



MENTAL FORAMEN IN DRY ADULT HUMAN MANDIBLES – A MORPHOLOGICAL STUDY

Anatomy

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ABSTRACT

Introduction – Knowledge of the mental foramen is important for surgery in the mental region. An attempt was made to study the Position of the Mental Foramen in the dry mandible at the Department of Anatomy in Gauhati Medical College.

Materials and Methods – 50 randomly selected adult dry Mandibles were studied. The Mental Foramen in light of its position as per Tebo & Telford Classification and its size were observed. Measurements were taken with Vernier Callipers. Accessory Mental Foramen were noted.

Result – The Mental Foramen was found to be mostly situated at the Position IV on both Right and Left side. On the Right side it was found that 48% of the Mental Foramina was present on Position IV while on the Left side it was found to be 46%.

Conclusion – The knowledge of the position of the Mental Foramen is important for Faciomaxillary Surgery.

KEYWORDS

Mental Foramen, Mandible, Anatomy.

Introduction

The Mental Foramina are a pair of openings present on the External Surface of the body of the Mandible, one on either side of the midline. They lie at a variable distance away from the midline and between the upper alveolar border and the lower inferior border of the mandible. They transmit the Mental vessels and nerve. The Mental Foramen is described to be Funnel shaped, with the mouth of the opening being Round or Oval. It marks the termination of the Mental Canal[4]. The Mental Canal carries the Mental vessels and nerve, which branch from the Inferior Alveolar Vessels and Nerves in the Mandibular Canal. It curves upward, backward and laterally to end in the Mental Foramen through which the vessels and nerve emerge[5]. They provide sensory innervations and blood supply to the chin, lower lip and gingiva[2]. The presence of Accessory Mental Foramina is noted in several individuals. They are usually located at the level of the first molar tooth and may transmit fibres branches of the Mental Nerve. [3]

The mental nerve as it emerges from the Mental Foramina is one of the common places for infiltration of local anaesthesia. It is used by faciomaxillary surgeons in procedures like Premolar Curettage, Denal Implants, Root Canal Treatments, Orthognatic Surgeries etc. Precise knowledge of the Mental Foramen would be of much application in this regard to have an effective anaesthesia during the nerve block. It should be borne in mind that due to variation in the position and number of the mental foramina, failure of Mental Nerve Block Anaesthesia is a common occurrence [1]. An attempt was made to study the Mental Foramina in 50 dry adult mandibles in the Department of Anatomy, Gauhati Medical College and Hospital to determine its Shape, Size, Position and Presence of Accessory Mental Foramina.

Materials and Methods

After proper clearance from the institutional ethical committee, a collection of 50 randomly selected anatomically correct adult dry Mandibles were studied and analysed at the Department of Anatomy, Gauhati Medical College, Guwahati. The Mandibles were collected from the Department of Anatomy, Gauhati Medical College.

Inclusion Criteria – All anatomically correct and anatomically complete mandibles were selected for the study

Exclusion Criteria – Any incomplete bone or any bone with apparent structural defect were excluded.

The size of the Mental Foramen and its distance from the Anterior, Posterior, Superior and Inferior border were recorder with the help of a pair of Vernier Callipers (Fig 1 and Fig 2) [1]. The Mean and Standard Deviation of the data were calculated.

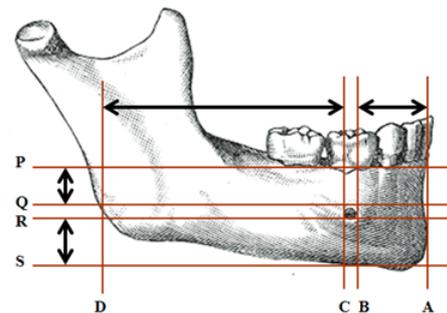


Fig 1: Distance of Mental Foramen from the borders of Mandible (AD – Distance from the Symphysis Menti to the posterior border of the Mandible, AB – Distance from the Symphysis Menti to the Anterior Margin of Mental Foramen, CD – Distance from the Posterior Margin of the Mental Foramen to Posterior Border of the Mandible, BC – The Horizontal Diameter of the Mandible. PS – Distance from Alveolar Margin to the base of the mandible, PQ – The Distance from Alveolar Margin to the Superior Margin of the Mental Foramen, RS – The Distance from the Inferior Margin of the Mental Foramen to the Base of the Mandible, QR – The Vertical Diameter of the Mental Foramen.)



Fig 2: Procedure of Measurement using Vernier Callipers The Tebo and Telford Classification was used to note the position of the Mental Foramen. (Fig 3) [1]. The shape of the Mental Foramen (Round or Oval) was also determined.

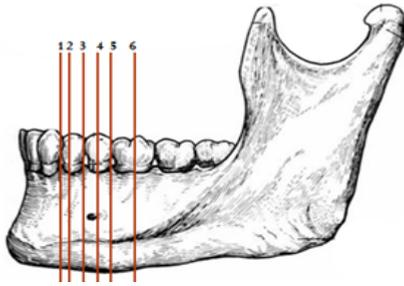


Fig 3: The Tebo and Talford classification for Position of Mental Foramen in relation to the teeth (I - Foramen lying on a longitudinal axis of passing between the canine and first premolar, II - Foramen lying on the longitudinal axis of the first premolar, III - Foramen lying on the longitudinal axis passing between first and second premolar, IV - Foramen lying on the longitudinal axis of the second premolar, V - Foramen lying on the longitudinal axis passing between the second premolar and first molar, VI - Foramen lying on the longitudinal axis of first molar)

The presence of Accessory Mental Foramen was noted in each mandible. (Fig 4)



Fig 4 – A Mandible displaying Accessory Mental Foramen on the Left Side.

Results:

The measurements recorded shows that on the Right Side, The mental foramen was situated 25.75mm from the Anterior Border, 61.75mm from the Posterior Border, 12.6mm from the Superior Border and 11.65 mm from the Inferior Border of the Mandible. The size of the Mental foramen was found to be 3.15mm x 3.1 mm in horizontal and vertical diameters respectively. (Table 1)

Table 1 – Position of the Mental Foramen in relation to the borders of mandible and its size (Right).

Parameters	Minimum	Maximum	Mean	SD
AD	79.1	102.2	90.65	5.78
AB	21.8	29.7	25.75	1.98
CD	55.8	67.7	61.75	2.98
BC	1.5	4.8	3.2	0.83
PS	18.2	36.5	27.35	4.58
PQ	8.5	16.7	12.6	2.05
RS	8.4	14.9	11.65	1.63
QR	1.3	4.9	3.1	0.90

On the Left Side, The mental foramen was situated 26.1mm from the Anterior Border, 59.8mm from the Posterior Border, 11.3mm from the Superior Border and 13.2 mm from the Inferior Border of the Mandible. The size of the Mental foramen was found to be 3.10mm x 3.6 mm in horizontal and vertical diameters respectively. (Table 2)

Table 2 - Position of the Mental Foramen in relation to the borders of mandible and its size (Left).

Parameters	Minimum	Maximum	Mean	SD
AD	78.1	101.9	95.2	4.2
AB	21.3	29.5	26.1	2.7
CD	53.2	71.7	59.8	4.2
BC	1.3	4.9	3.1	1.0
PS	18.4	36.9	25.1	3.9
PQ	8.8	17.9	11.3	3.1
RS	8.3	18.6	13.2	1.9
QR	1.3	5.1	3.6	1.5

Using the Tebo and Talford Classification to determine the position of the Mental Foramen in relation to the teeth shows that the Mental Foramen was mostly situated at the Position 4 on both Right and Left side. On the Right side it was found that 24 (48%) of the Mental Foramina was present on Position 4 while on the Left side it was found to be 23 (46%). (Table 3 and Fig 3 and Fig 4).

Table 3 - Position of the Mental Foramen (Tebo and Talford Classification)

Right Side			Left Side		
Position	Frequency	Percentage	Position	Frequency	Percentage
I	-	-	I	-	-
II	3	6	II	3	6
III	9	18	III	10	20
IV	24	48	IV	23	46
V	14	28	V	14	28
VI	-	-	VI	-	-
Total	50	100	Total	50	100

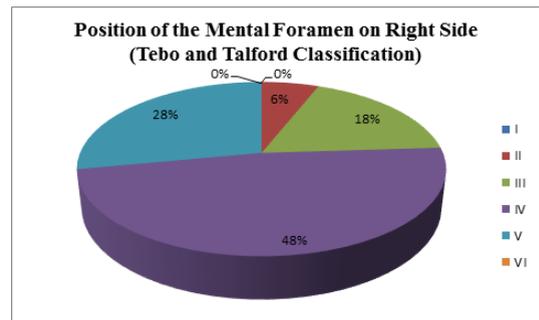


Figure 3 - Position of the Mental Foramen on the Right Side (Tebo and Talford Classification)

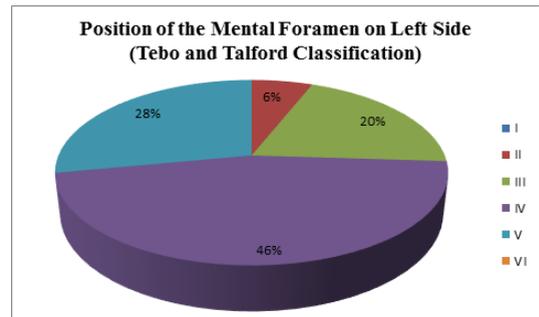


Figure 4 - Position of the Mental Foramen on the Left Side (Tebo and Talford Classification)

The shape of the Mental Foramen was found to be Oval in 33 (66%) and Round in 17 (34%) on the Right side. On the left side it was found to be Oval in 31 (62%) and Round in 19 (38%).

2 out of the 50 Mandibles studied showed accessory Mental Foramina on the Right Side (4%) while on the left side it was seen in 1 out of the 50 Mandibles (2%).

Discussion:

In our study the Mental Foramen was found to have a Horizontal Diameter of 3.2mm on the Right Side and 3.1 mm on the Left Side. The Vertical Diameter was found to be 3.1mm on the Right Side and 3.6mm on the Left Side. Udhava *et al* reported a Horizontal Diameter of 2.28mm on the Right Side and 2.95 mm on the Left Side. They reported a Vertical Diameter of 2.86mm on the Right Side and 2.52mm on the Left Side. [1] Chung *et al* reported a diameter of 2.4mm [6], Apinhasmit *et al* reported the diameter of the mental foramen to be 2.8 mm [7] while Rastogi *et al* found the Horizontal Diameter to be 4.57mm on the Right Side and 4.61mm on the Left side and the Vertical Diameter to be 3.58mm on the Right Side and 3.55mm on the Left Side [8].

In our study we found that the most common position of the Mental Foramen according to the Tebo and Talford Classification was in Position IV on both Right Side (48%) and Left Side (46%), i.e -

Foramen lying on the longitudinal axis of the second premolar. The same position was reported in studies on North Americans (49.4%) by Tebo et al [9], North Indians (68.75%) by Singh et al [10], Zimbabweans (56.3%) by Mbajioru et al [11] and Malawians (62.9%) by Igbigbi et al [12]. A study in China recorded the most common position of the Mental Foramen to be Position III (59%) [13] which was also reported by studies on British (59.1%) by Santini et al [14], Asian Indians (75.36%) [15], East Africans (57.88 %) [15], Kenyans (56.1%) by Mwaniki et al [16] and Nigerians (55.63%) [15].

In our study we found that the most common shape of the Mental Foramen is Oval in both Right Side (66%) as well as Left Side (62%). Gerhenson et al reported an Oval shape of the Mental Foramen in 65.5% [13] while Prabodra et al found an Oval shape in 66.7% of the population [17]. Agarwal et al reported an Oval Mental Foramen in 92% of the population [18]. Udhaya et al found an Oval mental foramen in 83.33% [1]. Rastogi et al [8] and Singh et al [10], however, reported the Round shape of the Mental Foramen to be more common than the Oval shape (51.7% and 94% respectively).

In our study we found Accessory Mental Foramen in 4% of the sample on the Right side and 2% of the samples on the Left Side. Singh et al reported the occurrence of Accessory Mental Foramen in 5% on the Right side and 8% on the Left Side [10]. Udhaya et al reported that 2.22% of the specimen had accessory mental foramen on the Right Side and 3.33% on the Left Side [1].

Conclusion:

Precise knowledge of the Shape, Size and Position of the Mental Foramen is essential for Surgeons to have proper infiltration of the Nerve Block Anaesthesia of the Mental Nerve. Knowledge of the Accessory Mental Foramina would be beneficial to the surgeon. This knowledge would prevent inadequate paresthesia during the surgical procedures. It would also prevent any accidental injury to the accessory mental nerves during surgery as they emerge from the accessory mental foramen. The position of the Mental Foramen in relation to the teeth, as seen in the Tebo and Telford Classification, would act as a guide for the anaesthesiologists as well as surgeons during the procedures. From the present study it is evident that accessory Mental Foramen are present among the population of North East India as well.

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