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INCIDENCE AND MORPHOLOGY OF RETROMOLAR FORAMEN IN DRIED MANDIBLE AND ITS CLINICAL IMPLICATIONS

Anatomy

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ABSTRACT

Background: The retromolar fossa present behind last molar tooth, may contain a foramen known as Retromolar foramen (RMF) and believed to transmit neurovascular bundle. The nerve can be misplaced fiber of Inferior alveolar nerve (IAN) and vessels can be a branch of the Inferior alveolar artery (IAA). The neurovascular bundle may get damage during oral surgery or implant procedure and its presence may lead to failure in anesthesia by regional blockage of IAN.

Aim & Objective: To find out the incidence of occurrence, morphology, its position with respect to various bony landmark and discuss its clinical significance.

Material and methods: 50 Dry adult mandible of known gender of North India origin were included from Department of Anatomy, AIIMS Patna. Complete mandible were included and congenital, acquired deformity and fractured mandible were excluded from the study.

Result: Out of 50 mandible, in 7 mandible RMF were present so, the incidence was 14%. RMF was bilateral in 28.57 % and unilateral in 71.43% of total incidence. Regarding gender among 7 mandible possess RMF, 5 were male and 2 were female.

KEYWORDS

Mandible, Retro molar foramen, extraction of 3rd molar

Introduction:

In the mandible, behind last molar tooth there is a triangular depression known as Retro molar fossa. Retro molar fossa is bounded medially by temporal crest, laterally by anterior margin of ramus of mandible [1]. The retro molar fossa may contains a foramen known as Retro molar foramen (RMF)[2][3][4]. When RMF is present, it may connected with mandibular canal with an another canal known as Retromolar canal (RMC) and believed to transmit neurovascular bundle [2, 3]. The nerve can be misplaced fiber of Inferior alveolar nerve (IAN) and travel either with lingual nerve or buccal nerve and provide additional supply to mandibular molars and buccal mucosa [5]. The vessels can be a branch of Inferior alveolar artery (IAA) and communicates with buccal artery or facial artery [6]. The neurovascular bundle may get damage during oral surgery or implant procedure and its presence may leads to failure in anesthesia by regional blockage of IAN [7,8,9].

Aim & Objective:

Since this foramen got attention in very few textbook and very less studies have been conducted in north Indian population hence we conducted this study to find out the incidence of occurrence, morphology, its position with respect to various bony landmark and discuss its clinical significance.

Material and methods:

50 Dry adult mandible of known gender of North India origin were included from Department of Anatomy, AIIMS Patna.

Inclusion criteria: Complete mandible

Exclusion criteria: Mandible with congenital or acquired deformity and fractured mandible.

Gender determination:

Male (33): Angle of mandible were everted

Female (17): Angle of mandible were inverted

Following parameters were observed: (figure 1.)

- Shape, Size, Side and Diameter of RMF.
- Distance between posterior margin of 3rd molar and RMF (line A of Figure1.)
- Distance between lingula of mandible and RMF. (line B of Figure1.)
- Nearest distance between anterior border of ramus of mandible and RMF. (line C of Figure1.)

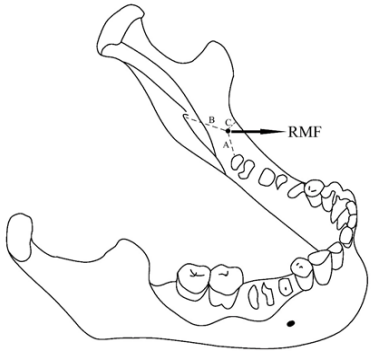

Figure 1. Showing the various parameters measured by Vernier caliper. (Line A, B and C).

All measurements were taken three times by Vernier caliper (Range: 0-150mm; accuracy-0.03mm) and their mean were taken to maintain reliability of the study.

Result:

Out of 50 mandible, in 7 mandible RMF were present so, the incidence was 14%. RMF was bilateral in 28.57 % and unilateral in 71.43% of total incidence (figure 2 and 3). In unilateral RMF it was 42.85% on left side and 28.57% on the right side. Regarding gender among 7 mandible possess RMF, 5 were male and 2 were female. The result is summarized in Table-1 using various parameters.

Table-1: Various parameters of Retromolar foramen of mandible

Mandible	Diameter (mm)	Distance (mm) from posterior margin of last molar tooth	Distance (mm) from anterior margin of ramus of mandible	Distance (mm) from lingula of mandible
Range	0.54-2.25	1.78-17.82	3.63-8.84	8.12-17.94
Mean	1.35	9.27	5.5	13.65
SD	0.59	4.69	1.72	3.28
S.E of Mean	0.20	1.56	0.57	1.10

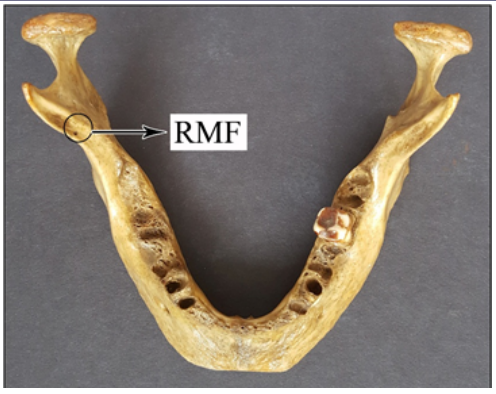

Figure 2: Showing right side RMF

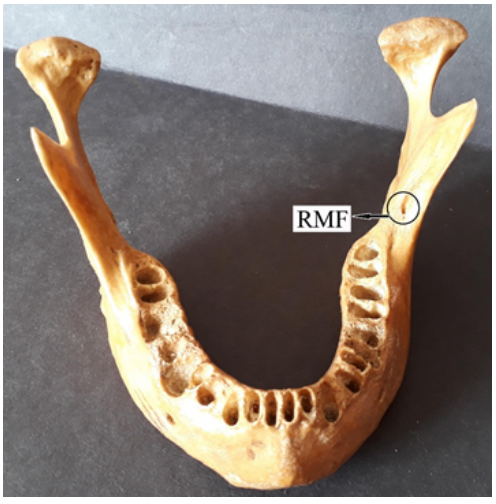

Figure 3: Showing Left side RMF

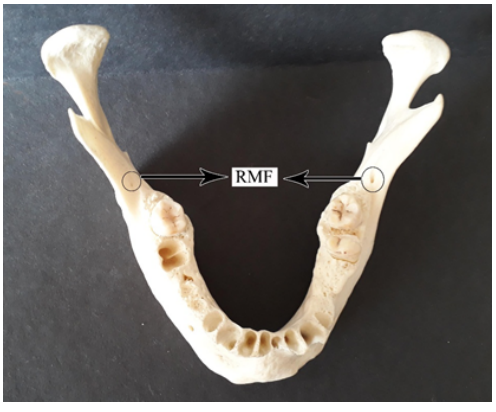

Figure 4: Showing Bilateral RMF

Discussion:

The incidence of RMF in our study is 14% which is closest to the incidence found by Akhtar et al (14.7%)[10], Athavale et al(14.1%)[6], Potu et al (11.7%)[4], Jacob et al (12.5%)[3], Orphan et al (11.1%)[10]. The incidence reported from Indian population are varying from 12-22% as documented by various studies [4,11]. Ours incidence (14%) is also falling within the range according to Indian population. The prevalence of RMF in India and around world were compared and compiled in table-2.Ossenberg et al examined RMF around different population of world and documented their finding as Italy (8.1%), Japan (3.2%), Eskimos (8.2%), and Canada (9.1%). He suggested that these foramen are more common in North America other than in other part of world (India, Europe, Africa & Northeast Asia) due to heterogeneity of individuals as result of racial miscegenation. He also suggested that frequency of RMF varies in ethnic factor which can be used as anatomic landmark of mandible as differentiator between ethnic group and in forensic anthropology [12].

Table-2: Showing prevelance of RMF in India and around world by various author

S.N.	Author(year)	No. of mandible	Incidence
1.	Present study (2017)	41	4 (9.76%)
2.	Poornima et al. (2015)[2]	109	9(9.81%)
3.	Bhagath K Potu et al. (2014)[4]	94	11(11.7%)
4.	Meera Jacob et al. (2014)[3]	120	15(12.5%)
5.	Akhtar et al. (2014)[10]	224	33(14.7%)
6.	Athavale et al. (2013)[6]	71	10(14.1%)
7.	Senthil et al. (2010)[13]	150	26(17.3%)
8.	Narayan et al. (2002)[11]	242	53(21.9%)
9.	Orphan et al. (2013)[10]	126	14(11.1%)
10.	Kawai et al. (2012)[10]	46	24(52%)
11.	Von Arx et al (2011)[10]	121	31(25.6%)
12.	Kodera and Hashimoto (1991)[8]	41	8(20%)
13.	Ossenberg (1987)[12]	485	40(8.2%)

Ossenberg reported that RMF is more frequent in unilateral than bilateral which was supported by Narayan et al, Akhtar et al, Senthil et al and our finding. Few authors could not find any gender variations regarding incidence of RMF [5,11,12]. The incidence of RMF were more common in females compare to males as noted by Akhtar et al [10] and Senthil et al [13]. in present study showed more in male than in female. Comparative study of various parameter have been shown in table-3.

Table-3: Showing Comparison of position of RMF from various landmark by different author

S. N.	Author	Diameter (mm)	Mean distance (mm) from posterior margin of 3rd molar		Mean distance (mm) from anterior border of ramus of mandible		Mean distance (mm) from lingula of mandible (mean)	
			Right	Left	Right	Left	Right	Left
1.	Present study	1.35	7.41	10.76	5.6	5.53	14.67	12.83
2.	Akhtar et al [10]	----	6.5	8.5	7.5	7	6	5
3.	Senthil et al [13]	1.3	4.3	4	8.4	8.3	14.1	12.6
4.	Jacob M et al [3]	-------	9.8	8.05	5.68	5.77	-----	------

Kodera and Hashimoto confirmed in the dissection of Japanese cadaver that artery running in RMC is a branch of IAA & joining with branch of buccal artery or facial artery and nerve was a branch of IAN and distributed to premolar and molar region. This was also confirmed by Kaufman et al [9] and Singh et al [14] during surgery of extraction of 3rd molar. Schejtman et al examined the content of RMF for histological examination during autopsy and found that the neurovascular elements are distributed mainly to the temporalis and buccinators muscle in the region of 3rd molar apart from sensory innervation. The myelinated nerve were the most constant element followed by arterioles and venules in descending order were noted [15]. Ana Clauda Rossi in radiological analysis revealed that the course of RMC is anterior inferior towards the alveolus of 3rd molar. [16]

Since mean distance between 3rd molar & RMF was within short distance of 9.27mm.The close relation of RMF with 3rd molar should be kept in mind to avoid nerve injury & hematoma during extraction of 3rd molar. The passage of vascular component may facilitate the spread of infection & metastases from oropharynx and its lesion during surgery can produce bleeding, difficulting the incision and increase potential for formation of fibrous tissue.

It remains unknown how the RMC develops in the mandible, but it appears that the presence of an abnormal neurovascular bundle determines its formation [11].We could not proceeded for radiological procedure which was limitation of our study.

Conclusion:

The knowledge of RMF and its contents are very important for

planning safest surgery (mandibular reconstruction, flap lifting, bone tissue for autologous bone grafts etc.), complete blockage of nerve and accurate implantation procedure to avoid any serious complications. The development of RMF and RMC is still unclear. Further study is needed to explore the genetic factor for better understanding of its development and ethical variation.

Conflict of interest: None

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