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Bifid mandibular canal: Report of two cases

[1]Dr. N S Mamatha, MDS, Professor and Head, Department of Oral and Maxillofacial Surgery, Raja Rajeswari Dental College and Hospital, Kumbalagodu, Mysore Road, Bangalore 560060

[2]Dr. Monisha Uday Hangal, Consultant , Oral and Maxillofacial Surgeon, Bangalore

[3]Dr. Rohit Rathod, Consultant, Oral and Maxillofacial Surgeon, Bangalore

Corresponding Author: Dr. N S Mamatha, MDS, Professor and Head, Department of Oral and Maxillofacial Surgery, Raja Rajeswari Dental College and Hospital, Kumbalagodu, Mysore Road, Bangalore 560060

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Abstract

Mandibular canal and its variation is of significant clinical importance. The bifid or trifid mandibular canal is a rare anatomical variation. The identification of course and configuration of inferior alveolar nerve is helpful in diagnosis, treatment planning and is of paramount importance to avoid intra operative and post-operative complications. This paper presents two cases of bilateral bifid mandibular canals which were accidentally identified – one on the Orthopantomogram and another on the CBCT. Both the cases required removal of lower third molar. The procedures were uneventful and one patient developed paraesthesia due to periodontal pathology abutting the canal which improved over time. Assessment and Intervention must be done carefully in such cases to have an uneventful procedure.

Keywords: Mandible, Inferior Alveolar Canal, Bifid Canal.

Introduction

The mandibular foramen in the ramus transmits inferior alveolar nerve and vessels. It travels in the mandibular canal, giving off multiple branches to the teeth and exits at mental foramen and continues as incisive nerve.[1] The nerve is around 4mm in diameter.[2] The anatomical variations of mandibular canal are, it is either close to the alveolar margin or makes a deep curve or runs at the mid-level of the body of the mandible. The mandibular canal appears as a linear radiolucency with radiopaque borders superiorly and inferiorly on the radiograph. The accessory inferior alveolar canal can be bifid or trifid canal. The term bifid is a Latin word meaning a cleft into two parts.[2] The accurate assessment of the course of the inferior alveolar canal is important in achieving profound anaesthesia, removal of impacted third molars,

placement of implants, orthognathic surgery, fracture reduction and treatment of pathology. The injury to inferior alveolar neurovascular bundle can lead to bleeding, paraesthesia, anaesthesia, traumatic neuroma formation. In edentulous jaws, bone resorption can result in canal running close to the alveolar ridge.[3,4]

Case report 1

A 73-year-old patient reported with a chief complaint of pain in the right lower posterior region for six months, swelling since one month and paraesthesia since 15 days. On examination, extra oral swelling measured 3 x3 cms, extended from ala tragal line superiorly to about 2cms below the lower border of the mandible. There was a draining sinus intraorally in right lower third molar region. On probing through the sinus presence of tooth was ascertained. The provisional diagnosis of dentoalveolar abscess was made. OPG showed horizontally impacted 48. The CBCT showed horizontally impacted 48 along with peri coronal radiolucency extending to involve the entire crown and the root of the tooth. Bifurcation of the mandibular canal bilaterally was observed. Bifid mandibular canal was starting at the mandibular foramen running below the main canal and parallel to it and converging at the mental foramen bilaterally (figure 1). The tooth was removed under local anaesthesia. Post operatively, the patient had mild paraesthesia for 3 weeks which gradually improved.

Case report 2

A 21-year-old female patient reported with a chief complaint of pain in the lower left back tooth region. On examination, it was a Pericoronitis in relation to 38. Orthopantomogram was advised. On OPG, bilateral double tram lines were observed. The CBCT of mandible showed Bifid mandibular canal bilaterally. The accessory canal started at the mandibular foramen running parallel to the main canal and converged at the mental foramen (figure 2). The third molar was surgically removed. The Peri-operative and post-operative period was uneventful.

Discussion

According to Chavez et al. During embryologic development there are 3 inferior alveolar nerve innervating the anterior teeth, premolars and molars which eventually fuse together and form a single nerve with one canal.[10] This explains lack of fusion of any one of the nerve would lead to occurrence of accessory canals.[4,5] The incidence of bifid or trifid mandibular canal reported earlier was low probably because of the availability of Orthopantomogram. The panoramic radiographs are not adequate to identify second accessory canals especially if it is a narrow one. The anatomical structures which can give a false image of a canal are deep mylohyoid groove, condensation of bone along the mylohyoid muscle origin and intra bony dense trabeculations.[4,5,6]

In both the cases discussed above the mandibular canal was bifid and bilateral and it is a rare occurrence. The canal bifurcation started at the mandibular foramen running below the main canal parallel to it and converging at the mental foramen and exited as a single nerve. The radiographic features of both the cases belongs to type 2D Langlias classification and on CBCT it was confirmed and according to Naitoh et al it belongs to forward canal category with confluence that is sub type B. Classical inferior alveolar nerve block technique was used in both case and adequate anaesthesia was obtained.

In 1973, Patterson discovered a case of unilateral BMC with two mental foramina and Kiersch and Jordan published a case of BMC found on radiograph. Nortje et al and Langlias et al found 0.9% and 0.96% incidence of

bifid mandibular canal on panoramic radiographs. Similar study by Grover and Lorton, Sanchiz et al, Zografos et al, Durst and Snow found 0.08%, 0.35%, 0.4%, 8.3% rate of occurrence of BMC respectively[6]. Lindh et.al reported 25% on the panoramic radiography.[3] The literature shows incidence of Bifid Mandibular Canal on Panoramic radiograph ranges from 0.08% and 0.95%.[3] The frequency of BMC on CBCT is 15.6-64.8%.[7] Kuribayashi et al in a study reported the incidence of 15.6% of BMC on CBCT. The other structures which mimic BMC on panoramic images are grooves of the mylohyoid nerve located in the rami of the mandible, on the inner surface.

Langlais et.al classified Bifid mandibular canal based on the radiograph-

Type 1- Unilateral or bilateral extending to the region of the third molar. Type 2 - A. Unilateral extending along the main canal and then coming together in the mandibular rami. B. Unilateral extending along the main canal and then coming together in the mandibular body. C. Bilateral extending along the main canal and then coming together in the mandibular rami. D. Bilateral extending along the main canal and then coming together in the mandibular body

Naitoh et.al based on CBCT in relation to source site and course of the accessory canal classified Bifid mandibular canal into 4 categories. The Forward, Buccolingual canal, Dental canal and Retromolar canal. 1.Forward canal- the accessory branch emerges from the upper border of the main canal. This is of 2 type, A. Forward canal without confluence- It separates from the mandibular canal in the ramus and then extends to the 2nd molar area. Type B. Forward canal with confluence- It separates from the mandibular canal in the mandibular ramus extends anteriorly and then re-joins to the main mandibular canal. 2.The end of the separated canal reaches the root apex of the first, Second and third molar. 3.Retromolar canal- the branch emerges from the main canal and reaches the retromolar region. The most common variation was forward canal 27.9% and least was buccolingual canal 0.8%. Among the 4 categories, retromolar and dental canal variant are at risk during removal of impacted third molar, harvesting ramus graft. The profound anaesthesia can be obtained by Gow-Gates and Akinosi methods which allows deposition of local anaesthesia at the higher level particularly in type 4 canals where there two distinct origins of the canal. A retrospective study on 500 Turkish patients using CBCT to assess the variations of mandibular canal showed 40% incidence of BMC. Mandibular canal variation was 71.5% on the right side, 52.5% on the left side and 24% bilaterally.[10]

Kuribayashi et al, reported the incidence of 15.6% of Bifid mandibular canal in 3011 samples on CBCT. The diameter of the accessory canal in 51% of the cases were narrower. In 49% of the cases, they were equal or bigger than the diameter of the main canal. The evaluation of diameter of branches is important for estimating the risk of injury[11].

Conclusion

The identification of mandibular canal course and innervation play a vital role in treatment planning and execution of surgery. The use of CBCT allows for accurate 3-dimensional assessments.

Image Captions:

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Legend figure

Figure 1: Panoramic View of CBCT Showing Bilateral Bifid Canal