Case Report - Developmental Disturbance

Anatomical variation of mandibular canal simulating a recurrence of odontogenic tumor

Access this article online
Website: www.amsjournal.com
DOI: 10.4103/2231-0746.133088
Quick Response Code:

Douglas Magno Guimarães[1], Flávia Sirotheau Correa Pontes[1,2]
Diogo Dos Santos Da Mata Rezende[2], Helder Antonio Rebelo Pontes[1,2]
[1]Department of Surgery and Oral Pathology, "João de Barros Barreto" University Hospital, [2]Federal University of Pará, Belém, Pará, Brazil

Address for correspondence:
Dr. Douglas Magno Guimarães, Department of Surgery and Oral Pathology, Mundurucus Street, nº 4487, 66073-000, Belém, Pará, Brazil.
E-mail: douglas_guima@hotmail.com

ABSTRACT

Mandibular nerve has an important role in the field of oral maxillofacial surgery. Furthermore, several anatomical variations can be found and are clinically relevant mainly in procedures involving the posterior mandible. The unknown of these anatomical variations of the inferior alveolar nerve have been implicated with complications in the performance of surgical procedures and anesthesia in dental and maxillofacial practice. The present paper reports a rare anatomical variation of inferior alveolar nerve mimicking a recurrence of keratocystic odontogenic tumor.

Keywords: Anatomical variations, inferior alveolar nerve branches, mandibular nerve, misdiagnosis

INTRODUCTION

The mandibular nerve is the third and inferior division of the trigeminal nerve. Unlike the ophthalmic and maxillary divisions, which contain only afferent fibers, the mandibular division contains both afferent and efferent fibers.[1,2] Usually, the mandibular nerve enters the mandibular foramen and runs downwards and forwards in the mandibular canal where it divides into the terminal incisive and mental branches.[2]

The inferior alveolar nerve is the largest branch of mandibular nerve and can give multiple branches during its course into the mandibular canal.[1,3] Variations in trajectory may occur due the presence of accessory foramina, whereas several authors reported the presence of multiple foramen in the mandible suggesting an important role in vascularization or innervations.[1] Carter and Keen[3] classified the intramandibular course of the inferior alveolar nerve into three types on the basis of their anatomical study: Type I, the inferior alveolar nerve is a single large structure lying in a bony canal; Type II, the nerve is situated substantially lower down within the mandible; and Type III, the inferior alveolar nerve separates posteriorly into two large branches.

Anatomical variations of the inferior alveolar nerve branches have been of major concern in the performance of surgical procedure and anesthesia in dental and maxillofacial practice.[4] The aim of this study is to report a rare anatomical variation of inferior alveolar nerve mimicking a recurrence of keratocystic odontogenic tumor.

CASE REPORT

In April of 2008, a 14-year-old girl was referred to department of Surgery and Oral Pathology to investigate a multilocular radiolucent lesion involving body and ramus of right mandible that was discovered, incidentally, in orthodontic documentation [Figure 1a]. The extraoral view showed slight swelling in region of right mandible and the intraoral examination showed no alterations in oral mucosa. In addition, computerized tomography (CT) with axial and 3-dimensional (3D) reconstruction was performed to define the extension of lesion and the views showed hypodense expansive lesion with buccal and lingual cortical expansion that pushed the mandibular canal to the base. Incisional biopsy was performed under local anesthesia revealing a cystic lesion, it was then marsupialized. The histological examination of the specimen diagnosed a keratocystic odontogenic tumor.

In June of 2009, 14 months after decompression was performed, the cyst was enucleated through an intraoral approach under

general anesthesia. The patient was lost to follow-up returning in October of 2011, during which an oblique mandibular radiograph was done, revealing a small radiolucent lesion with radiopaque borders in same region of the keratocystic odontogenic tumor [Figure 1b]. It was confirmed on panoramic radiograph [Figure 1c]. A CT scan was done and it revealed a hypodense lesion that caused the expansion of cortical bone suggesting bone repair. Moreover, two parallel hyperdense lines in posterior region of right body of mandible were seen, compatible with bifid mandibular canal [Figure 1d]. In addition, a multislice CT scan was performed which revealed an ascendant bifurcation of the mandibular canal from nearly the angle to the superior border of mandible, surrounding the bone repair, simulating sclerotic margins of a possible recurrence [Figure 2].

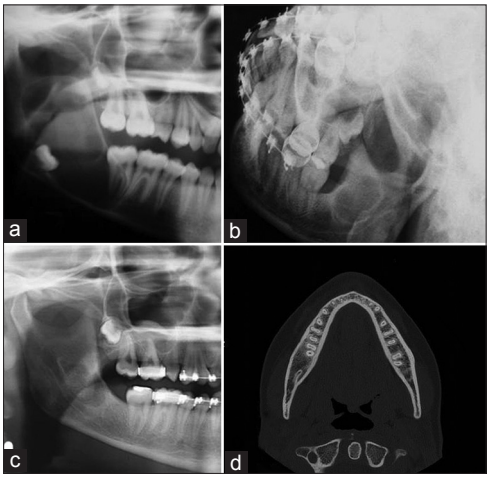

Figure 1: (a) The initial panoramic radiograph showing multilocular radiolucency well-circumscribed associated with impacted teeth, involving ramus and angle of mandible, (b) The oblique of mandible and, (c) panoramic, radiograph at 28 months after the surgery revealing radiolucency in posterior region of mandible. (d) The computerized tomography image showing the presence of two parallel hyperdense lines in posterior region of right body of mandible, compatible with bifid mandibular canal

DISCUSSION

The mandibular canal is an anatomical structure that is present bilaterally in mandible running from the mandibular foramen to mental foramen and contains the inferior alveolar artery, vein and nerve.[5] In radiographs, the mandibular canal appears as a radiolucent strip between two radiopaque lines.[6] This paper reports an unilateral variation of the mandibular canal mimicking a recurrence of an odontogenic tumor, observed in panoramic radiography, which on CT scan was shown to be a bifid mandibular canal showing the key role of utilization of several radiographic techniques in the follow-up, mainly in lesions with high grade of recurrence such as keratocystic odontogenic tumor.

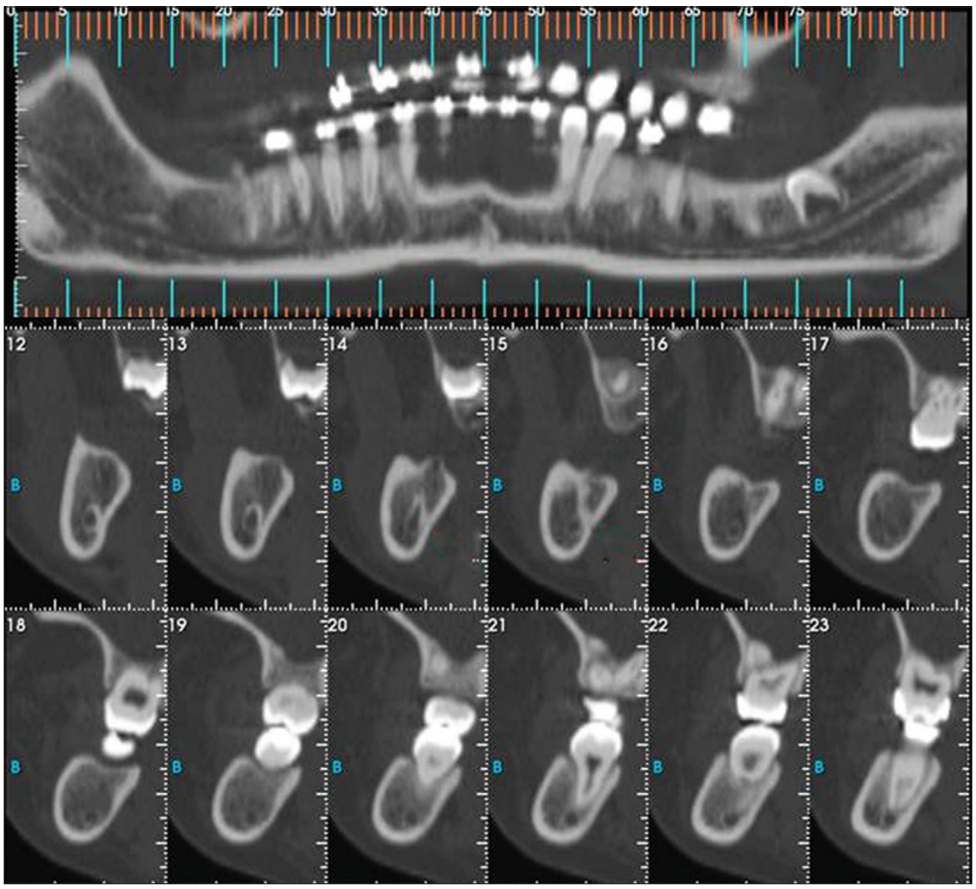

Figure 2: Multislice computerized tomography at the angle of mandible region revealing bifurcation of mandibular canal with direction ascendant and lingual

Bifid mandibular canals have been reported to pose complications in oral surgery, such as sensory impairment after surgery, difficulty of inferior alveolar nerve block in anesthesia, paresthesia and bleeding.[4,7] This supports the need to conduct radiological examinations before the procedure, avoiding injury to inferior alveolar nerve. Anatomical variations in mandibular canal are derived from three individual nerve branches that, during prenatal growth, will fuse and the intramembranous ossification eventually forms the mandibular canal. The incomplete fusion of these three nerve branches can explain the occurrence of bifid and trifid mandibular canal.[8]

There have been few studies that have classified the anatomical variations of mandibular canal. A study by Nortjé *et al*. and Langlais *et al*.[9,10] classified the patterns of bifurcation of mandibular canal in four types, Type I: Two canals originating from one foramen. Type II: Short supplemental upper canal extending to the second molar or third molar. Type III: Two mandibular canals of equal dimension apparently arising from separate foramina in the mandibular ramus and joining together to form one canal in the molar region. Type IV: Supplemental canal arising in the retromolar pad region and joining with the main canals in the retromolar area.

Panoramic radiography is a quick, simple, low-dose and low-cost technique and provides visibility of anatomical structures and pathological changes of the teeth, jaws and temporomandibular joints.[11] However, in this radiography there are some images that resemble bifid mandibular canal,, such the existence of the mylohyoid groove, an impression of the mylohyoid nerve on the medial surface of the mandible,[12] radiographic osteocondensation images produced by the insertion of the mylohyoid muscle into the mylohyoid line,[13] confusion with the lingual vascular canal and trabecular bony patterns.[14] Thus, these anatomical variations in mylohyoid regions make the diagnosis of bifid mandibular canal a challenge, mainly when analyzed by panoramic radiography.

The better method for identification of bifid mandibular canals is 3D images, such multislice CT and cone beam CT. CT techniques have the same quality in diagnosis of mandibular structures,[15,16] however, cone beam CT presents some advantages such as low dose of radiation and high level of image resolution.[17] Magnetic resonance imaging can show the content of mandibular canal directly, while the panoramic radiography and conventional CT cannot, mainly in cases without clear-cut bony delineation.[18]

CONCLUSION

Bifid mandibular canal is an anatomical variation that has great importance to clinical dentistry, especially to dentomaxillofacial surgery and radiology. On correct detection through panoramic radiography and confirmation by 3D imaging, we can avoid surgical complications such as excessive bleeding and paresthesia. It also prevents misdiagnosis for recurrence for follow-up of mandibular lesions.

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Cite this article as: Guimaraes DM, Pontes FC, Da Mata Rezende DS, Pontes HR. Anatomical variation of mandibular canal simulating a recurrence of odontogenic tumor. Ann Maxillofac Surg 2014;4:107-9.

Source of Support: Nil, **Conflict of Interest**: None declared.