



Case Report

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An Anatomical Variation in the Position of the Mental Foramen: A Case Report

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Running Title A Rare Mental Foramen Position

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ABSTRACT

Evaluating the anatomic variations and location of the mental foramen is essential for preventing damages to the branches of the mental nerve during dental implants placement and other surgical procedures. The mental foramen commonly lies at the apices of the mandibular premolars. This foramen may lie in the canine anterior segment or the posterior first molar area in only 1%-2% of cases. This report presents a case with a rare mental foramen position identified in Cone Beam Computed Tomography (CBCT).

Introduction

As a strategic anatomical aperture bilaterally lying on the mandible outer surface, the mental foramen transmits blood vessels and the inferior alveolar nerve to innervate the skin and mucosa of the lower lip mandibular labial gingiva, and the chin skin as far posterior as premolars [1].

Accurately locating the mental foramen before administering topical anesthetics and performing surgeries is crucial for preventing damage to the neurovascular bundle, which can cause neurosensory disorders or hemorrhage [2]. Given the typical dental applications of implants and flapless implant placement, radiographically locating and anatomically characterizing the mental foramen is crucial before operating [3].

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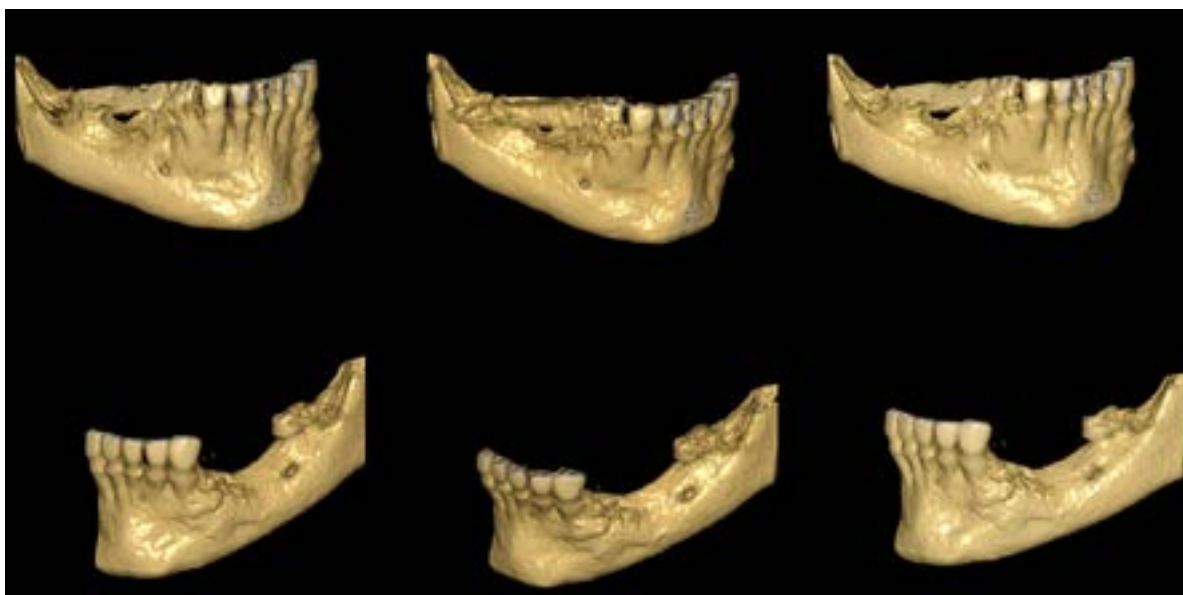


Figure 1. 3D cropped volume rendering projection



The mental foramen bilaterally observed in the buccal cortex of the mandible; the posterior position of the mental foramen on the left in line with the extracted first molar (bottom row).

Below the apices of mandibular premolars is the normal position of the mental foramen; however, race, tooth loss, gender, alveolar bone resorption, and age affect this position. It is atypical to find the mental foramen in the canine anterior segment or the posterior to the first molar region [4]. The present case report involves a patient with an anatomical variation in the mental foramen position detected in Cone Beam Computed Tomography (CBCT).

Case Presentation

As part of implant planning, a 60-year-old female underwent CBCT based on the standard exposure and positioning protocol, i.e., 5 mA, 3.6 s, and 90 kV, using a New Tom VGI CBCT scanner (Quantitative radiology, Verona, Italy) with an 8×8 cm field of view. A 0.3-mm voxel size was applied to the data reconstruction. The posterior position of the mental foramen was observed on the left side of the mandible in the Three-Dimensional (3D) and cross-sectional reconstructed images of CBCT. The 3D cropped reconstruction is presented in Figure 1. The mental foramen was oval on the

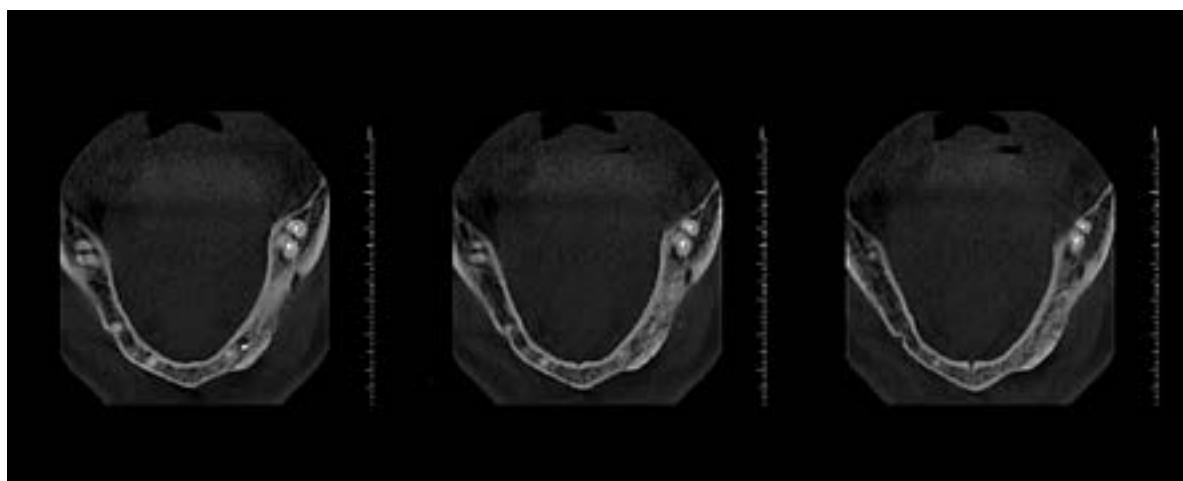


Figure 2. Serial axial sections showing the more posterior position of the mental foramen on the left mandible compared to on the right side

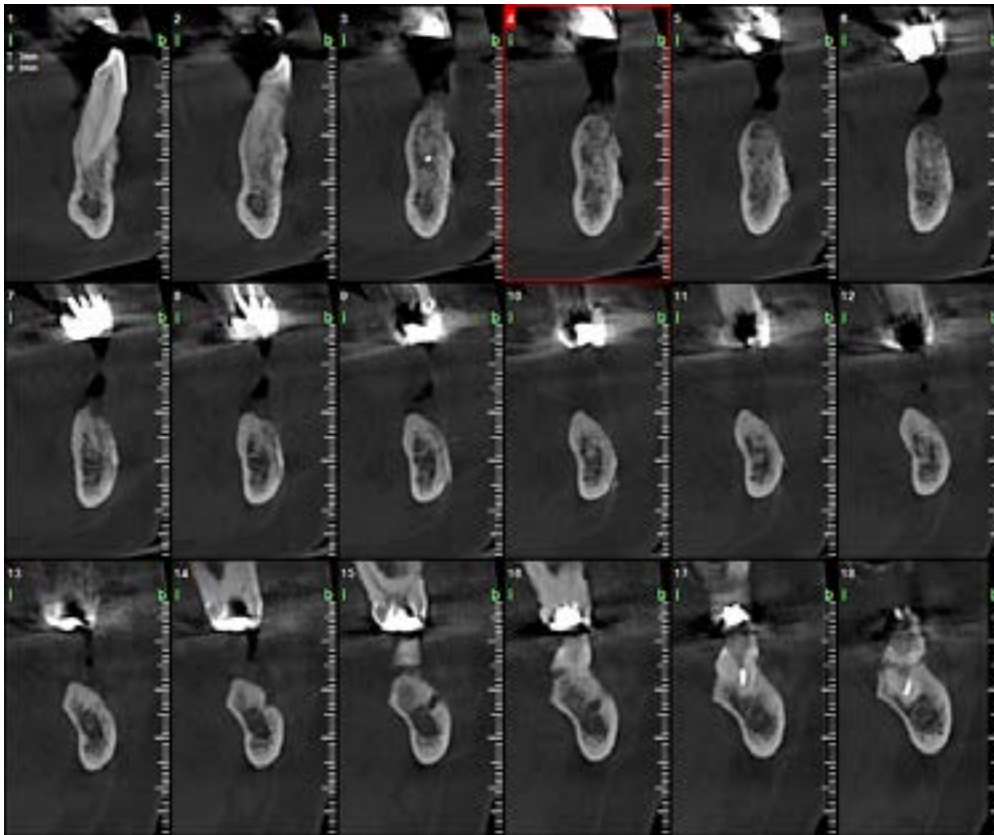


Figure 3. Serial multiplanar sections associated with edentulous ridges 34-37 showing the mental foramen in line with the first molar

left side in region 36. The round foramen observed in region 45 is the mental foramen's common position. **Figure 2** shows serial axial sections with 2-mm slice thickness illustrating the locations of foramina on both sides. Moreover, the bone graft observed on the buccal cortex of the left

premolars was utilized for ridge augmentation in implant placement. **Figure 3** illustrates serial multiplanar sections with a 2-mm slice thickness associated with regions 34-37. An opaque foreign body detected in region 34 suggested root canal overfilling after dental extraction.

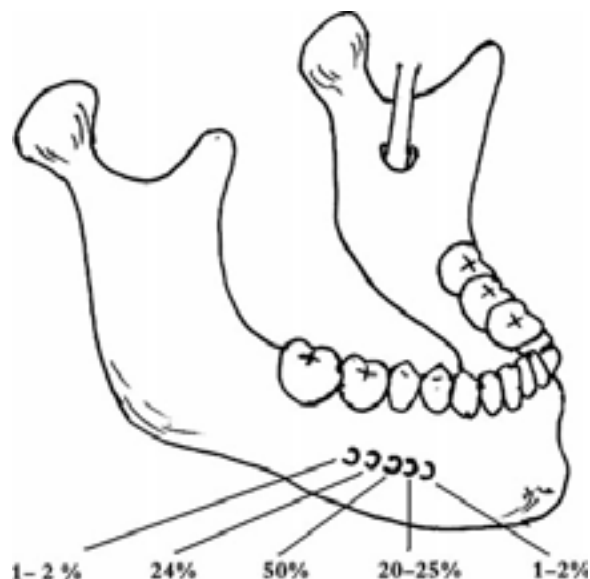


Figure 4. A schematic diagram of position variations in the mental foramen [8]



Discussion

Precise knowledge of the mental foramen as a vital anatomic structure is essential before surgical procedures. The position of the mental foramen can vary among individuals. The mental foramen usually lies more coronal than the mandibular canal in the vertical plane. This foramen is identified at an equal distance from either the inferior border of the mandible or the bone crest. However, it might be affected by the amount of crestal bone loss. The mental foramen lies closer to the alveolar crest after dental extraction and alveolar bone resorption. It horizontally lies either between the apices of the first and second premolars or below the second premolar apex, and its location varies in vertical and horizontal planes. The race is insignificantly related to the position of the mental foramen [1]. Research on different human races has found the mental foramen rarely positioned in line with the mandibular first molar [5]. According to Figure 4, this abnormal position has been reported in a mere 1%-2% of cases [4]. Assessing 400 panoramic images [6] and 180 CBCT images found the mental foramen never in line with the mandibular first molar in the Iranian population [7].

The present case report involves a patient with a mental foramen posteriorly and almost aligned with the first molar detected in CBCT. This abnormal position of the mental foramen simplified implant placement in the premolar region. However, the implant placement of the first molar was more challenging in this case. The proximity of the mental foramen to the alveolar crest in the molar region shown in CBCT required the creation of adequate space for implant placement by transposing the nerve. Negligence can cause damage to the neurovascular bundle during surgeries. CBCT can help ensure the safety of implant surgeries. The anatomical variations of the mental foramen present the significance of a preoperative radiographic examination. Inexperienced clinicians may misdiagnose the abnormal position of the mental foramen as a radiolucent lesion on X-ray images. Compared to panoramic radiography, CBCT imaging allowed for mental foramen more accurately.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article. The participants were informed of the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information. They were free to leave the study whenever they wished, and if

desired, the research results would be available to them. Written consent has been obtained from the subjects. Principles of the Helsinki Convention were also observed.

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Conflict of interest

The authors declared no conflict of interest.

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