

Research Article



Assessment of Mental Foramen Landmarks in South Indian Population Using CBCT

Karishmaravinthar^{1*}, Dr. Revathy Gounder²

¹ Bachelor of Dental Surgery, ² Senior lecturer, Department of Prosthodontics, Saveetha Dental College and Hospitals, Chennai-77, Tamil Nadu, India.

*Corresponding author's E-mail: karishma.ravinthar@gmail.com

Received: 01-05-2017; Revised: 18-08-2017; Accepted: 22-09-2017.

ABSTRACT

The aim of this study is to assess the mental foramen and its relation to the surrounding structures in south Asian population using CBCT. The objective of this study is to evaluate the location of the Mental foramen and measure the distance to neighboring structures by using cone-beam computed tomography (CBCT). Cone-beam computed tomography (CBCT) was used to determine the location of the mental foramen in 15 patients. The CBCTs were measured using 3D imaging software and NNT viewer software. The horizontal height was evaluated by drawing a line through the long axis of the first or second premolar and the distance was measured from the greater diameter of the mental foramen in the panoramic view of the CBCT. The vertical height is measured in the axial view by drawing a tangent to the base of the mandible and measuring the perpendicular distance from the exit point of the mental foramen to the tangent drawn. In this study it was found that mean value of the horizontal measurements were found to be 2.35mm and 9.3 mm and the vertical measurements were found to be 5.5mm and 10.65mm in the left and right side respectively. The Levenes test for equality gives the statistical significance between means in two unrelated groups, the t value was found to be 0.056 for the vertical measurements indicating the vertical measurements had a significance, whereas the horizontal measurements had a t value of 0.512 hence being insignificant. Hence it is essential to have a thorough knowledge about the location of the mental foramen from various anatomical landmarks by the means of exact measurements in order to have a record to perform the above various procedures in a convenient, safe and efficient manner.

Keywords: mental foramen, landmarks, CBCT, Landmarks.

INTRODUCTION

The mental foramen is located in the anterior surface of the mandible, externally, below the second premolar but the location varies from the canine to the molars. They occur as a pair and are either round or oval¹. The mean vertical diameter on the right and left are 2.3±0.64mm and 2.29±0.6mm and the mean horizontal diameter are 2.63±0.85mm and 2.61±0.85mm². It transmits the mental nerve and vessels, the mental nerve being the terminal branch of the inferior alveolar nerve. Beneath the depressor anguli the mental nerve divides into three branches. Two supply the skin and mucous membrane of the lower lip and the other supplies to the skin of the chin. The location of the mental foramen varies according to the age and other physiological processes. During birth, the mental foramen is close to the alveolar process, during eruption the it is located half way between the alveolar ridge and the base of the mandible and as age progresses the mental foramen is closer to the base of the mandible³. The mental foramen landmarks play an important role in various endodontic and dental surgical procedures. The mental nerve also has to be carefully located in order to administer local anaesthesia when mental nerve block is given during extractions involving the mandibular anterior teeth. Sometimes during extractions involving the resorbed ridge to the mental foramen position near the alveolar crest thus causing the nerve to get exposed. It plays an important role in the placement of osseointegrated implants in

completely edentulous patients in which radiographic estimation of the mental foramen and the mandibular canal is an essential preoperative procedure in order to evaluate the bone quantity and quality¹. The other procedures in which the mental foramen plays an impossible landmark are incisions, flap elevation and osteotomy procedures. Hence it is essential to have a thorough knowledge about the location of the mental foramen from various anatomical landmarks by the means of exact measurements in order to have a record to perform the above various procedures in a convenient, safe and efficient manner.

MATERIALS AND METHODS

Cone-beam computed tomography (CBCT) was used to determine the location of the mental foramen in 15 patients. The CBCTs were measured using 3D imaging software and NNT viewer software. The horizontal height was evaluated by drawing a line through the long axis of the first or second premolar and the distance was measured from the greater diameter of the mental foramen in the panoramic view of the CBCT. The vertical height is measured in the axial view by drawing a tangent to the base of the mandible and measuring the perpendicular distance from the exit point of the mental foramen to the tangent drawn. (Figures -1, 2 and 3).



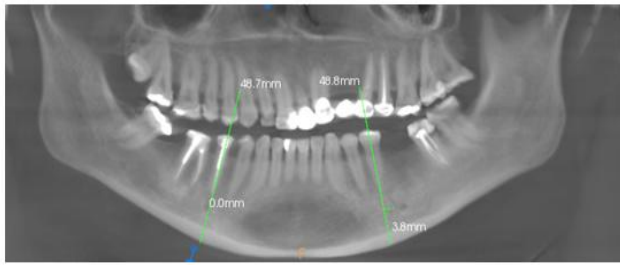


Figure 1: OPG depicting the distance of the mental foramen through the long axis of the tooth

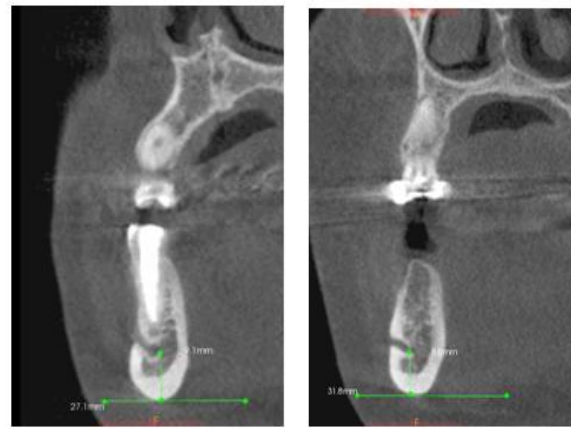
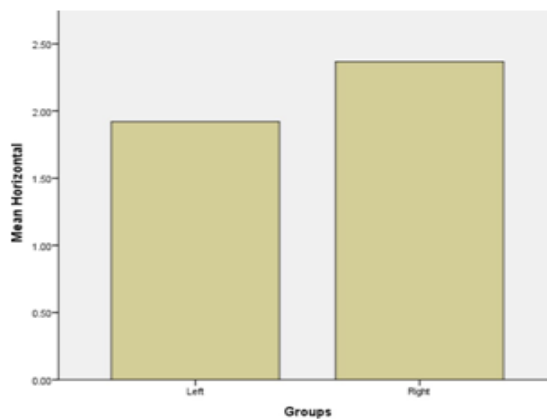
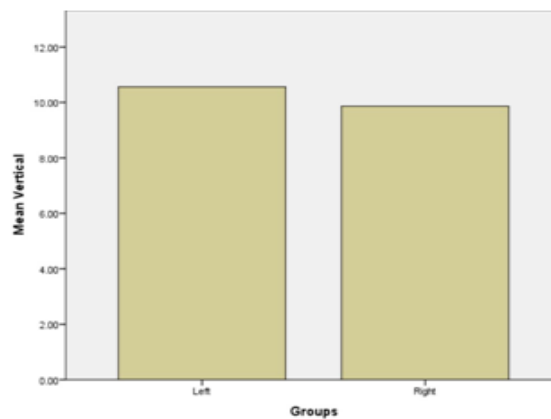


Figure 2 and 3: Cross sectional view of the mental foramen from the base of the mandible.

RESULTS



Graph 1: comparison of the right and left mean horizontal values



Graph 2: comparison of the right and left mean vertical values

Table 1: The mean values of the right and left mental foramen.

Side	Horizontal	Vertical
Left	2.35mm	5.5mm
Right	9.3mm	10.15mm

In this study it was found that mean value of the horizontal measurements were found to be 2.35mm and 9.3 mm and the vertical measurements were found to be 5.5mm and 10.65 mm in the left and right side respectively (Table 1). The Levenes test for equality gives the statistical significance between means in two unrelated groups , the t-value was found to be 0.056 for the vertical measurements indicating the vertical measurements had a significance, whereas the horizontal measurements had a t value of 0.512 hence being insignificant (Graphs -1,2).

DISCUSSION

Cone beam computerised tomography has gained immense popularity owing to its increased image quality

and enhanced precision of measurements taken. The location of the mental foramen plays as an important role during the placement of implants as there needs to be a minimum safe distance between the mental foramen and the implant (2mm) and procedures like the administration of mental nerve blocks during which unexpected damage can occur to the presence of neurovascular bundles. In this study it was found that mean value of the horizontal measurements were found to be 2.35mm and 9.3 mm and the vertical measurements were found to be 5.5mm and 10.65mm in the left and right side respectively. This can be compared to study conducted by by Lan Zhan et.al in which the horizontal measurements were found to be 7.10 mm, 5.14mm and the vertical measurements were found to be 0.72mm and 3.85 mm respectively in contrast

to a study conducted in Sri Lanka wherein the measurements were found to be 3.31mm, 0.61 mm and 0.76mm, 0.25 mm respectively in the left and right side respectively indicating a huge difference in the measurements between the two studies especially in the right horizontal and vertical measurements indicating that this may vary for a large population proving to be of significance^{4,5}. In another study conducted by Gungor et al in which the vertical measurements were 3.29 ± 0.6 mm and 3.12 ± 0.64 mm and horizontal measurements were 3.56 ± 0.68 mm and 3.31 ± 0.99 mm with a p value less than or equal to 0.01⁶.

The Levenes test for equality gives the statistical significance between means in two unrelated groups, the t value was found to be 0.056 for the vertical measurements indicating the vertical measurements had a significance, whereas the horizontal measurements had a t value of 0.512 hence being insignificant in contrast to a study conducted by Mahnaz Shieki et.al which the paired t test revealed no statistical significance between the right and left sides with a p value of 0.488 but statistical significance between gender⁷. There was no difference between the right and left sides in the measurement of mental foramen from the edge of the mandible in a study conducted by Gungor et.al. similar to a study by Caglayan et.al.^{6,8}

CONCLUSION

Hence the vertical position of the mental foramen is significant and varies with a large number of population whereas the horizontal measurements are statistically insignificant for a large population in this study and

stresses the importance of CBCT as an important source for pre-surgical planning and the necessity for a thorough knowledge of the measurements for the same.

REFERENCES

1. Saito K, Analysis of the mental foramen using cone beam computerized tomography, *Rev. odontol. UNESP*, vol.44 no.4, 2015, 226-223.
2. Rai, Mental foramen: a morphological and morphometrical study *International J. of Healthcare and Biomedical Research*, Volume: 2, Issue: 4, July 2014, Pages 144-150.
3. Gerhenson A, Mental Foramen and Mental Nerve: Changes with Age, *Acta Anat(Basel)*, 126(1), 1986, 21-8.
4. Yang L, Location of mental foramen based on soft- and hard-tissue landmarks in a Chinese population. *J Craniofac Surg*. 20(6), 2009 Nov, 2235-7. PMID:19934679.
5. Ilayperuma I, Morphometric analysis of the mental foramen in adult Sri Lankan mandibles. *Int. J. Morphol.*, 27(4), 2009, 1019-1024.
6. E Gungor, Evaluation of mental foramen location in the 10–70 years age range using cone-beam computed tomography, *Nigerian Journal of Clinical Practice*, 27(4), 2017, 88-92.
7. Sheikhi M, Kheir MK. CBCT Assessment of Mental Foramen Position Relative to Anatomical Landmarks. *International Journal of Dentistry*. 2016, 2016, 5821048. doi:10.1155/2016/5821048.
8. Çaglayan F, Morphometric and morphologic evaluation of the mental foramen in relation to age and sex: An anatomic cone beam computed tomography study, *J Craniofac Surg*, 25, 2014, 2227-30.

Source of Support: Nil, Conflict of Interest: None.

