The Mylohyoid Nerve Traveling within the Mandibular Canal and Frequency of Partial Mandibular Canal

Canalis Mandibulae İçerisinde Seyreden Nervus Mylohyoideus ve Parsiyel Mandibular Kanalın Sıklığı

Cenk KILIÇ,[a]
Kıvanç KAMBUROĞLU,[b]
Tuncer ÖZEN,[c]
Ali Rıza İlker CEBECİ[d]

Departments of
[a]Anatomy,
[c]Oral Diagnosis and Radiology,
GATA,
[b]Department of Oral Diagnosis and Radiology,
Ankara University,
Faculty of Dentistry,
[d]Private Clinic,
Tomoloji Dentomaxillofacial Radiology Center, Ankara

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Yazışma Adresi/*Correspondence:*
Cenk KILIÇ
GATA,
Department of Anatomy, Ankara
TÜRKİYE/TURKEY
ckilicmd@yahoo.com

ABSTRACT Objective: The mylohyoid nerve is a branch of the inferior alveolar nerve and travels through mylohyoid groove in the medial side of the mandible. This nerve innervates the mylohyoid muscle and the anterior belly of the digastric muscle. The purpose of this study was to determine the variations of the course of the mylohyoid nerve and frequency of the partial mandibular canal. **Material and Methods:** Thirty dry and 25 cadaver mandibles; and 86 dental volumetric tomography images of routine patients were used. Presence of the mylohyoid canal, mylohyoid foramen and partial mandibular canal were examined in all specimens. In all cadaver mandibles, the position of the mandibular canal was assessed from dental volumetric tomography images and by dissection after imaging. **Results:** We found that the mylohyoid nerve traveled within the mandibular canal on cadaver mandibles (6%). Additionally, the mandibular canal was partial in 5 (8.33%) dry hemi-mandibles and 27 (15.69%) dental volumetric tomography images of routine patients. **Conclusion:** The mylohyoid nerve can be damaged during surgical procedures of the mandible such as osteotomy and salivary gland operations. Clinicians should be aware of the possible anatomical variations of the mylohyoid nerve and of complications that may arise from a mylohyoid nerve traveling within the mandibular canal.

Key Words: Mandible; mandibular injuries

ÖZET Amaç: Nervus mylohyoideus n. alveolaris inferior'un bir dalıdır ve mandibula iç yüzündeki sulcus mylohyoideus'ta seyreder. Bu sinir m. mylohyoideus ve m. digastricus'un ön karnını uyarır. Bu çalışmanın amacı, n. mylohyoideus'un seyir varyasyonlarını ve parsiyel canalis mandibule sıklığını belirlemekti. **Gereç ve Yöntemler:** Otuz kuru kemik mandibula, 25 kadavra mandibulası ve 86 rutin hastalara ait dental volumetrik tomografi görüntüsü kullanıldı. Tüm örneklerde mylohyoid kanal, mylohyoid foramen ve parsiyel canalis mandibulae'nin varlığı incelendi. Tüm kadavra mandibulalarında canalis mandibulae'nin pozisyonu dental volumetrik tomografi görüntüleriyle ve görüntüleme sonrası diseksiyon ile değerlendirildi. **Bulgular:** Kadavra mandibula'larında %6 oranında canalis mandibulae içerisinde seyreden n. mylohyoideus bulduk. Ayrıca canalis mandibulae 5 (%8.33) kuru yarım mandibula'da ve 27 (%15.69) rutin hastalara ait olan dental volumetrik tomografi görüntüsünde parsiyeldi. **Sonuç:** Nervus mylohyoideus osteotomi ve tükürük bezi operasyonları gibi mandibula'nın cerrahi işlemleri esnasında hasar görebilir. Klinisyenler canalis mandibulae içerisinde seyreden bir n. mylohyoideus'un bulunmasından kaynaklanabilecek komplikasyonların farkında olmalıdırlar.

Anahtar Kelimeler: Mandibula; mandibular yaralanmalar

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The mylohyoid nerve is a branch of the inferior alveolar nerve that innervates the mylohyoid muscle and the anterior belly of the digastric muscle.[1] The mylohyoid nerve usually travels through the mylohyoid groove located in the medial side of the mandible; however,

transition of the mylohyoid groove into a partially or fully osseous canal has been previously reported.[2,3] The mylohyoid nerve can be damaged during surgical procedures of the mandible such as osteotomy and salivary gland operations. Moreover, accessory innervation of mandibular anterior and posterior teeth pulp by the mylohyoid nerve's sensory components is thought to be one reason for failure in the anesthesia of the inferior alveolar nerve.[4-7] Therefore, the position and course of the mylohyoid nerve is important in operations on the mandibular region. The aim of this study was to determine the variation in the course of the mylohyoid nerve, in dry and cadaver mandibles; and dental volumetric tomography images of routine patients.

MATERIAL AND METHODS

We examined 30 dry and 25 cadaver mandibles; and 86 dental volumetric tomography images (Imtec Imaging, Ardmore, OK, US) of routine patients in this study. Subjects and patients with a history of trauma, surgical procedures or disorders on the head were excluded from the study.

Presence of the mylohyoid canal or mylohyoid foramen or partial mandibular canal were analyzed in all dry hemimandibles, all cadaver mandibles and all dental volumetric tomography images of routine patients.

In all cadaver mandibles, the position of the mandibular canal was assessed from dental volumetric tomography images and by dissection after imaging. Using a low speed diamond saw (Model 650 South Bay Tech. California, USA), the hemimandibular specimens were sectioned at 8 serial sites and 7 bony slices were obtained.

RESULTS

The mandibular canal was seen in all dry hemimandibles, all cadaver mandibles and all dental volumetric tomography images. In addition, mylohyoid nerve and inferior alveolar nerve were visible in all cadaver mandibles. No mylohyoid canal or mylohyoid foramen was observed in any of the dry hemimandibles, cadaver mandibles and dental volumetric tomography images.

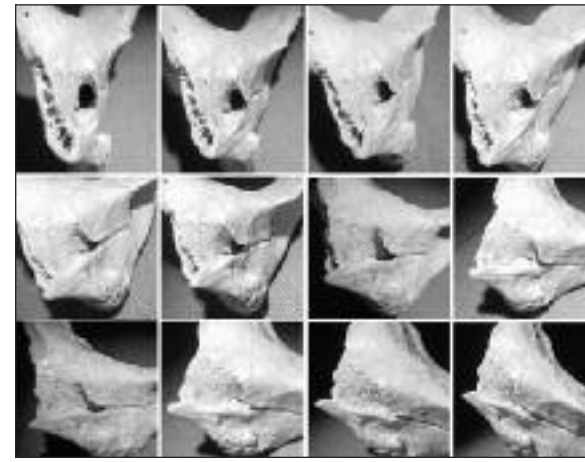

FIGURE 1: Partial mandibular canal in left side of a dry mandible from different views.

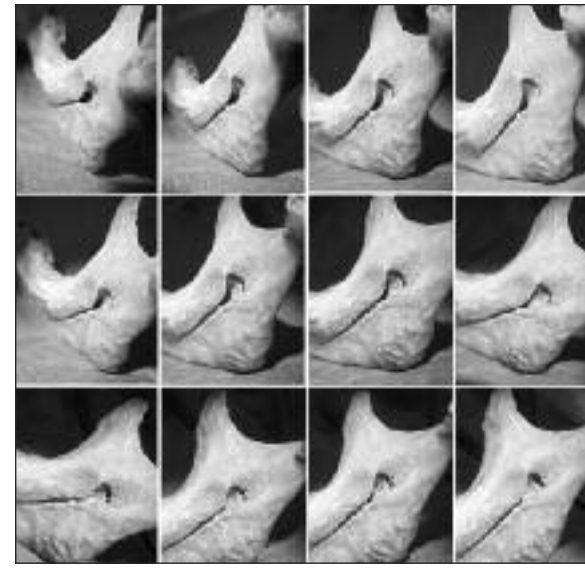

FIGURE 2: Partial mandibular canal in right side of a dry mandible from different views.

The mandibular canal was partial in 5 (8.33%) dry hemi-mandibles (Figure 1, 2) and 27 (15.7%) dental volumetric tomography images of routine patients (Figure 3-7). Additionally, the mylohyoid nerve traveled within the mandibular canal was seen on 3 (6%) cadaver hemi-mandibles and the mandibular canal was partial in these specimens (Figure 8-10).

DISCUSSION

Our study documents the route of the mylohyoid nerve within the mandibular canal. Arensburg and

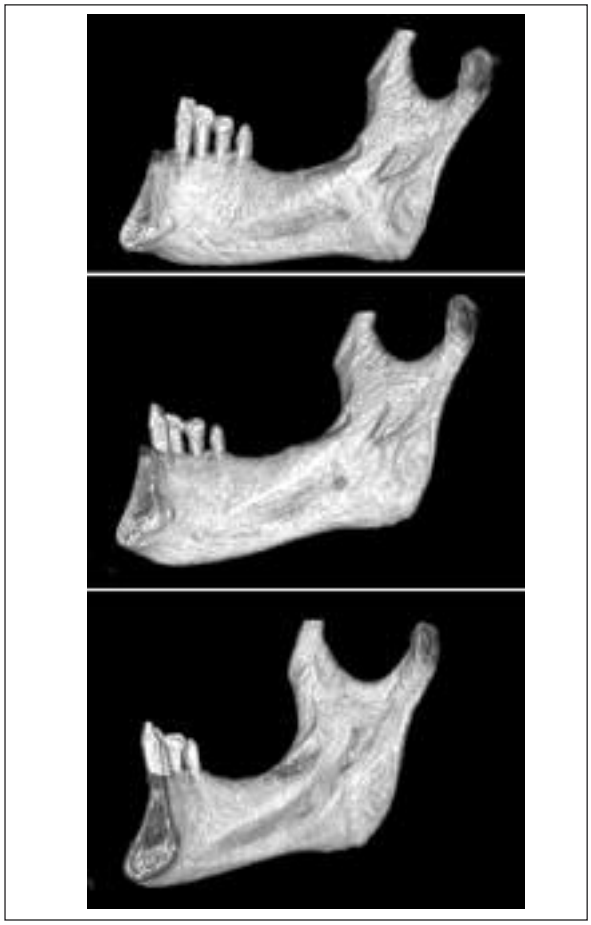

FIGURE 3: Partial mandibular canal of right side mandible in dental volumetric tomography images from different views.

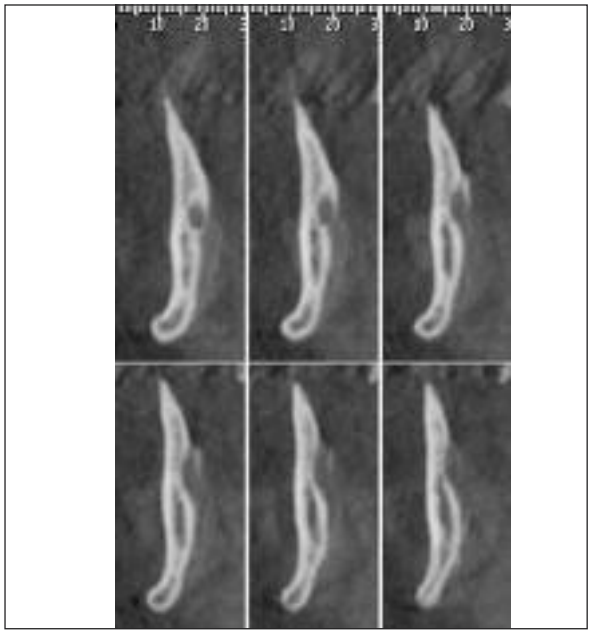

FIGURE 4: Partial mandibular canal in right side mandible from dental volumetric tomography images at different levels.

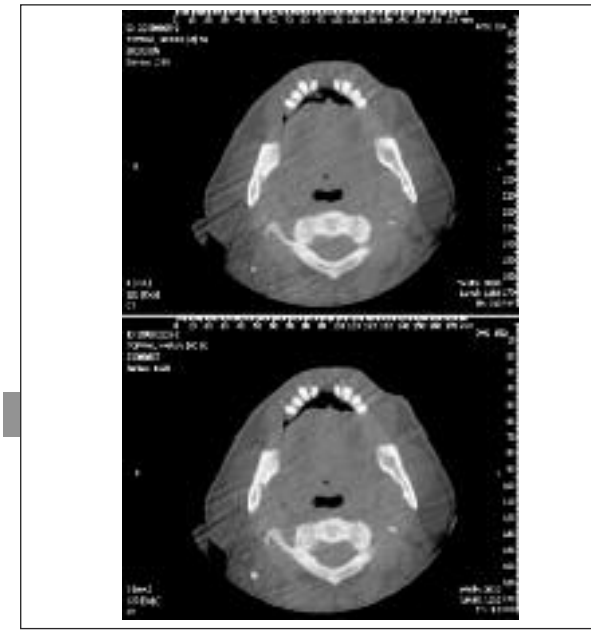

FIGURE 5: Initio of the partial mandibular canal at right mandible is seen on dental volumetric tomography images. Note that the left side is normal.

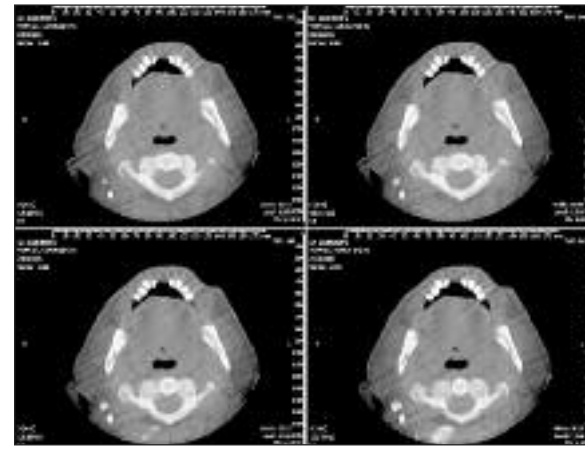

FIGURE 6: Partial mandibular canal at right mandible is seen on dental volumetric tomography images. Note that the left side is normal.

Nathan[2] reported that out of a total of 390 dry hemimandibles, 83.6% had a mylohyoid groove, whereas this groove was partially or fully converted to a bony canal in 16.4%. Ossenberg[8] reported that the mylohyoid bridge was present in 0.47 of 844 cases in Europe (French) population. The ossification of the mylohyoid groove may best be explained by the membrane's embryologic origin from the Meckel's cartilage which is close to the canal.[2]

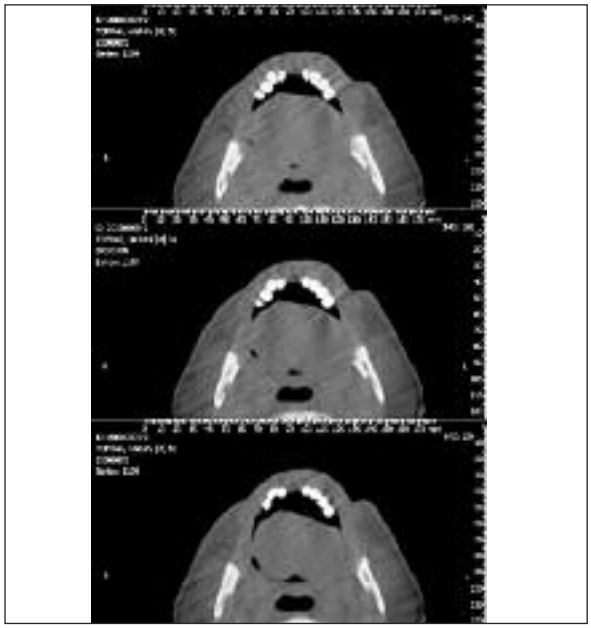

FIGURE 7: Mandibular foramen is seen on both sides of mandible in dental volumetric tomography images.

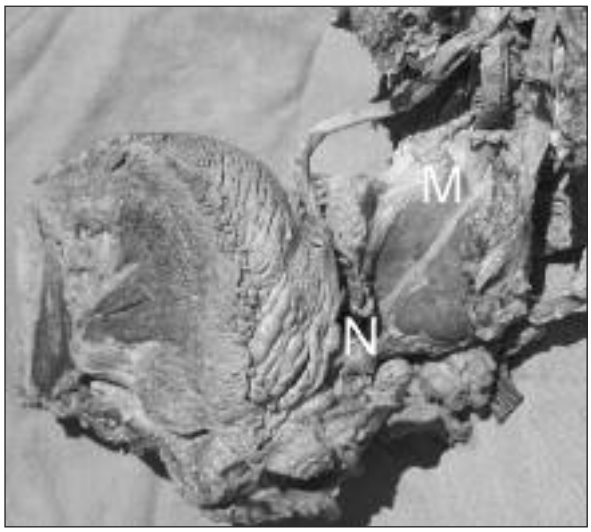

FIGURE 8: Lingual view of right hemi-mandible. Mylohyoid nerve (N); mandibular canal (M).

Bennett and Towsend[3] observed the mylohyoid nerve to travel through either a mylohyoid groove or a mylohyoid canal. Out of 247 samples we observed partial mandibular canal in 35 (12.41%). A study is being carried out regarding the percentage of mylohyoid nerve in patients which we detected mandibular canal in dental volumetric tomography images.[3]

We describe the variations of this unusually course, and recommend that it be named "the mylohyoid nerve traveling within the mandibular canal". Multiple mandibular canal (bifid or trifid) have been reported previously.[9-13] Mandibular inju-

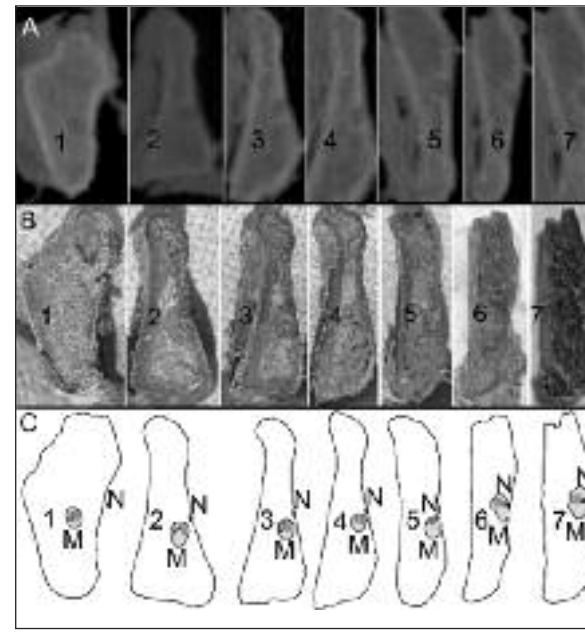

FIGURE 9: Right hemi-mandible. A: Dental volumetric tomography images. B: Eight serial sections and seven bony slices (anterior view). C: Schematic drawing of seven bony slices. Bony slices (1-7); mylohyoid nerve (N); mandibular canal (M).).

FIGURE 10: Lingual view of right hemi-mandible. Eight serial sections and seven bony slices. Bony slices (1-7); mylohyoid nerve (N); mandibular canal (M)).

ries are frequently encountered in routine clinical practice[14-17] and alternative treatment modalities are being developed.[18]

Clinicians should be aware of the possible anatomical variations of the mylohyoid nerve and of complications that may arise in cases where the nerve travels within the mandibular canal. In such cases, the mylohyoid nerve can be damaged during surgical procedures of the mandible, including osteotomies and salivary gland operations. The anatomical and radiographic findings of a mylohyoid nerve traveling within the mandibular canal that are highlighted in this study suggest that further research is necessary to obtain more detailed knowledge regarding variations of position and course of the mylohyoid nerve.

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