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Original Research Article

Mental Foramen Position, Shape and Size of Mental Foramen in Adult Human Mandibles

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ABSTRACT

Purpose of this study was to investigate the most common accurate position of the mental foramen in selected persons which helps in several clinical procedure and nerve block anesthesia. The study sample included 50 human mandibles from govt dental and govt medical college Srinagar irrespective of sex in human the mental foramen is normally present as a single opening on each side of the mandible. Previous studies found the size, shape, number, location, and the direction of the opening of the mental foramen have many variations and these variations are influenced by race and sometimes gender. Mental foramen may not be detected in panoramic radiographs and usually bifurcates at inferior superior or medial lateral plane. The most common Horizontal position of the mental foramen was below the root of second premolar tooth (37.6%). In vertical axis, the location of MF in lower half of body of mandible was found in all OPGs (100%). In vertical distance, Position B, which is measured by distance between 1.0 mm to 1.5 mm, is the most common position of MF in all aspect as viewed in OPGs in Bangladeshi population. In this study, the difference of the location of the mental foramen in different ethnics groups was discussed. Clinicians and anthropologists should expect to find the position of the mental foramen to be symmetrical and below the root of secondpremolar tooth.

Keywords: Premolars, mental foramen.

INTRODUCTION

Mental foramen (MF) is the front opening of the mandibular canal on the body of mandible alongside and above the tubercle of chin. Normally, MF is located below the interval between the two premolars (Rajani and Srivastav, 2010; [1] Ngeow and YusofYuzawati, 2003). [2] But, studies have shown that there are variations in the position of MF in different populations. It may lie between the apices of premolars, below the apex of second premolars (Rajani and Srivastav, 2010). [1] Mental foramen (MF) is located in the body of mandible at an equal distance from the superior and inferior border Picosse (1982) and Marzola (1989). [3-4] Normally, MF is located below the interval between the premolars. Mental nerve and vessels pass through MF. Variations in the position of MF have been analysed. It may lie between the apices of lower premolars, below the apex of second premolar. Data from various ethnic groups e.g. Tanzanian, Thai, Chinese, British, Saudi Arabian vary regarding the location of MF. A review by Green (1987)

[5] demonstrated a clear racial trend in the position of the MF. Any foramina in addition to the MF found in body of mandible are known as accessory MF. It may not present in some of the populations but both MF and accessory MF are important landmarks in surgical procedures (Rajani and Srivastav, 2010 [1]). Mental nerve, a branch of inferior alveolar nerve passes through MF and supplies the chin, lower lip, buccal mucosa of incisors, canines and premolars (Frederico et al., 2010). [6] Preoperative study of MF is important to prevent damage to the mental nerve which will cause paresthesia, patient may complaint that there is transient or permanent loss of sensation of the lip, chin, oral mucosa that is often associated with a limited xerostomia (Gary and Dennis, 2006). [7] Accessory mental foramen (AMF) is situated below the first molar tooth according to Cag˘irankaya& Kansu (2008). [8] The distances between MF and AMF in three cadavers were reported to be 0.67 mm, 2.1 mm and 5.74mm Toh et al. (1992). [8] Ethnic variations in relation to AMF have also been reported by Sawyer et al. (1998). [9]

Hence location, size, shape, position and incidence of MF and AMF would facilitate the dental surgeon to apply nerve block in different surgical procedures involving lower jaw.

MATERIALS AND METHODS

Present study was carried out using 50 dried adult human mandibles of unknown sex in the Department of Anatomy, govt dental and medical college Srinagar, India. Digital Vernier Callipers was used to measure the dimensions of MF and AMF to analyse and examine the size, shape and position of MF and AMF. The shape, size, location, number of MF, direction of opening of mental foramen was measured on both sides of mandible by using digital Vernier caliper. The shape of MF observed was either oval or rounded. Mean horizontal and vertical diameters were measured. Location of MF was identified by using following parameters:

(1) Distance from mental foramen to mental symphysis;

(2) Distance from mental foramen to alveolar margin and

(3) Distance from mental foramen to inferior border of the mandible.

The position of MF was noted in relation to mandibular teeth. The direction of opening of MF was recorded as postero-superior, superior, lateral, antero-superior, posterior or anterior (Phillips et al, 1990). [11]

Table I: Morphometric measurements of the mental foramen between two sides

Characteristic	Right side (mean±SD)mm	Left side (mean±SD)mm
Distance between MF and symphysismenti	25.55±5.07	25.05±5.07
Distance between MF and alveolar margin	14.05±3.05	13.82±3.06
Distance between MF and lower border of mandible	12.16±3.04	12.11±3.11

Table II: Frequency of the location of mental foramen in relation to mandibular teeth between the two sides.

Location	Right side	Left side
In the line with the second premolar	81%	81%
Between second premolar and first molar	3%	3%
Between first and second premolar	8%	8%
In the line with first molar	8%	8%
In the line with the first premolar	0%	0%

RESULTS

Morphometric features of 50 dried human mandibles revealed that the number of MF on each side was single in 97 % cases, where as double in 3% cases.

SHAPE OF MF; The shape of foramen was oval in 92% cases and rounded in 8% cases.

SIZE OF MF; Mean horizontal diameter was 3.32mm on right side and 3.25mm on left side, whereas mean vertical diameter was 2.14mm on right side and 2.12mm on left side. The linear measurements of MF with respect anatomical landmarks are given in Table I.

POSITION OF MF; The positions of mental foramen in relation to mandibular teeth on the two sides are shown in Table II. The most frequent position of foramen in relation to the teeth was in line with the

longitudinal axis of 2nd premolar for both right (81%) and left (81%) sides. The second common position was in the line of 1st molar teeth (right 8%; left 8%), followed by in line between 1st & 2nd premolar (right 8 %; left 8 %); least common position was in the line between 2nd premolar & 1st molar teeth (right 3 %; left 3 %). The direction of exit of the MF was posterosuperior in 90%, followed by superior in 4%, laterally in 4%, and posterior in 2% of the mandibles.

Position of AMF in 4 mandibles out of 50 was found situated below apex of first molar tooth whereas it was observed to be located between first and second premolar in 3 mandibles out of the same 50. Average distance between MF and AMF was 0.67mm lateral to MF

Incidences of AMF: AMF is observed in 7 mandibles out of 50 mandibles. AMF was situated in 4 out of 7 mandibles on right side and in 3 out of the same7 mandibles in left side. Thus out of total population of 50 mandibles, AMF was found in right side of the body of mandibles in 8 % while in left side it was present in 6 % of the population under study.

DISCUSSION

The location of the mental foramen has been controversial for many years. The mental foramen is an anatomic landmark positioned on both sides of the mandible-it contains the mental nerve and vessel. This anatomical landmark is very important in many dental procedures regardless of specialty. However, accurately determining the location of the foramen is a problem because there are many disparities in the location of the foramen between different individuals. Some say that it is located between the lower first and second premolars, [12] and other locate it near the apex of the lower second premolar. [13,14] Thus, this implies that different geographic populations may have different anatomical variations in the mental foramen. In conclusion, knowing the location of the mental foramen facilitates successful and safe dental procedures and anesthetic injections.

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