

Mental Foramen: An Eagle Eye

S.Thaminee¹, Saravana Kumar², Ashok Velayudhan³, Dhanraj Ganapathy⁴

Graduate Student¹, Professor³, Professor & Head⁴, Department of Prosthodontics, ²Senior Lecturer, Department of Anatomy, Saveetha dental college, Saveetha Institute of Medical and Technical Sciences, Chennai.

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Abstract

The mental foramen is a strategically important landmark during osteotomy procedures in implantology. Its location and the possibility that an anterior loop of the mental nerve may be present mesial to the mental foramen needs to be considered before implant surgery to avoid mental nerve injury. The aim of the study was to provide anatomical information on the position, morphological variations and incidence of mental foramen and accessory mental foramen as they are important for dental surgeons, anaesthetists in nerve blocking and surgical procedures to avoid injury to neurovascular bundle in mental foramen area. The present study was conducted using 120 dried human mandibles of both sexes. Size, shape and position of mental foramen and accessory mental foramen were determined using digital vernier caliper. Mental foramen was present in all observed mandibles and it was bilateral in position. Accessory mental foramen was present in 8 mandibles and was unilateral in position. The knowledge about variation in size, shape and position of mental foramen and presence of accessory mental foramen may be helpful to the dental surgeons to achieve full anesthesia and it's a guide for the implantologist to proceed with placing implant without damaging the nerve.

Key Words:

Mental foramen (MF), accessory mental foramen (AMF), mandible, premolar tooth.

Introduction:

The mental foramen is defined as the entire funnel-like opening in the lateral surface of

the mandible at the terminus of the mental canal. Mental nerves and vessels pass through this foramen. This is contained

entirely within the buccal cortical plate of bone. The mental foramen is the opening of mental canal, a branch of mandibular canal. Wall of the mental foramen is made up of cortical bone. The density of the foramen varies, as does the shape and definition of its border (Philips et al., 1992). Knowledge of the position of the mental foramen is important both when administering regional anesthesia, performing periapical surgery, dental implant surgery and endodontic treatment in mandible (Popović et al., 2017).

Foramen may occasionally be mis-diagnosed as a radiolucent lesion in the apical area of the mandibular premolar teeth. It also aids in interpreting anatomical landmarks in oral pathology and forensics (Phillips et al., 1990). Mental foramen is a small foramen situated in anterolateral aspect of the body of the mandible. Normally, mental foramen is located below the interval between the premolars. It transmits mental nerve, artery and vein. Mental nerve is a branch of inferior alveolar nerve which supplies sensation to lower lip and the labial mucosa and lower canines and premolars. The most useful injection for anaesthetizing the mandibular teeth is the inferior alveolar nerve block (Fishel et al., 1976; Phillips et al., 1990).

To anaesthetise the anterior teeth, including the premolars and canines, it is possible to avoid giving inferior alveolar nerve block by injecting anaesthetic solution adjacent to the mental foramen. So, the study of position and morphological variation of mental foramen is very important because it will be helpful to localize the important neurovascular bundle passing through the mental foramen. Any

foramen in addition to mental foramen in the body of the mandible is known as accessory mental foramen. Accessory mental foramen transmits the accessory branch of mental nerve. So, the knowledge of its position and incidence is helpful to dental surgeons to achieve complete anaesthesia because if this nerve is not blocked, anesthesia will be incomplete (Seema et al., 2012).

Mental foramen is located in the face and in the body of the mandible at an equal distance from the superior and the inferior border and it is located below the interval between the premolars. Mental nerves and vessels pass through it. Accessory mental foramen is due to the branching of mental nerve before passing through the mental foramen. Hence its shape, size and verification of its existence would prevent accessory nerve injury during periapical surgery. So the knowledge of its position and incidence is helpful to dental surgeons to achieve complete anesthesia because if this nerve is not blocked anesthesia will be incomplete. Mental nerve is the branch of the inferior alveolar nerve which supplies the sensation to the lower lip and the labial mucosa and the lower canines and the premolars. The most useful injection for anaesthetizing the mandibular teeth is the inferior alveolar nerve block (Daniel et al., 2018).

Mental foramen is also located between the apices of the lower premolar, below the apex of the second premolar. Any foramen in addition to mental foramen is known as the accessory mental foramen in the body of the mandible (6). Variations like multiple or absent foramina are often encountered these

variations in the position and the number of mental foramen have been reported in the pattern of their occurrence. Recent advancement in the clinical dentistry have increased the possibility of the procedures in the mental region and the detailed knowledge of the mental foramen and it may not only aid in the prevention of post-surgical neuromuscular complications and morbidity; but also hold the potential of contributing as the identification of maxillofacial anthropologic characteristic feature of different populations. (Daniel et al., 2018; Rao et al., 2017)

Human mandibles with over one mental foramen (MF) on one aspect do not seem to be such a rare discovery. Depending on the comparative size of the multiple MF traced on one side of a mandible, only one of them is considered as the main MF, while the others are regarded as accessory mental foramina (AMF). In order to distinguish an AMF from common buccal foramina without continuity with the mandibular canal, which are regarded as nutrient foramina, an AMF is defined as a foramen of an accessory bony canal originating from the mandibular canal (AMF). This foramen transmits the accessory branch of mental nerve. The knowledge of this foramen is essential to achieve complete anaesthesia (Nadeem et al., 2018).

The mental foramen (MF) is present on the anterolateral aspect on the body of the mandible. It transmits mental nerve and vessels. Mental nerve which is a branch of the inferior alveolar nerve supplies sensation to lower lip, labial mucosa, lower canines and premolars. Anaesthetising the anterior teeth together with premolars and avoiding inferior

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alveolar nerve block is feasible by injecting anesthetic solution adjacent to the mental foramen (Parmar et al., 2013).



Size Of Mental Foramen:

The average size of the foramen is 4.6 mm horizontally and 3.4 mm vertically on the lateral surface of the mandible. The foramen is usually larger on the left side of the mandible. Based on its radiographic appearance, the mental foramen has been classified by Yosue and Brooks into

four types: (Yosue & Brooks, 1989)

Type I: mental canal is continuous with the mandibular canal

Type II: the foramen is distinctly separated from the mandibular canal

Type III: diffuse with a distinct border of the foramen

Type IV: unidentified group

Location:

Anatomical variations occur concerning the mental foramen's location. It is usually found more coronal than the mandibular canal and the foramen was 28 mm from the midline of the mandible and 14 to 15 mm from the inferior border of the mandible. Similarly, Neiva et al.¹⁴ reported the foramen was 27.6 mm (range: 22 to 31 mm) from the midline and 12 mm (range: 9 to 15 mm) from the most apical portion of the lower cortex of the mandible. Other authors commented the foramen was usually found halfway between the crest of bone and the inferior border of the mandible. However, this finding could be influenced by the amount of crestal bone loss. (Çağırankaya & Kansu, 2008; Ozgedik et al., 2017)

Position:

The position of the mental foramen with respect to the teeth of the lower jaw

were classified according to the method of Tebo and Telford, 1950.

Position of Mental Foramen in relation to teeth (Tebo &

Telford Classification)

1-Foramen lying on a longitudinal axis of passing between the canine and first premolar.

2-Foramen lying on the longitudinal axis of the first premolar.

3-Foramen lying on the longitudinal axis passing between first and second premolar

4-Foramen lying on the longitudinal axis of the second premolar

5-Foramen lying on the longitudinal axis passing between the second premolar and first molar.

6-Foramen lying on the longitudinal axis of first molar. The foramen which lay on a longitudinal axis which passed between the canine and the first premolar.

Detection Of The Mental Foramen On Radiographs:

Panoramic Films Radiographic assessment of the mental foramen must be interpreted cautiously. Jacobs et al.³⁶ reported the foramen was detected on 94% (N = 545) of panoramic radiographs, but clear visibility was only attained 49% of the time. Similarly, Yosue and Brooks¹⁵ noticed the foramen on 87.5% (N = 297) of panoramic radiographs, and it was distinct 64% of the time. In another investigation in which four skulls were radiographed, (mean: 0.2 mm; range: 0.0 to 0.5 mm). It can be concluded that neither periapical nor panoramic films precisely portray the amount of bone coronal to the mental foramen. (Naitoh et al., 2009)

Ct Scans:

CT scans are more accurate than conventional radiographs. Nevertheless, conventional radiographs can usually be used if potential radiographic distortions are taken into account⁽¹⁰⁾. However, if it is difficult to locate the inferior alveolar canal or the mental foramen, consideration should be given to obtaining a CT scan. (Chau & Fung, 2009; Naitoh et al., 2011)

Conclusion:

The anatomical variability of the position of the mental foramen should always be considered when performing periodontal or endodontic surgery in the area from canine to root of first molar tooth. The knowledge about variability in position of mental foramen and presence of accessory mental foramen is important in order to avoid nerve damage in connection with surgical procedure and to achieve complete effect of anesthesia after mental nerve block.

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