



Anatomical Peculiarities of Mandibular Foramen

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Abstract: A Craniometric study of the mandibular foramen was conducted on 178 mandibles of adults. According to the results of all measurements, the transverse size of mandibular foramen on the right side ranges from 1.5 to 5.5 mm and averages 3.36 mm, and on the left side, it varies from 1.00 to 5.00 mm, with an average value of 1.87 ± 0.34 mm. The smallest distance from the center of the mandibular foramen to the anterior edge of the ascending branch of the mandible is from 13.00 to 23.5 mm on the right side, and from 13.50 to 22.50 mm on the left side. The average values of this parameter for the right side are 17.118 ± 2.39 mm, and for the left, respectively, 17.31 ± 2.50 mm, as confirmed by computed tomography data. According to craniometric measurements, the mandibular foramen most often has an oval or round shape. Respectively the inferior alveolar neurovascular bundle forming in the region of the mandibular foramen has an oval or rounded shape.

Keywords: Mandibular Foramen, Craniometric Measurements, Inferior Alveolar Nerve

1. INTRODUCTION.

The neurovascular structures of the mandibular canal play a huge role in the nutrition and innervation of this single movable bone of the skull [1-3]. The mandible is unique in both anatomic and functional aspects: by participating in the formation of the temporomandibular joint, the mandible becomes indispensable for chewing and speech articulation [4, 5]. The soft tissues that form the lower third of the face are based on a solid bone foundation of the mandible, so the mandible also has important cosmetic value. The anatomical uniqueness of the mandible is that this bone (as well as the maxilla) is the site of development, eruption, and location of the teeth, in other words, of the individual 16 organs that need nervous and vascular supply. In this regard, it is possible to understand that inexhaustible interest on the part of the morphologists and clinicians to the mandibular canal containing the neurovascular bundle, which supplies the teeth and the soft tissues surrounding them [6, 7]. An important attribute of this canal is the mandibular foramen, in other words, the inlet of this canal, the size and, localization of this opening, its shape and relation to other anatomical structures in close proximity [8, 9]. Even in recent years, the mandibular foramen and the inferior alveolar nerve are considered as a single complex [10]. Available and constantly updated data play a

significant practical role in dentistry because traditionally one of the most difficult manipulations (especially for young specialists, although problems with more experienced doctors can often be observed) is inferior alveolar nerve block (IANB) [11, 12]. The value of anatomical knowledge of the mandibular foramen when performing various kinds of surgical manipulation of the mandible, it is difficult to overestimate.

Based on the above statements, we set the goal of a detailed study of the mandibular foramen, both on craniometric material and on materials that were obtained by computed tomography.

2. MATERIAL AND METHODS.

We conducted a craniometric study of the mandibular foramen on 178 mandibles of adults. At the same time, its shape, size and, attitude to various bone landmarks were studied. Digital research data were statistically processed in accordance with the general rules for medical and biological research. To estimate the difference between variational series, the parametric Student's t-test was used.

3. THE RESULTS AND DISCUSSION.

The shape of the mandibular foramen can be circular, oval and intermediate configuration and is closely interconnected with the vessels and nerves passing here. According to the results of all measurements, the transverse size of mandibular foramen on the right side ranges from 1.5 to 5.5 mm and averages 3.36 mm, and on the left side, it varies from 1.00 to 5.00 mm, with an average value of 1.87 ± 0.34 mm. The smallest distance from the center of the mandibular foramen to the anterior edge of the ascending branch of the mandible is from 13.00 to 23.5 mm on the right side, and from 13.50 to 22.50 mm on the left side. The average values of this parameter for the right side are 17.118 ± 2.39 mm, and for the left, respectively, 17.31 ± 2.50 mm, as confirmed by computed tomography data (figure 1).

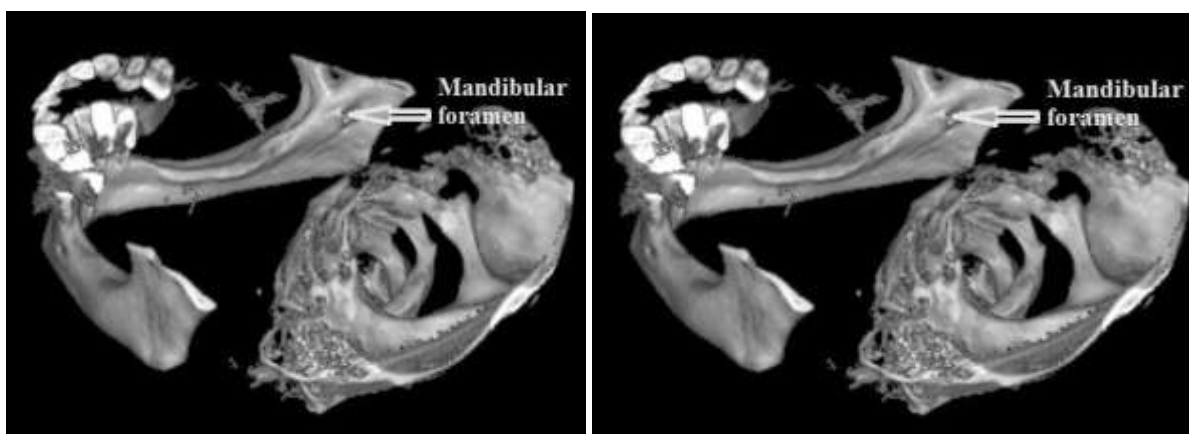


Figure 1. Mandibular foramen. 44 aged woman. CT reconstruction.

Somewhat closer, the mandibular foramen is located to the posterior edge of the ascending branch: on the right side, this distance varies from 7.5 to 20.0 mm, and on the left, from 7.5 to 18.5 mm. By the sum of all measurements, the average values are respectively 13.94 ± 2.46 mm and 13.86 ± 2.34 mm. More significantly, the center of the mandibular foramen is far from the mandibular notch: on the right - from 8.0 to 30.5 mm, and on the left - from 8.5 to 33.0 mm. The average value of this parameter for the right side is 22.925 ± 4.15 mm, and for the left - 22.59 ± 4.09 mm.

Thus, the extreme forms of the variability of the considered distance are more impressed on the left side, but their average values are almost the same. Approximately in the same range, the smallest distance of the center of the mandibular foramen from the top of the angle of mandible fluctuates. On the right side of the mandible, this size ranges from 8.00 to 31.00 mm, averaging 23.48 ± 4.48 mm. On the left side, it ranges from 8.5 to 30.0 mm, with an average value of 23.35 ± 4.57 mm. The results show that the displacement of the mandibular foramen occurs mainly in two directions – forward-backward and upper-lower. The definition for these shifts is the size of the ascending branch of the mandible and the shape of the structure of the latter. With the prevalence of long sizes of the mandible with its narrow and long shape, the mandibular foramen shifts in the upper-lower direction. With a wide and short form, the distance from the foramen to the anterior and posterior edges of the mandibular branch varies more.

The obtained craniometric data on the mandibular foramen, which is the entering site of the inferior alveolar nerve into the mandibular canal, directly expand our understanding of the topographical relationship of this nerve with practically important bone landmarks (figure 2).

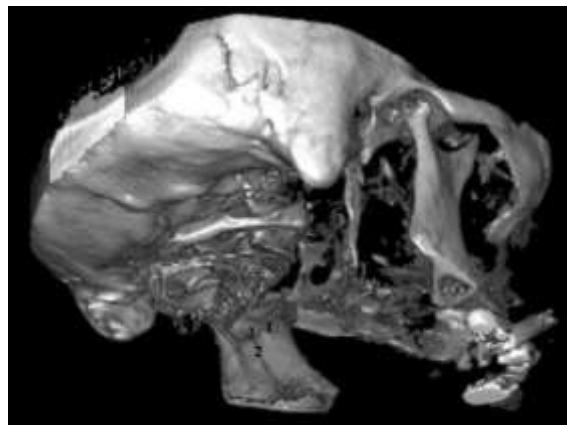


Figure 2. Mandibular foramen and surrounding anatomical landmarks. 54 aged woman. CT reconstruction.

1. Mandibular lingula.
2. Mylohyoid groove.
3. Mandibular foramen.

According to craniometric measurements, the mandibular foramen most often has an oval or round shape. Respectively the inferior alveolar neurovascular bundle forming in the region



of the mandibular foramen has an oval or rounded shape. The data obtained by us in the course of craniometric and computed tomographic studies, in our opinion, are of quite important clinical significance. As we indicated at the beginning, in recent years, interest in the anatomical features and topography of the mandibular foramen has increased. It is indicated [13] that the mandibular foramen, located at the level of the occlusal surface in the early years of a person's life, moves up over the years. A very promising is a study using endoscopy, which makes it possible to clearly visualize small accessory openings on the medial surface of the mandible branch, to reveal the topography of the mandibular lingula [14]. The topography of the mandibular lingula is also discussed in earlier studies [15]. The mandibular lingula was also examined by us both using craniometric material and the method of computed tomography (Figure 2). In our opinion, the parameters of the mandibular foramen we studied, such as the distance between the foramen and the anterior and posterior edges of the mandibular branch, localization of the foramen, depending on the height of the branch, are of more practical importance. The obtained data are consistent with the literature data [8, 11], which assert that both the localization of the foramen and the accompanying anatomical landmarks are highly individual and subject to variations; therefore, it is better to adhere to more clinically important parameters.

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