

Morphometric Study of Mandibular Foramina in Denatate and Edentulous Human Mandible in Gujarat Region

Jignesh Vadgama*, Mital Patel**

*Assistant Professor, **Professor And Head, Department Of Anatomy, M P Shah Government Medical College, Jamnagar, Gujarat

Abstract: Introduction: Precise knowledge of the location of reference points in the oral and maxillofacial area provides important data in local anesthesia and in maxillofacial operations. The important maxillofacial anatomical entities are neurovascular bundles passing through different foramina. The mandibular foramen is an opening on the medial aspect of the vertical ramus of the mandible approximately midway between the mandibular and gonial notches. Methodology: The material for the present study consists of 140 adult Mandible of unknown sex. These were collected from Govt. Medical college-Bhavnagar, P.D.U. Medical College, Rajkot and K.J.Mehta Dental College, Amargadh, Bhavnagar. Materials used are Vernier calipers of 0.02mm accuracy, Digital camera and Pencil. The data were statistically analyzed. Result: Site of mandibular foramina form posterior wall, inferior wall of mandibular ramus and from mandibular notch(superior) on both the side in dentate and edentulous mandibles are significant statistically. The distance of mandibular foramen from anterior wall of mandibular ramus is not statistically significant on the left side. Conclusion: The knowledge of the distances from surgically encountered anatomical landmarks in the present study provide valuable information to dental surgeons that will facilitate effective localization of the neurovascular bundle passing through mental foramen thus avoiding complications from local anesthetic, surgical and other invasive procedures. [Jignesh V NJIRM 2017; 8(4):96-98]

Key Words: Mandibular foramina, bone, Mandible, dentate and edentulous

Author for correspondence: Mital Patel, Professor and Head, Department of Anatomy, M P Shah Government Medical College, Bedi Road, Jamnagar - 361008, Gujarat. E-Mail: drmitalpatel72@gmail.com M:9898515610

Introduction: The mandible, the largest and strongest bone of the face, serves for the reception of the lower teeth. It consists of a curved, horizontal portion, the body, and two perpendicular portions, the rami, which unite with the ends of the body nearly at right angles¹. Precise knowledge of the location of reference points in the oral and maxillofacial area provides important data in local anesthesia and in maxillofacial operations. The most certain way to avoid damage to their structure is to know their location. The important maxillofacial anatomical entities are neurovascular bundles passing through different foramina² The mandibular foramen is an opening on the medial aspect of the vertical ramus of the mandible approximately midway between the mandibular notch and inferior border of mandibular ramus.

Traced below, mandibular foramen leads into the mandibular canal, which continues downwards below the alveoli towards the body of the mandible³. The inferior alveolar nerve and vessels continue into the mandibular canal after entering the mandibular foramen and way towards the mental foramen^{4,5}. Precise knowledge and awareness of mandibular foramina would therefore be important for dental surgeons performing nerve block. The lingula, which is anatomically related to the mandibular foramen,

has significant importance in other surgical procedures.

Methods: Present study was conducted after taking permission from the institutional review board. The material for the present study consists of 140 adult Mandible of unknown sex from Govt. Medical college-Bhavnagar, P.D.U. Medical College, Rajkot and K.J.Mehta Dental College, Amargadh, Bhavnagar.

- 1) 100 dentate 40 edentulous dry mandibles
- 2) Vernier calipers of 0.02mm accuracy (fig.no.1).
- 3) Digital camera.
- 4) Pencil

Exclusion criteria:

1. Bones having any fractures or any pathology.
2. Macerated bones.

The relative position of the mandibular foramen was analyzed with measurements made from his posterior wall to the posterior mandibular rim (parallel to the standard horizontal plane), from his inferior wall to the inferior mandibular rim (perpendicular to this rim), from the most superior part of the lingula (lingula tip) to the most caudal point of the mandibular notch, from his anterior wall to the anterior ascending mandibular rim (parallel to the standard horizontal plane).

Table I: Comparison in measurements of mandibular foramina between dentate and edentulous mandibles

Sr.No	Parameter	Rt side			Lt side		
		Dentate (n = 100)in mm	Edentulous (n = 40)	P value	Dentate (n = 100)	Edentulous (n = 40)	P value
1	Mandibular foramen (posterior wall) to posterior mandibular ramus rim	11.42 ±2.02	13.42 ±1.36	<0.001	12.94 ±5.64	13.38 ±0.38	<0.001
2	Mandibular foramen (anterior wall) to anterior mandibular ramus rim	16.07 ±2.80	15.54 ±0.78	0.007	16.31 ±3.24	15.95 ±0.49	NS 0.125
3	Mandibular foramen (inferior wall) to inferior mandibular rim	21.06 ±5.23	24.85 ±2.07	0.002	20.73 ±5.23	24.40 ±1.31	0.030
4	Mandibular foramen (superior lingual) to mandibular notch	15.54 ±2.70	18.71 ±2.43	<0.001	15.39 ±2.89	18.10 ±1.27	<0.001

P values <0.05 was considered significant, NS= not significant

Result: The present study reveals valuable insights on the information concerning the morphology of mandibular foramen in Gujarat population. In present study we took measurements of 140 mandibles, out of which 100 were dentate and 40 were edentulous. We found average distance of Mandibular foramen (posterior wall) to posterior mandibular ramus rim in right sided dentate and edentulous mandibles are 11.42 mm and 13.42 mm respectively, which is statistically significant and same average distance in left sided dentate and edentulous mandibles are 12.94 mm and 13.38 mm respectively, which is also statistically significant. We also found average distance of Mandibular foramen (anterior wall) to anterior mandibular ramus rim in right sided dentate and edentulous mandibles are 16.07 mm and 15.54 mm respectively, which is statistically significant and same average distance in left sided dentate and edentulous mandibles are 16.31mm and 15.95 mm respectively, which is not statistically significant. We found average distance of Mandibular foramen (inferior wall) to inferior mandibular rim in right sided dentate and edentulous mandibles are 21.06 mm and 24.85 mm respectively, which is statistically significant and same average distance in left sided dentate and edentulous mandibles are 20.73 mm and 24.40 mm respectively, which is also statistically significant. We found average distance of Mandibular foramen (superior lingual) to mandibular notch in right sided dentate and edentulous mandibles are 15.54 mm and 18.71 mm respectively, which is statistically significant and same average distance in left sided dentate and

edentulous mandibles are 15.39 mm and 18.10 mm respectively, which is also statistically significant.

Figure: Measurements of mandibular foramina
Figure is captured by author



Discussion: In this study the distance of Mandibular foramen (posterior wall) to posterior mandibular ramus rim in dentate and edentulous mandibles is statistically significant in both sides. The distance of Mandibular foramen (anterior wall) to anterior mandibular ramus rim in dentate and edentulous mandibles in right side is statistically significant but it is not significant in left side. The distance of Mandibular foramen (inferior wall) to inferior mandibular rim in dentate and edentulous mandibles is statistically significant on both sides. The distance of Mandibular foramen (superior lingual) to mandibular notch in dentate and edentulous mandibles is

statistically significant on both sides. Thus, the position of the mandibular foramen in relation to the anterior and the posterior mandibular ramus rim was statistically significant different between dentate and edentulous mandibles except on left side in case of distance of Mandibular foramen (anterior wall) to anterior mandibular ramus rim.

In the study of Bruno et al², they used female known sex dentate and edentulous mandibles for the study. When we compare the results of both the studies, distance of mandibular foramen is statistically

significant in all the parameters except, the distance of mandibular foramen (anterior wall) to anterior mandibular ramus rim on the left side. Thus, the narrowest anteriorposterior width of the mandibular ramus was statistically significantly smaller in edentulous than in dentate mandibles (P= < 0.001). Mandibular foramen (inferior wall) to inferior mandibular rim measurement, Mandibular foramen (superior lingual) distance to mandibular notch was also more in edentulous mandible and the difference was statistically significant.

Table II: Correlation of present study with other study (%)

Sr. No.	Parameter	Present Study		Bruno et al ²	
		Dentate	Edentulous	Dentate	Edentulous
		(n = 100)	(n = 40)	F (n = 92)	F (n = 18)
1	Mandibular foramen (posterior wall) to posterior mandibular ramus rim	12.18	12.56	11.43	9.84
2	Mandibular foramen (anterior wall) to anterior mandibular ramus rim	16.19	16.25	17.52	15.97
3	Mandibular foramen (inferior wall) to inferior mandibular rim	20.9	20.81	22.00	19.91
4	Mandibular foramen (superior lingual) to mandibular notch	15.47	15.43	15.06	14.11

Conclusion: The knowledge of the distances from surgically encountered anatomical landmarks in the present study provide valuable information to dental surgeons that will facilitate effective localization of the neurovascular bundle passing through mandibular foramen thus avoiding complications from local anesthetic, surgical and other invasive procedures.

The results of this research showed that the presence or absence of the teeth can alter mandibular shape and raises the intriguing possibility that mandibular edentulism may be associated with specific shape changes in the mandible. The dental status has a higher influence on the mandibular anatomy.

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