The Study of Antilingula and Its Relation to the Lingula and Mandibular Foramen, the Presence of Mylohyoid Bridging in Dry Mandibles of South Indian Population

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Abstract

Background and Objectives The mandibular foramen and the lingula, because of their relation to the inferior alveolar nerve are of clinical significance for the orodental surgeons. Identification of the antilingula is important in mandibular ramus surgery in which the medial surface of the ramus is not visualized.

Methods The present study includes adult dry 50 mandibles of unknown age and sex. The measurements were taken using vernier calipers. The points taken for measurements were most prominent point on antilingula, tip of lingula, most anterior, posterior and inferior points of mandibular foramen. The measurements were denoted as A, B, C and D which represent the anterior, posterior, superior and inferior distances.

Results Antilingula was present on right side in 25 and on left side in 28 mandibles. There was a significant difference in distances in mean between the antilingula and mandibular foramen of both the sides ($p < 0.001$). Retromolar foramen was observed in 6 mandibles. Mylohyoid bridging was seen in 3 mandibles.

Conclusion The mandibular foramen was located posterosuperior to the antilingula on both the sides. There was

no statistical significance in the distances between the lingula and the antilingula. Therefore antilingula can be used as an important surgical landmark for locating the mandibular foramen in mandibular ramus osteotomies.

Keywords Antilingula · Lingula · Mandibular foramen · Retromolar foramen

Introduction

The lingula of the mandible is a sharp tongue-shaped bony projection on the medial aspect of ramus. The mandibular foramen is overlapped by the lingula which is the landmark for inferior alveolar local anaesthetic block injection [1]. The mandibular foramen and the lingula, because of their relation to the inferior alveolar nerve are of clinical significance for the orodental surgeons [2].

The antilingula is a bony tubercle or prominence on the lateral surface of the ramus of the mandible. Identification of the antilingula is important in mandibular ramus surgery in which the medial surface of the ramus is not visualized [3]. The antilingula is felt to correspond to the position of the true lingula and the underlying mandibular foramen on the medial side of the mandible [4]. Thus surgical procedures can be performed superior and posterior to the antilingula without damage to the inferior alveolar nerve [5].

The mylohyoid groove is located on the medial aspect of the ramus and the body of the mandible and transmits the neurovascular bundle destined to the mylohyoid muscle. Occasionally the groove may get canalised by bony bridges of varying size. The accessory foramina of the mandible have their importance in dental anaesthetic blocking techniques. Most of them are unnamed and infrequent in

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Fig. 1 The distances measured using antilingula as landmark, A anterior, B posterior, C superior and D inferior

Fig. 2 The distances measured using lingula as landmark, A anterior, B posterior, C superior and D inferior

occurrence, but one such accessory foramen which occurs frequently is the ‘retromolar foramen’ [1].

The present study was undertaken to determine the relationship of the antilingula to the lingula and mandibular foramen. The correlation between the position of the antilingula with respect to the lingula and the mandibular foramen was evaluated.

Fig. 3 The distances measured using mandibular foramen as landmark, A anterior, B posterior, C superior and D inferior

Fig. 4 The mandible showing retromolar foramen on left side

Materials and Methods

The present analytical study includes adult dry 50 mandibles of unknown age and sex. The mandibles were collected from the Anatomy Museum and Department of Anatomy, Kasturba Medical College, Manipal. The measurements were taken using vernier calipers.

The lateral surface of the ramus of each mandible was observed for the presence of antilingula which is considered to be a prominent point on the lateral aspect of the ramus [8]. All the distances were measured placing the mandible vertically on a flat and firm surface. The

Fig. 5 The mandible showing mylohyoid groove bridging

distances were measured in millimeters using the different predetermined points which are shown in Figs. 1, 2 and 3. The points taken for measurements were most prominent point on antilingula, tip of lingula, most anterior, posterior and inferior points of mandibular foramen. The measurements were denoted as A, B, C and D which represent the anterior, posterior, superior and inferior distances.

Additionally the mandibles were examined for the presence of retromolar foramina and bridging of mylohyoid groove which are shown in Figs. 4 and 5.

Results

Antilingula was present on right side in 25 (50 %) and on left side in 28 (56 %) mandibles. The distances were measured with respect to mandibular foramen, lingula and antilingula. The mean and standard deviations of all parameters are shown in Tables 1, 2 and 3. The paired *t* test was applied to compare the mean distances of antilingula with respect to mandibular foramen and lingula. There was a significant difference in distances in mean between the antilingula and mandibular foramen of both the sides ($p < 0.001$). There was no significant difference in the distances between the lingula and the antilingula observed for the posterior (B, $p = 0.8$) and the inferior (D, $p = 0.5$). Mandibular foramen was located posterosuperior to the lingula on both the sides.

Table 1 Measurements with respect to the mandibular foramen

Parameters measured in mm	Right side (N = 50)	Left side (N = 50)
F–A	17.42 ± 2.73	17.00 ± 2.78
F–B	11.84 ± 2.01	11.12 ± 2.50
F–C	24.52 ± 2.38	20.28 ± 2.95
F–D	22.56 ± 2.55	24.20 ± 5.50

Table 2 Measurements with respect to the lingula

Parameters measured in mm	Right side (N = 50)	Left side (N = 50)
F–A	16.68 ± 1.72	16.32 ± 3.14
F–B	16.20 ± 2.10	15.00 ± 2.29
F–C	16.32 ± 2.57	13.64 ± 1.72
F–D	31.92 ± 2.01	30.48 ± 5.85

Table 3 Measurements with respect to the antilingula

Parameters measured in mm	Right side (N = 50)	Left side (N = 50)
F–A	15.96 ± 2.74	15.72 ± 2.35
F–B	16.00 ± 1.77	15.56 ± 2.36
F–C	13.40 ± 1.44	13.32 ± 2.35
F–D	33.16 ± 3.54	33.40 ± 4.47

Additionally retromolar foramen was observed in 6 (2 on right side and 4 on left side) mandibles. Mylohyoid bridging was seen in 3 mandibles (2 on left side and 1 on right side).

Discussion

Pogrel et al. [4], in a study tried to identify the antilingula by palpation of the lateral aspect of the mandibular ramus and were able to identify it in all specimens studied. Martone et al. and Yates et al. demonstrated that the antilingula was present in only 42 % of the specimens [6, 7]. A study done by Monnazzi et al. [8] identified the antilingula in 15 % of the specimens. A study carried out using dry mandibles by Apinhasmit et al. found the AL in 80.4 % of specimens. He also stated that the AL could not be considered as surgical landmark as it is not a constant landmark while the midwaist of mandibular ramus and the midpoint between the coronoid process and gonion could be considered [9]. In our present study the antilingula was identified in 53 % (right 50 %, left 56 %) of the specimens.

Martone et al. [6] noted that the mean distance between the antilingula and the mandibular foramen was 4.8 mm and that the most frequent relationship was for the

mandibular foramen to lie postero-inferior to the antilingula. Similarly Langston and Tebog noted that the position of the antilingula varied from 4.7 mm posterior to and 4.7 mm anterior to the mandibular foramen [10]. Yates et al. also found that the mandibular foramen is predominantly posterior and inferior to the antilingula [7]. The position of the lingula was observed posterior-inferior relative to the position of the antilingula by Aziz et al. [11].

In our present study the mandibular foramen was located 0.74 and 0.68 mm posterior to the lingula on the right and left side respectively and was located 1.46 and 1.28 mm posterior to the antilingula on the right and left side respectively. The mandibular foramen was located posteroinferior to the antilingula on both the sides. Many authors opine that the antilingula could be a viable anatomic landmark to determine safety in mandibular ramus surgery in order to avoid the mandibular foramen because of their relationship. Similarly in the present study the antilingula was related close to the lingula which can be considered as an important landmark in mandibular ramus surgery.

The study done by Sawyer and Kiely observed the retromolar foramen in 7.7 % of 234 specimens [12]. The study done by Nayak et al. observed the retromolar foramen in 21.9 % of 242 specimens [13]. In the present study the retromolar foramen was seen in 6 % of specimens which is almost similar to study by Sawyer and Kiely. The inferior alveolar neurovascular bundle may be injured in the surgical procedures, like surgical extraction of lower third molars, or in the sagittal split osteotomy surgery, on account of its vulnerable location [14].

According to Ossenberg “the precursor of the mylohyoid bridge is a membrane continuous proximally with the sphenomandibular ligament and stretching the length of the mylohyoid groove medial to its contained neurovascular structures. The membrane and its bony variant may be derived from Meckel’s cartilage [15]. A study done by Shantharam et al. [16] observed mylohyoid groove bridging in 8 mandibles out of 115 mandibles.

A study done by Sawyer and Kiely in 1987 observed mylohyoid bridging in 2.60 % (234 mandibles) and Gopinathan et al. in 1995 in 8.63 % (220 mandibles) [17, 18]. In our present study we observed mylohyoid bridging in 3 specimens.

Conclusion

The location of antilingula was noted with respect to the lingula and mandibular foramen.

The mandibular foramen was located posteroinferior to the antilingula on both the sides. There was no statistical significance in the distances between the lingula and the antilingula. Therefore antilingula can be used as an

important surgical landmark for locating the mandibular foramen in mandibular ramus osteotomies. However it cannot be considered as accurate surgical landmark as the lingula when the antilingula is absent.

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