(70.09%) patients and in line with 2nd premolar position was seen in 14(13.08%) patients. The study results showed that the fracture line passing through the foramen was observed in 13(12.15%) patients. The mental nerve passes through the mental foramen, supplying sensory innervation to the lower lip, buccal vestibule, and gingiva mesial to the first mandibular molar.¹

In Tanzanians the mental foramen is seen to be on a posterior position than usual that is in between 2nd premolar and 1st molar with the anterior most position below the apex of 2nd premolar⁸. In Zimbabwean, Caucasian and Jordanian races it has been observed to be located more medially that is between 1st and 2nd premolars. In mongoloid and Japanese population it has been found to be in line of long axis of 2nd premolar.^{9,10}

In 2015, Navya N, Swamy et al. described the radiographic study of mental foramen type and position in Bangalore population, India. In this study, most common position of mental nerve foramen was in line with second premolar (63.5%), second common position is between first and second premolar (23%), 3.5% in line with first premolar and 9% other position.⁴ In 2016, Muhammad Waheed El-Anwar et al described the mental nerve foramen location in Arab population and described its relationship to mandibular fracture site. According to his findings mental foramen was found 78.3% between first and second premolar, and 21.7% below the first premolar.³ His study showed that when mental foramen is below the root of first premolar 52% fractures were parasymphysis and 48% body; when mental foramen is distal to first premolar 66.7% fractures were parasymphysis and 33.3% body.¹

Moiseiwitsch et al⁹ carried out a study on position of the mental foramen in a North American, white population. The author reported that mental foramen was, on average, between the premolars, therefore not statistically different from previous studies. However, there appears to be a greater range than generally reported, which is of considerable clinical significance.

Lumnije Kqiku et al¹¹ did a study on position of the mental foramen. The researcher reported that the most common position of the mental foramen investigated - using anatomical dissection - was between the first and second mandibular premolars and in line with the longitudinal axis of the second mandibular premolar in 27.5% of cases.

Ceballos et al¹² demonstrated in their study that the mental foramen was found in 4,824 hemi-mandibles

(95.2%), with greater presence on the left side (50.29%) than the right (49.71%). The mental foramen is most commonly located between the apices of the inferior premolars (42.22%), coincident with the root of the second inferior premolar (33.98%) or distal of the root of the second inferior premolar (10.98%). The mental foramen is a very frequent anatomical structure.¹²

The second most frequent position was coincident with the root of the second premolar and the least frequent was mesial to the first premolar. These findings were corroborated by Al-Mahalaway et al.¹³, Fuentes et al.¹⁴, Verma et al. (2015)¹⁵ and Rehman et al.¹⁶

CONCLUSION

According to this study the most common anatomical position of mental foramen in Pakistani population was between 1st & 2nd Premolar. By knowing this most common position of mental foramen; surgeons, anesthetists and dentists can perform their procedures without complications. This study also revealed that approximately 10% of the patients appeared with fracture line passing through the mental foramen.

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CONTRIBUTIONS BY AUTHORS

- 1 **Muhammad Dilshad:**
- 2 **Shahid Ali:**
- 3 **Iqra Amin:**

Study concept and design, wrote article. Data Collection & analysis
Study supervision.
Clinical Assistance. Literature search and review.