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Anthropomorphic assessment of the retromolar foramen and retromolar nerve: anomaly or variation of normal anatomy?

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M. H. K. Motamedi, J. Gharedaghi, S. Mehralizadeh, F. Navi, A. Badkoobeh, N. Valaei, T. Azizi: Anthropomorphic assessment of the retromolar foramen and retromolar nerve: anomaly or variation of normal anatomy?. Int. J. Oral Maxillofac. Surg. 2016; 45: 241–244.

Abstract. The retromolar foramen, retromolar canal, and retromolar nerve constitute a variation of the inferior alveolar nerve (IAN) with a prevalence of 12–75%; this represents type 1 bifidity of the IAN. The aim of this study was to assess the prevalence of the retromolar nerve in our population and to obtain related data. One hundred and thirty-six mandibles of fresh cadavers aged 20–75 years were dissected. The buccolingual location, diameter, and distance from the third molar, and their associations with sex, were measured. The area of innervation and demographic data were also documented and analysed statistically. The retromolar foramen and retromolar nerve were observed in 55 cases (40.4%). The mean diameter of the retromolar foramen was 1.7 mm (range 1.1–2.1 mm); the mean diameter was 1.8 mm in males and 1.5 mm in females. Histological findings showed that the retromolar nerve extended from the anterior border of the ramus, innervating the retromolar pad and continuing to the buccal gingiva of up to two teeth anteriorly (first molar region). This high percentage of IAN type 1 bifidity (40.4%) suggests it to be a normal anatomical variation of the IAN rather than an anomaly.

Keywords: retromolar; bifid mandibular canal; type 1 bifidity; inferior alveolar nerve.

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Anomalies of the inferior alveolar nerve (IAN) have always been of interest. The retromolar canal is a bifid variation of the IAN, branching from above the inferior alveolar nerve canal and travelling anterosuperiorly within the bone, exiting the retromolar foramen into the retromolar fossa.[1–3] The reported incidence of the retromolar foramen ranges from 12% to 75%.[3–15] In a cone beam computed tomography (CBCT) study of the mandible, Kawai et al. reported that the retromolar foramen was present bilaterally in 37% of images, and at least one retromolar foramen was observed in 52% of mandibles.[4] The content of the retromolar foramen consists of small arteries and venules, and a thin myelinated nerve branching from the IAN.

It has been postulated that nerve fibres branching from the IAN and exiting through the retromolar foramen may preclude obtaining complete anaesthesia in the buccal gingiva in the mandibular

molar region.[5] Bilecenoglu and Tuncer reported that the mean distance of the retromolar foramen from the distal edge of the third molar was 4.2 mm in their series.[5] Detecting normal variations such as the retromolar nerve may have implications for surgical operations and may be of importance for preventing complications.[7,8] Information on this subject is limited and may vary in different populations. Thus, this study was performed to assess the prevalence as well as the site, diameter, sex distribution, and area of innervation of the retromolar nerve in fresh cadavers to add to the body of literature on the subject.

Materials and methods

One hundred and thirty-six mandibles (272 sides) of fresh adult cadavers (refrigerated for 36 h maximum) aged 20 to 75 years were dissected; 68 were male and 68 were female. An incision was made medial to the retromolar pad and sulcus of the third molar and a full thickness mucoperiosteal flap was reflected to allow direct exposure of the bone on both sides of each mandible. The distance from the retromolar foramen to the distal third molar and the diameter and buccolingual location of the retromolar foramen were measured with a stainless steel gauge (manual calliper) and documented. The area of innervation was traced by microscopic evaluation of histological sections taken from the retromolar pad to the mesial aspect of the first premolar. Histological sections were stained with haematoxylin and eosin and divided into four areas: section 1 comprised the retromolar pad and third molar, section 2 the second molar, section 3 the first molar, and section 4 the second premolar.

Data were tested to confirm normality of distribution with the Kolmogorov–Smirnov test. As the data were normally distributed, the data analysis was done using the Student *t*-test. Measurements were performed again at an interval of XX days to confirm intra-examiner reliability. It was presumed that there would be no difference in relation to sex.

This cadaver study was approved by the relevant review board and ethics committee.

Results

The retromolar foramen and retromolar nerve were observed in 55 cadavers (40.4%). There were 24 cases with a unilateral retromolar foramen and retromolar nerve (17.6%); 31 cases had bilateral retromolar foramen and retromolar nerve (22.8%). The mean diameter of the retromolar foramen was 1.7 mm (1.1–2.1) the mean diameter was 1.8 mm in males and 1.5 mm in females. There was no difference in the prevalence by sex.

The mean distance of the retromolar foramen from the lingual cortex was 7.3 ± 0.8 mm in males and 7.2 ± 0.6 mm in females, and from buccal cortex was 6.6 ± 0.8 mm in males and 6.5 ± 0.9 mm in females.

Histological findings showed that the retromolar nerve, which branches from the IAN, is a thin myelinated nerve, accompanied by tiny arteries and venules; it extends to innervate the retromolar pad, continuing to the buccal gingiva of up to two teeth anterior to the retromolar foramen. Microscopic tracing showed that in sections 1 and 2, which were dissected from the retromolar mucosa and buccal gingiva of the second molar, the retromolar nerve was found close to the gingival sulcus. The retromolar nerve was not observed in sections 3 and 4. Sections and schematic images are shown in Figs. 1–3. Histological findings are shown in Fig. 4.

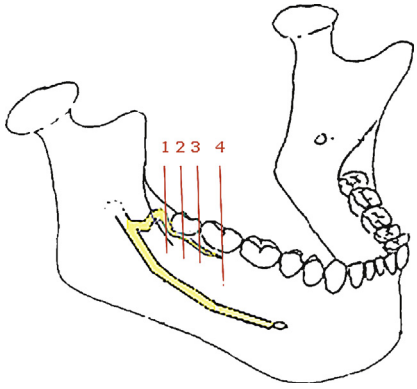

Fig. 1. Schematic image of the dissected area showing the path of the retromolar nerve and sections taken.

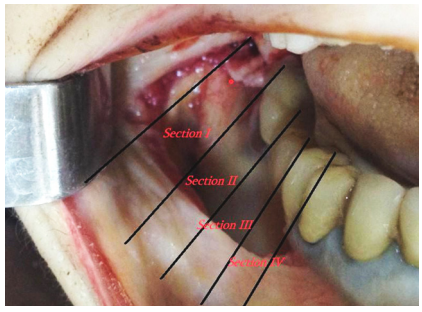

Fig. 2. Intraoral image of the dissected area showing the sections.

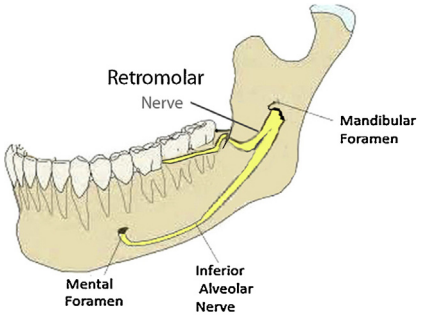

Fig. 3. Schematic image showing the branches of the bifid mandibular canal; the superior branch is the retromolar nerve.

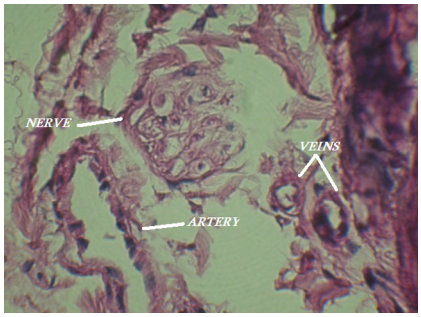

Fig. 4. Histological magnified image of a dissected specimen.

Discussion

The aim of this study was to assess the prevalence of the retromolar foramen and evaluate the anatomical characteristics related to the retromolar nerve in fresh cadavers; 136 cadavers were evaluated, with 24 presenting the retromolar foramen unilaterally and 31 presenting the foramen bilaterally. Similar results have been reported by Von Arx et al.,[6] while other studies have indicated the unilateral presentation to be more prevalent.[2,5,9,15]

The retromolar nerve represents type 1 bifidity of the IAN. The reported prevalence of the retromolar foramen ranges from 12% to 75%.[3–15] Bilecenoglu and Tuncer reported that 25% of the Turkish population had a retromolar foramen.[5] In the Indian population, the prevalence has been reported to be 21.9%[9] and 22.5%.[15] Kawai et al. reported that at least one retromolar foramen was present in 52% of Japanese cadavers,[4] which is close to the results reported in the present study. It was found that 40.4% of our population had a retromolar nerve (22.8% presenting the nerve bilaterally and 17.6% unilaterally). Von Arx et al. reported that the retromolar foramen was more prevalent in males.[6]

The possible reason for the difference between reports of cadaver studies and