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Triple Mental Foramina Detected by CBCT

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Abstract: ***The identification of the mental foramen (MF) is an important prerequisite for surgical procedures involving anterior part of the mandible. Its position and possible presence of accessory mental foramina need to be considered before surgery in order to avoid mental nerve branches injury. We present a rare case of 33 - year - old woman with triple mental foramina of the right side of the mandible detected by CBCT which was not seen on panoramic radiography.***

Keywords: Cone-Beam Computed Tomography, Dental Implants, Mental foramen, Panoramic radiography

1. Introduction

The mental foramen (MF) is located on outer surface of the mandible, near the apices of the premolars. It permits passage of the mental nerve and blood vessels. The number of MF's can vary up to four on one side [1]. Accessory foramina occur due to splitting of the mental nerve into several fasciculi before the development of MF during the 12th week of intrauterine life [1].

Damaging of the neurovascular bundle in accessory MF can lead to sensory disturbances and hemorrhages during implant installations [1, 2]. Preliminary assessment about accessory mental foramina would prevent inferior alveolar nerve branches injury during periapical surgery and implant placement. Using intraoral and panoramic radiography the accessory mental foramina can be rarely observed [3]. MF and it's relation to neighboring anatomical structures of the lower jaw poorly visualized on panoramic radiographs can lead to in-correct plan of treatment in the mental region [1].

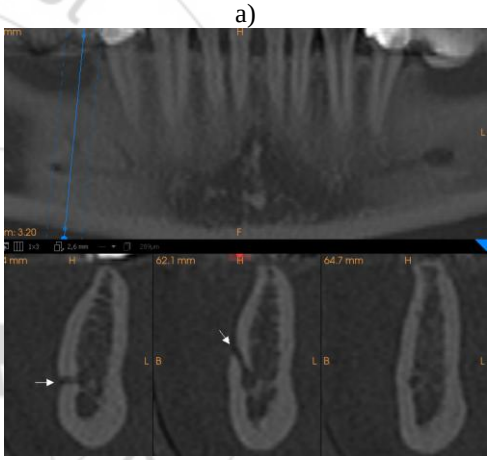
There is presence of other crucial structures related to the MF - mandibular incisive canal (MIC), lingual concavity and anterior loop (AL) of the inferior alveolar nerve which are also not clearly visible on radiographs [4-7]. They also should be considered before surgery (e.g. implant placement).

Introducing cone beam computed tomography (CBCT) in the dental practice ensures visualization of small bone structures and MF with high spatial resolution and relatively lower dose compared to multi detector computed tomography (MDCT).

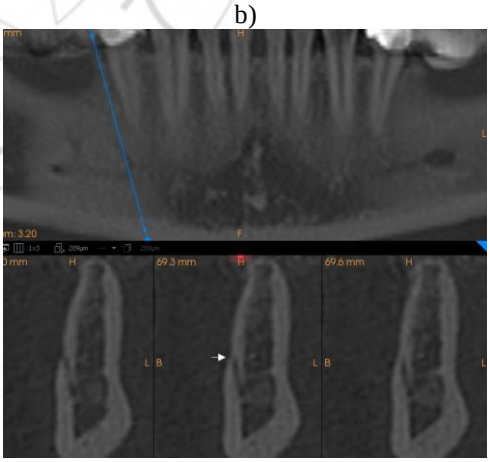
2. Case Report

We present a case of 33 Caucasian women examined by CBCT (ILUMA™, Imtec Imaging, Ardmore, OK) as a part of implant planning. The scan was performed using a standard exposure and patient positioning protocol (120 KV, 40 s, 3.8 mA). The data were reconstructed at a voxel size of 0.3 mm. On the three-dimensional image and cross-sections derived from CBCT data triple mental foramina on the buccal surface of right side of the mandible were clearly seen (Fig1).

a)



b)



c)

Figure 1: a) Three-dimensional reconstruction. Ovoid openings in the buccal cortex of the right mandible constituting a well-defined three MFs are visible. b) Panoramic reconstruction and crossections with slice interval 2.6 mm through the distal right mental foramina. c) The same panoramic reconstruction and crossections with slice interval 0.3mm through the medial right MF.

They were opened backward and were smaller than the opposite single MF sized 3 mm in diameter. The medial right sided MF was 1mm in diameter. The other two, distally placed (upper and lower) were 1.3 mm and 1.1 mm respectively. The connections of the three MFs with the right mandibular canal and the right mandibular incisive canal were well visible on the cross section images (Fig 1 b, c). On the previously performed panoramic radiography the right MF was not clearly visible, so the patient didn't know about such anatomic variation (Fig2).

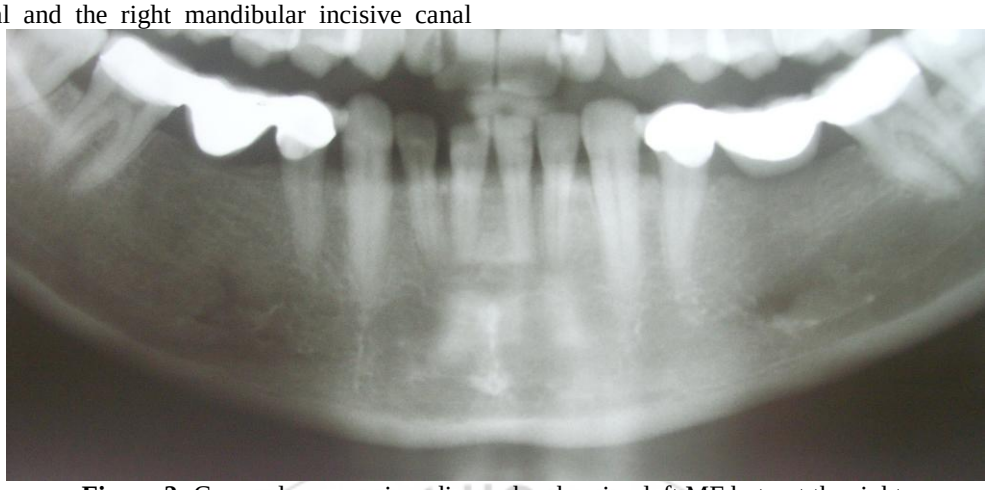


Figure 2: Cropped panoramic radiography showing left MF but not the right.

3. Discussion

The MF is an important landmark for surgery in the area of the chin. It is very important to preserve neurovascular bundle in the mandibular canal and MF when surgery (e.g. endosseous dental implantation) near the MF is planned. The position and number of MFs can vary among individuals, but panoramic and intra-oral radiographs not always demonstrate them [8, 9]. Triple mental foramina are rare finding. Gershenson et al. described triple foramina in 0.7 % of 525 dry mandibles, Katakami et al. reported 0.6% rate in 150 CBCT scans [10, 11]. The Multi-detector Computed Tomography (MDCT) is useful imaging modality to visualize MF [2]. Cone beam computed tomography (CBCT) is another exquisite technique in demonstrating bone structures in details. The advantage of this modality compared to MDCT is in the lower radiation dose and low cost [12]. Dose is dependent on equipment type and exposure parameters, especially the field of view selected [13].The radiation doses (and hence risks) from dental CBCT are generally higher than conventional dental radiography (intraoral and panoramic) but lower than MDCT scans of the dental area [13, 18]. Using CBCT the mental foramina (i.e. accessory foramina) and other important anatomical structures as mandibular lingual and incisive canals, lingual concavity, and anterior loop of the inferior alveolar nerve could be clearly identified [4-7, 14-20].

In case of failure of radiographs to demonstrate the MF position and possible accessory mental foramina, CBCT is a method of choice before surgery in this area. This information can contribute to avoid potential neurosensory disturbances.

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