

Prospective, Randomized Morphological Assessment of Variations in Shape of Coronoid Process of Adult Human Mandible

Vijay Shekhar Kumar¹, Vineeta Laxmi², Bhavesh Kumar³

¹Tutor, Department of Anatomy, Government Medical College, Bettiah (W.Champaran), Bihar, India.

²Tutor, Department of Anatomy, Government Medical College, Bettiah (W.Champaran), Bihar, India.

³Tutor, Department of Anatomy, Government Medical College, Bettiah (W.Champaran), Bihar, India.

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Corresponding author: Dr. Vineeta Laxmi

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Abstract

Aim: Morphological study of variations in shape of coronoid process of adult human mandible.

Material and methods: This prospective, randomized, study was carried out in the Department of Anatomy, Government Medical College, Bettiah (W.Champaran), Bihar, India. Shape of the coronoid processes of 50(100 sides) dry adult human mandibles were studied out of which 30 (60 sides) were of males and 20(40 sides) were of females. Male and Female bones were differentiated by noting standard morphological features. Different shapes of coronoid process observed are triangular, rounded, and hooked. The different shapes of coronoid process were compared for sexual dimorphism and difference on either side.

Results: In present study it is observed that Triangular shape of coronoid process was present in 50 mandibles out of which, in 70% cases it was bilateral while in 30% cases it was unilateral. Hence, observation leads to the interpretation that triangular shape of is more commonly bilateral. In case of unilateral, eight coronoid process of right sides were triangular (corresponding side have 2 rounded shaped & 5 hook shaped coronoid process). It was left side in 3 mandibles. It was of round shaped in 19 mandibles, out of which, in 47.37% cases it was bilateral mandibles and unilateral in 52.63% mandibles. In cases of unilateral side, it is present at three right and nine left side of mandible, The corresponding side of mandibles were two triangular shaped and one hooked shape in case of right side, while in cases of left side, five were triangular and four were hooked shape coronoid process.

Conclusion: In present study it is found that hook shape of coronoid is most common in male mandibles followed by triangular and rounded shape. In case of female mandibles triangular shape is most common followed by hook and rounded shape.

Keywords: coronoid process, shape, gender

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Introduction

There are two structures in the human body which are known by a common name the coronoid process. The first one is present in the jawbone i.e., mandible while other one present in a long bone of forearm named ulna. In both the location it has a triangular shape. The coronoid process of mandible is a thin & triangular eminence which is flattened from side to side and varies in the shape as well as size. The different variation in the shape of the coronoid process are like rounded, triangular & hook shaped [1]. This process projects upwards & slightly forwards. It has a superior border which is convex in shape, while its lower part is concave in shape. The temporalis muscle has attachment on its margins as well on the medial surface. These variations in the shape of coronoid process of mandible may be due to the functional or hereditary changes and has a strong correlation with the mode of attachment of the temporalis muscle. These different shapes of the coronoid process act as an evolutionary marker & is very useful in the anthropological & the forensic studies. The coronoid process has also great clinical significance to the maxillofacial surgeons for the reconstructive surgeries [2]. The morphological variation in the shape of coronoid process may be due to the hereditary or functional changes and has a correlation with the way of attachment of temporalis muscle. Various scholars in their studies have noted different sequences of prevalence of shapes. Tanveer A et al [3], Nirmale et al [4] observed that triangular shape of coronoid process were most prevalent which were followed by hooked

and rounded shapes respectively in their respective studies. Vipul et al [5], Sahithiet al [6], Shakya et al [7], Sudha et al. [2] and Pradhan et al. [8] have concluded that most common shape of coronoid process was triangular only in their studies also, but, it was followed by rounded and hooked shapes respectively. It is very useful for anthropological and forensic studies to know about the prevalence of shapes of coronoid process [7]. Although various studies are already done on the topic but, it is noticeable that different scholars came out with different pattern of shapes according to prevalence of the shapes of coronoid process.

Material and methods

This prospective, randomized, study was carried out in the Department of Anatomy, Government Medical College, Bettiah (W. Champaran), Bihar, India. Shape of the coronoid processes of 50(100 sides) dry adult human mandibles were studied out of which 30 (60 sides) were of males and 20(40 sides) were of females.

Male and Female bones were differentiated by noting standard morphological features. Different shapes of coronoid process observed are triangular, rounded, and hooked. The different shapes of coronoid process were compared for sexual dimorphism and difference on either side.

Statistical Method:

Statistical analysis was also done through Chi-square test using IBM SPSS software on personal computer.

Results

Table 1: Incidence of various shape of coronoid process in total side with percentage.

Type	Shape	Total	%	Bi lateral		Unilateral			
				Sides	%	Right	Left	Total	%
1	Triangular	48	48	37	77.08	8	3	11	22.92
2	Rounded	19	19	9	47.37	2	8	10	52.63
3	Hook	33	33	24	72.73	5	4	9	27.27
Total		100	100	70	70	15	15	30	30

In present study it is observed that Triangular shape of coronoid process was present in 50 mandibles out of which, in 70% cases it was bilateral while in 30% cases it was unilateral. Hence, observation leads to the interpretation that triangular shape of is more commonly bilateral. In case of unilateral, eight coronoid process of right side were triangular (corresponding side have 2 rounded shaped & 5 hook shaped coronoid process). It was left side in 3 mandibles. It was of round shaped in 19 mandibles, out of which, in 47.37% cases it was bilateral mandibles and unilateral in 52.63% mandibles. In cases of unilateral side, it is present at three right and nine left side of mandible, The corresponding side of mandibles were two triangular shaped and one hooked shape in case of right side, while in cases of left side, five were triangular and four were hooked shape coronoid process.

Remaining 33 mandibles were found hooked shaped, out of which, 72.73% mandibles were bilateral and in 27.27% mandibles it was unilateral. On analyzing above data using Chi Square Test on IBM SPSS software it is observed that X^2 is 8.76, "P" value is .0142 and hence, results are significant. The test is used between Bilateral and unilateral among the shapes of the bone. It was found that higher percentage (77.08%) of bilateral is triangular shape and about 72.73% in Hooked shaped. In rounded shape, percentage of unilateral is higher than bilateral. Overall results are significant. Out of total 50 (100 side) mandibles, 30 (60 sides) were of male. On analysis of male mandibles, it was found triangular shaped in 36%, rounded shape in 24% and hook shaped in 40% mandibles. On the other hand, while analyzing 20(40 sides) female mandibles, triangular shape was found in 60%, rounded shape in 10% and hook shaped in 30% mandibles.

Discussion

The knowledge of the morphological shapes of the coronoid process is useful for the maxillofacial surgeons. It makes an excellent donor graft site for reconstruction of orbital floor deformities. A Coronoid process graft can be used for alveolar defects repair, orbital floor repair, maxillary augmentation, repair of non-union fracture of mandible [9].

The present study exhibited overall triangular shape of coronoid process were most prevalent followed by hook shaped and rounded. As discussed earlier, it is observed that the patterns of prevalence of shapes in coronoid process of mandible in human were different in different studies. Some studies have shown triangular shape prevalence which is followed by rounded and hooked shape coronoid process respectively, while, some other studies have concluded triangular shape as most common shape of coronoid process, but, followed by hooked and rounded shapes respectively.

In the study of Tanveer A et al [3] and Nirmale et al [4] similar observations were found as in this study where triangular shape was followed by hooked and rounded shape respectively. In the study of Vipul et al [5] it was observed that triangular shaped are the most common shape but, Round & Hook shapes are the next shapes respectively. According to Isaac B et al [10] in 79.6% mandibles the type of coronoid process was the same bilaterally and only 20.4% mandibles did the presentation differ between sides. Triangular and rounded types were the most and the least prevalent in males (46.5% & 23.5% respectively) while in female the triangular and hooked shape type were the most & least prevalent.

According to the studies conducted by Sahithi et al [6], Shakya et al [7], Sudha et al [2] and Pradhan et al [8] among the South Indian populations, in case of male and female, the most common shape of the

coronoid process detected was triangular followed by round with male predominancy. In their study Sheela D. Kadam et al [11] observed that most common shape of coronoid process was triangular in both sex (62.5% in male and 67.08% in female). 87.26% mandible showing same shape coronoid process bilaterally and in 12.74% of mandible shape differs on both sides.

Out of total 50 (100 side) mandibles, 30 (60 sides) were of male. On analysis of male mandibles, it was found triangular shaped in 36%, rounded shape in 24% and hook shaped in 40% mandibles. On the other hand, while analyzing 20(40 sides) female mandibles, triangular shape was found in 60%, rounded shape in 10% and hook shaped in 30% mandibles.

Table 2: Shapes of coronoid process in mandibles.

Studies	Shapes observed		
	Triangular	Hook Shaped	Rounded
Is sac B et al [10]	49%	27.4%	23.6%
Vipul et al [5]	54.17%	21.25%	24.58%
Nirmale et al [4]	65%	28%	7%
Tanveer A et al [3]	67%	30%	3%
Present Study	48%	33%	19%

Conclusion

In present study it is found that hook shape of coronoid is most common in male mandibles followed by triangular and rounded shape. In case of female mandibles triangular shape is most common followed by hook and rounded shape.

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