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Location of The Mandibular and Mental Foramen in Panoramic Radiographs

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SUMMARY

Knowing the localization of mandibular and mental foramen is necessary in the maxillofacial surgery, oral procedures and dentistry for mandibular block anesthesia injection. That's why, the study presented; aiming to determine the exact positions of the bone landmarks around the foramens for providing the most comfortable and suitable indicators according to the exact positions of the mandibular and mental foramen was made at the both right and left sides of the mandibula bone with 52 panoramic radiographs.

The distance of mandibular foramen to the front side of the ramus 20,5 mm on the right, 21,173 mm on the left, its distance to the rear side of the ramus is 15.077 mm on the right, 14,788 mm on the left, the narrowest anteroposterior diameter on the right, 34.942 mm and 35.577 mm on the left, and the distance of the lowest point of mandibular notch to the mandibular foramen is 20.731 mm on the right and, 20.942 mm on the left while the distance of the mental foramen to the inferior border of the mandibula was 14.596 mm on the right and, 14.519 mm on the left, its distance to the superior border was 12.692 mm on the right and 12.5 mm on the left. Size of the mental foramen horizontal dimension was found as 5.077 mm on the right, 5.192 mm on the left and its vertical dimension is 3.769 mm on the right and 3.885 mm on the left.

Key words: Mandibular foramen-mental foramen.

ÖZET

PANORAMİK RADİOGRAFLARDA FORAMEN MANDİBULAE VE FORAMEN MENTALE'NİN LOKALİZASYONU

Foramen mandibulanın ve foramen mentalenin lokalizasyonunu bilmek maxillofascial cerrahi ve oral prosedürler ile diş hekimliğinde, mandibular blok anestezi enjeksiyonu için gereklidir. Bu nedenle, sunulan çalışma; foramen mandibula ve mentalenin tam pozisyonuna en rahat ve uygun indikatörleri sağlamak için, foramenlerin etrafındaki kemik landmarkların doğru pozisyonunu belirlemek amacıyla, 52 panoramik grafide mandibula kemiğinin hem sağ, hemde sol tarafında yapılmıştır.

Foramen mandibulanın; ramusun ön kenarına uzaklığı sağda 20.5 mm, solda 21.173 mm, ramusun arka kenarına uzaklığı sağda 15.077 mm, solda 14.788 mm olarak, ramusun en dar antero posterior çapı sağda, 34.942 mm, solda 35.577 mm ve mandibular çentiğin en düşük noktasının foremen mandibulaya uzaklığı ise sağda 20.731 mm, solda 20.942 mm bulunmuştur. Foramen mentalenin; mandibula alt kenarına uzaklığı sağda 14.596 mm, solda 14.519 mm iken üst kenarına uzaklığı ise sağda 12.692 mm, solda 12,5 mm idi. Foramen mentalenin horizontal çapı sağda 5.077 mm, solda 5.192 mm ve vertical çapı ise sağda 3.769 mm, solda 3.885 mm olarak bulunmuştur.

Anahtar Kelimeler: Foramen mandibula, foramen mentale.

INTRODUCTION

Mandibular foramen is at the medial surface of the mandibula bone and inferior alveolar nerve and vessels pass through it. The foramen leads into the mandibular canal, which opens on the lateral surface of the body of the mandible at the mental foramen (9). The mental foramen, that can be seen under the first or second premolar tooths through the first, second premolar tooths passes the inferior alveolar vessels by the and branches of the inferior alveolar nerve (9,10). To know the localizations of both the mental foramen and mandibular foramen are necessary at the maxillofacial surgery, oral procedures and dentistry, for the mandibular block anesthesia injections (4,11).

TABLE I. ANATOMİC LANDMARKS AND VARİOUS MEASUREMENTS CALCULATED ON PANAROMİC RADİOGRAPHS

A. The distance of the deepest front side of the ramus to the mandibular foramen (Fig. 1)
B. The distance of rear side of the ramus to the mandibular foramen (Fig. 1)
C. The narrowest anteroposterior diameter of the ramus (Fig. 1)
D. The shortest distance from the mandibular foramen to the lowest point of the mandibular notch (Fig. 1)
E. The distance of the mental foramen to the inferior border of mandibula (Fig. 1)
F. The distance of mental foramen to the superior border mandibula (Fig. 1)
G. Size of the mental foramen (a. horizontal dimension, b. vertical dimension) (Fig. 1)

TABLE II. MEASUREMENTS OF THE POSİTİON OF THE MANDİBULAR AND MENTAL FORAMEN

	Side	Mean	S.D.
A. The distance of the deepest front side of the ramus to the mandibular foramen	R	20.5	2.852
	L	21.173	2.969
B. The distance of rear side of the ramus to the mandibular foramen	R	15.077	2.633
	L	14.788	2.154
C. The norrowest anteroposterior diameter of the ramus	R	34.942	4.461
	L	35.577	3.947
D. The shortest distance from the mandibular foramen to the lowest point of the mandibular notch	R	20.731	3.291
	L	20.942	3.718
E. The distance of the mental foramen to the inferior border of mandibula	R	14.596	4.599
	L	14.519	4.386
F. The distance of mental foramen to the superior border mandibula	R	12.692	5.02
	L	12.5	5.035
G. Size of the mental foramen			
a. Horizontal dimension	R	5.077	0.967
	L	5.192	1.358
b. Vertical dimension	R	3.769	0.831
	L	3.885	1.149

R= right; L= left; measurements in mm.

Recently, development of the mandibular implant technique and the increasing frequency of the orthognathic surgery have increased the possibility of surgical procedures near the mental foramina (11). For these reasons, accurate identification of the localization of the foramens is very important for both diagnostic and cilinical procedures (8). Although inferior alveolar nerve anesthesia is administered routinely in the dental practice, it is not universally successful. The most common reasons of this failure is; improper placement of the hypodermic needle of anesthesic procedures because of improper evaluation of anatomic landmarks (3). Frequently, the mental foramen is difficult to locate. There are no absolute anatomical landmarks for reference and the foramen can not be cilinically visualized or palpated (8).

That's why, in the study presented, for providing the most comfortable and suitable indicators according to the exact position of mandibular and mental foramen study was arranged to locate the exact positions of the bone landmarks around the foramens.

MATERIALS AND METHODS

The measurements were taken both on the right and left sides of the mandibular bone with 52 panoramic radiographs (Table I, Figure I). Radiographs were taken from the patients over their 50 years old, who will require complete denture prosthesis at the Dental Unit of Numune Hospital Adana. Panoramic radiographs were obtained by a standard method at 65 KV, 10 MA and in 15 seconds. Measurements were taken by the use of a compass.

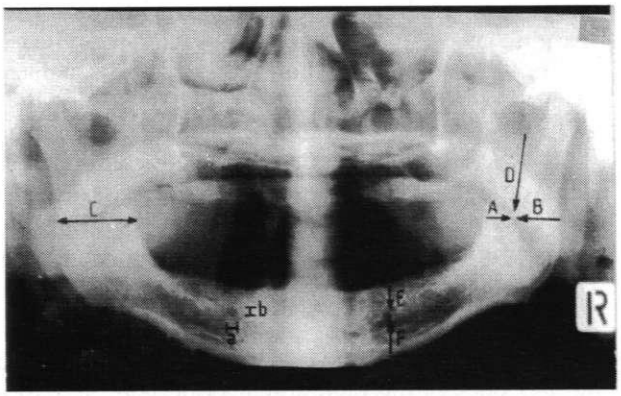
RESULTS

The result of measurements belong to mandibular and mental foramen determined on 52 panaromic radiographs, are shown on Table II. According to this the distance of the mandibular foramen to the deepest front point of the ramus is 20,5 ± 2.852 mm on the right side, 21.173 ± 2.969 on the left side, and the distance to the rear side of the ramus is 15.077 ± 2.633 on the right, 14.788 ± 2.154 mm on the left. The narrowest anteroposterior diameter of the ramus was 34.942 ± 4.461 mm on the right, 35.577 ± 3.947 mm on the left, and it was passing through mandibular foramen. The shortest distance from the mandibular foramen to the lowest point of the mandibular notch was found 20.731 ± 3.291 mm on the right, 20.942 ± 3.718 mm on the left.

In the measurement about the mental foramen, the distance of the mental foramen to the inferior border of the mandibular foramen was 14.596 ± 4.599 mm on the right, 14.519 ± 4.386 mm on the left and its distance to the superior border of the mandibula was 12.692 ± 5.02 mm on the right, 12.5 ± 5.033 mm on the left. In addition, horizontal dimension of the size of the mental foramen was measured as 5.077 ± 0.967 mm on the right, 5.192 ± 1.358 mm on the left and its vertical dimension, 3.769 ± 0.831 mm on the right, 3.885 ± 1.149 mm on the left.

DISCUSSION

Its clinically important for mandibular block anesthesia injection, to know the localization of the mandibular and mental foramen (4,11). Numeric da-



Figüre 1. Location of the mandibular and mental foramen in panoramic radiographs.

ta regarding the location of the mandibular foramen are essential for planning the site of surgical splitting or fracturing of the ramus, especially in the restoration of functional or esthetic dentofacial deformities in such cases, determining the precise location of the mandibular foramen is important. In as much as failure to do so may lead to hemorrhage and permanent neurologic damage caused by transsection of the inferior alveolar neurovascular bundle (4,7). A. number of authors describe the position of the foramen as halfway between the anterior and posterior borders of the ramus (1,2,3,7). In Gray's Anatomy the only location of the foramen given is "a little above the centre of the ramus" (10). Furthermore, some authoritativa texts do not attempt to localize the position of the foramen at all (6).

In our study mandibular foramen was found from the anterior side of ramus avarage 20.5 mm on the right, 21.173 mm on the left, from the posterior side 15,077 mm on the right, 14.788 mm on the left (Table II). Augier states that the mandibular foramen is about 2 cm from the anterior border of the ramus (7). Our findings about the distance of the lowest point of mandibula notch to mandibular foramen suited the literature informations (4,5).

Anatomically, the mental foramen is opening of the short mental canal a branch of the mandibular canal (11). It is difficult to compare the studies about this foramen with the past anatomical studies. A clear definition of the edges of mental foramen is very few. At the same time, the position of this foramen, is not related with a specific structure. In this study, the distance of mental foramen, to the superior border of the mandibular foramen was found as 12.692 mm on the right, 12,5 mm on the left, and the distance of it to the inferior border 14.596 mm on the right, 14.519 mm on the left on an avarage (Table II).

While, Montagu stated that vertical position of the mental foramen to be midway between the alveolar process and the base of the mandible, Matsuda, as a result of his measurements found the distance of foramen to the superior border of mandibula 10.5 to 18.0 mm, and the distance of it to the inferior border of mandibula, 11.5 to 16.0 mm (8). Our results suited the results of Matsuda. The avarage dimension of mental foramen is found as horizontally 5.077 mm on the right, 5.192 mm on the left, vertically 3.769 mm on the right, 3.888 mm on the left. (Table II). Philips and his friend measured this dimension on an avarage horizontally 4.6 mm, vertically 3.4 mm (8). Those findings, show similarity with ours.

As a result, we defend the wiev that the datas collected in this study may be useful for maxillofacial surgery, oral procedures and mandibular and mental block anesthesia injections in dentistry.

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