Bilateral bifid mandibular canal: A case report

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Abstract
The objective of this case report is to help clinicians identify bifid mandibular canals on panoramic radiographs and subsequently use the information in the modification of dental treatment planning. A 45-year old man was referred to the service of Oral Diagnosis and Radiology. Routine panoramic radiography, suggested the presence of bilateral bifid mandibular canals (BMC). Mandibular computed tomography revealed a clear view of bilateral mandibular canals. BMC can be detected on a panoramic radiograph.

Key words: Bifid mandibular canal, panoramic radiography, cone beam computed tomography.

Introduction
The mandibular canal, or the inferior alveolar canal, transmits the inferior alveolar nerve, a branch of the third division of the trigeminal nerve, and the associated vessels. The canal typically extends from the mandibular foramen to the mental foramen. The terminal dental and incisive branches leave the inferior alveolar nerve within the canal to supply the teeth and adjacent structures. A terminal branch leaves the canal at the mental foramen to become the mental nerve (1). The location and configuration of mandibular canal variations are important in surgical procedures involving the mandible, such as extraction of an impacted third molar, dental implant treatment, and sagittal split ramus osteotomy (2).

When we reviewed the literature regarding BMC; we encountered only two case reports that had two mental foramina (3,4). The following case report describes a patient with bilateral bifid mandibular canals with two mental foramina by using cone beam computed tomography (CBCT).

Case Report
A 45-year-old man was referred to Department of Oral Diagnosis and Radiology for the prosthetic restoration. The patient stated in his anamnesis that he wanted an implant treatment since he had problems with accepting a removable lower denture. On the routine panoramic radiograph, bilateral, duplicated mandibular canals were suspected. CT scans with axial, sagittal and coro-
Fig. 1A and 1B. The panoramic view of the patient formed on a selected axial section.

Fig. 2A and 2B. The sagittal image of patient’s right and left mandible.

Fig. 3A and 3B. The cross-section images of patient’s right and left mandible.

Discussion

Nortjé et al. (5,6) found an occurrence of bifid inferior mandibular canals of 0.9%. Grover et al. (7) were only able to find 0.08% of radiographs suggestive of bifurcation of the inferior alveolar nerve. Langlais et al. (8) found 0.95% cases of bifid inferior mandibular canals. Klinge et al. (9) reported that mandibular canal of specimen cadavers was not visible in 36.1% of panoramic radiographs. Also, Lindh et al. (10) reported that the mandibular canal of specimen cadavers was clearly visible in approximately 25% of panoramic radiographs. Thus, it was considered that there was a limitation in the observation of the mandibular canal using panoramic radiography. Detailed 2-D and 3-D images could be recon-
structed using CBCT. When further studies regarding the BMC will be conducted using CBCT, a frequency of BMC will increase compared with previous studies using panoramic radiography.

Nortjé et al. (5,6) reported that there were three main variants of mandibular canal division or duplication. Another radiographic study by Langlais et al. (8) also revealed similar variations, with four different patterns of bifid mandibular canals being described. The bilateral bifid canals in our cases originated from two separated foramen on both sides. In this respect, our cases might be considered as appropriate for the Type III classification by Nortjé and Type IV classification by Langlais. Nevertheless, the fact that, as opposed to the upper canals, the duplicate canals on both sides extended into different mental foramen allows us to consider our cases as a new division.

The clinical relevance of this issue is to remind clinicians of the variable anatomy of the mandibular canal. Bifid mandibular canals may have some important clinical implications. Inadequate anesthesia may be possible with any bifurcation type, but especially when there are two mandibular foramina such as our case. Conventionally, the presence of profound soft tissue anesthesia of the ipsilateral lip, chin and teeth is indicative of an effective inferior alveolar nerve block. If a patient experiences only soft tissue anesthesia around the injection site, but not of the ipsilateral lip or chin, then a problem with local anesthesia technique is likely to be the cause of the failure. However, if there is soft tissue anesthesia of the lips and chin but not the teeth, one should consider anatomical variation.

If the problem is considered to be due to a problem with local anesthesia, a repeat inferior alveolar nerve block should prove effective provided the operator is able to correct his or her technique. If the problem is thought to involve anatomical variation, other types of local anesthesia technique are indicated, as repeating the same procedure is likely to be ineffective and may result in increased postoperative pain and even trismus (11).

**Conclusion**

The location and configuration of the mandibular canal should be carefully observed using cross-sectional images of the mandibular canal and images perpendicular to them, reconstructed by CBCT, when conducting surgical procedures such as implant treatment involving the mandible.

**References**