



Case report

RARE ANATOMIC VARIATIONS: AGENESIS OF LEFT MENTAL FORAMEN COEXISTING WITH TWO RIGHT MENTAL FORAMINA

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ABSTRACT:

Knowledge about the proximity of important anatomical structures is crucial for all surgical interventions, including those in the lower jaw region.

One of these important structures is the mental foramen, which transmits the mental nerve, whose branches provide sensory innervation to the chin, lower lip, and gingiva.

The mental foramen variations can influence the effectiveness of the mental nerve anesthesia and can also be related to complications during surgical procedures such as implant placement, apicoectomy, vestibuloplasty, etc.

We present a very rare case of agenesis of left mental foramen coexisting with two right mental foramina incidentally found in a patient examined by cone-beam computed tomography.

Keywords: Mental foramen, Accessory mental foramen, Agenesis, Cone-beam computed tomography, Mandible, Surgery,

BACKGROUND

The information about the proximity of important anatomical structures is crucial for all surgical interventions, including those in the region of the lower jaw, in order to avoid possible complications.

The mental foramen (MF) is one of these structures as it transmits the mental nerve, which divides into several branches, providing the innervation of the skin of the mental region, the angle of the mouth, lower lip, oral mucosa, and gingiva up to the second premolar [1].

MF is a vital structure for local anesthesia, implantology, forensic odontology, periapical and orthognathic surgery.

In general, MF is a bilateral oval or round opening located on the vestibular aspect of the mandible, in the region of the premolars, but the foramen can vary in number, shape, size, and position to the mandibular anatomical landmarks [2-6].

Although the foramen is typically a single opening on each side of the jaw, an accessory mental foramen can also be found.

The accessory mental foramen (AMF), also named satellite MF, can vary from 1 to 3 per side [2, 7].

Regarding the number of AMF, the most frequent type of variation is the presence of double mental foramen, which has a reported incidence ranging from 1.4 to 12.5% [2, 8].

The incidence of three mental foramina on one side ranges from 0.3 to 1.2% [2, 8].

Quadruple MF on one side of the mandible is an extremely rare finding [7, 8].

MF and AMF may not always be visible on the radiographs because of superimpositions of anatomic landmarks, trabecular pattern, and distortion of the radiographic image due to positional errors [4].

Using cone-beam computed tomography (CBCT), the position of the MF and its variations can be assessed correctly [1, 4, 9].

Concerning MF variations, there are also a few reported cases of absence of MF, and at the best of our

knowledge, no reported cases of agenesis coexisting with AMF in the same individual [1, 4, 9-17].

CASE DESCRIPTION

We present a case of a 72-year-old Caucasian patient examined by CBCT.

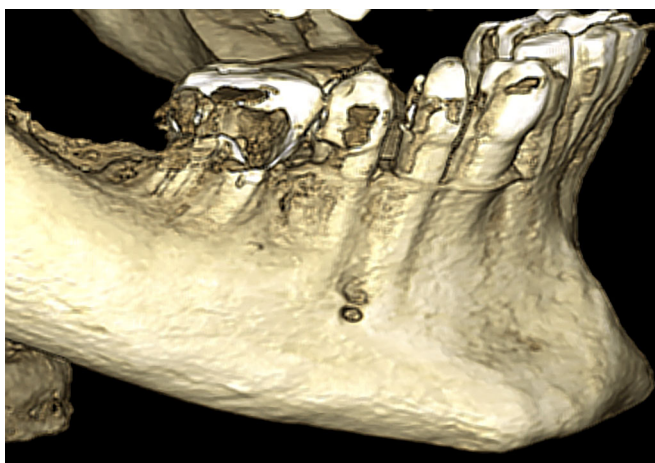
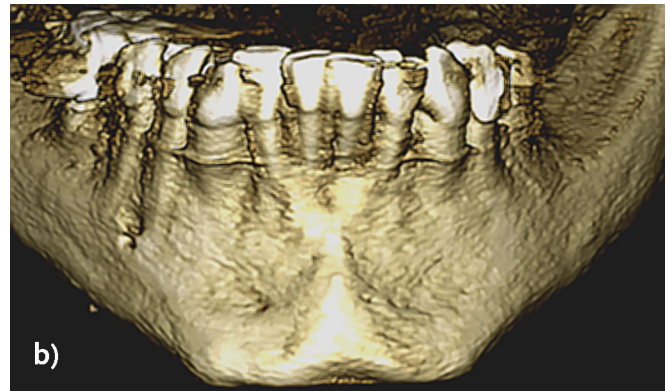
The examination was performed with a CBCT unit (Planmeca Promax 3D Mid, Planmeca Oy, Helsinki, Finland) at 90 kV, 4 mA and isotropic voxel size 0.15 mm.

The images were reviewed using Planmeca Romexis 4.6 imaging software (Planmeca, Helsinki, Finland) by two radiologists, an oral surgeon and a conservative treatment specialist.

During the image analysis, the right mandibular canal was found to end in two mental foramina located in the expected place for the MF, respectively, in the region of the premolars.

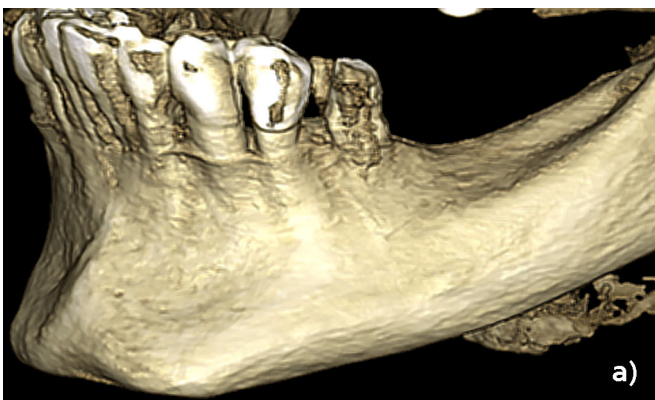
Both right mental foramina were situated one above the other (Fig. 1).

Fig. 1. A well-defined two right mental foramina visible on volume rendered reconstruction of the mandible.



The left mental foramen of the patient was absent (agenesis) (Fig. 2).

Fig. 2. An absence of the left MF on volume rendered images. Left hemi - mandible (A) and anterior view of the mandible (B).



DISCUSSION

The inferior alveolar nerve and the mental nerve are formed in the twelfth gestational week [18].

The formation of MF is affected by different tissues, such as connective tissue, nerves, blood vessels, and surrounding bone [9].

It has been suggested that accessory mental foramina may develop from the branching of the mental nerve before the twelfth gestational week [18].

The location of the MF and AMF is important to avoid neurovascular bundle injury during an implant placement, apicoectomy, periodontal flap surgery, vestibuloplasty and orthognathic surgery [3].

Paresthesia, hyperesthesia, dysesthesia, anesthesia of the lower lip and chin, hematoma and tissue necrosis can occur after injuries to the mandibular neurovascular bundle [3, 13].

The anatomic position of the mental foramen is also an important factor for therapeutic interventions in the mandible that requires mental nerve block [3].

The insufficient information about MF position, about the presence of AMF and the absence of MF can influence choosing the correct anatomical site for the anesthesia and can be related to an ineffective mental block and neuromuscular disturbances on the chin and around the lip [3, 9].

Agenesis of MF is a very rare anatomic variation and the reports concerning this condition are infrequent.

We found only 11 papers describing cases with the absence of MF [1, 4, 9-17].

Unilateral absence of the MF has a very low incidence, ranging from 0.02% to 0.47%, while the bilateral absence is statistically negligible [8, 11, 12].

The reason for the MF's absence is unclear, but it is most likely congenital [12, 13, 14, 16].

Silva et al. reported interesting cases of a daughter and her mother with MF absence and hypoplasia, so variations of the MF may partly arise because of some genetic factors [1].

No innervation or vascularization disturbances were reported in previously reported cases (as in our case) [1, 4, 9, 14, 16].

In case of the absence of MF, the mental nerve branches and blood vessels might be very thin but surely present and may pass through an alternative path, which could not be detected [1, 14].

Conditions such as post-traumatic atrophy, post-traumatic fibrosis, osteoblastic hyperplasia and age-related bony changes can also be reasons for the absence of MF [13].

To our knowledge, this is the first described case

with agenesis of MF and double MF coexisting in the same patient.

CONCLUSION

Despite the rarity of such cases, clinicians must be aware with the anatomical variations of the mental foramen in order to perform successful local anesthetic blocks and to avoid some complications during surgical procedures.

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