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RESEARCH ARTICLE

VARIATIONS IN THE SHAPES OF CORONOID PROCESS OF MANDIBLE: AN OSTEOLOGICAL STUDY

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ABSTRACT

Background: Coronoid process is a flat, triangular projection from the ramus of mandible giving attachment to two important muscles of mastication -temporalis and masseter. The knowledge of variations in the shapes of coronoid process is important for maxillofacial surgeons as a graft material as well as for anthropologists for the detection of races.
Aim: To determine the different shapes of coronoid process of mandible in both sides and both sexes.
Material and Method: The present study was conducted on 104 mandibles from the department of anatomy, MVJ Medical College and Research Hospital, Bangalore. The different shapes of coronoid processes like triangular, hooked, rounded were macroscopically studied and analysed.
Results: Triangular shaped coronoid process was seen in 45.19%, hooked in 33.6% and rounded in 21.15% mandibles. Triangular shaped coronoid process was seen in 45.7% in males and 43.3% in females followed by hook shaped 30.5% in males and 34.4% in females. Round shaped was least in both male and females showing the incidence of 23.7% and 22.3% respectively.
Conclusion: Triangular shape of coronoid process was more prominent followed by hook and rounded shape in both sexes. This study will be helpful for maxillofacial surgeons, anatomists, forensic researchers ad anthropologists.

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INTRODUCTION

Coronoid process (Processus condyloideus) derived from the Greek word "korone" meaning "like a crown". (Vipul P Prajapati *et al.,* 2011) The coronoid process of mandible is a thin, triangular process projects upward and slightly forward. (Soames, 1995) This process gives attachment to two important muscles of mastication –Temporalis muscle attached to apex, whole of the medial surface and anterior part of lateral surface. Rest of the lateral surface gives attachment to masseter (Dutta 2009). The knowledge of variation in the shape of coronoid process is important for maxillofacial surgeons for the reconstructive surgeries. It can be easily harvested as donor graft site for reconstruction of orbital floor deformities. It also act as an anthropological marker for detection of races in forensic studies and anthropological studies. (Tapas, 2014) Hence the present study was undertaken to study the different shapes of coronoid process and their prevalence in dry adult human mandibles of both male and female

MATERIALS AND METHODS

The present study was conducted on 104 mandibles (59 males, 45 females, 208 sides) from department of anatomy, MVJ Medical College and Research Hospital, Bangalore.

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The edentulous and damaged mandibles were excluded from the study. The shapes of coronoid process were macroscopically studied and their photographs were taken for documentation.

Depending upon the observation, the shapes coronoid process was classified into 3 types.

a)Type 1: Triangular: the tip of coronoid process pointing straight upward.
b)Type 2: Hook shaped in which the tip of coronoid process was pointing backward.
c)Type 3: Rounded:tip is rounded.

RESULTS

Type 1 (Triangular) shaped coronoid process was seen in 94 sides. In 33 mandibles it was seen bilaterally and unilateral in 28 sides (16 on right side and 12 on left side). The overall percentage of type1 was 45.19%. Type 2 (hook shaped) was seen in 70 sides, in which it was bilateral in 18 and unilateral in 34 sides (13 on right side and 21 on left side). The percentage of type 2 was 33.65%. Type 3 (round shaped) coronoid process was present in 44 sides. Bilateral in 12 mandibles and unilateral in 20 mandibles (12 on right side and 8 on the left side) showing the percentage of 21.15%.

Table 1. Incidence of different shapes of coronoid process with their percentage

Shape	Number	Percentage	Bilateral	Unilateral	
				Right	Left
Type1	94	45.19%	33	16	12
Type2	70	33.65%	18	13	21
Type3	44	21.15%	18	12	8

In the present study the gender wise distribution of various shapes of coronoid process were also noted. Out of 118 sides of mandibles belonging to males, the triangular shape was found in 54 sides, hook shape in 36 sides and round in 28 sides. Of the 90 sides of mandibles belonging to females, hook shape was found in 31 sides, round shape in 20 sides and triangular shaped in 39 sides.

Table 2. Gender wise distribution of different shapes of coronoid process with their percentage

Shape	Male				Female			
	Number (118sides)	Bilateral	Unilateral		Number (90 Sides)	Bilateral	Unilateral	
			Right	Left			Right	Left
Triangular	54(46.7%)	40	08	06	39(43.3%)	20	11	08
Hook	36(30.5%)	22	08	06	31(34.4%)	16	05	10
Round	28(23.7%)	10	05	03	20(2.3%)	12	04	04

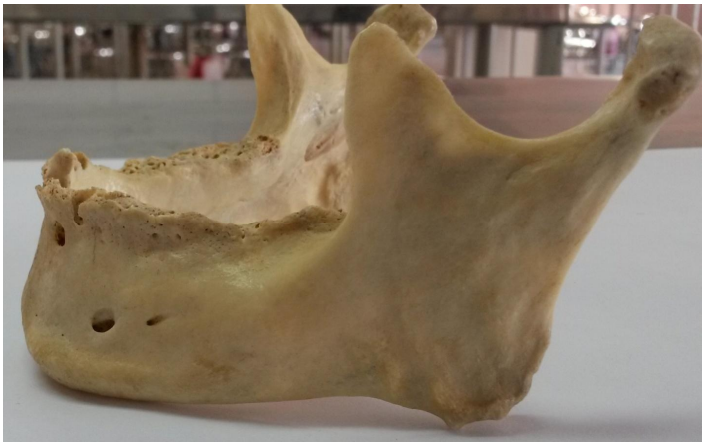

Fig.1. Mandible showing rounded coronoid process

Fig.2. Mandible with triangular coronoid process

Fig.3. Mandible with hooked coronoid process

DISCUSSION

The mandible or the submaxilla is a U shaped bone having curve shaped body with 2 rami. Each rami has condylar and coronoid process (Dutta 2009). The coronoid process develops as a discrete entity within the mass of temporalis muscle (Dutta 2009). Various studies have described the variations in the shapes of coronoid process of mandible. Standring *et al*. described the coronoid process as a flat triangular process (Soames, 1995). Triangular coronoid process was also noted by Hamilton, Romanes and Snell (Hamilton, 1976; Romanes, 1986; Snell, 1986). In the present study, the triangular shape of coronoid process was more predominant followed by hook and rounded. The result of our study correlates with that of study by Isaac *et al.* (2001), Tanveer *et al.* (2011). According to Vipul *et al*. (2011) triangular shaped coronoid process was more predominant and hook shaped was least (Vipul P Prajapati, 2011). In our study in both sexes triangular and hook shaped coronoid process was more predominant compared to round shaped. The difference in the shape and size of the coronoid process is influenced by various factors liIke unilateral habits, hormonal factors, genetic contribution and action of temporalis muscle (Shakya *et al.,* 2013).

The coronoid process is of great clinical significance to the maxillofacial surgeons. This is a membranous bone showing less resorption, so it can be harvested as local bone graft intra orally with minimal morbidity without any cutaneous scarring (Sudha *et al.,* 2013). Hence it is used as a graft in maxillofacial regions to reconstruct the osseous defects such as orbital floor repair, maxillary augmentation, alveolar defects and correction of non-union fracture of mandible (Pradhan *et al.,* 2014). Clauser *et al.* reported the use of a temporalis myofascial flap as composite flap with coronoid process as arteries supplying the coronoid process as well as muscles are same (Vipul P Prajapati, 2011). Since the medial aspects of coronoid process lies close to the distal molar tooth, the variation in the shapes of coronoid process may leads to narrowing of vestibular spaces and cause impingement resulting in restriction of mouth opening and mandibular hypomobility (Pradhan *et al.,* 2014).

Conclusion

In the present study triangular shaped coronoid process was more predominant unilaterally and bilaterally in both the sexes followed by hook and round shaped. Detailed knowledge of variations in the shapes of coronoid process is important for anatomist, anthropologists and forensic researchers. It also important for maxillofacial surgeons as it is used as graft material to reconstruct the osseous defects in maxillofacial regions.

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