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Case Report

Bilateral absence of mental foramen – a rare variation

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ABSTRACT

Mental foramen, an important landmark of the human mandible is the determinant of the mental triangle. It is an oval or circular opening on the anterior surface of the mandible. The mental bundle exits through the mental foramen and supplies the soft tissues of the chin, lower lip, and gingivae. Recent advancements in orthognathic surgery have increased surgical procedures in the mental region. The exact location of the mental foramen is determinant of effective nerve block and prevention of post surgical neurovascular complications. Its modal position varies according to age and ethnicity, from sub-canine to sub-molar. Variations like multiple or absent foramina hold strategic importance in clinical dentistry and are best revealed by computerized tomography scans. This case reports an extremely rare and previously undescribed anatomic variation of bilateral absence of mental foramen along with literature review of relevance to peridontologists and maxillofacial surgeons. © **IJAV. 2010; 3: 167–169.**

Key words [mental foramen] [mandible] [anatomical variation] [mental nerve]

Introduction

The mental foramen is described in literature as an oval or circular opening on the anterior surface of the mandible, usually below the apex of the first or second premolar or between the first and second premolars. The inferior alveolar nerve and artery enter the mandibular foramen and after traveling through the body, exit at the mental foramen as the mental nerve and vessels. These nerves provide sensory innervation to the lower teeth, lip and a part of lower face [1]. The mental foramen has also been characterized as a highly suitable model to study bone remodeling activity in the presence of different spatial osteo-neuro-vascular components. Recent advancements in orthodentistry have increased the possibility of invasive procedures in the mental region. The position of the mental foramen may vary according to race and ethnicity [2–4]. The direction of the opening of the mental foramen is outward and upward in a posterior orientation [5]. The identification and actual location of this foramen is important in clinical dentistry during nerve block and the evaluation of the morphology and maturity of the human mandible. Variations of the mental foramen are often encountered, ranging from difference in modal location [2–4] or presence of accessory foramina [6] or even complete absence in some rare cases [7–9]. However, these variations are often insufficiently described in most anatomy textbooks. Their accurate identification by a prior 3D-CT scan may reduce the incidence of postoperative paralytic and hemorrhagic complications in the mental region.

Case Report

Recorded herein is a dry human mandible that presented with bilateral absent mental foramina (Figure 1). The case was encountered during routine dissection tutorials and represents a rare anatomic variation –agenesis of the mental foramen. A steel wire was introduced into the mandibular foramina of the aforementioned mandible and the length of the pervious wire was recorded for right and left sides.

The dry mandible (unspecified age and sex and unknown ethnic background, average sized and partially edentulous) showed normal gross morphology in all aspects except for bilateral absence of mental foramen. The mandibular foramen was bilaterally symmetrical and the mandibular canal was patent to a distance of 3 cm on the right and 4.7 cm on the left sides respectively by steel wire probe. Radiography established normal bone density with no evidence of age related bony resorption or previous surgical or mechanical trauma establishing that the case was that of congenital absence of mental foramen.

Discussion

The mental foramen is an important anatomical structure located on the lateral surface of the mandible and represents the termination of the mental canal. The mental foramen is a strategically important landmark during osteotomy procedures and is of paramount clinical significance to

Figure 1. Dry human mandible with bilateral absence of mental foramen.

Figure 2. Absent mental foramen on the left side.

dental and other health practitioners with regards to the achievement of effective mental nerve block anesthesia and the prevention of damage to the mental nerve during surgical procedures on the lower jaw. The mental bundle exits through it. A bony canal is not always observed between the mandibular and mental foramina [10]. The mental foramen may be oval or round and is usually located apical to the second premolar or between apices of the premolars and sometimes sub-canine or sub-molar in different races [2–4]. It has been demonstrated that in Mongoloid population, the mental foramen was located in line with the longitudinal axis of the lower second premolar teeth. In Caucasians, the mental foramen was more medially located, between first and second premolar; whereas in Black populations it was found to be more posterior, between second premolar and first molar posterior [3]. Paleoanthropologists believe that tooth position may not be a reliable indicator of mental foramen position because of variability of tooth size within and between taxa and during eruption levels. The mental foramen location also shows changes with age [11]. In children before tooth eruption, the mental foramen is closer to the alveolar margin; in adults, it is closer to the inferior border, and with age related bone resorption the mental foramen moves closer to the alveolar border. CT scans are more accurate for detecting the mental foramen than conventional radiographs. Sometimes, an anterior loop of the mental nerve may be present mesial to the mental foramen and may cause mental nerve injury during dental implants [12]. Guidelines to verify the position of the mental foramen and validating the presence of an anterior loop of the mental nerve while establishing a zone of safety (in millimeters) for implant placement can avoid sensory dysfunction and altered lip sensation due to inferior alveolar or mental nerve damage in the foraminal area.

Yosue and Brooks radiographically classified the mental foramen into four types: the separated type being most common followed by continuous and diffuse types while the unidentified type was the least frequent [13].

A morphometric study demonstrated the mental foramen to lie at an average height of 12.96 mm from the inferior edge of mandible. The largest horizontal diameter ranged between 3.25–3.32 mm whereas the vertical diameter ranged from 2.38–2.39 mm between the right and left sides. The mental foramen was localized in similar statistic proportions between the 1st and 2nd premolars and above the 2nd premolar on the right side and between the 1st and 2nd premolars on the left side. The mental foramen was predominantly single and oval

Figure 3. Absent mental foramen on the right side.

Figure 4. Steel wire probe into the mandibular foramen.

with larger horizontal diameter. The average inclination of the mental foramen was 96.82 degrees [14].

Unlike primates, the mental foramen is usually single in humans, but accessory foramina have been recorded. It has been suggested that separation of the mental nerve into several fasciculi earlier than the formation of the mental foramen until the 12th gestational week could be a reason for the formation of the accessory mental foramen [15]. The incidence of accessory mental foramen varies between ethnic groups, while non-Caucasians may have a higher incidence of accessory mental foramen than Caucasians; there are yet no reported gender differences [15]. The contents of the accessory mental foramen have been determined as neurovascular, which can be responsible for incomplete anesthesia and is therefore an important aspect for the clinicians to consider.

Absent mental foramen is a rare anatomical variation. Absence of mental foramen (unidentified type) on panoramic radiographs may result most often from superimposition of teeth, trabecular pattern of bone, thinning of mandible and false radiography results due to overall dark radiographs. Very few cases report the actual absence of mental foramen. Such cases are often accidentally revealed on CT scans or dry human mandible studies. In fact, man is the only primate known to have agenesis of the mental foramen. Absence of mental foramen is not a frequent occurrence. In a previous study, no mental foramen was found in only 3 cases out of 2870 sides of 1435 dry skulls. The foramen was absent twice in the right side and once in the left side [9]. The frequency of unilateral absence of the mental foramen ranges from less than 0.02% [8] to 0.47% [7]. There have yet been no reports of any sexual or ethnic influence in mental foramen absence. Apart from these cases cited, no other published reports of the absence of mental foramen have been found.

The case reported here is an extremely rare anatomical variation of bilateral absence of the mental foramen. The underlying cause seems most likely to be congenital agenesis because the mandible was otherwise healthy with normal morphology and no evidence of trauma as revealed by a clear radiograph. However, the subject could possibly have presented with some neurosensory disturbance in the mental region and around lips due to this rare condition.

Recent trend in replacement of missing teeth by dental implant and the increasing frequency of orthognathic surgery, have increased the possibility of surgical procedures near the mental foramen. Mental foramen variations often remain unnoticed and undiagnosed. Even so, in order to obtain effective nerve block and to avoid neurovascular complications in the mental region, particular attention should be paid to such variations. A prior CT scan can elucidate morphology of the jaw and prevent postoperative complications. Therefore, detailed anatomical knowledge of the mental foramen and it's variations in different populations is essential in clinical dentistry when administering regional anesthesia and performing peripheral procedures in the mental region. A more elaborate mention of its population based morphology and clinically relevant variations in our standard anatomy textbooks would be a welcome change.

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