Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/sdj

Scientific article

Branching of mandibular canal on cone beam computed tomography images

Masoomeh Afsa[a,*], *Hamid Rahmati*[b]

[a]*Department Of Maxillofacial Radiology, Persian Gulf Oral and Dental Diseases Research Center, Hormozgan University Of Medical Sciences, Shahid Naser Blvd., Dental School, Bandar Abbas, Iran*

[b]*Dentist, Department Of Endodontics, Persian Gulf Oral and Dental Diseases Research Center, Hormozgan University Of Medical Sciences, Bandar Abbas, Iran*

ARTICLE INFO

Keywords:
Inferior alveolar canal
Cone beam computed tomography
Accessory
Branch

ABSTRACT

Background: Mandibular neurovascular canal contents may be vulnerable to damage during mandibular surgical procedures. Greater knowledge of the location and configuration of the mandibular canal can help in the safe performance of these procedures in the dental clinic. Cross-sectional CBCT imaging is a good modality for studying the course, location, configuration and accessory branches of the mandibular canal. The aim of this study was to observe the branching of the mandibular canal at different segments of the mandible and mandibular tooth groups.

Methods: CBCT images of 116 mandibular halves were included in this study. The presence of secondary branching of the mandibular canal in the ramus, retromolar area, molar and premolar teeth as well as the length, diameter and angle of these branches were observed.

Results: sixty nine mandibular halves (59.5%), had a main canal with no branching, There were 36 IAC (31%) with one, 8 (6.9%) with two, 2 (1.7%) with three and 1(0.9%) with 5 accessory branches. Of these secondary branches, 16 (25.4%) were in the ramus, 16(25.4%) in the retromolar, and 31(49.2%) in the molar regions.

Conclusion: Advanced cross-sectional imaging modalities especially CBCT is a suitable tool for observing anatomic characteristics of mandibular canal to preserve this vital structure in surgical procedures.

Introduction

The mandibular canal which passes through the mandible from the mandibular foramen to the mental foramen and includes the inferior alveolar artery, vein and nerve; and may be vulnerable during surgical procedures such as impacted third molar extractions, dental implants placement, sagittal split ramus osteotomy, and fixation of mandibular fractures. Greater knowledge of the location and configuration of the mandibular canal can help in safer performance of different procedures in the dental clinic [1,2].

Variations in the course of the mandibular canal have been reported using cadavers and dry skulls [3]. Some of these variations (so called bifid and trifid mandibular canals)

*Corresponding author. Fax: +98 7633350458.
E-mail address: masoomeh.afsa@hums.ac.ir (M. Afsa).

http://dx.doi.org/10.1016/j.sdj.2016.10.005
0377-5291/

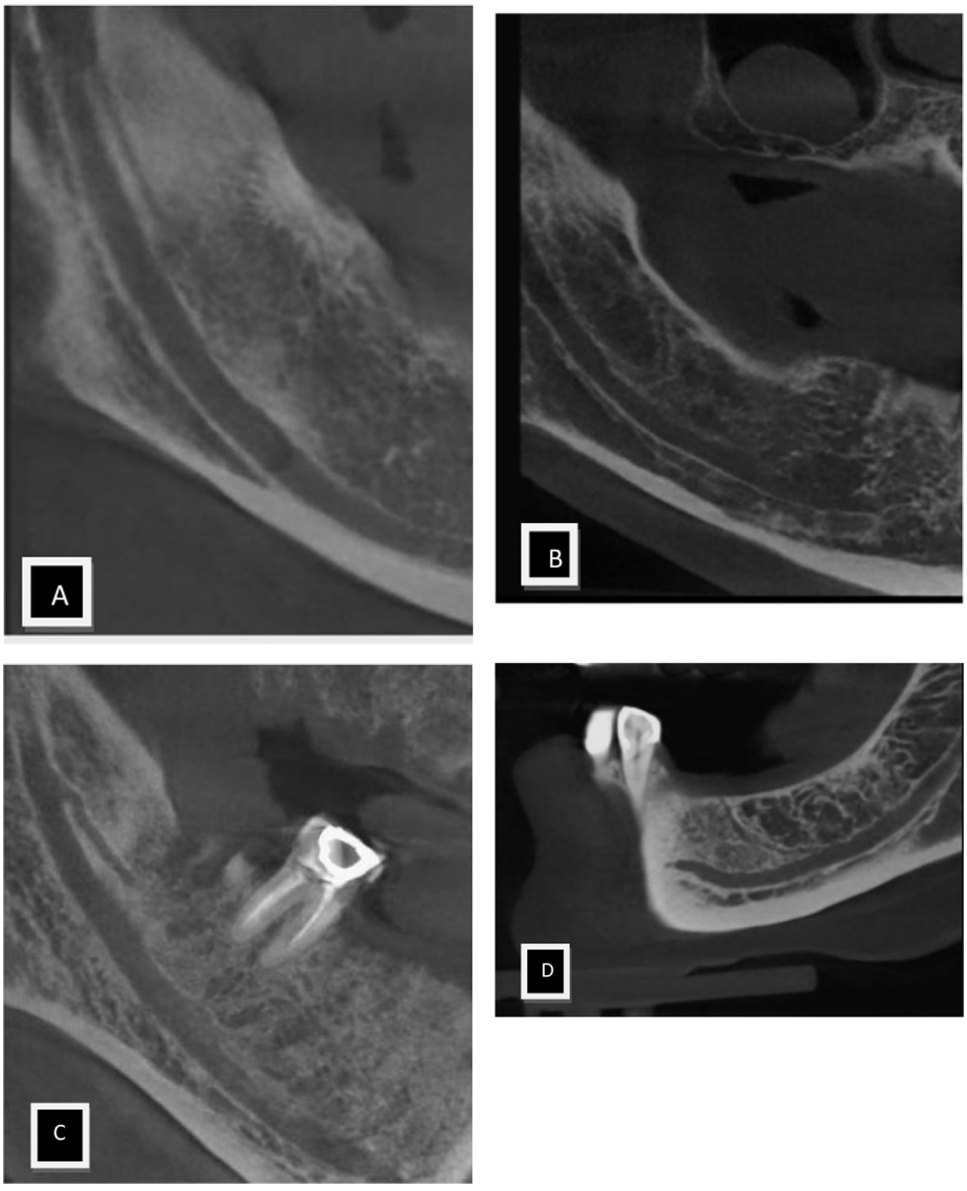

Fig. 1 – Secondary Branches of Mandibular Canal in Different Segments of Mandible. A: Ramus-B and C: Retromolar Area. D: Molar Area.

have been reported using different imaging modalities [2]. However; estimation of the location, size and configuration of the inferior alveolar nerve during mandibular surgery is usually difficult using conventional two dimensional panoramic images. Compared with panoramic images, Cone Beam Computed Tomographic (CBCT) is a better tool at displaying the neurovascular bundle giving better visualization of this vital structure during surgical procedures of jaw bones cone beam CT can provide high-resolution three-dimensional images and detect accessory canals with a narrow diameter including those that bifurcate in any direction. Furthermore, it can correctly differentiate true from false mandibular accessory canals [4]. The distribution of these accessory canals is not distinctly depicted on the spiral CT images owing to their lower resolution.

The cross-sectional limited CBCT images show features that coincide with those of the gross anatomical sections. Also the trabecular bone and bifid mandibular canal walls can be discriminated on these images [5]. The nerve along with the inferior alveolar artery and vein sends branches to innervate posterior teeth through the inferior alveolar canal (IAC) before splitting into incisive and mental components [2]. In CBCT images, occasionally small tubular structures with diameters even less than 1 mm are detected which originate from the main mandibular canal travelling parallel to the canal or toward the different mandibular teeth groups. In the literature, there are many studies that have examined the incidence and patterns of mandibular canal bifidity. But, most of the reports do not include these smaller branches. This descriptive study aimed to determine the presence,