

DISTANCE OF MANDIBULAR FORAMEN FROM 3RD MOLAR TOOTH IN DRY ADULT MANDIBLE OF WEST BENGAL POPULATION

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ABSTRACT

Adequate anaesthesia is a prerequisite in most of the maxillofacial and dental procedures related to mandible and which is achieved by inferior alveolar nerve block technique. Inferior alveolar nerve (IAN) and vessels passes through mandibular foramen (MF). Therefore, distance of mandibular foramen from 3rd molar tooth is important as this is the only visible landmark in living. The aim of this study was to determine the distance of MF from 3rd molar tooth in both genders. Seventy dry adult mandible were included in this study. Mandible having 3rd molar tooth was selected for the study. Distance of MF from mid point of 3rd molar tooth to anterior margin of MF was measured with Vernier caliper. The mean distance of the MF from right and left 3rd molar tooth in male mandibles was 2.28 ± 0.49 cm and 2.17 ± 0.47 cm respectively. Mean distance of the MF from the 3rd molar on the right and left female mandibles was 2.18 ± 0.66 cm and 2.16 ± 0.56 cm respectively. Anatomical knowledge gained from this study might help maxillofacial and dental surgeon in certain surgical procedure.

Key words: Mandibular foramen, 3rd molar tooth.

INTRODUCTION

The increased awareness of maxillofacial surgery and development of implant techniques has significantly increased the interest in the maxillofacial anatomy including mandible, specially the mandibular foramen. Mandibular foramen transmits inferior alveolar nerve and vessels and inferior alveolar nerve block technique is commonly used in dental practice and also in reconstructive surgery. Mandibular foramen (MF) is located on the medial surface of the mandibular ramus. Inferior alveolar nerve (IAN) and vessels enter into the mandibular canal through the foramen and supply the mandibular teeth (Williams et al., 2000). Most vital anatomical landmark for mandibular surgery is mandibular foramen. A detailed knowledge of the mandibular foramen and ramus of mandible is essential to avoid complications (Daw et al., 1999). Neurosensory deficit in the chin and lower lip is one of the most complicated complications, which can occur

during implant placement in anterior mandible. This complication can be prevented if important vital structures such as mental foramen (mf) and anterior mental loop are properly identified and protected (Walton, 2000). Anatomical variation in size, shape, location and direction of opening are more common in mandibular and mental foramen (Neiva et al., 2004, Apinhasmit et al., 2006, Gershenson A. et al., 1986). In dental practice inferior alveolar nerve block is most commonly used. Failure to achieve this nerve block is due of anatomical variations in the position and the presence of accessory mandibular foramen (Erika C, 2014). Study has shown that accessory mandibular foramen can spread tumours following radiotherapy so during planning of radiation therapy the knowledge of variations is essential for the radiotherapist (Funibunda et al., 1999). Study has shown anatomical variations of the mandible in three major racial phenotypes (Komar et al., 2006).

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Evidence shows an obvious racial variation in the position of the mandibular foramen but there is no such data to prove it in Eastern India. Therefore, thorough knowledge of the population specific data on the mandibular foramen will help therapeutic, diagnostic and

surgical manipulations in the maxillo-facial region. The goal of this study was to explain the morphological features and exact anatomical position of the mandibular foramen in dry adult mandible in West Bengal population

MATERIAL AND METHODS

Seventy adult human dry mandibles were collected from the department of anatomy, Burdwan Medical College, Burdwan and Nil Ratan Sircar Medical College, Kolkata, West Bengal. The mandibles which had 3rd molar tooth were selected for the study, but the sample size did not represent the total population. The position of the mandibular foramen from the midpoint of the 3rd molar tooth to anterior margin of the mandibular foramen was recorded on both the sides of the mandibular ramus [Fig. 1]. We have selected 3rd molar tooth to be the landmark because during the process of anesthesia we are not being able to see the soft

tissue covered ramus of mandible. Vernier caliper of 1/20 accuracy was used for distance measurements and recorded in centimeter. The measurements were taken by same author to avoid inter observer bias. All measurements were made bilaterally in male and female mandible, data were compared between the right and left sides of the mandibles. The statistical analysis was subjected to calculate the mean and standard deviation (SD) in Microsoft office excel 2007, and Student's t test was used for the paired and independent samples, and the significant difference was evident when p value < 0.05.



Figure 1: Distance measurement from mid-point of 3rd molar tooth to anterior margin of mandibular foramen of right side.

RESULTS

The mean and standard deviation (SD), lowest and maximum distance values of the distance of mandibular foramen (MF) from the 3rd molar tooth on both side of mandible in male and female mandible are shown in Table 1. The mean distance of the MF from right and left 3rd molar tooth in male mandible was 2.28 ± 0.49 and 2.17 ± 0.47 respectively. Whereas mean

distance of the MF in female mandible was 2.18 ± 0.66 and 2.16 ± 0.56 from right and left 3rd molar tooth respectively. Independent Student's t test results of both right and left side of MF in male mandible was $p= 0.3$, 95% CI $-0.1-0.3$, t value 0.9, SED 0.1 and female mandible was $p= 0.8$, 95%CI $-0.2-0.3$, t value 0.1 and SED 0.1 respectively.

Table 1: Shows Distance of MF from mid-point of 3rd molar tooth in Centimeter (Cm)

Male Mandible (n=35)			Female Mandible (n=35)		
	Right	Left	Right	Left	
Mean	2.28	2.17	2.18	2.16	
SD	0.49	0.47	0.66	0.56	
LV	1.46	1.36	1.02	1.05	
HV	3.22	3.08	3.63	3.61	
p value- 0.3, 95% CI= -0.1-0.3, t value- 0.9, SED- 0.1.			p value- 0.8, 95%CI= -0.2-0.3, t value- 0.1, SED-0.1.		

SD= standard deviation, LV= lowest value, HV= highest value, CI= confidence interval, SED= Standard error of difference.

DISCUSSION

Inferior alveolar nerve (IAN) block is very difficult due to variable positions of mandibular foramen (MF) (Afsar et al., 1998). To avoid injury to the inferior alveolar nerve and vessels which pass through MF and to achieve complete IAN block a fair knowledge regarding its position is essential.

Different authors have used various methodologies to determine the location of the mandibular foramen in dry mandible, like distance from anterior border, posterior border, base of ramus and from mandibular notch. But in living subjects all are covered by soft tissues so we have used only visible 3rd molar tooth as land mark for measurement of distance of MF from it.

Kilarkaje et al., (2005) reported that mandibular foramen maintains bilateral symmetry in dry mandible in all ages and the foramen was within 2.5 cm from 3rd molar tooth, anterior border of

ramus and mandibular notch. Our finding is more or less similar with this finding.

Another study from south Indian mandible by Verma et al., (2011) locate that the mean distance of MF from 3rd molar tooth was 1.5 cm and 1.8 cm in right and left side of mandible respectively. This finding slightly differs from our study as the distance was taken from the posterior border of the socket for 3rd molar tooth instead of centre of 3rd molar tooth, and probably due to racial variations too.

In our study there is no significant difference of distance in both side of the MF in both male and female mandible. This result is similar to the findings of Oliver et al., (2009) in his Radiological study on Mandibular foramen.

In a study in Bangladesh Haque Md.M et al., (2013) reported that the mean distance of MF from posterior margin of 3rd molar socket was 16.70 ± 2.18 mm and 16.72 ± 2.16 mm right and

left side of mandible respectively which differs the present study.

In conclusion, the present study which is done in Eastern Indian mandibles will give a fair knowledge of position of MF from 3rd molar

tooth in living human beings in local population of West Bengal and can help maxillofacial and dental surgeon during surgical intervention in the region of mandibular foramen.

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