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Variations of Coronoid Process in Adult Human Mandible in Eastern Region of West Bengal

DR. PARAMITA NAG [1], DR. ENAKSHI GHOSH [2], DR. ANINDYA ROY [3]

[1]Demonstrator/Tutor, [2]Associate Professor, Department of Anatomy R.G.Kar Medical College, Kolkata;
[3] Associate Professor and Head of the Department, Department of Physiology, Raiganj Government Medical College, Raiganj, U.D, West Bengal.

Corresponding Author
DR. ENAKSHI GHOSH
Associate Professor, Department of Anatomy,
R.G. Kar Medical College, Kolkata- 700004, West Bengal.

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ABSTRACT

The coronoid process of mandible is gaining importance to maxillofacial surgeons for reconstructive surgeries. Variations of coronoid process can result in narrow vestibular space because of close proximity of medial aspect of coronoid process to distal molar tooth. It is very much suitable for paranasal augmentation with reduced operation time. The knoeledge of variations is also helpfull in Forensic practice.

In the present study 50 adult dry mandibles were taken. Shape, height & width of those coronoid processes were measured along with relevant statistical data. The morphologic & morphometric variations of coronoid process is clinically important for maxillofacial surgeons & also for forensic experts.

Keywords: Coronoid Process**,** Variations, Autograft, Allograft, Reconstructive Surgeries, Forensic Science, Anthropometry

INTRODUCTION

Mandible is the only bone in the skull (except ear ossicles) which can move separately. Coronoid process is derived from Greek word "Korone" means" like a crown". Coronoid process has gained importance to maxillofacial surgeons as it can be used as a graft material.

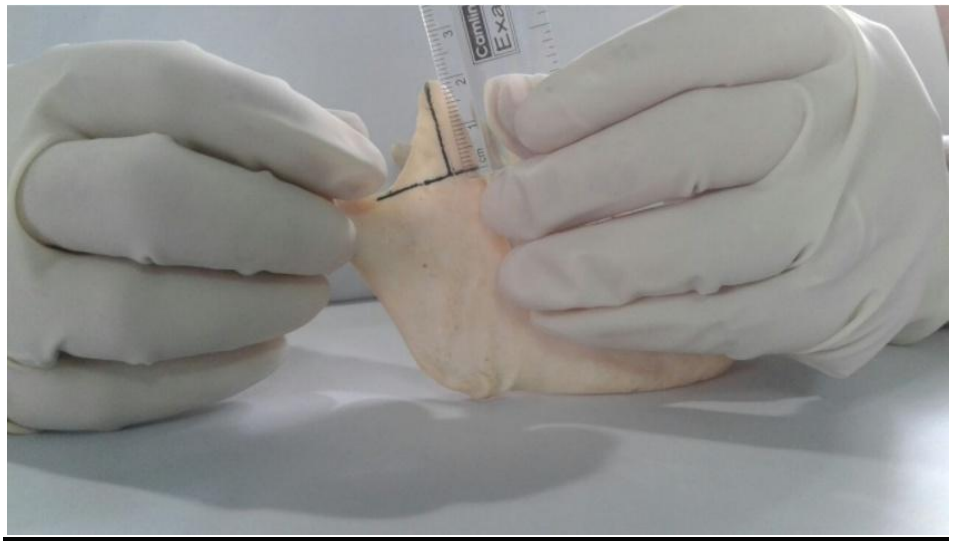
Size, shape of coronoid process is influenced by diet, genetic constitution and by temporalis muscle action. Enlargement of coronoid occurs in various disease.

This study is undertaken to note different forms of presentation of coronoid process. The aim of this study is to compare the morphology, morphometry and variations of coronoid process in dry adult human mandibles in Eastern Region of West Bengal.

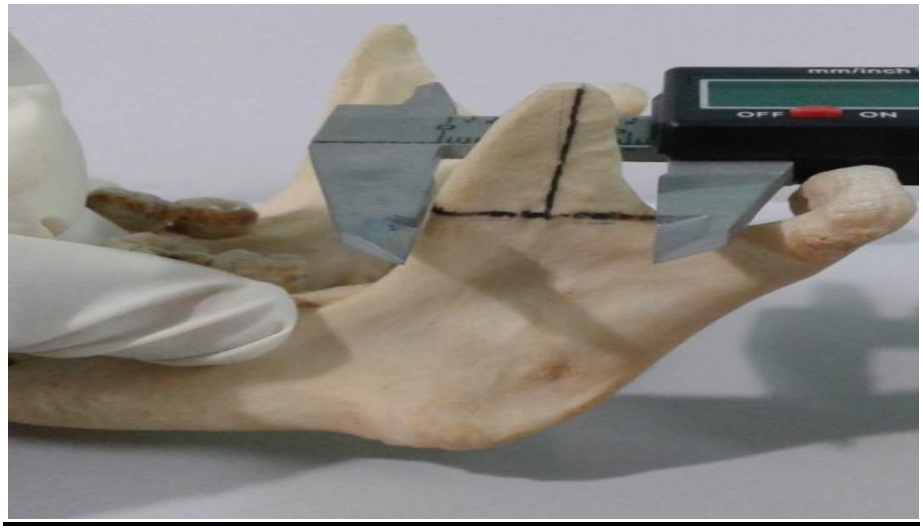
Materials & Methods:

Fifty dry adult human mandibles were examined for studying the shapes of coronoid process and for measuring different dimensions, photographs were taken.

Shapes of Coronoid process were noted. For measuring height & width base of coronoid process was taken as the line tangential to the deepest part of maudibular notch. Width & height of the coronoid process was measured with digital slide calipers.



Photograph 1: Showing the measurement of height of coronoid process (horizontal black line indicates the base of the coronoid process and black line perpendicular to it indicates the height of the coronoid process.



Photograph 2: Showing the measurement of width of coronoid process (horizontal black line indicates the base of coronoid process)

Results:

Fifty dry adult human mandibles were taken and examined.

The shapes of coronoid process were classified into four groups:-

a) Triangular - Tip pointing directly upwards.
b) Rounded - Tip rounded.
c) Hook - Tip pointing backwards.
d) Miscellaneous - Combination of above types.

Distribution of various shapes of coronoid process on right & left side was determined.

The comparison of distribution of coronoid processes between right & left side were determined by calculating P value & Chi square value.

P Value < 0.05 is considered statistically significant and provides strong evidence against null hypothesis. Null hypothesis says that there is no significant association between two variables.

The critical chi square value is 3.84 with 1 df (degree of freedom). If the chi square value is more than critical value it indicates strong evidence against null hypothesis.

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Pie chart was applied to show the distribution of various shapes of coronoid process.
Bar diagram was applied to show the distribution of various shapes of coronoid process on both sides.
The height & width of different types of coronoid process were measured on both sides. Data was statistically analysed for the purpose of comparison & correlation.

Comparison of height & width of coronoid process of various shapes in between right & left were done by calculating & Z value & P value.
Z value is a test of statistical significance which decides whether or not to reject the null hypothesis. Z value <- 1.645 is considered to be statistically significant & a strong evidence against null hypothesis.

Photograph3: Showing triangular coronoid process.

Photograph 4: Showing rounded coronoid process.

Photograph 5: Showing hook shaped coronoid process.

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Photograph 6: Showing rounded and hook shaped coronoid process.

Analysis:

Table 1: Distribution of various shapes of coronoid process on both sides

Side	Percentage of shapes of coronoid process							
	Hook	%	Triangular	%	Round	%	Misc	%
Right	22	44	17	34	10	20	1	2
Left	26	52	14	28	8	16	2	4
Average	24	48	15.5	31	9	18	1.5	3

Table 1: shows that percentage of hook shaped coronoid process and coronoid process of miscellaneous type is more on left side and triangular and round shaped coronoid process is more on right side.

Table 2: Association of distribution of various shapes of coronoid process between right and left side.

	Right		Left		Total	Chi-square	P-Value
	No.	%	No	%			
Hook	22	44	26	52	48	1.179	0.758
Triangular	17	34	14	28	31		
Round	10	20	8	16	18		
Misc	1	2	2	4	3		
Total	50	100	50	100	100		

Table 2: shows that there is no statistically significant difference in the distribution of various shapes of coronoid process between right and left side (p = 0.758) & (chi square = 1.179).

Table 3: Showing comparison of height of coronoid process between right & left side.

Shape	Height of coronoid process			
	Right (mm)	Left (mm)	Z Value	P value
Hook	22	26	0.202	0.420

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Triangular	17	14	-0.317	0.375
Rounded	10	8	0.725	0.234
Misc	1	2	---	---

Table 3: Shows that there is no significant association between the height of coronoid process on right and left side.

Table 4: Showing comparison of width of coronoid process between right & left side.

Shape	**Width of coronoid process**			
	Right (mm)	**Left (mm)**	**Z Value**	**P value**
Hook	22	26	-0.921	0.178
Triangular	17	14	-1.451	0.073
Rounded	10	8	0.568	0.284
Misc	1	2		

Table 4: shows that there is no significant association between the width of coronoid process on right and left side.

Figure 1: Pie chart showing the distribution of various shapes of coronoid process.

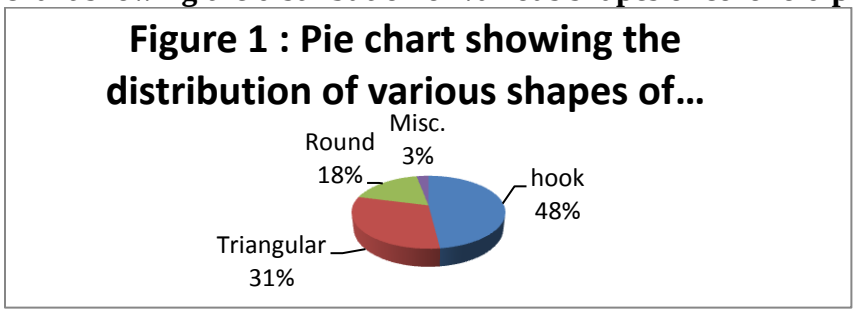

Figure 1 shows *hook shaped (48%) coronoid process is most prevalent followed by triangular (31%) and round shaped (18%).*

Figure 2: Bar diagram showing distribution of various shapes of coronoid process in right and left side.

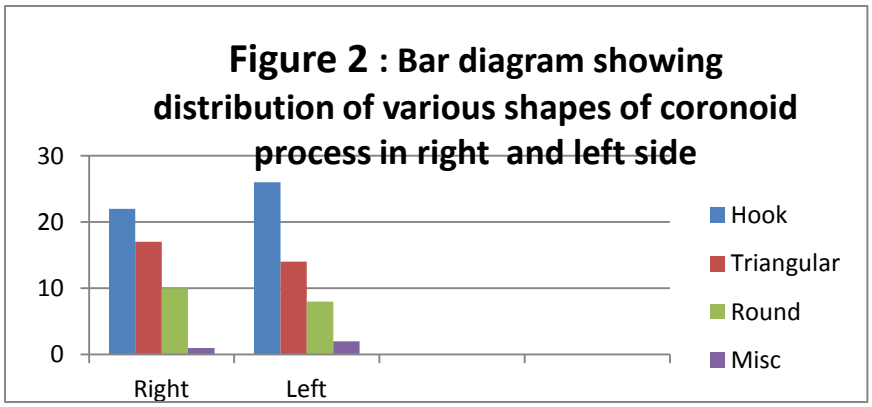

Figure 2. Shows different percentages of different shapes of coronoid processes, shown in bar diagram.

Discussion

The mandible or submaxilla is a 'U' Shaped bone having curved body & two rami. Each ramus has a coronoid process & a condylar process.

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The variations in the coronoid process morphology noted in the present study may be related to the variations of socio-demographic profile of individuals which has an effect on the size of temporalis muscle, altering the morphology of coronoid process.

Here, hook-Shaped coronoid process is mostely found (48%) followed by triangular (31%), rounded (18%) & miscellaneous (3%).

Miscelleaneous includes shapes like square (0.51%), hook- shaped & rounded (3%).

The variations of the shapes of coronoid process is due to different hormones, chewing habits, attachment & direction of pull of temporalis.

According to Kasat et al.[1] (2016), diet has an effect related to muscular pull on the bony process & may alter the shape of coronoid process. Thus, omnivores and carnivores possess larger coronoid process while herbivores possess smaller ones.

According to Nayak et al.[2] (2015), occupation & hormones also have effects on it, for example, basket makers, who often use their mouth for weaving– tend to have a bigger coronoid process due to overactivity of temporalis. It can be explained by M-T Coronoid Lever Complex, means Masseter- Temporalis muscle complex, related to coronoid process & responsible for vertical, vigorous thrust during mastication. So, overuse of these muscles leads to enlargement of the coronoid process.

In this study, the range of height of hook shaped coronoid process is (10-20) mm. with a mean value of (11.50 ± 2.62), the range of height of triangular coronoid process is (8-20) mm. with a mean value of (10.66 ± 2.47) & the range of height of rounded coronoid process is (10-17) mm with a mean value of (11.61 ± 2.20) mm on right side.

The range of height of hook shaped coronoid process is (10-20.30) mm. with a mean value of (12.34 ± 3.66), the range of height of triangular coronoid process is (7-27) mm. with a mean value of (12.93 ± 5.39), the range of height of rounded coronoid process is (10.20-14)mm. with a mean value of (11.14 ± 1.29) and the range of height of coronoid process of misc. type is (10.10-10.90) mm. with a mean value of (10.50 ± 0.57) on left side.

The range of width of hook shaped coronoid process is (11.19-22.66) mm. with a mean value of (15.73 ± 2.80), the range of width of triangular coronoid process is (12.32 – 17.75) mm. with a mean value of (15.40 ±± 1.76) and the range of width of rounded coronoid process is (14.77-20.34) mm. with a mean value of (17.13-1.68) on right side.

The range of width of hook shaped coronoid process is (9.89-22.76) mm. with a mean value of (15.57 ± 2.67), the range of width of triangular coronoid process is (11.90-21.02) mm. With a mean value of (15.64 ± 2.30), the range of width of rounded coronoid process is (13.44-23.56) mm. with a mean value of (16.22 ± 3.22) and the range of width of coronoid process of miscellaneous. Type is (14.44-20.53) mm. with a mean value of (16.99 ± 5.01) on left side.

A study by Pradhan et al.[3] (2014) (2) showed that rounded coronoid process is seen mostly in young person's whereas in adults (middle age group) it is triangular mostly. Probably it is the traction of temporalis muscle which changes the shape from rounded to triangular as age advances.

Sudha et al.[4] (2013) studied few bones & found 53.3% to be hooked type, which varies from previous result.

A study by Nayak et al[2] (2015) suggested the impact of male hormones on muscle growth and accordingly the pull on coronoid process.

At the time of birth coronoid process projects higher than the condylarprocess. But, in adults, it comes to a lower level.

Bilateral hyperplasion of coronoid process is very infrequent and mostly affects the adolescent males.

Developmentally, lower jaw develops at about 4^{th} -8^{th} wks. of gestation, from paired mandibular processes. These processes are produced by neural crest cell-proliferation Neural crest cells of mandibular primordia come mainly from part of anterior rhomben cephalon and give rise to connective tissues like bones, cartie layes & ligaments of facial / oral region.

A study by Ilguy M, et al.[5] (2014) showed that abnormal elongation of coronoid process presents with limitation of mouth opening.

Coronoid process is clinically very important to the maxillofacial surgeons. It can be used as local bone graft intraorally with minimum morbidity, without cutaneous scarring (Sudha et. al 2013)[4].

Autologous bone graft, allograft or synthetic bone graft can be obtained by different methods.

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Autologous bone graft is obtained from a part of patient's own body & can be used in any other part of the body of the same patient. Due to this procedure infection, bleeding, tissue damage remains less than allograft. So, this method is preferred by most Surgeons. According to Bakirei et al[6] (2013) Graft material is usually taken from the coronoid process if the injured area is small or can be taken from iliac crest, rib(s) or from Calvarium.

Conclusion

In this study, hook shaped (48%) coronoid process is most prevalent followed by triangular (31%) and round shaped (18%) coronoid process.This is similar to findings of Subbaramaiah et al (2015)[7].
A part from these shapes, mentioned here, other shapes like square, hook and round shaped are also included in this study these are called as miscellaneous type (3%).
Knowledge of variations of different shapes of coronoid process are necessary for maxillofacial surgeons for graft implant and reconstructive surgeries.
Clauser et al.(1995)[8] reported use of temporalis myofacial flap both as a single or composite flap, with cranial bone, in all cases of cranid-maxillofacial surgeries including trauma, tumors, deformities, temporo-mandibular joint ankylosis and facial paralysis.
Coronoid process hyperplasia leading to mandibular hypomobility is a common clinical problem andbecoming very important to medical practioners, now days.

Thorough clinical &radiological evaluation can rationalize line of management & clinical outcome.

We are hopeful that this study of variations of the shapes of coronoid process will be useful to the Anatomists, Anthropologists and Doctors of forensic medicine and Maxillofacial Surgeons. At the same time it is also desirable that more studies involving larger sample size and other groups of population will be done in future which will be more beneficial in medical field.

References:

1. Kasat PA, Bhuiyan PS (2016), A study on Coronoid process of dry human meundibles: Journal of the Anatomical Society of India, 2016: 65: 9-14.
2. Nayak S, Patra S, Singh G, Study of the Size of Coronoid process of mandible: IOSR Journal of Dental edical cience. 2015:14(6): 66-69.
3. Pradhan, Bara D.P., et al. Anatomical Study of Varioua Shapes of mandibular Coronoid process in relation to gender & age : IOSR Journal of Dental Medical Science, 2014;13(August) (8) : 9-14.
4. Sudha R, Shanta C, Aruna N. Study of Morphological Variations in the Shpae of Coronoid process of mandible in South Indian Population: IJCRR 2013 : 5(May) (10) : 84-92.
5. Ilguy, Kursoglu P et al. Three Cases of elongated mandibular Coronoid process with different presentations: Iranian Journal of Radiolpgy, 2014: 11.
6. Bakirci Set. al. Morphometric Characteristic and typology of the coronoid process of the mandible. Acta edica Meditettanea, 2013:29: 683-686.
7. Subbaramaiah M et al A study of various forms of mandiblular coronoid process in determination of sex: Indian Journal of Clinical Anatomy and physiology 2015:2 (4)199-203.
8. Clauser , et al. The use of Temporalis muscle flap in facial and craniofacial reconstructive surgery: review of 182 cases: Journal of Craniomaxillofacial Surgery 1995: 23 (40): 203-214.
9. Dutta A.K. Essentials of Human Anatomy Head & Neck, Chapter 1, 5th Edition: Page 40
10. Hamilton WJ. Text book of Human Anatomy 1976: 2nd Edition: Page 80.
11. Romanes GJ. Cunningham's Mannual of Practical Anatomy (Head and Neck) 1986: 15th Edition Page 12.
12. Snell RS .Clinical Anatomy for Medical Students (Head and Neck), 1986, : 3rd Edition :Page 773.
13. Soames R.W. Gray's Anatomy, 1995, 38th edition. Chapter - Skeletal system: 576-577.

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