

Retromolar Foramen and its Clinical Significance in Dry Human Mandibles

Bhaskaran Sathyapriya¹, Purushothaman Lakshmanan², Govindarajan Sumathy^{3*}, Ramachandran Tamilselvi⁴, Sindhuja Devi Sandrasekhar⁵, Muthiah Saravanan⁶

1. Professor, Department of Anatomy, Sree Balaji Dental College & Hospital, Bharath Institute of Higher Education & Research, Chennai.
2. Consultant Orthodontist, Apollo Hospitals and Apollo White Dental, Chennai, and Sree Vels Dental College & Hospital, Chennai.
3. Professor and Head, Department of Anatomy, Sree Balaji Dental College & Hospital, Bharath Institute of Higher Education & Research, Chennai.
4. Reader, Department of Conservative Dentistry & Endodontics, Sree Balaji Dental College & Hospital, Bharath Institute of Higher Education & Research, Chennai.
5. Senior Lecturer, Department of Oral and Maxillofacial Surgery, Sree Mookambikai Institute of Dental Sciences, The Tamilnadu MGR Medical University, Tamilnadu
6. Consultant Oral Pathologist, Private Dental Practitioner.

Department of Anatomy,
Sree Balaji Dental College & Hospital,
Bharath Institute of Higher Education & Research.
Chennai.

Abstract-

The retromolar foramen is considered as an anatomical variation and is located in the region of retromolar area. Its content is derived from the arterioles and venules of inferior alveolar nerve. The aim of this study is to evaluate the clinical importance of the retromolar foramen in dry human mandibles. The study was conducted in 30 dried mandibles from the Department of Anatomy at Sree Balaji Dental College & Hospital, Chennai. In each mandible, the area behind the last molar tooth was carefully inspected for the presence of retromolar foramen. The parameters like retromolar foramen side, distance between retromolar foramen and posterior third molar, distance between anterior border of ramus and retromolar foramen and the distance between retromolar foramen and lingula of the mandibular foramen were analysed and measured with a digital calliper to the nearest millimetres. Retromolar foramen was found in 6 of 30 mandibles of which 3 on the right side and 1 on left side and 2 bilaterally. The distance between posterior third molar to the retromolar foramen was found to be an average of 8.23mm on the right side and 7.86mm on the left side. Distance between anterior border of ramus to retromolar foramen was found to be an average of 5.68mm on the right side and 5.77 on the left side. The average distance measurements between the retromolar foramen and the lingula was 15.18 mm on the right side and 15.11 mm on the left side. Care should be taken not to damage the neurovascular bundle passing through the retromolar foramen during routine anaesthetic, surgical and implantation procedures of the mandible

Keywords: Retromolar foramen Mandible; Mandibular nerve

INTRODUCTION

The retromolar foramen is an anatomical variation that appear in the retromolar trigone region, which is bounded medially by temporal crest, laterally by the anterior border of the ramus, and anteriorly by the base of third molar tooth. The foramen receives a canal of variable depth that normally arises from the mandibular canal behind the lower third molar, which is regarded as the retromolar canal. This foramen and canal contain

neurovascular structures which provide accessory/additional innervation to the mandibular molars and the buccal area. These neurovascular contents of the canal gain more importance in medical and dental practice, because these elements are vulnerable to damage during placement of osteointegrated implants, endodontic treatment and sagittal split osteotomy surgeries and a detailed knowledge of this anatomical variation would be vital in understanding failed inferior alveolar nerve blockage, spread of infection and also metastasis¹. Though this variation posed challenging situations for the practicing surgeons, it has been quite neglected and the incidence of it is not well presented in all the textbooks. Hence, this study was attempted to consolidate the clinical applications of the retromolar foramen.

MATERIALS AND METHODS

The study was conducted in 30 dried mandibles from the Department of Anatomy at Sree Balaji Dental College & Hospital, Chennai. In each mandible, the area behind the last molar tooth was carefully inspected for the presence of retromolar foramen. The following parameters were analysed and measured with a digital calliper to the nearest millimetres: Retromolar foramen side, distance between retromolar foramen and posterior third molar, distance between anterior border of ramus and retromolar foramen and the distance between retromolar foramen and lingula of the mandibular foramen.

RESULTS

Retromolar foramen was found in 6 of 30 mandibles of which 3 on the right side and 1 on left side and 2 bilaterally (Figure 1). The distance between posterior third molar to the retromolar foramen was found to be an average of 8.23mm on the right side and 7.86mm on the left side. Distance between anterior border of ramus to retromolar foramen was found to be an average of 5.68mm on the right side and 5.77 on the left side. The value of the average distance measurements between the retromolar foramen and the lingula was 15.18 mm on the right side and 15.11 mm on the left side.

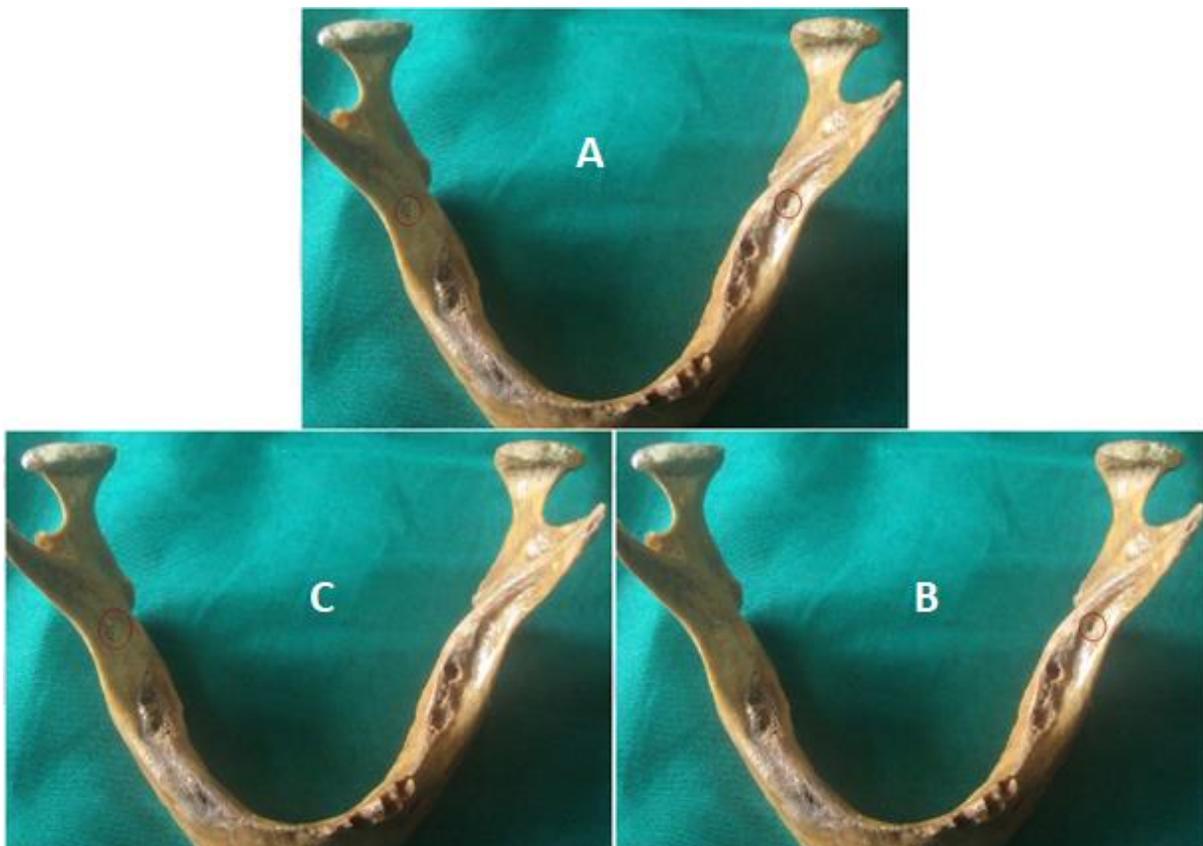


Figure 1: Retromolar foramen bilaterally (A), Right Side (B) and Left side(C).

DISCUSSION

The first description of FRM was reported in the literature in 1957, by Lofgren^{2,3}. Ossenberg carried out an analysis of retromolar foramen in large series of mandibles and suggested that the population of Latin America such as Argentina, Colombia and Brazil were more likely to possess this foramen due to heterogeneity of individuals^{4,5}. He also reported that the retromolar foramen is more frequent unilaterally than bilateral in mandibles of these populations. Koder and Hashimoto dissected retromolar foramen in Japanese cadavers and found that inferior alveolar neurovascular bundle was traversing through the canal. The artery after emerging from the mandibular canal anastomosed with the branches of buccal artery and the facial artery. The nerve was found to supply the lower third molar, mucosa of retromolar trigone and the buccal gingival of premolar and molar region. It was also observed that the retromolar foramen extended into the body of mandible as retromolar canal⁶. Narayana et al described three morphological types of retromolar canals in their study using injection of radiopaque dye angiograffin into the retromolar foramen⁷. Schejman et al performed dissection of retromolar canal in cadavers during autopsy, where the contents were subjected to histological examination, it was found that the most constant element is a myelinated nerve. They also found one or more arterioles and one or more venules in descending order of frequency⁸. The presence of retromolar foramen and canal and its contents have great clinical significance and can be injured in various surgical procedures like flap lifting, bone tissue for autologous bone grafts, osteotomy for the surgical extraction of third molar, placement of osseointegrated implants for orthodontic or in sagittal split osteotomy surgeries⁹. So retromolar foramen is considered as potential route for additional innervation to the lower third molar region causing failure in anaesthetic mandibular blocking^{10,11}. With refinements in scoring criteria, retromolar foramina should be useful along with other cranial variants for ethnic historical studies⁵. Due to the vast innervated area, sometimes when anesthetizing the patient for procedures in the region posterior to the third molar, it may still have pain, which could possibly justify some of the failures in effectiveness of anaesthetic techniques of inferior alveolar nerve block^{2,5,7}. Having the dentist come across such a situation and all possible anaesthetic failures like altered tissue pH, incorrect anaesthetic technique, altered integrity of anaesthetic salt, patient anxiety, cervical plexus innervations or presence of bifid mandibular canal have been ruled out, consideration should be given to infiltration of anaesthetic solution in this region as a complement anaesthetic technique, since the retromolar nerve has fibres that promote innervation of large areas, thus justifying the failure of the anaesthetics^{1,8}. Many of the anatomy textbooks do not describe the presence of retromolar foramen; however, despite the negligence regarding its existence, its frequency is relevant since, in the literature, its prevalence ranges from 7.7 to 72%, and this large variation may be associated with several factors such as different ethnicities, genetic factors and environmental influences^{1,12}. Corrigan Hook reported a case of unusual bleeding in extraction of the third molar associated with the presence of the retromolar canal¹³. Thus, when performing surgery in this region, special care should be taken in third molar extraction procedures, removal of bone grafts, ortho implant placement and sagittal osteotomies as these interventions may promote intraoperative complications and late complications, either by inefficient anaesthesia, sensory impairment or abnormal bleeding.

CONCLUSION

The present study evaluates the clinical significance of retromolar foramen in south Indian mandibles. Care should be taken not to damage the neurovascular bundle passing through the retromolar foramen during routine anaesthetic, surgical and implantation procedures of the mandible because the presence of these structures lead to failure of local anaesthesia, abnormal bleeding during surgical procedures or even sensory changes in this region postoperatively

CONFLICT OF INTEREST – Nil.

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