

Anatomical variations in developing mandibular nerve canal: a report of three cases

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ABSTRACT

Anatomical variations in the known pattern and course of inferior alveolar nerve are of considerable interest to a dentist. We report three cases, two paediatric cases with bifid canals and a case of 20-year-old female patient with trifid mandibular nerve canal and discuss in brief about the development of mandibular nerve canal. *Neuroanatomy; 2005; 4: 28–30.*

Key words [mandibular] [nerve] [canal] [anatomy] [variation]

Introduction

Chavez et al. [1] suggested that during embryonic development three canals fuse to form a single nerve canal. Failure of these canals to fuse can explain presence of multiple canals in some individuals. In *case-1* and *case-2* there are bifid canals, one nerve canal is supplying the developing permanent tooth bud while the other branch is following its course into the mandible. To the best of our knowledge *case-3* is the first reported case of a trifid mandibular nerve canal.

Case Reports

Case 1

A 9-year-old girl reported at our department with a request for panoramic radiograph to evaluate eruption status of permanent teeth. Panoramic radiograph (Fig-1 and Fig-2) indicated presence of bifid canals on the both the sides. Bilaterally, one canal is supplying the developing tooth bud of permanent third molar while the other branch is extending its course into the mandible.

Case 2

A 10-year-old boy underwent a routine panoramic radiographic examination. Panoramic radiograph (Fig-3) revealed bifid canal on the right side with a branch supplying the developing tooth bud of third permanent molar while the other branch followed its course in the mandible.

Case 3

A 20-year-old female patient reported with a request for a panoramic radiograph for evaluation of orthodontic treatment and pain in the lower left molar teeth. Panoramic radiograph (Fig-4) revealed presence of bilateral lower impacted third molars and multiple nerve canals on the left side. Patient was made aware of presence of multiple mandibular canals and after her consent, a CT scan was advised. Coronal CT scan of 2 mm slice thickness revealed presence of multiple canals on the left side. Coronal section in the mandibular ramus region showed presence of a canal perforating the lingual cortex, innervating and terminating after supplying the left lower third molar (Fig-5). The coronal section at the second molar region revealed presence of two canals on left side but only one canal on the right side (Fig-6). Based on the findings on the panoramic radiograph and CT scan a final diagnosis of a trifid mandibular canal was made.

Discussion

Chavez et al. [1] suggested that during embryonic development there might be three inferior dental nerves innervating three groups of mandibular teeth. The canal to the incisors appeared first followed by the canal to the primary molars and subsequently canal to the permanent molars. These canals are directed from the lingual surface of mandibular ramus towards different tooth groups. During rapid prenatal growth and remodeling

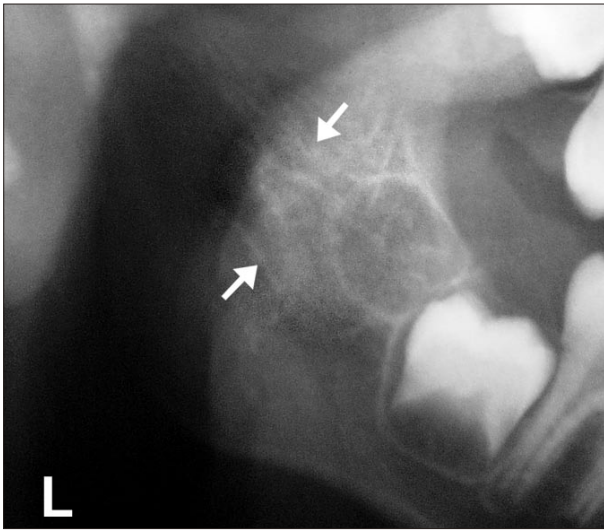


Figure 1. Panoramic radiograph of *case-1* (left side) showing a branch supplying the developing third molar and another branch following its course in the mandible.

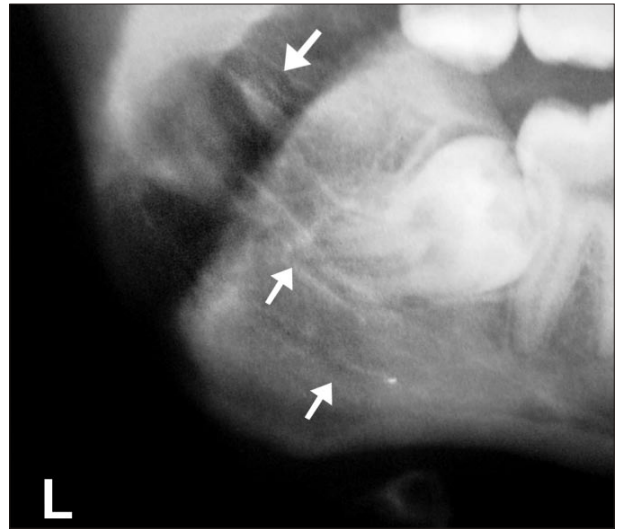


Figure 4. Panoramic radiograph of *case-3* showing trifold mandibular canal on the left side.

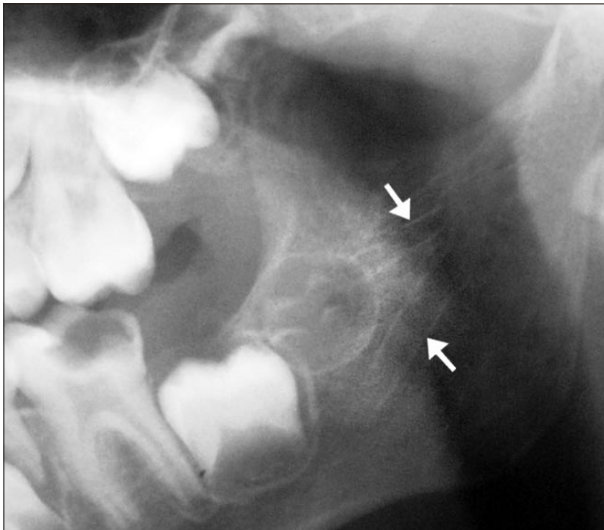


Figure 2. Panoramic radiograph of *case-1* (right side) showing a branch supplying the developing third molar and another branch following its course in the mandible.

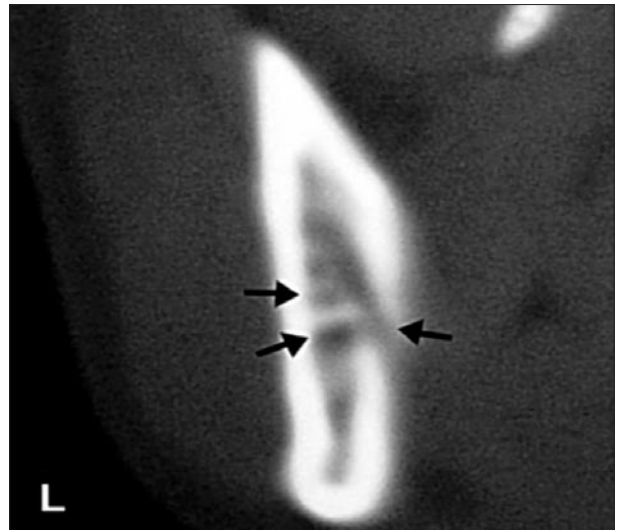


Figure 5. Coronal CT scan section at the ramus region showing a trifold canal with perforation of lingual cortex.



Figure 3. Panoramic radiograph of *case-2* (right side) showing a branch supplying the developing third molar and another branch following its course in the mandible.

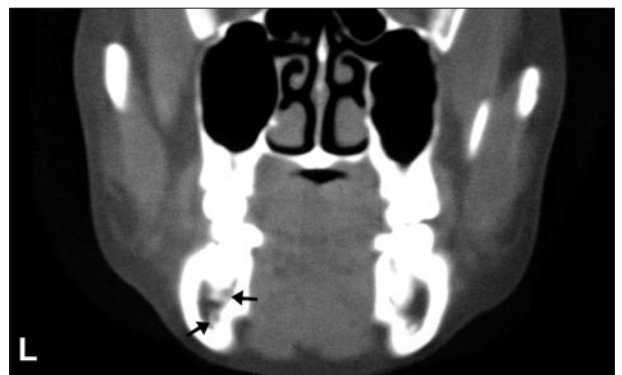


Figure 6. Coronal CT scan at molar region showing two canals.

in the ramus region there is coalescence of canal entrances that are obvious at birth. These observations are consistent with panoramic radiographic findings in case-1 and case-2 in which there are different branches supplying the developing tooth buds of permanent third molars and extending into the mandible.

This theory also explains the occurrence of trifid mandibular canals in some patients secondary to incomplete fusion of these three nerves as observed in case-3.

It is suggested that two canals showed a relatively parallel course but there were variations in the orientation of the third canal with distribution towards the molar crypt [1]. In case-3, CT scan showed a branch that has perforated the lingual cortex to supply the third molar (Fig-5) while two branches are following their course in the mandible (Fig-6).

The incidence of bifid canals is considered to be very low and reported to be 0.08%, 0.4% and 0.9% in various

studies [2, 3]. It is important for dentists to identify the presence of bifid canals to modify anesthetic techniques to avoid pain and discomfort to patients [4, 5]. Therefore identification of such variations in patterns of mandibular nerve canal are of considerable interest to dentists.

It is reported that inferior alveolar nerve is a single canal in 60% cases while in other specimens the canal was less defined and the nerves and vessels were spread out to occupy a space within the bone rather than a tunnel [6]. This can explain the absence of complete course of nerve canal in case-1 and case-2. With further growth and remodeling of the mandible follow up radiographs in case-1 and case-2 may show the complete path of nerve canal in the mandible.

As different nerve branches supply different teeth groups, congenital absence of some teeth can be attributed to lack of development of different nerve branches.

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