

Bifid mandibular canal: an aberrant anatomic variation



CrossMark

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Abstract

Objective: To review the literature and to present the report of a case with bifid mandibular canal.

Methods: A cone-beam computed tomography scan with incidental finding of bifid mandibular canal was studied and presented in different sections.

Results: The MC is a bilateral channel in the mandible that gives the passage to the inferior alveolar nerve, artery, and vein. It usually

presents as a single canal where a variation in anatomy has been reported. The bifid mandibular canal is such an anatomic variant where it splits into two canals.

Conclusion: The role of CBCT scans can be emphasized while performing procedures on posterior mandibular region, as it can provide the vital information regarding anatomical variation to avoid iatrogenic complication.

Keywords: Bifid mandibular canal, CBCT, Cone beam computed tomography, Inferior alveolar nerve, Local Anaesthesia

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Introduction

The mandibular canal (MC) is a bilateral channel in the mandible that gives the passage to the inferior alveolar bundle (nerve, artery, and vein). It begins at the mandibular foramen, runs obliquely downward and forward in the ramus, and then horizontally forwards in the body till mental foramen.¹ The portion anterior to mental foramen is referred as incisive canal.² The MC has an average diameter of 5 and 2.6 mm in the vertical and horizontal parts and usually present as a single large structure proximal to third molar region.^{3,4} The MC is normally located using panoramic radiographs where it appears as a dark ribbon of radiolucency flanked by two radiopaque white lines.² The unusual anatomic variation where it splits into two parts is known as Bifid MC and has reported occurrence ranging from 0.08–0.95%.^{5–8} It has been classified on the basis of anatomic configuration and location and pattern of duplication.^{5,7}

The use of cone-beam computed tomography (CBCT) has evolved much faster than anticipated and is accelerating rapidly for imaging of maxillofacial structures. Its three dimensional reconstructions has improved the diagnostic ability and enhanced the scope of research opportunities.⁹ The present paper reports an incidental finding of bifid MC on CBCT scan and highlights the clinical implications of the condition.

Case Report

A 36-year-old male was referred to an imaging centre at Delhi for CBCT scan for the evaluation of periapical radiolucency with relation to left mandibular first molar (tooth # 36). The scan was performed on i-CAT model Next generation with machine parameters set at 120KV, 5 mA, 130 mm FOV, 0.250 mm voxel size, and 7 s exposure times. The panoramic view showed large periradicular radiolucency surrounding the root apices of tooth # 36 and wide mandibular canal with bifurcation on left side [figure 1](#).

The coronal section perpendicular to alveolar ridge with two well-defined oval shaped areas close to the lingual cortical plate confirmed the presence of bifid mandibular canal [figure 2](#).

Discussion

The inferior alveolar nerve (n. alveolaris inferior) is the largest branch of the 3rd division of the fifth cranial nerve that divides into dental and incisive and mental branches to innervate mandibular teeth and adjacent structures.¹⁰ During rapid prenatal growth and remodelling in the ramus region, there is spreading of intramembranous ossification that commences from where the inferior alveolar nerve divides into mental and incisive branches during 7 weeks in utero.¹¹ The extension of ossification posteriorly along the lateral border of Meckel's

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Figure 1 Panoramic radiograph showing wide mandibular canal with bifurcation on left side

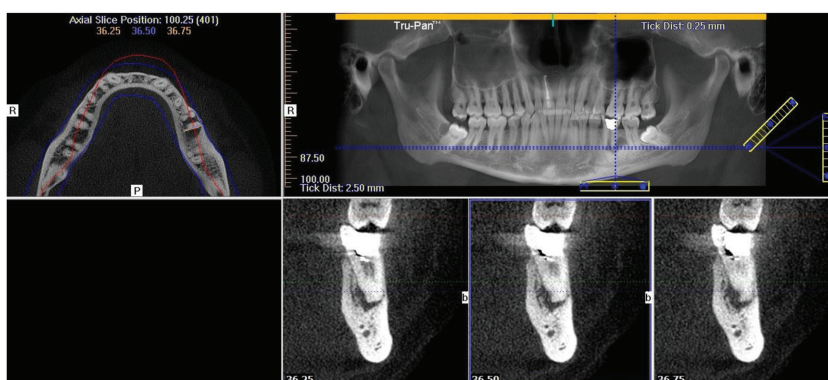


Figure 2 Coronal section perpendicular to alveolar ridge with two well-defined oval shaped areas depicting bifid mandibular canal

cartilage produces a gutter around the inferior alveolar nerve that eventually forms the mandibular canal. The incomplete fusion of these three nerves leads to bifid/trifid variants of MC.¹²

The precise information about the course of the canal can be revealed on cross-sectional CT images perpendicular to the alveolar ridge.¹³ The recent reports utilizing the CBCT scans noticed the presence of Bifid MC in the mandibular ramus region, which was observed in 65% of patients and 43% of sides.¹⁴

Variation in the anatomy and position of MC has important implication as presence of secondary neurovascular bundle can complicate the routine surgical and endodontic procedures involving the mandibular teeth. Inadequate anaesthesia may be possible with any bifurcation type, but especially when there are two mandibular foramina it would require performing anaesthesia at a higher level (gow-gates technique).¹⁵ The failure to identify such aberrations before surgical procedures involving endosseous implant placement and third molar extraction can lead to complications such as traumatic neuroma, paresthesia, and bleeding.^{2,13} The presence of secondary neurovascular bundle located in different plane makes the alignment of mandibular fracture segments difficult and can cause its impingement during fracture reduction.²

Conclusion

The presence of bifid MC is an unusual but not a rare finding. Using the CBCT scans as a supporting examination is recommended to avoid complications when perform surgical procedures on the posterior mandibular teeth since it can help to identify the anatomical variation of MC.

Conflict of Interest

The authors report no conflict of interest.

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