Surgical and Radiologic Anatomy (2021) 43:1259–1272
https://doi.org/10.1007/s00276-021-02708-7

REVIEW

Anatomical variations of the mandibular canal and their clinical implications in dental practice: a literature review

J. J. Valenzuela-Fuenzalida[2,4] · C. Cariseo[3] · M. Gold[3] · D. Díaz[2] · M. Orellana[1] · Joe Iwanaga[5,6,7]

Received: 8 December 2020 / Accepted: 5 February 2021 / Published online: 25 February 2021
© The Author(s), under exclusive licence to Springer-Verlag France SAS part of Springer Nature 2021

Abstract

Introduction The anatomical variations of the mandibular canal have been described according to the number of additional branches it presents, bifid and trifid. Within the bifids we can also find subtypes of variations such as the retromolar mandibular canal. These anatomical variations can have important clinical implications for the work of dental professionals.

Methods A systematic search of the literature was carried out in different databases that met the following criteria: articles published between 2000 and 2020, and articles that established a clinical correlation with variations in the mandibular canal.

Results After applying inclusion and exclusion criteria, 32 articles were obtained, in which the variations of the mandibular canal were identified, their prevalence and incidence, which was very varied between the different articles, it was also found that the CBCT was the main technique to identify the anatomical variations of the mandibular canal. Lastly, the anatomical variations of the mandibular canal have a direct clinical correlation with pre-surgical, intra-surgical and postsurgical complications in pathologies that require surgical intervention.

Conclusions The anatomical variations of the mandibular canal have a high incidence, so knowing them is of vital importance both for clinicians and anatomy professors who provide morphological training. We believe that research should focus on describing and diagnosing the causes of these anatomical variations. That said, there is also a continuous challenge for all health professionals to learn about the different anatomical variations that the human body presents and how these can affect clinical practice.

Keywords Mandibular canal · Bifid canal · Anatomical variations · Classifications · Mandibular canal · Clinical anatomy · Retromolar canal

✉ J. J. Valenzuela-Fuenzalida
juan.kine.2015@gmail.com

1 Escuela de Medicina, Universidad Finis Terrae, Santiago, Chile

2 Department of Morphology and Function, Faculty of Health Sciences, Universidad de las Américas, Santiago, Chile

3 Departamento de Morfología, Facultad de Medicina, Universidad Andrés Bello, Santiago, Chile

4 Departamento de Ciencias Química y Biológicas Facultad de Ciencias de la Salud, Universidad Bernardo O'Higgins, Santiago, Chile

5 Department of Neurosurgery, Tulane Center for Clinical Neurosciences, Tulane University School of Medicine, New Orleans, LA, USA

6 Division of Gross and Clinical Anatomy, Department of Anatomy, Kurume University School of Medicine, Kurume, Fukuoka, Japan

7 Dental and Oral Medical Center, Kurume University School of Medicine, Kurume, Fukuoka, Japan

Introduction

The mandibular canal and its contents run through the mandible in a longitudinal direction, originating in the mandibular foramen, and then descending through the spongy tissue of the mandible in an anteroinferior direction, following a curve of anterosuperior concavity [12, 32, 55]. Although it has been controversial for a long time that the mandibular canal wall is either cortical or trabecular bone [2, 3, 53, 58], recent studies by Iwanaga et al. have proved the superior wall of the mandibular canal is classified into four groups: class I (trabecular), class II (osteoporotic), class III (dense/irregular), and class IV (smooth) [17–19].

The mandibular canal can be divided into three segments: a posterior segment, obliquely anteroinferiorly, which comprises from the mandibular lingula to the second molar; a middle segment, which tends to be horizontal and approaches the vestibular table and the basilar border,