

Morphological analysis of the lingula in dry mandibles of individuals in Southern Brazil

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Abstract

The lingula of the mandible is a small-tongue-shaped bone projection overlaying the mandibular foramen, and it is clinically significant in oral and maxillofacial surgical procedures. This study aims to analyze the shapes of the lingula and its relationship with the surface of the mandibular ramus, and to record data about the population in Southern Brazil. The maxillofacial study of the lingula in 80 dry mandibles in adult individuals was conducted. The lingula of the two rami of each mandible were assessed and classified in the following shapes: triangular, truncated, nodular and assimilated. The triangular shape was analyzed according to its direction in relation to the condyle or the posterior region of the mandible posterior ramus, and also according to its relationship with the inner surface of the mandibular ramus: assimilated, free or partially free. The occurrence of accessory mandibular foramina in each mandibular ramus was also recorded. The triangular shape of the lingula was found in 66 sides (41.3%), seeing that in 21 mandibles (42 sides) it was noticed both on the right side and the left side, whereas 13 occurred on the right side and 11 on the left side, unilaterally. The truncated lingula was present on 58 sides (36.3%), and the nodular lingula was noticed on 17 sides (10.5%); as to the assimilated lingula it was found on 19 sides (11.9%). Accessory foramina were found in 11.3 and 3.8% of the right and left mandibular rami, respectively. Considering that the lingula shows morphological variants in different populations, these results include significant data of the population in the South of Brazil regarding the morphometric study of the mandible, also playing a role to avoid failure of the anesthetic surgical block of the inferior alveolar nerve.

Keywords: brazilian population, dry mandibles, lingula, morphometry.

1 Introduction

The lingula is a bone prominence shaped like a small tongue which overlays the mandible foramen that continues along the mandible channel. This channel goes from the ramus to the body, below the alveoli and connected to them through small channels leading the nerve and the inferior alveolar vessels. At the height of the first and second premolars it divides into the mental and incisive parts. The inferior alveolar nerve goes into the mandibular foramen together with the inferior alveolar artery. Inside the mandible the nerve supplies the pulps of all teeth located on its side and part of the periodontal ligament, and innervates the lower lip and the chin skin through the mental ramus. The lingula is where the sphenomandibular ligament is inserted (GARDNER, 1992; WILLIAMS, WARWICK, DYSON et al. 1995; ABRAHAMS, HUTCHINGS and MARKS, 1998).

Due to its connection to nerve and vascular structures the study of the tongue features provides important information related to oral and maxillofacial surgical procedures, such as the sagittal split ramus osteotomy and the intraoral vertico-sagittal ramus osteotomy carried out to correct dental facial deformities as prognathism (CHOUNG, 1992; KIM, LEE, CHUNG et al. 1997). Early studies described lingula characteristics and located it in relation to its position on the mandibular ramus (KIM, LEE, CHUNG et al. 1997), its shape and different races (TULI,

CHOUDHRY, CHOUDHRY et al. 2000; DEVI, ARNA, MANJUNATH et al. 2003; KOSITBOWORNCHAI, SIRITAPETAWE, DAMRONGRUNGRUANG et al. 2007). The position of the lingula was also investigated in the inferior alveolar nerve blockage in children (KANNO, DE OLIVEIRA, CANNON et al. 2005) and adults (HIATT and GARTNER, 1987). Researchers analyzed the morphological characteristics of the mandibular foramen and the lingula, and they arrived at the conclusion that such structures' variability would account for failure to block the inferior alveolar nerve (NICHOLSON, 1985; KEROS, KOBLER, BAUCIC et al. 2001).

This study aims to analyze the shapes of the lingula and its relationship with the surface of the mandibular ramus, and to record data about the population in southern Brazil.

2 Material and methods

Eighty (80) dry mandibles of adult individuals in the south of Brazil were used. The analysis of the lingula characteristics which is the aim of this study was conducted mainly through observation, without measurement tools. Two researchers conducted the analysis, separately. The obtained data were compared later. The lingula was classified as triangular, truncated, nodular and assimilated (TULI, CHOUDHRY, CHOUDHRY et al. 2000).

As to the triangular lingula it was conducted the analysis of their ends' direction to the condylar process or to the posterior portion of the ramus, and the characteristics of their borders, as well, according to their relationship with the surface of the mandibular ramus, which can be free, partially free or assimilated.

3 Results

The triangular shape of the lingula was found on 66 sides (41.3%), seeing that in 21 mandibles (42 sides) it was present on the right side and the left side. The unilateral assessment showed that 13 occurred on the right side only, and 11 on the left side only (Table 1). As to the direction of the triangular tip to the mandibular condyle 78.4 and 74.1% were noticed on the right side and left side, respectively (Table 2). Regarding the features of the borders of the triangular lingula, the partially free border was prevalent on the right side (55.3%) and left side (63.0%), followed by the assimilated type, with 26.3% on the right side, and 18.5% on the left side, and 18.4 and 18.5% free on the right side and the left side, respectively (Table 3). The truncated lingula was present on 58 sides (36.3%), and the nodular type was noticed on 17 sides (10.5%), whereas the assimilated lingula was found on 19 sides (11.9%). Accessory mandibular foramens were noticed in 11.3 and 3.8% of the right mandibular ramus and the left mandibular ramus, respectively (Table 4).

The opening of the mandibular channel is covered anteriorly by a bony projection, the lingula, which works as a region where the sphenomandibular ligament can be fixed (GARDNER, 1992; WILLIAMS, BANNISTER, BERRY et al. 1995; ABRAHAMS, HUTCHINGS and MARKS, 1998). Most references on the morphological aspects of the lingula in early studies are incomplete or nonexistent, except in kinds of lingula in Indian origin mandibles (TULI, CHOUDHRY, CHOUDHRY et al. 2000).

The approach on this small-lingula-shaped projection in some papers is limited to the assimilated type, the triangular type directed towards the mandibular condyle, and the assimilated type and nodular type, or to the one which has a free projection only towards the mandibular condyle (ABRAHAMS, HUTCHINGS and MARKS, 1998). The prevalence of the triangular lingula on both sides of the investigated mandibles, and the higher incidence of the tip direction to the condyles as well are coincident in early study (TULI, CHOUDHRY, CHOUDHRY et al. 2000). In a study of the Thai population the truncated lingula was prevalent, followed by the nodular type, the triangular type and the assimilated type (KOSITBOWORNCHAI, SIRITAPETAWE, DAMRONGRUNGRUANG et al. 2007).

The frequency of the bilaterally truncated type and nodular type in Indian mandibles was noticed (DEVI, ARNA, MANJUNATH et al. 2003). As to the borders of the triangular lingula, the most frequent one was the partially free border, different from the prevalence of the assimilated borders (TULI, CHOUDHRY, CHOUDHRY et al. 2000). As to the presence of accessory mandibular foramens, although with low incidence, 11.3% were found in the right rami and 3.8% in the left rami, data which were regarded as equally significant to prepare for the surgical blockage of the inferior alveolar nerve.

Table 1. Analysis of the shape of the lingula according to the triangular, truncated, nodular and assimilated classification (160 sides).

Shape	Bilateral	Unilateral	
		Right	Left
Triangular (n = 66, 41.3%)	42	13	11
Truncated (n = 58, 36.3%)	32	13	13
Nodular (n = 17, 10.5%)	8	5	4
Assimilated (n = 19, 11.9%)	14	1	4

Table 2. Frequency of the triangular shape of the lingula regarding the direction of its tip in the right ramus and the left ramus of the mandible: A1, towards the posterior region of the ramus; and A2, towards the condylar process.

	Right side		Left side	
	Frequency	%	Frequency	%
A1	8	21.6	7	25.9
A2	29	78.4	20	74.1
Total	37	100.0	27	100.0

Table 3. Frequency of the triangular shape of the lingula regarding the border, in the right ramus and the left ramus of the mandible: B1, assimilated; B2, free; and B3, partially free.

	Right side		Left side	
	Frequency	%	Frequency	%
B1	10	26.3	5	18.5
B2	7	18.4	5	18.5
B3	21	55.3	17	63.0
Total	38	100.0	27	100.0

Table 4. Frequency of the accessory mandibular foramen in the right ramus and the left ramus of the mandible.

	Right side		Left side	
	Frequency	%	Frequency	%
Present	9	11.3	3	3.8
Absent	71	88.7	77	96.2
Total	80	100.0	80	100.0

4 Conclusion

Considering that the lingula shows morphological variants in different populations, these results include significant data of the population in the south of Brazil regarding the morphometric study of the mandible, also playing a role to avoid failure of the anesthetic surgical block of the inferior alveolar nerve.

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Received August 18, 2010
Accepted November 12, 2010