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Accessory Mental Foramen Cone-Beam Computed Tomography (CBCT) finding during Implant Planning: A Rare Anatomical Variant

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Abstract

Mental foramen (MF) is an important landmark to consider for surgical procedures performed in the mandible. Anatomical variations such as accessory mental foramen are considered to be a rare occurrence. Only a few cases have been reported in the literature. The purpose of this article is to present a case with Cone-beam computed tomography (CBCT) images and suggest that preoperative cone-beam computed tomography (CBCT) would aid in the assessment of anatomical variations and prevent any post-operative complications.

Keywords:

Accessory mental foramen; Mental foramen; Three-dimensional imaging; Cone-beam CT imaging

Introduction

The mental foramen (MF) is a small foramen positioned in the anterolateral area of the body of the mandible typically, an area adjacent to the root of the second mandibular premolar. The shapes of the foramen come in oval or rounded forms. The positional variations with individuals in terms of the location of the MF are considered to be any points between the canine and the first lower molar. The contents of the foramen include the mental nerve, artery, and vein. The inferior alveolar nerve has two terminal branches, which are the mental and incisive nerves. This mental nerve is the pure sensory nerve that supplies the skin to the chin, lower lip, mucous membrane, and buccal surface of the lower lip. Those landmarks, including mental foramen, must be carefully considered when planning and providing surgical intervention, such as the placement of the implants around the inter-foraminal region [1].

There is some anatomical variation relating to the mandibular nerve despite the current understanding of the anatomy of the nerve. Those variations also must be considered to avoid clinical complications arising from the surgical intervention. Accessory mental nerve (AMF) is one of the notable variations that emerge *via* the small foramina around the MF area. Another variation relates to the anterior loop of the mental nerve found at a mesial relation to the mental foramen. Other variations are noted in terms of location and number of foramina [2].

The radio graphical shape of the mental foramen shows it to be a rounded and oval radiolucent area located at the lower level of the bone close to the apices of the premolar and, in some situations, superimposed them. The MF appears mostly as the single structure on the radiographs, but its anatomic variations are rarely reported from the radiographs, such as accessory foramina [3].

One, the two-dimensional radiographs used in dentistry usually does not depict the anatomic variations of the MF area. This is due to the long axis of the AMF, which is less than 1.5 mm [4]. However, the 3-Dimensional imaging and evaluation conducted with CT and Cone-beam (CBCT) allow for identifying any available variations and its course. Detecting the AMF has a great potential to help reduce the risk of hemorrhage, post-operative pain, and paralysis due to surgical procedures. Professionals have thus recognized CBCT as the right diagnostic tool that can help provide the needed comprehensive information relating to the anatomy and structures of the maxillofacial region and help in the variations' evaluation process [5]. While planning for the surgical intervention using the presurgical imaging examination, variations relating to the neurovascular will be easier to identify and evaluated for better treatment outcome.

Case Presentation

A 25-year-old female patient was advised CBCT of the mandible to facilitate dental implant placement in the 36 regions where the patient desired replacement with a fixed prosthesis. The asymptomatic patient was examined for both the intraoral and extra oral aspects. Evaluation of the panoramic radiograph shows the presence of accessory mental foramen (**Figure 1**).

Figure 1: Panoramic radiograph cannot appreciate clearly accessory mental foramen Results.

Reconstructing the three-dimensional imaging help in the process of confirming the presence of two mental foramina in **Figure 2** below.

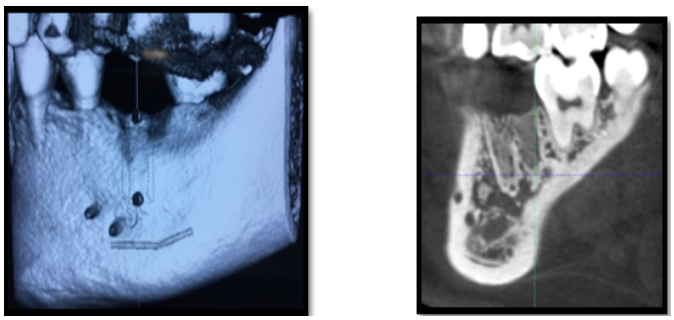

Figure 2: CBCT clearly shows two mental foramen.

Sequential axial sections showed the presence of two mental foramina (**Figure 3**). At the level of the second premolar, the accessory mental foramen and mental foramen were present, measuring 0.96 mm and 1.36 mm (**Figure 4**) in diameter, respectively, with the AMF in a little posterior position [6].

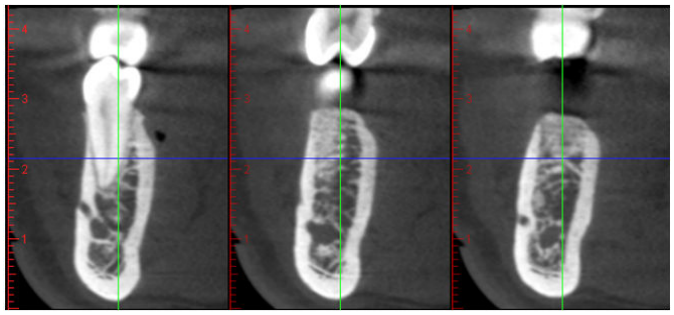

Figure 3: Sectional view of CBCT with clearly evident two Mental.

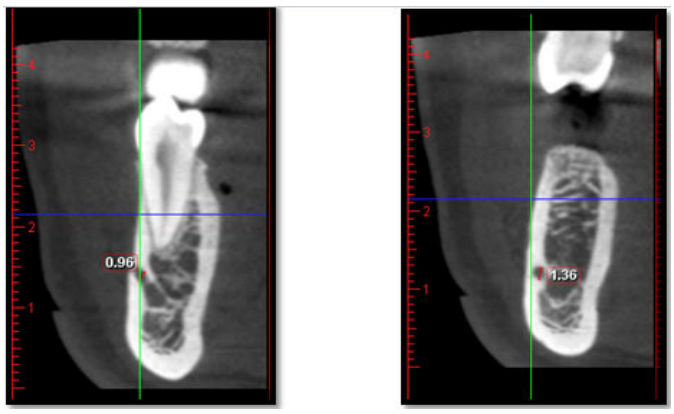

Figure 4: Measurement of Mental foramen in different sectional view.

Under local anaesthesia, the full-thickness mucoperiosteal flap was raised. A mental nerve was identified at the apex of the second premolar emerging distal to the mental foramen. Along with this one, more nerve was found at the periapex of the second premolar, one above the other but emerging from separate foramina (**Figure 5**). Care was taken to avoid the perforation of the mental foramen, and osteotomy was performed.

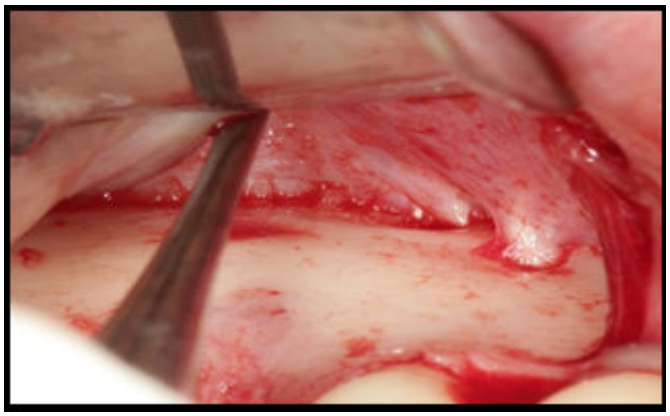

Figure 5: Clinical photograph of mental and Accessory Mental foramen.

Discussion

The accessory mental nerve is an important anatomic structure when considering surgical procedures involving this region, such as bone harvesting from the chin, particularly dental implants placement. Studies have shown the rate of sensory troubles to the lower lip right after dental implant surgery in the MF area to range from 7%-10% [6]. Partial or complete damage to the accessory mental nerve or the mental nerve may result in sensory disturbance and pain to the patient [7].

Two-dimensional radiographs often fail to depict anatomic variations in the MF area, which are the most frequent imaging technique. Using a panoramic radiograph recognized a significant presence of AMF; however, specified that AMF identification is difficult with intraoral and panoramic radiographs because they are commonly less than 1.0 mm in terms of their sizes. When the three-dimensional assessment using the CT is compared with the two-dimensional radiographs, the CT imaging can be considered more useful in terms of helping to define the presence of the AMF. In particular, cone-beam computed tomography (CBCT) provides a satisfactory resolution to evaluate bony landmarks around the maxillofacial region for presurgical identification and evaluation of the AMF [8].

Size

Studies have stated the average height of the MF was found to be 3.47 mm (range: 2.5-5.5 mm), and the average width was 3.59 mm (range: 2-5.5 mm). However, some other researchers found the mean diameter to be between 3.515 and 5 mm wide.

Location

Variation in the anatomical landmark does occur with respect to mental foramen reported the location of the foramen to be 28 mm from the midline and 14-15 mm from the inferior border of the mandible. Similarly, another group of researchers reported the foramen to be located at 27.6 mm (range: 22 to 31 mm) from the midline and 12 mm (range: 9 to 15 mm) from the most apical portion of the mandible.

Generally, most authors found this foramen to be halfway between the crest of bone and the inferior border of the mandible. Findings have shown this location to be influenced by the level of crestal bone loss [2]. Findings from our reviewed cases revealed the dimensions of right AMF and the MF to be around were 0.96 and 1.36 mm (**Figure 4**) [9], respectively. Several studies have reported the position of the AMF to be inferior to that of the MF. Those reports also emphasized that locating the MF position in the presurgical examination should be adequate to plan for surgical interventions or procedures.

The site of the AMF is always crucial for treatment planning because it tends to affect the approach and implant placements for surgical procedures. When an accessory mental foramen is identified, the clinician should consider it for treatment planning. Disruption or damage to the nerves and blood supply could lead to consequent haemorrhage, paraesthesia, dysesthesia, and other consequences [7].

Conclusion

Anatomical variation is a common phenomenon in the maxilla and mandible. However, it is essential to emphasize the importance of identifying those variations on presurgical imaging exams to help with more precise surgical interventions. Since conventional radiographs may fail to identify variations, CBCT is of fundamental importance in this process. The assessment of AMF contributes to the use of an appropriate surgical technique, preventing complications in the premolar-molar region.

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