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Case Report

A rare case of an anatomical variant of nonexistent mental foramen [☆]

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ABSTRACT

The mental foramen (MF) is an important anatomical landmark in the jaw, where the sensory nerve (mental nerve) and blood vessels emerge. To avoid sensory impairment or paresthesia caused by mental nerve damage, the MF must be accurately identified and localized. The literature describes a variety of anatomical variants of the MF, such as changes in its position, emergence profile or the presence of extra foramina. This case report documents a rare case of nonexistent mental foramina on the left side of the jaw, which was detected incidentally using cone-beam computed tomography (CBCT) prior to implant surgery planning.

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Introduction

The neurovascular bundles (NVB) within the inferior mandibular canal become apparent as they emerge from the mental foramina (MF), which mark the terminal apertures of the mental canals as they exit the buccal aspects of the mandible [1]. The NVB nourishes the facial gingiva anterior to the foramen, the lower lip and the skin of the chin area [1–3].

The emerging profile of the mental canal may take several trajectories, including superior, posterosuperior, labial, anterior, and posterior [4,5]. The mental foramen's location in the horizontal and vertical planes, as well as its size and shape, might vary based on race and gender [5,6].

Accurate identification of the mental foramen on a radiograph is an essential step prior to multiple dental procedures in the vicinity of the structure. On conventional radiographs (eg, panoramic radiographs), the MF present as regular or irregular rounded/oval radiolucency on both sides of the mandible [7,8]. CBCT (particularly the coronal and axial planes) showed superior capabilities in the thorough examination of the mental canal and its foramen's architecture, position, and emergence profile [5,7,9].

The absence of a mental foramen structure is a unique finding that was scantily reported in the literature [3,8]. This case report documents a case of a unilateral absence of the mental foramen for a Palestinian patient without any neurosensory disturbance.

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Fig. 1 – Panoramic radiograph. Accurate identification of the mental foramen is not possible, particularly on the left side.

Case presentation

A 32-year-old female patient presented at Qirresh Radiology Center (West Bank, Palestine), referred by her primary care dentist for a CBCT scan as part of dental implant planning at tooth sites #17 and #36. Her initial complaint was the need for implant-supported restorations in the lower left and lower right posterior mandibular regions. Prior to her CBCT scan, a panoramic radiograph was obtained (Fig. 1) to evaluate the initial condition of the jaw and surrounding structures.

During the CBCT scan acquisition, conducted on the Carestream® 8100 3D (Carestream Health, Rochester, NY, USA) with a medium field-of-view protocol (Figs. 2 and 3), the maxillofacial radiologist observed an unusual finding: the apparent absence of the mental foramen on the left side of the mandible. To confirm this anatomical variation, a second maxillofacial radiologist independently reviewed the CBCT data in axial, coronal, and sagittal planes, corroborating the initial assessment.

The patient's dentist was contacted to gather more information on her dental and neurosensory status. Additionally, the patient's medical, surgical, and family histories were thoroughly reviewed, revealing no history of systemic diseases, surgical interventions, or previously known genetic predispositions that could affect maxillofacial development or sensation. Her medical records indicated she was in good health.

The dentist performed a thorough clinical examination of the patient, including palpation of the chin and lower lip area, as well as vitality tests and percussion of the left-side anterior teeth and premolars. The examination revealed no neurosensory disturbances, with normal sensation noted in the lip, gingiva, and mental region. Additionally, her dental history was unremarkable, with no previous trauma, surgeries, or infections in the mandibular region.

Following a collaborative discussion between the dental implantologist and the maxillofacial radiologist, the case was carefully documented, with the absence of the mental foramen noted as an anatomical variation. Although implant placement was meticulously planned to accommodate this

finding and avoid potential complications, the patient ultimately chose not to proceed with the implant surgery. During follow-up, she remained asymptomatic, with no signs of neurosensory impairment or other complications in the affected regions.

Discussion

It is crucial to predetermine the structure of the mental foramen before engaging in dental surgical interventions, as this ensures the preservation of the neural and vascular support to the associated anatomical regions [5,7,10]. Traditional 2-dimensional radiographic methods may not always offer reliable identification of the mental foramen, necessitating the adoption of more advanced techniques [7,11,12]. This becomes especially pertinent when attempting to discern potential variations in the anatomy, including differences in structure, number, position, and emergence patterns [5,7].

Mental foramen can be located in several mandibular periapical/interradicular locations in relation to the teeth ie, first premolar, second premolar, between first and second premolars, and between second premolar and first molar [5]. In Palestine, 2 reports indicated a position periapical to second premolar [5] and between first and second premolars [13]. Other international reports indicated the majority of sites were periapical to second premolars [4,14] and between first and second premolars [15–17]. The height and width of mental foramen ranged from 3 mm–4.08 mm and 1.64 mm–4.11 mm, respectively in different studies [5,17,18]. The dimensions of the foramen were noted to be associated with the gender and jaw side [5,19].

The extremely rare finding of the absence of mental foramen was scarcely reported in the literature. Some reports presenting such a finding are found in Table 1. Some cases reported were with unilateral [3,8,20,21] and bilateral [12,22–24] absence of MF. The vast majority of found reports indicated normal neurosensory functions.

The accurate identification of mental foramen on conventional dental radiographs eg, periapical and panoramic radio-

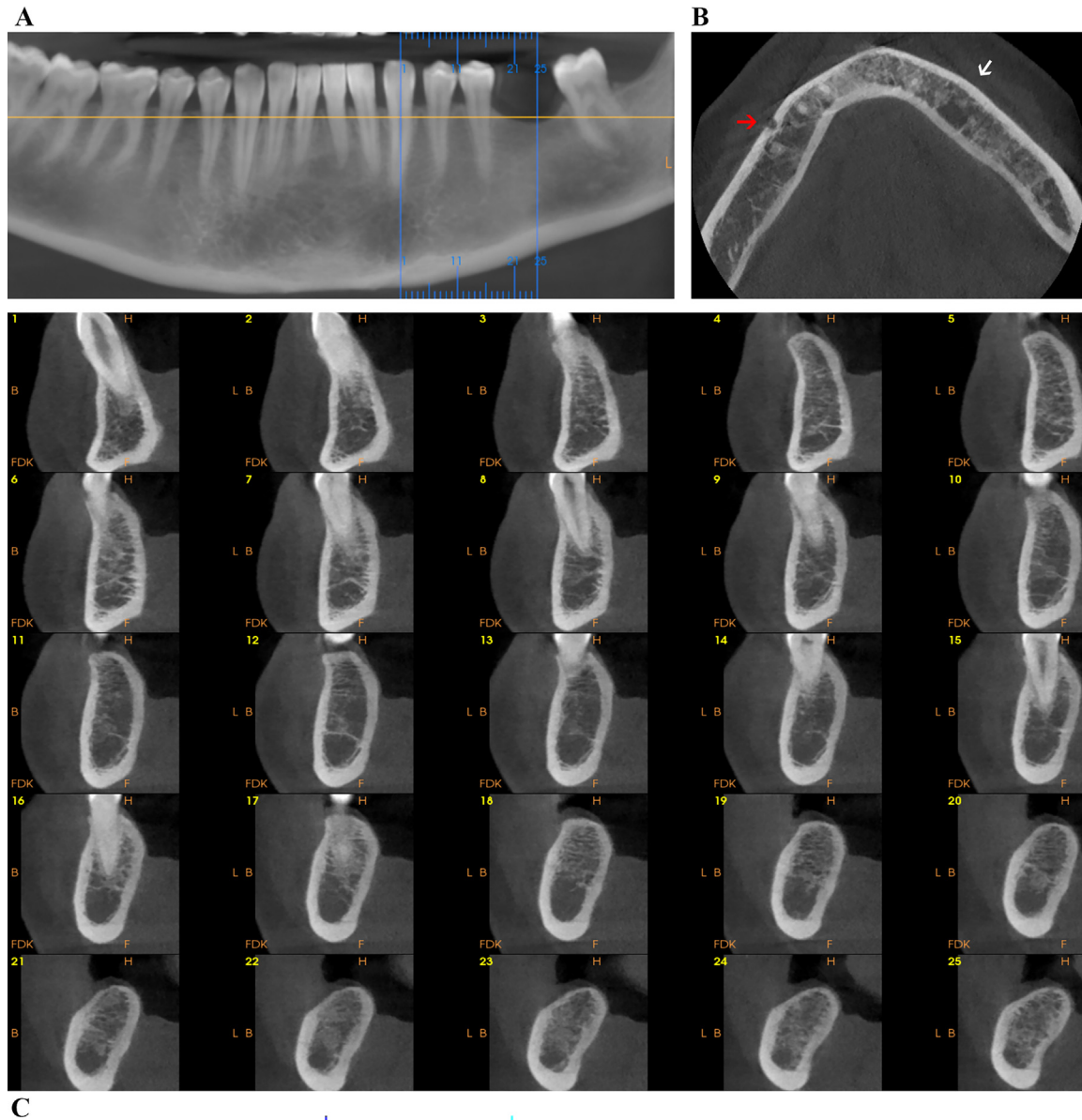


Fig. 2 – (A) Reformatted panoramic view. (B) CBCT axial view demonstrating the absence of the left-side mental foramen (white arrow) in contrast to its presence on the right side (red arrow). (C) Cross-sectional series of the left mandibular body showing no visible exit of the mental bundle along the buccal wall.

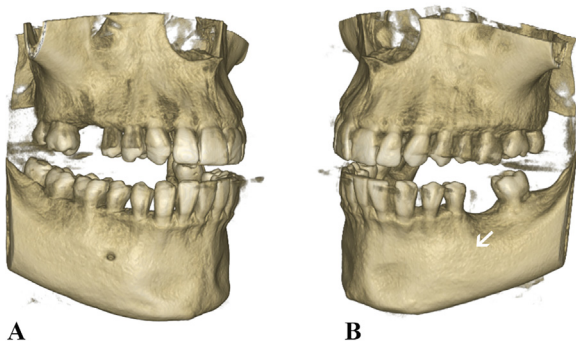


Fig. 3 – Two 3D model reconstructions show the absence of left-side mental foramen (white arrow).

graphs sometimes is challenging due to distortions, superimposition of teeth and thick bony structures, and the inability to characterize the surrounding trabecular bone patterns [20,23]. The actual absence of the mental foramen structure is usually confirmed using 3-dimensional imaging modalities or studying dry mandibles [23]. In our case, the mental foramen was not apparent on the panoramic radiograph (Fig. 1) but the true nonexistence of the mental foramen structure was confirmed on the CBCT scan (Figs. 2 and 3).

Due to the rarity of this case, the aetiology of the foraminal agenesis is still ambiguous. Some researchers postulated to be congenital and genetic factors [23,24]. In Brazil, a unilateral absence of a mental foramen for a young female and a unilateral MF hypoplasia of her mother were reported [24].

Table 1 – Summary of the published reports on absence of mental foramen/a.

#	Author	country	# cases	Sensory disturbance	Uni/bilateral	Technique
1	Ulu et al. [8]	Turkey	1	No	Unilateral	Panorama, CBCT, Surgical exposure
2	Da Silva Ramos Fernandes et al. [24]	Brazil	1	no	Bilateral (with one being only hypoplastic)	Panorama, CBCT
3	Singh et al. [20]	India	1	no	Unilateral	CBCT
4	Yovchev et al. [3]	Bulgaria	2	Case 1: no Case 2: yes (after implant placement)	Unilateral	CBCT
5	Lauhr et al. [12]	France	1	No	Bilateral	CBCT
6	Freitas et al. [21]	Brazil	3	N/A	Unilateral	Dry skulls
7	Matsumoto et al. [22]	JAPAN	1	No	Bilateral	Panorama, CBCT
8	Hasan et al. [23]	Saudi Arabia	1	N/A	Bilateral	Dry mandible
9	Hasan et al. [25]	Saudi Arabia	1	N/A	bilateral	dry skull
10	OLIVEIRA-SANTOS et al. [11]	Brazil	2	N/A	Unilateral	Panorama, CBCT
11	Yovchev et al. [26]	Bulgaria	1	N/A	Unilateral	CBCT

Note: N/A indicates that the information is either not applicable, not mentioned, or could not be retrieved by the authors.

In our case, the patient has no neurosensory complaints related to the apparent absence of the left mental foramen. It is assumed by several authors that the neurovascular bundles could be very thin, and/or running through alternative pathways through minute foramina that are challenging to be detected [22,24], or substituted by the superficial cervical plexus innervation [12]. While these hypothetical assumptions are yet not confirmed, and the absence of other implicating factors in our case, we were not able to identify the underlying cause in our patient.

Conclusion

Accurate identification of the mental foramen structure is vital prior to several dental treatments adjacent to their boundaries. Three-dimensional imaging is better than conventional radiographic techniques to analyze the structure and other possible variations of the mental foramen. The agenesis of the mental foramen is a rare entity that needs further investigations to know the underlying causes.

Patient consent

Informed consent for participation in the study and for the publication of the results was obtained from the patient. No patient personal identification information will be disclosed.

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