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Bilateral wide mental foramina an incidental finding in an asymptomatic patient: A case report & mini literature review

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ABSTRACT

The mandibular canal and the mental foramina are constant structures that remain largely bilaterally symmetrical except for variations in shape and size within certain limits. Structural alterations such as enlargement of mental foramen and the mandibular canal are rare and usually recorded as incidental finding on plain radiographs. This enlargement may be associated with multiple factors. We present a unique case of bilateral wide mental foramina with enlarged mandibular canal in a 56-year-old asymptomatic male.

Keywords: Mental foramen; Anatomical variation; Mandibular canal; Cone beam computed tomography (CBCT); Nerve enlargement.

Introduction

The mental foramen is located on the anterior region of mandible as a circular or oval opening. The mental neuro vascular bundle exits through it posteriorly in an outward and upward direction innervating the gingiva, lower lip and chin of ipsilateral side [1]. Mental foramen is an important landmark holding crucial importance during surgical procedures of the mandibular region [2]. It also holds strategic information about the maturity pattern and bone remodelling activity of the mandible [3]. Its position may vary ranging from sub canine to sub molar based on race and age in different populations [9]. In the absence of any local and systemic clinical alterations and bases on patient's accurate history it is quite difficult to establish an accurate diagnostic hypothesis based on routine X-ray techniques alone, such as panoramic radiographs [4].

Structural alterations of the mental foramen or mandibular canal such a widening of the lumen is rare and incidentally recorded on plain radiographs [5]. The differential diagnosis of wide canal & foramen is diverse which includes hemangioma, lipoma, locally invasive carcinoma of soft tissues [6,31], peripheral nerve sheath tumour [13,17], lymphoma [11,16], primary sarcoma [24], osteomyelitis, neurofibromatosis [21], distant metastasis [38], idiopathic, iatrogenic bone defects, as well as various syndromic conditions [8]. The vertical dimension of the mental foramina in different study populations ranged from 0.8 to 6.9mm with an average dimension of 4.3mm. The average horizontal dimension was 3.56mm with a range of 0.7 to 7.3mm. The foramen on the right had an average vertical and horizontal dimension of 3.3mm and 4.2mm respectively while the average left vertical and horizontal dimensions were 3.5mm and 5.0mm respectively [7].

Clinical Findings

The 57-year-old Saudi male patient visited the outpatient clinic of the Department of Oral and Maxillofacial Surgery for a comprehensive evaluation and oral rehabilitation of his missing teeth in mandibular posterior region bilaterally using implants. Preliminary investigations such as full mouth radiographs and a panoramic radiograph were acquired followed by 3D. Cone beam computed tomography (CBCT) scan evaluation. The panoramic radiograph revealed an unusually wide mental foramina and possible enlarged mandibular canals bilaterally which did not co relate with the normal morphology. Whereas there was no definitive enlargement of the mandibular foramina (Fig. 1).

Patient gave history of previous dental visits 5-6 years back for extraction of grossly destructed teeth, multiple restorations, crown & bridge in relation to maxillary right anterior teeth. There was no discrete asymmetry of the mental foramina noticeable in retrospective comparison of former and current radiographs. The patient's medical history was insignificant with no underlying systemic co morbidities. There was no history or evidence of local trauma. No signs of dysesthesia were found in the mental nerve supply region. Intraoral inspection revealed intact healthy mucosa. There was adequate response to cold stimulus in the mandibular teeth bilaterally. The initial assessment revealed adequate bone volume with no functional failure or occlusal discrepancies. Three dimensional cone beam computed tomography (3D CBCT) parameters is a different heading. A 3D CBCT by ortho pantomograph OP300 scanner with technical parameters: image volume size 61 x 78 mm, tube current 15 mA, tube voltage 80 kV, scan time 16 s, exposure time 12 s pulsed X-ray. The software used was DICOM OnDemand3D from Cybermed, USA, for image acquisition.

Analysis of the 3D reconstruction of the scans confirmed the structural alteration such as wide mental foramina bilaterally with mild enlargement of the mandibular canals with presence of multiple accessory mandibular canals and multiple accessory mental foramina anterior to the main mental foramina bilaterally.

CBCT scan assessment of the skeletal lining of the mandibular nerve revealed no enlargement in the size of the mandibular foramina bilaterally. The three-dimensional reconstruction images revealed presence of multiple accessory foramina over the right side of the symphysis region anterior to the mental foramen. The right sided mental foramen measured 6.76mm vertically and 5.68mm in the horizontal direction. Whereas the left sided mental foramina measured 8.18mm vertically and 7.16mm horizontally with an isolated accessory foramen anteriorly (Fig 2). The left sided mandibular canal however measured 12.21mm vertically and right sided mandibular canal measured 6.86mm vertically. There were multiple accessory mandibular canals inferior and lateral to the main mandibular canal with an isolated foramen exiting on the medial aspect over the left side (Fig 3). There was an accessory canal running parallel inferior and lateral to the main mandibular canal and joining at the level of mental foramen on the left side (Fig 4-5).

A biopsy of the nerve was made suspecting a lesion but there was no alteration in the functions of the nerve due to the enlargement or widening. The tissue sample of the nerve neither showed necrosis nor infiltration by lymphatic tissue. Moreover, our patient refused further surgical exploration of the enlarged nerve and foramina so, it is difficult to assume with conviction that the nerve was of the same histological type throughout its course.

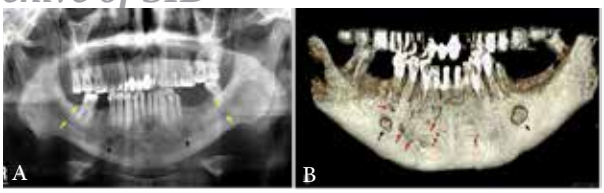

Fig 1. A Panoramic radiograph showing wide mental foramina bilaterally (black arrows) with mild enlargement of the mandibular canals bilaterally (yellow arrows) and no significant widening of the mandibular foramina (mf). B Panoramic reconstruction of the CBCT scan showing multiple accessory mental foramina (red arrows) on the right side and isolated accessory mental foramen on left side and wide mental foramina bilaterally (black arrows).

Fig 2. Three-dimensional reconstruction scan images of left and right side showing the wide mental foramina with multiple accessory foramina right side (black arrows).

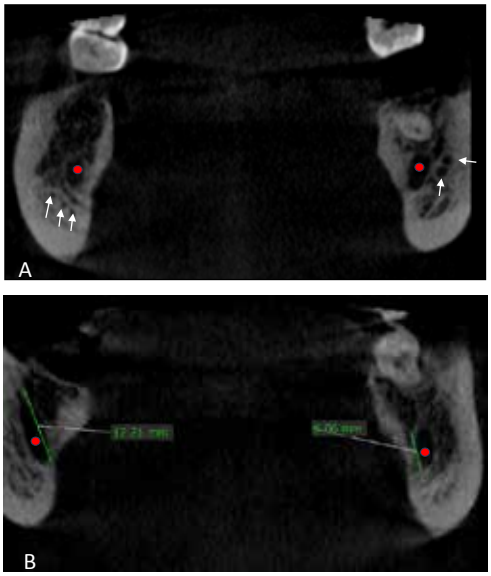

Fig 3. Coronal section of the cbct scan with posterior to anterior orientation. A showing multiple accessory canals (white arrows) inferior and lateral to the main mandibular canal (red dots) bilaterally, an isolated canal & foramen exiting on the medial aspect of the mandible (yellow arrow). B showing the right sided canal measuring 6.86mm and left sided measuring 12.21mm vertically at the level of the second molar.

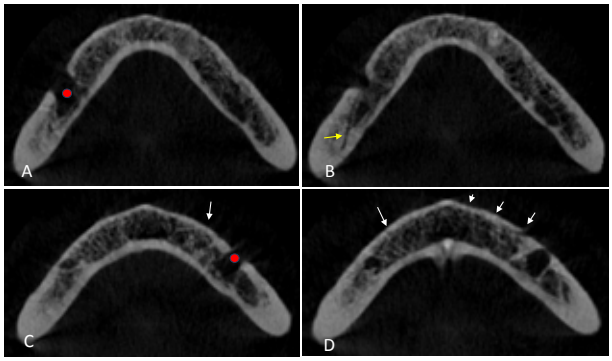

Fig 4. Axial section of the cbct scan with superior to inferior orientation. A showing left sided wide mental foramen (red dot). B showing the an accessory mandibular canal running lateral to the main mandibular canal and exiting from the mental foramen (yellow arrow). C showing right sided mental foramen (red dot) with an accessory mental foramen (white arrow). D showing multiple accessory foramina anterior to the mental foramina bilaterally (white arrows).

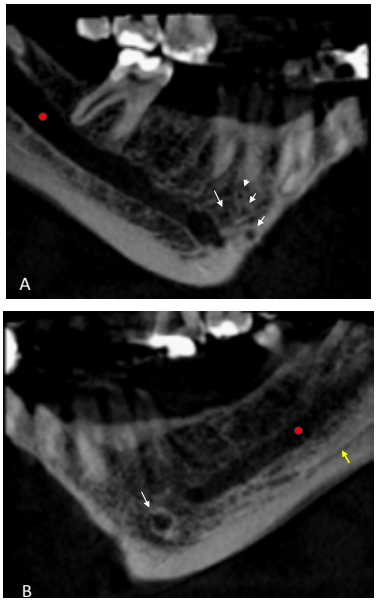

Fig 5. Sagittal section of the cbct scan with lateral to medial orientation. A showing ride sided enlarged mandibular canal at the level of second molar (red dot) and multiple accessory mental foramina (white arrows) anterior to the main mental foramen. B showing the left sided mandibular canal (red dot) communicating with an accessory mandibular canal (yellow arrow) inferiorly upto the level of mental foramen, accessory mental foramen (white arrow).

Discussion

A thorough understanding of the imaging and clinical features of any unusual enlargement of nerve or foramen is necessary to prevent diagnostic confusion, particularly with vascular malformations or benign alterations [7-9]. There are studies about lymphoma

with no bone destruction but demonstrated solitary expansion of the bone. The classical and infrequent radiologic finding of oral lymphoma is lytic destruction and poorly defined, suggesting osteomyelitis or malignant transformation into a neoplasm [11,16-20]. Furthermore, the radiographic features of the present case were suggestive of a benign lesion more than a malignancy as surrounding bone around the mandibular canal did not lose its characteristic sclerosis that define the canal walls. Also, the patient reported with no symptoms, with primary complaint of missing teeth.

Based on the clinical presentation of canal or foramina widening various hypothesis can be given. Hyperesthesia or hypoesthesia may be related to infiltration or compression of the of the involved nerve [16-18]. Extra nodal bone lesions are usually accompanied with history of pain, swelling, hyperesthesia or paresthesia along mandibular nerve extension and its distribution. Other nonspecific symptoms, like tooth mobility may be suggestive of dental abscess or osteomyelitis [13], lymphadenopathy especially to lymphomas at alveolar process. It is also considered a common radiological sign of neurofibromatosis type 1 (NF1) which may occur either unilaterally or bilaterally and its pathogenesis in NF1 is unclear [21]. Unilateral enlargement or widening of mental foramen may indicate an underlying neoplastic process, predominantly lymphatic or nerve sheath tumors [29]. However, the biological phenomenon of enlarged mental foramen cannot be determined by just radiological evaluation. Widening of the nerve canal and the mental foramen can be occasionally identified in syndromic cases such as Noonan syndrome, Proteus syndrome [8]. Enlargement of the mandibular canal and foramina can also be noticed in rare nontumorous conditions such as multiple endocrine neoplasia [25].

Unilateral enlargement or widening of mental foramen may indicate an underlying neoplastic process, predominantly lymphatic or nerve sheath tumors [39]. However, the biological phenomenon of enlarged mental foramen cannot be determined by just radiological evaluation. Widening of the nerve canal and the mental foramen can be occasionally identified in syndromic cases such as Noonan syndrome, Proteus syndrome [8]. Enlargement of the mandibular canal and foramina can also be noticed in rare nontumorous conditions such as multiple endocrine neoplasia [11,19].

The nerve sheath tumor particularly schwannoma, is known to also cause distension of the nerve canal. The intraosseous type of schwannomas are usually sporadic tumors unrelated to NF2, it differs by not exhibiting tubular but instead cyst-like appearance on sectional radiographic images of the mandible [27-31]. Most often the center of the lesion being in the distal portion of the mandibular corpus. The most preferred imaging technique for the peripheral nerve sheath tumors such as of trigeminal nerve sheath origin is the Magnetic resonance imaging (MRI) [32-35]. This technique has a disadvantage of not allowing differentiation between entities of neurogenic origin. Osteolytic remodeling can also cause enlargement of mandibular canal in malignant neoplasms of neurogenic and non-neurogenic origin, which can extend up to the mental foramen [37-40]. Despite preliminary evaluation of the suspected tumor entity by imaging-assisted investigations along with a knowledge of the preferred anatomic locations, growth patterns and prevalence of certain diseases with this radiological finding, the range of diagnoses remains extensive.

Based on the clinical presentation, the present case report describes an asymptomatic normal widened nerve at the mental foramen without hyperesthesia or hypoesthesia. To the best of our literature search we could find only one report of a similar finding being described which was caused by extra nodal Non-Hodgkin's lymphoma [41]. Initially, from plain radiographs it appears like a benign nerve sheath lesion limited in size and extension to the site of the mental foramen. Interestingly, the widening of nerve was remarkably confined to the mandibular canal and the mental foramina.

Conclusion

The awareness of mental foramen and its typical morphologic features within different ethnicities is crucial for maxillofacial surgeons, anatomists, and paleoanthropologists. The mental foramen represents the termination of the mental canal. It is an oval or circular opening on the anterior surface of the mandible. Few of the variations such as multiple or absent foramina are not uncommon. There seems to be a clear racial trend in the pattern of occurrence in the size, position, and number of the mental foramen.

Conflict of Interest

There is no conflict of interest to declare.

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