

Position Of Mental Foramen In A Indian Population-Radiographic Study

Research Article

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Abstract

Aim: The Aim of the study is to document the information on appearance, size, horizontal and vertical locations of Mental Foramen (MF) in Orthopantomogram.

Material And Method: 1000 panoramic radiographs of both gender aged between 18-50 years were evaluated. Each radiograph was traced to understand the position of the horizontal and vertical locations. The relation of the mental foramen to the superior and inferior borders of the mandible and the apex of the second premolar were measured. All radiographs were excluded whenever mental foramen is not seen clearly.

Result: The Mental foramen was most commonly located medially in relation to the apex of second premolar with no tangible differences with gender.

Conclusion: To identify the morphological appearance and positional variation of Mental foramen is important for isolation of mental bundles when administering LA and performing surgeries.

Keywords: Mental Foramen; Mental Bundles; Orthopantomogram; Mandible.

Introduction

Sutures have been around for thousands of years and are used The Mental Foramen (MF) is a crucial anatomical structure located in the body of mandible. It shows the tail-end of mental canal which opens onto the surface of oblique direction. The mental nerve emerges through MF and supplies sensory innervations and nutrition to the chin, lower lip and gingiva on the ipsilateral side of the mandible. The pin-point location of the mental foramen is crucial for both diagnostic and clinical procedures. Poor knowledge about the accurate position of mental foramen leads to repeated failure during injection and operative protocol. The mental nerve liable to be traumatized during periapical surgery, orthognathic surgery, mandibular fixation/reduction resulting in paresthesia or anesthesia. Also recent development of mandibular implant techniques and increasing frequency of orthognathic

surgery has increased the possibility of surgical procedures near the MF. It is also ideal to the practice of acupuncture as the Jiachenjiang point lies within the mental foramen. Mental nerve injury can cause transitory or permanent sensitive, thermal and tactile changes. The mental foramen is difficult to locate due to lack of consistent anatomic landmark for reference and the foramen cannot be clinically visualised or palpated. Moreover, dental practitioners have been experiencing problem during injection and operative procedure involving MF as the mental foramen is frequently encountered in a number of maxillofacial surgical procedure. On radiographs, MF appears as a radiolucent area in lower premolar region, sometimes overlapping the apex of a premolar [1, 2]. Its visualization on intraoral radiography may be difficult. The most common difficulty is that its position is below the edge of the films is due to small mouth, large mandibular tori and a shallow floor or malposed teeth prevent the correct placement

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of film during radiographic examination. Cases such as these may require a different radio-graphic technique to visualize the foramen. Moreover, due to the oblique direction of mental canal in the mesiodistal and inferior superior planes, it cannot always be observed in a periapical radiograph [3].

Orthopantomogram has gained popularity in the last three decades. The advantages of this technique include a great area of soft and hard tissue coverage, continuity off the visualized area, and the rapidity with which the view is formed. Panoramic radiography is curved plane tomographic technique used to draw the body of the mandible, maxilla and the lower half of the maxillary sinuses on a single image.

The current study was done to identify the most common position of the mental foramen in a randomly selected Indian population using the digital panoramic radiographs.

Previously our team has a rich experience in working on various research projects across multiple disciplines (Govindaraju and Gurunathan 2017; A. Christabel et al. 2016; Soh and Narayanan 2013; Mehta et al. 2019; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Campeau et al. 2014; Kumar and S 2016; S. L. Christabel 2015; Kumar and Rahman 2017; Sridharan, Ramani, and Patankar 2017; Ramesh et al. 2016; Thamaraiselvan et al. 2015; Thangaraj et al. 2016; Ponnulakshmi et al. 2019; "Fluoride, Fluoridated Toothpaste Efficacy and Its Safety in Children - Review" 2018) Now the growing trend in this area motivated us to pursue this project.

Material And Method

1000 panoramic radiographs of both gender aged between 18-50 years were evaluated.

Exclusion criteria includes:

- 1.Non visualization of the mental foramen bilaterally on OPG
2. Presence of periodontal lesion
- 3.Patients with previous orthodontic treatment
- 4.Presence of a radiolucent lesion in the lower jaw anywhere in the area of the mental foramen.
- 5.Patient below 18 years
- 6.Missing upper premolars because of possibility of over eruption of lower premolars.

Radiographs were chosen according to the following criteria:

- 1.High quality with respect to angulation and contrast.
2. present of teeth from the right first molar to the left first molar.
- 3.Radiograph not having any radiolucent or radiopaque lesion in the lower arch and showing no radiograph exposure or processing artefacts.

All those radiograph were excluded where mental foramen was not visible clearly. The position of the image of the mental foramen was recorded according to criteria given by Yosue and Brooks. They were

Type 1: Mental canal is continuous with mandibular canal.

Type 2: Foramen is distinctly separated from the mandibular ca-

nal.

Type 3:Diffuse with a distinct border of the foramen

Type 4: Unidentified type, in which the mental foramen cannot be identified on panoramic radiographs under ordinary exposure and viewing condition.

The horizontal location in relation to the apices of the teeth were determined and categorised [4-6] as follows.

- a. Anterior to first premolar
- b. In line with first premolar
- c. Between first and second premolar
- d. In line with second premolar
- e. Between second premolar and first molar
- f. In line with first molar

Patient are divided in to two age group ;

Group A; 18 to 25

Group B;26 to 50

Result

1000 panoramic radiographs were evaluated. The radiographs were 753 males and 247 females participated. The mental foramen appeared continuous type in 50% male and 37.5% separate female. The test results however showed a significant association of age ($p=0.005$) and gender ($p=0.004$). The most common horizontal position of mental foramen is at "c" . Location "c" was most common among both age group. There was no tangible differences between age and gender. The MF was most commonly positioned medially in relation to the apex of second premolar with no significant differences with gender. The average horizontal dimension of foramen on both side was 2.50 ± 1.50 . The average size of vertical dimension of foramen on both side was 2.25 ± 1.75 . Data entry and statistical analysis were carried out with SPSS.Chi-square and t-test were employed.

Discussion

Radiography method is one of the most commonly used non invasive method for diagnosis and treatment plan. For screening and planning surgeries panoramic radiograph is most commonly used technique. This study conducted to know the position of mental foramen which helps in administrating local anaesthesia and surgical approaches in mandible. Position of mental foramen is very important in placing the implant.The position mental foramen may differ in growing patient hence the patient above 18 years are included in the study. From the study it found that the 50% mental foramen is continuous type in all age group. The most common horizontal position of mental foramen is at "c" for both gender and all age group. The MF was most commonly positioned medially in relation to the apex of second premolar with no significant differences with gender. The average horizontal dimension of foramen on both side was 2.50 ± 1.50 . The average size of vertical dimension of foramen on both side was 2.25 ± 1.75 . Determining the morphological appearance and position of MF is important for isolation of mental nerves and vessels when administering LA and performing surgeries. The important of mental foramen in surgery, it is very important to know the normal range of possible locations of MF. The most common

Figure 1. The above flow chart represents percentage of patients having different types of mental foramen based on gender. The study shows highernumber of male patients havecontinuous type. Whereas female patients predominantly have separate type mental foramen.

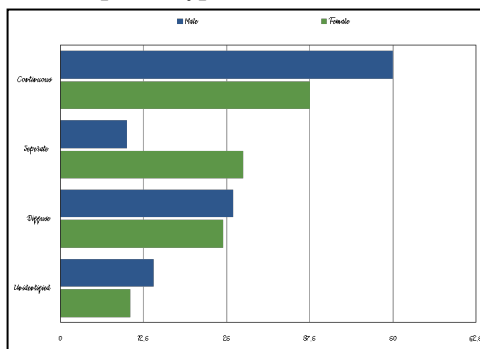


Figure 2. The above flow chart represents percentage of patients having different types of mental foramen based on age as factor of consideration. The study divides patients into two different groups I.e, 18-25 years(GroupA) and 26 to 50 years(Group B). As for as Group A and group B is concern higher number of patients have continuous type of mental foramen.

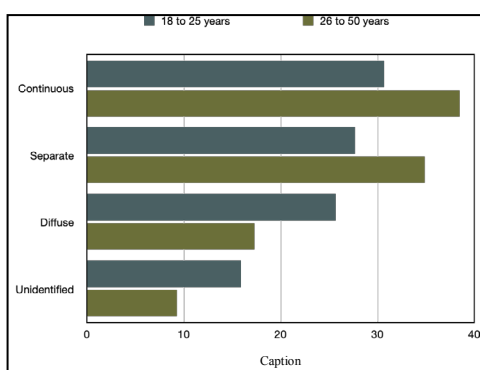


Figure 3. The above flow chart represents position of mental foramen. As study shows Mental foramen largely resides near Position C for both gender.

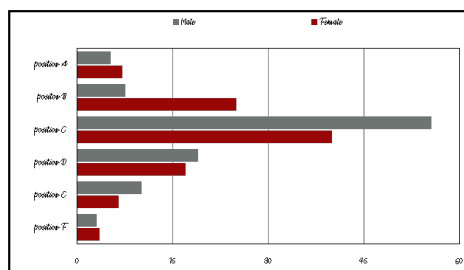
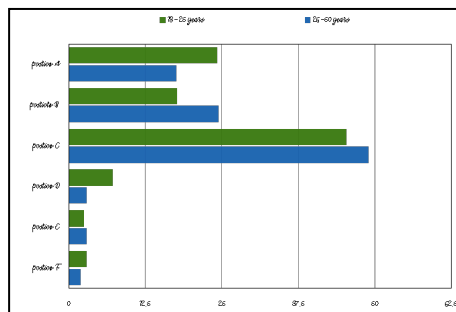


Figure 4. The above flow chart represents position of mental foramen. As study shows Mental foramen largely resides near Position C for both age group.



appearance of MF in our study was continuous type. From the results of our study it is found that there is change in the horizontal and vertical locations of MF in different population groups. Therefore the study show the important of accurate radiographic identification of Mental foramen and interpretation before administration of local anesthesia or conducting any surgery of mandible. These findings can be used as reference material by the dental practitioners of India while performing clinical procedures

that involve Mental foramen.

Our institution is passionate about high quality evidence based research and has excelled in various fields (Jayaseelan Vijayashree Priyadharsini 2019; Pc, Marimuthu, and Devadoss 2018; Ramesh et al. 2018; Ramadurai et al. 2019; Sridharan et al. 2019; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Mathew et al. 2020; Samuel 2021; R et al. 2020; Chandrasekar et al. 2020; J. Vijayashree

Priyadharsini, Smiline Girija, and Paramasivam 2018)

Conclusion

The mental foramen is most important anatomical landmark in the mandible region. The position of mental foramen is different for different population. The Mental foramen was most commonly positioned medially in relation to the apex of second premolar. It is very important to know the correct position of the mental foramen for performing surgeries in mandibular region. Therefore, the study conducted to know the exact position of mental foramen in panoramic radiograph.

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