

## Short Report

# Variation in shape of the lingula in the adult human mandible

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### ABSTRACT

The lingulae of both sides of 165 dry adult human mandibles, 131 males and 34 females of Indian origin, were classified by their shape into 4 types: 1, triangular; 2, truncated; 3, nodular; and 4, assimilated. Triangular lingulae were found in 226 (68.5%) sides, truncated in 52 (15.8%), nodular in 36 (10.9%) and assimilated in 16 (4.8%) sides. Triangular lingulae were found bilaterally in 110, truncated in 23, nodular in 17 and assimilated in 7 mandibles. Of the remaining 8 mandibles with different appearances on the 2 sides, 6 had a combination of triangular and truncated and 2 had nodular and assimilated. The incidence of triangular and assimilated types in the male and female mandibles are almost equal. In the truncated type it was double in the male mandibles while the nodular type was a little less than double in the female mandibles.

*Key words:* Osteology; mandible; lingula.

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### INTRODUCTION

The lingula of the mandible is a salient feature and is described in textbooks, as suggested by its name, as a sharp tongue-shaped bony projection on the medial aspect of ramus. It is an important landmark as it lies in close proximity to the mandibular foramen. The foramen and the lingula, because of their relation to the inferior alveolar nerve are of clinical significance for the orodental surgeon. The lingula is used for identifying the site for injection of local anaesthetics or for excision of nerve for facial neuralgia. While performing mandibular osteotomy it is imperative that these vital structures are not injured. This study was undertaken to address the forms of presentation and their prevalence in dry adult human mandibles.

### MATERIAL AND METHODS

The study was conducted on 165 dry adult human mandibles (330 sides), 131 males and 34 females of Indian origin, to determine the shape of the lingula,

the direction of its tip and special features of its borders. It was not possible to measure the lingula with precision as the exact point forming the base could not be ascertained.

### RESULTS

#### *Shapes of lingulae*

Depending on the shapes of the lingulae, they were classified into 4 types: 1, triangular; 2, truncated; 3, nodular; and 4 assimilated (Table 1, Figs 1–7). Type 1 or the triangular lingula had a wide base and a narrow rounded or pointed apex in 226 (68.5%) sides (Figs 1, 2). In 110 mandibles (220 sides) it was present bilaterally while in 6 mandibles (1 right, 5 left) it was found unilaterally, the other side having a truncated type lingula (Table 1). The type 2 truncated lingula was seen in 52 (15.8%) mandibles. The top of this bony projection appeared somewhat quadrangular (Fig. 3). The type 3 lingula was nodular and of variable size, and present in 36 (10.9%) sides (Figs 4, 5). Almost the entire lingula except for its apex merged into the ramus. In 16 (4.8%) sides the lingula was completely incorporated into the ramus (Fig. 6) and was classified

Table 1. *Distribution of the lingula, in adult human mandibles (330 sides)*

Type	Shape	Bilateral	Unilateral	
			Right	Left
1.	Triangular (n = 226, 68.5%)	220	1	5
2.	Truncated (n = 52, 15.8%)	46	5	1
3.	Nodular (n = 36, 10.9%)	34	—	2
4.	Assimilated (n = 16, 4.8%)	14	2	—



Fig. 1. Mandibular lingula of triangular shape (type 1), directed superiorly in the direction of the condyle. The anterior border is almost entirely attached to the ramus.



Fig. 4. Small nodular lingula (type 3).



Fig. 2. Triangular lingula (type 1) with apex directed towards the posterior border. Both borders are free.



Fig. 5. Lingula seen as a less prominent nodule (type 3).



Fig. 3. Truncated lingula (type 2) having a superior border.

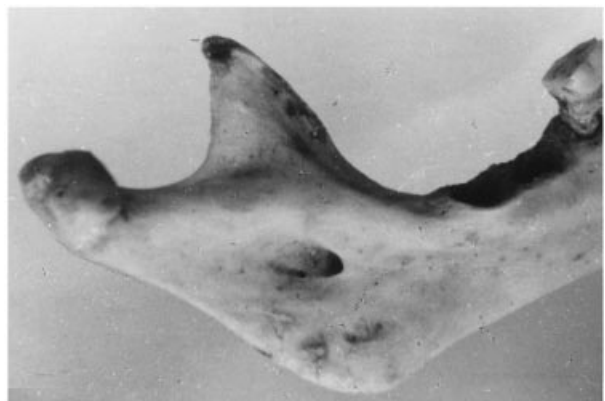


Fig. 6. Lingula assimilated in the mandibular ramus (type 4).

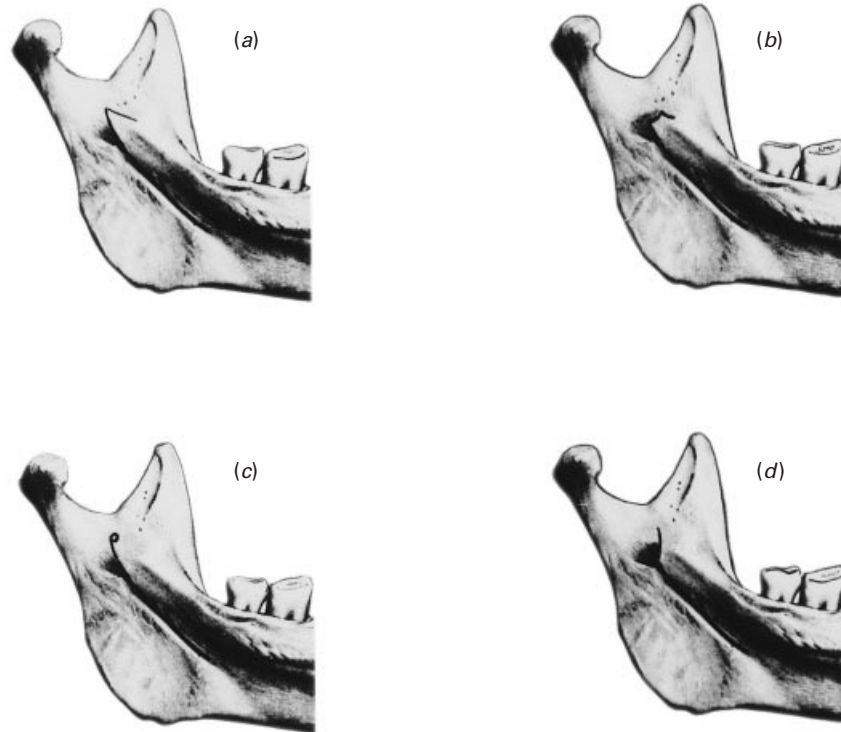


Fig. 7. Diagrammatic representation of the 4 main types of lingula: (a) triangular, (b) truncated, (c) nodular, (d) assimilated.

Table 2. Distribution and incidence (in parentheses) of lingula in males and females, bilateral or unilateral

	Male		Female	
	Bilateral	Unilateral	Bilateral	Unilateral
Triangular (n = 226)	172 (65.6)	6 (2.3)	48 (70.6)	—
Truncated (n = 52)	40 (15.3)	6 (2.3)	6 (8.8)	—
Nodular (n = 36)	24 (9.2)	1 (0.4)	10 (14.7)	1 (1.5)
Assimilated (n = 16)	12 (4.6)	1 (0.4)	2 (2.9)	1 (1.5)
Total	248	14	66	2

as assimilated or type 4. In the last 2 types, 2 mandibles had nodular lingulae on the left and completely absorbed or assimilated ones on the right (Table 1).

*Tip of lingula in types 1 and 2*

The direction of the tip could only be assessed subjectively. The apex of the type 1 lingula was directed posterosuperiorly, i.e. towards the condyle in 202 (89.4%) (Fig. 1) and towards the posterior border in 24 (10.6%) (Fig. 2). The type 2 lingula had 3 borders, superior, inferior and posterior. Between

them were 2 angles, superior and inferior, directed towards the condyle and the posterior border respectively (Fig. 3).

*Anterior and posterior borders of types 1 and 2*

The upper or the anterior border of the type 1 lingula was attached, either partially or completely to the ramus in 200 (88.5%) sides (Fig. 1) or well separated and free from the ramus in 26 (11.5%) sides (Fig. 2). The posterior border of the type 2 lingula was slightly convex upwards in 36 (69.2%), straight in 10 (19.2%) and concave in 6 (11.5%) sides.

*Distribution of various types in male and female mandibles*

The distribution and incidence of the various types of lingula was noted in male and female mandibles and whether they were present unilaterally or bilaterally. Of the 262 sides of mandibles belonging to males, the triangular type was found in 178, truncated in 46, nodular in 25 and assimilated in 13. Of the 68 sides of mandibles of females, the triangular type was found in 48, truncated in 6, nodular in 11 and assimilated in 3 (Table 2).

## DISCUSSION

Lingula, meaning 'little tongue', has been described in relation to the mandibular foramen as a bony elevation partially covering it. It was described by Johannes-Baptist Spix in 1815 and was therefore named 'Spix's ossicle or spine' (Dobson, 1962). The impression given by the text of standard medical books that lingula is always tongue shaped (or triangular) is a consequence of the nomenclature in studies that have been conducted on the lingula: authors have failed to state the precise morphological forms, thus preventing comparisons. Nicholson (1985) and DuBrul (1988), however, reported the presence of various shapes but did not describe them. Textbook illustrations reflect the existence of forms other than triangular, i.e. the truncated type depicted by Hollinshead (1962) and the nodular type shown by Berkovitz et al. (1978), Sampson (1991) and Williams et al. (1995) and the assimilated type shown by Morgan et al. (1982).

In 95.2% mandibles the type of lingula was the same bilaterally and only in 8 mandibles (4.8%) did the presentation differ between sides. Of the unilateral presentations, 6 were triangular in shape on one side and truncated on the other, while 2 mandibles had a nodular type on the left and an assimilated lingula on the right. Surprisingly the combination was that of type 1 with 2 and 3 with 4, but the number of such mandibles were few.

A triangular lingula with an anterior border partially or completely absorbed was found in 88.5% of sides and has also been depicted by Schafer et al. (1915), Jamieson (1937) and DuBrul (1988). Lingulae with borders not attached or free of the ramus were present in 11.5% and have been illustrated by Meschan (1959), Hamilton (1996), Romanes (1986) and Snell (1986). A triangular lingula directed posteriorly was illustrated by Pick & Howden (1901) and Basmajian (1980).

The triangular and assimilated types were the most and the least prevalent both in males (67.90% and 5.0% respectively), and in females (70.6% and 4.4% respectively). The truncated type was twice as common in males (17.6% sides) as in females (8.8%), while the nodular type was a little less than double in females (16.2%) as compared with males (9.6%).

The sphenomandibular ligament is considered an accessory ligament of the temporomandibular joint because its lower attachment to the lingula is at the axis of rotation when the mouth is opened. There is no lengthening or tension produced on or by the ligament in all movements of the jaw. It is merely a point of attachment to this vestigial structure and is not responsible for altering the shape of the cartilage of the first branchial arch, Meckel's cartilage. In a study to localise the mandibular foramen, Nicholson (1985) examined adult mandibles of East Indian ethnic origin and used the lingula as the reference point to standardise the measurements. The height and the shape of lingulae revealed great variation, but no description of these was presented.

To our knowledge this is the first study to identify and classify the different morphological shapes of the lingula. Whether these are disappearing as a process of evolution as in the nodular and assimilated types can only be a conjecture. Along with other features of the skull known as nonmetric variants these could be used as anthropological markers to assess different populations and races (Berry, 1975).

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