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Original Article

Anatomy Section

Mylohyoid Bridging of the Mandible and its Clinical Importance in Dry Mandibles: A Cross-sectional Study

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ABSTRACT

Introduction: Mylohyoid Bridging (MB) is a hyperostotic variation in the mandible. On the inner aspect of the ramus of the mandible, the Mylohyoid Groove (MG) is observed. The content of this groove is the mylohyoid nerve and vessels. The mylohyoid bridging can compress these neurovascular structures.

Aim: To determine the incidence of mylohyoid bridging and to determine, whether it is complete/incomplete or proximal/distal or unilateral/bilateral.

Materials and Methods: The present cross-sectional study was conducted in the Department of Anatomy, School of Medical Sciences and Research, Sharda University, Greater Noida, Uttar Pradesh, India, in July 2022. The study was conducted on 60 dried human mandibles (120 sides). The mandibles were collected from the Department of Anatomy. The mandibles were observed for the presence of a mylohyoid bridge on the inner aspect of its ramus on both sides. Results were expressed using descriptive statistics and were expressed in terms of frequency and percentage.

Results: Mylohyoid bridge was observed in three out of 120 (2.5%) mylohyoid grooves. All the observed mylohyoid bridges were incomplete types (one each of proximal type, intermediate type, and distal type). In one of the mandible, a triangular bony spicule was noted at the proximal end of the mylohyoid groove, in a close approximation of the mandibular foramen on the right side, whereas in one of the mandible, the mylohyoid groove was very deep, and communication between the mylohyoid groove and mandibular canal was noted.

Conclusion: From the present study, it is concluded that knowledge regarding mylohyoid bridging will help in the successful administration of inferior alveolar nerve block.

Keywords: Inferior alveolar nerve block, Mylohyoid nerve, Vessels

INTRODUCTION

The mandible is the largest and strongest unpaired bone, forming the lower jaw and is derived from the first pharyngeal arch [1]. On the inner surface of the mandibular ramus, the mandibular canal is seen. From the mandibular canal, a groove runs downward and forward called the Mylohyoid Groove (MG). The content of this groove is mylohyoid nerve and vessels [1]. Mylohyoid Bridge (MB) is a bony plate that roofs the MG [2]. The variations in skull and mandible can be classified into four types i.e. foraminal, hyperostotic, hypostotic, and fusion [3]. Hyperostotic variation may result due to ossification of connective tissue. MB is a hyperostotic non metrical variation of the mandible [4]. MB is also termed as ponticulus mylohyoideus, canalis mylohyoideus, mylohyoid arch, and arcus mylohyoideus by different authors [5,6]. Hypostotic variations are basioccipital cleft and fossa navicularis [7]. Fusion means premature fusion of the bones, and foraminal variations are the presence of extra foramen.

Viscero-cranium i.e., bone of the face is derived from the first two pharyngeal arches. The ventral portion of the first arch (mandibular arch) contains Meckel's cartilage. Mandible develops from intramembranous ossification of mesenchyme present around this cartilage [8]. Remnant of this cartilage is the sphenomandibular ligament which is proximally attached to the spine of the sphenoid and distally attached to the lingula which is a bony projection present above the mandibular canal [9]. MB can be a derivative of the sphenomandibular ligament as suggested by Ossenberg [10]. MB can compress mylohyoid nerve and vessels resulting in associated neuropathy. He also suggested that MB is an inherited anomaly and incidence varies among different races and regions. He classified MB as a common and uncommon type and also stated that precursors of both the MB are sphenomandibular ligament i.e. both types are formed in a similar way [10].

The mylohyoid nerve is a branch from the inferior alveolar nerve, just before it enters the mandibular foramen. The inferior alveolar nerve is the branch from the posterior division of the mandibular nerve, a branch of the trigeminal nerve which is the fifth cranial nerve [1]. Mylohyoid nerve supplies mylohyoid muscles and anterior belly of digastric. The nerve can be compressed due to the presence of the bony plate (mylohyoid bridge) and can result in weakness of the mylohyoid and anterior belly of the digastric. The presence of such a bony plate can interfere with nerve block during the extraction of the mandibular teeth. So, the present study aims at establishing the incidence of MB in the North-Indian population which can be helpful to the dental surgeons operating in this area.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the Department of Anatomy, School of Medical Sciences and Research, Sharda University, Greater Noida, Uttar Pradesh, India, in July 2022 on 60 dried human mandibles (120 sides). The mandibles were collected from the Department of Anatomy after obtaining approval from the Institutional Ethics Committee (IEC) (SU.SMS&R/76-A/2022/86). All adult mandibles were of unknown sex.

Inclusion criteria: All intact mandibles were used in the study.

Exclusion criteria: Damaged and broken mandibles were excluded from the study.

The mandibles were observed for the presence of MB on the inner aspect of its ramus on both sides. If MB was present, it was further classified as complete, if entire mylohyoid groove was bridged or incomplete, and if MG was partially bridged [6]. Incomplete MB [6] was further classified as a proximal, intermediate, or distal type, based on its location in relation to the mandibular canal. It was classified as proximal type if located close to the mandibular canal

(0-2 mm) and as distal type, if located away from the mandibular canal (beyond 2 mm). Intermediate type, wherein the MB was present in the centre of the mylohyoid groove. Also, the bilateral presence of the MB was noted. Photographs were taken using a digital camera.

STATISTICAL ANALYSIS

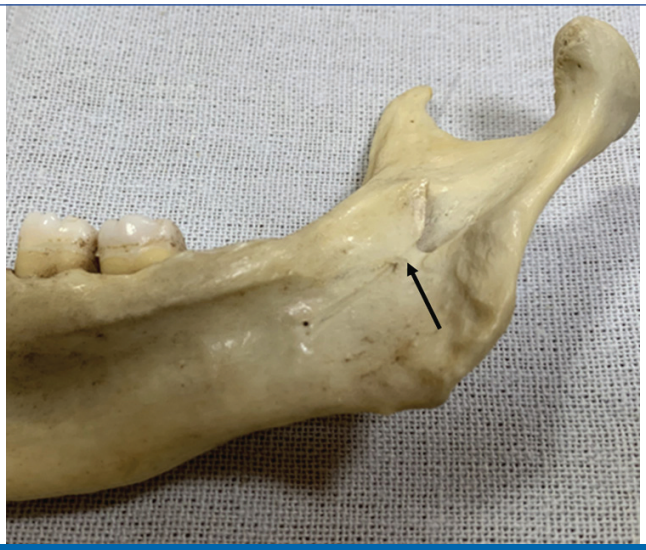
The data was analysed and descriptive statistics was used, and results were expressed in terms of frequency and percentage.

RESULTS

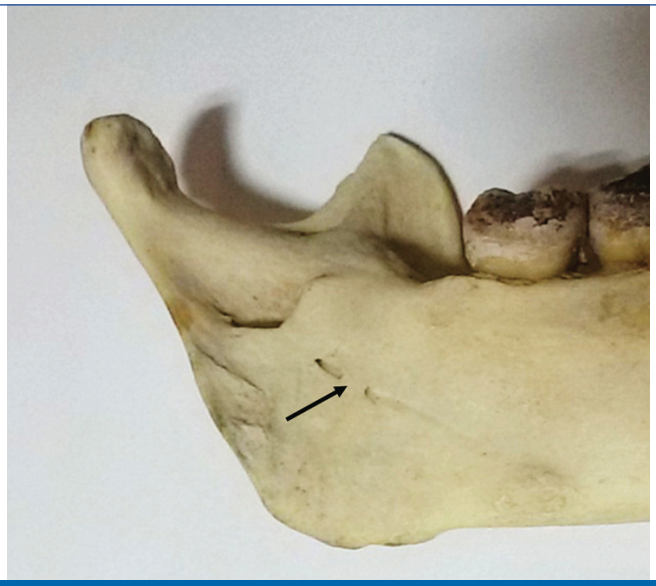
Out of 60 mandibles (120 sides), the mylohyoid bridge was observed in 3 (2.5%) out of 120 mylohyoid grooves. No complete MB was observed. Incomplete MB was seen in three mandibles [Table/Fig-1]. Proximal type [Table/Fig-2] observed in one mandible (0.8%), intermediate type [Table/Fig-3] observed in one mandible (0.8%) and distal type [Table/Fig-4] observed in one mandible (0.8%). No bilateral MB was observed. In one of the mandible, a triangular bony spicule was noted at the proximal end of the mylohyoid groove in close approximation with the mandibular foramen on the right side [Table/Fig-5]. In one of the mandible, the mylohyoid groove was very deep and appeared to have communication with the mandibular canal on the left side [Table/Fig-6].

Type	Right (n=60)	Left (n=60)
Complete	0	0
Incomplete	2	1
Bilateral	0	0

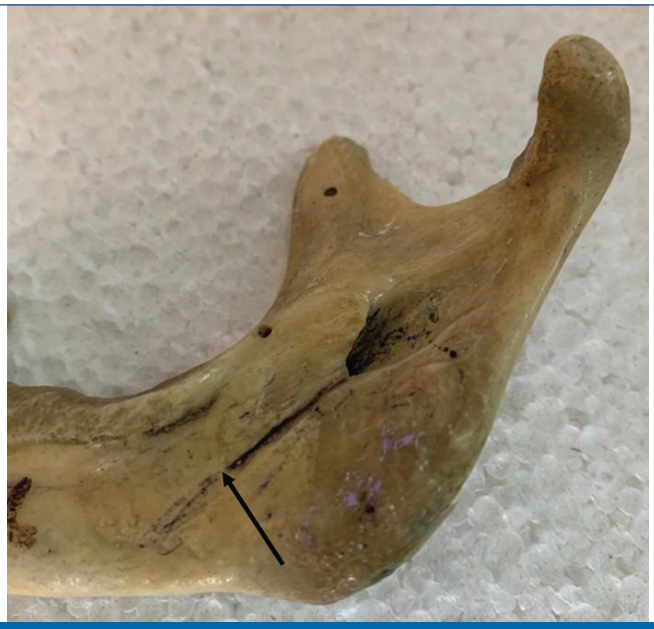
[Table/Fig-1]: Incidence of Mylohyoid Bridging (MB).



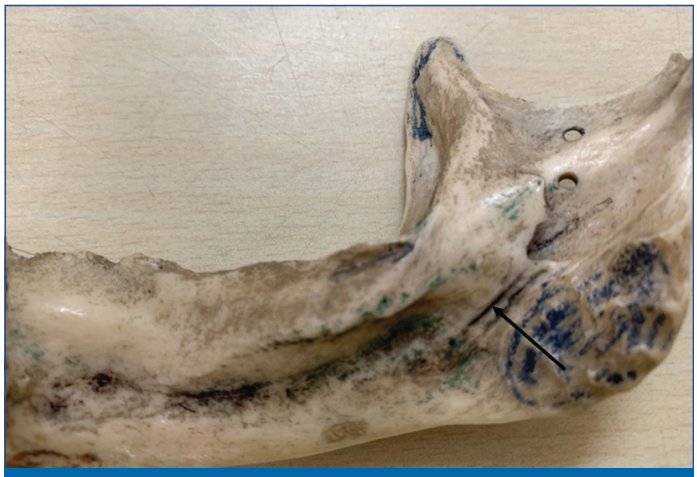
[Table/Fig-2]: Proximal type of MB (right side).



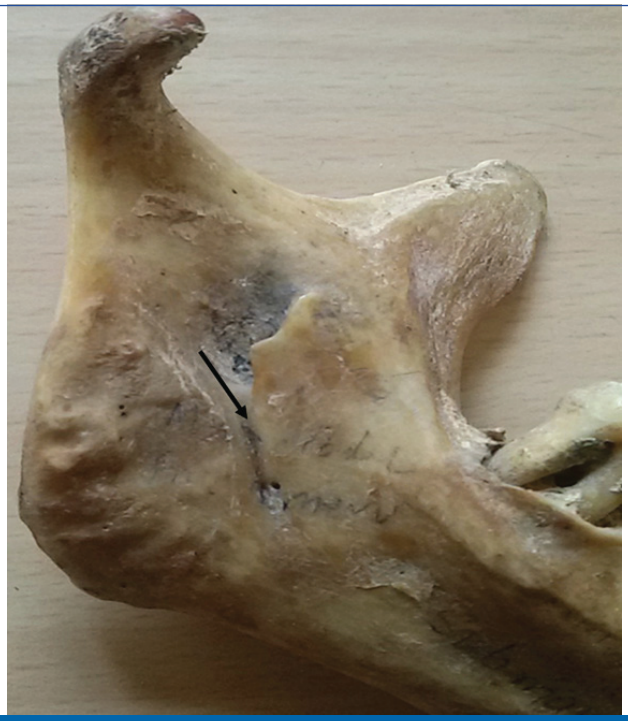
[Table/Fig-3]: Intermediate type of MB (left side).



[Table/Fig-4]: Distal type of MB (right side).



[Table/Fig-5]: Triangular bony spicules in the mylohyoid groove.



[Table/Fig-6]: Deep mylohyoid grove in communication with mandibular canal.

S. No.	Authors	Year	Sample size	Population	Incidence of MB	Complete	Incomplete	Bilateral
1	Shantharam V et al., [11]	2011	115	South Indian	3.91%			1
2	Devi IB et al., [12]	2012	120	North Coastal India	3.33%	-	4	-
3	Kumar R et al., [3]	2013	120	Uttarakhand	7.43%	-	-	5
4	Dave UH et al., [14]	2019	300	Gujarat	15.66%	-	-	17
5	Ossenberg NS [10]	1974	844	European	0.47%	-	-	-
6	Nikolova SY et al., [16]	2017	191	Bulgarian Population	10.99%	-	-	-
7	Manjunath KY [18]	2003	450	South Indian Population	6.39%	-	-	9
8	Present Study	2022	120	North Indian Population	2.5%	-	3	-

[Table/Fig-7]: Comparison of similar studies with the present study [3,10-12,14,16,19].

DISCUSSION

The Mylohyoid Bridging (MB) was observed in three MG (2.5%) out of 120 mylohyoid grooves (2.5%) in the present study. All incomplete MB was observed with none present bilaterally. Shantharam V et al., reported the incidence of occurrence of MB as 3.91% in the study conducted in Karnataka. They reported the bilateral presence of MB in one case [11]. In the present study, no bilateral presence of MB was noted. Devi IB et al., (2012) [12] reported that four out of 120 mandibles (3.33%) showed the presence of incomplete MB in a study done in the North coastal Andhra population. All bony ridges were unilateral. Proximal type of MB was reported in two mandibles and distal type was noted in two mandibles. No intermediate type was reported in this study. No complete type of MB was noted [12]. Kumar R et al., [3] in a study conducted in Uttarakhand reported the incidence of occurrence of MB in 9 (7.43%) out of 120 mandibles. Bilateral presence of MB was observed in 5 out of 120 mandibles. In this study, the MB were not further classified as proximal and distal type. Narayana K et al., reported incidence of occurrence as 7.2%. No bilateral presence of MB and complete MB were noted [13]. Dave UH et al., noted the incidence of MB as 15.66% [14].

There are racial variations in the occurrence of MB. The incidence of occurrence of MB in the European population is 0.47% in a study done by Ossenberg NS [10]. In the Japanese population, the occurrence of MB is 4.2% [15]. Nikolova SY et al., observed that the incidence of occurrence of MB in Bulgarian population is 10.99% (21 out of 191 mandibles) and the most common type of MB was distal type [16]. The incidence of occurrence varies from one to 60% among different populations [11]. Ossenberg NS, stated that it is an important trait as it is inherited. The frequency varies in different regions and populations [10].

Richany SF et al., reported about the development of mandibles from Meckel's cartilage based on their study on human embryos. The embryonic mandible is formed by intramembranous ossification of the neural crest cell mesenchyme lateral to Meckel's cartilage. Once the mandible is formed the cartilage occupies the deep grove on the inner side of the ramus of the mandible. During the process of development, inferior alveolar branch of the mandibular nerve occupies the lateral side of the cartilage. The mylohyoid nerve, a branch from the inferior alveolar nerve is also seen on the lateral aspect of the cartilage. As the development progresses, inferior alveolar nerve sinks deeper and gets separated from the cartilage and is seen in the mandibular canal [17]. Mylohyoid nerve lies in close contact with the cartilage. Meckel's cartilage degenerates but its sheath persists as a sphenomandibular ligament [1,12]. The MB is formed by the ossification of the sphenomandibular ligament. In the present study, in one of the mandibles, the MG was very deep and appeared to have communication with the mandibular canal on the left side. This could be due to the incomplete separation of the inferior alveolar nerve from the Meckel's cartilage during the course of the development. The difference in the incidence can be due to the difference in race, climate, and geography [18]. The incidence of MB in different studies published in literature is summarised in [Table/Fig-7] [3,10-12,14,16].

Mylohyoid groove is present on the inner surface of the ramus of the mandible. Inferior alveolar nerve which is a branch of the mandibular nerve enters the mandibular foramen. It gives a branch, nerve to mylohyoid, before it enters the foramen. Nerve to mylohyoid is present in the mylohyoid groove which supplies mylohyoid muscles and anterior belly of digastric. Mylohyoid bridge which is a bony plate present on the mylohyoid groove can result in the compression of the nerve leading to the weakness of the muscles. It can also interfere with the inferior alveolar nerve block. The knowledge regarding the presence of the mylohyoid bridge will be useful during third molar extraction by dentists, dental implant surgery, and for fracture management.

Limitation(s)

In the present study, mandibles were not categorised as male or female.

CONCLUSION(S)

From the present study, it is concluded that knowledge regarding mylohyoid bridging may be useful to dentists for the successful administration of anaesthesia during surgery.

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