

Study of Supratrochlear Foramen of Humerus: A Morphometric Study

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ABSTRACT

This study is conducted to know the incidence of supratrochlear foramen and its morphometry. A total of 38 humerus bones are studied in the Indian population sample, in light of available literature, and clinical, racial, and regional significance is drawn, if present.

Materials and methods: Thirty-eight humerus bones belonging to the museum of the Department of Anatomy, Rohilkhand Medical College & Hospital, Bareilly, Uttar Pradesh, India, were studied to observe the incidence of supratrochlear foramen anomaly in the Indian population sample.

Results: The supratrochlear foramen anomaly was observed in 7 out of 38 humeri studied, i.e., 18.4%.

Conclusion: The findings are of considerable clinical, racial, and regional significance, and are discussed.

Keywords: Bony septum, Coronoid fossa, Supratrochlear foramen.

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INTRODUCTION

A thin plate of bone separates the coronoid fossa present on the anterior aspect of the lower end of humerus and olecranon fossa present posteriorly. This bony septum can be either opaque or translucent and, in some cases, may be perforated to form a foramen called supratrochlear aperture, septal aperture, intercondylar foramen, or epitrochlear foramen.¹ It is most commonly referred to as supratrochlear foramen. Meckel first described it in 1825.²⁻⁴ Until 7 years of age, this septum is present, after

which it is occasionally absorbed to form supratrochlear foramen.^{5,6} Various studies have demonstrated that the distal portion of medullary canal in humeri with supratrochlear foramen was much narrower and shorter at the entry point of a retrograde nail than in humeri not having septal aperture. Hence, anatomical knowledge of variations, such as supratrochlear foramen is important in intramedullary fixation. The presence of supratrochlear foramen is also important for radiologists and orthopedics for proper interpretation of X-rays, since they are radiolucent and are easily mistaken for osteolytic and cystic lesions.

MATERIALS AND METHODS

A total of 38 humeri bones (15 right, 23 left) of human-dried humeri of unknown age and sex were obtained from the Department of Anatomy, Rohilkhand Medical College & Hospital, Bareilly, Uttar Pradesh, India, and were examined to determine the presence of supratrochlear foramen in the Indian population.

Shape of each foramen was noted and classified. The vertical and transverse diameters were measured by using digital vernier caliper.

RESULTS

The supratrochlear foramen (Fig. 1) was seen in a total of seven bones (18.4%); it was observed in 13.3% cases on right side and 21.7% cases on left side (Table 1). Hence, it was more common on the left humeri than on the right ones.



Fig. 1: Supratrochlear foramen in humerus

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Table 1: Incidence of supratrochlear foramen of 38 humerus

Right side	Percentage	Left side	Percentage	Total	Percentage
2	13.33	5	21.74	7	18.4

Table 3: Mean vertical and transverse diameter of supratrochlear foramen

Measurements	Right side (mm)	Left side (mm)
Transverse diameter	4.75	6.03
Vertical diameter	4.91	3.75

Table 5: Racial incidence of septal aperture

Australians	46.5
Egyptians	43.9
Mexicans	38.7
Central Indians	32
American Indian	29.6
Eastern Indians	27.4
Eskimos	19.8
American Negroes	18.4
Japanese	18.1
Koreans	11
Present study	18.4

Septal aperture was found more in left humerus, which is in line with findings of other races (Tables 2 to 4).

DISCUSSION

Anthropologists claim it is important in establishing the relationship between human and lower animals.⁷ According to Hrdlicka, the supratrochlear foramen is very frequent in primates other than man.⁸

A number of hypotheses were proposed regarding cause of supratrochlear foramen; some say it may be an atavistic character.⁹ Mechanical pressure caused during hyperextension can be one of the causes.¹⁰ Large olecranon process was suggested by few.¹¹ Some believe that supratrochlear foramen is formed by resorption from the anterior surface of septum.

It was suggested by Mays that hyperextension of elbow joint results in perforation due to resorption of humeral septum, when coronoid processes of ulna make contact with it. There is a huge variation in the rate of supratrochlear foramen occurrence in various human populations. Racial incidence of septal aperture is shown in Table 5.

In the present study, the vertical diameter of supratrochlear foramen was 4.91 mm on the right side and 3.75 mm on left side, and the transverse diameter was 4.75 mm on the right side and 6.03 mm on left side (Table 6).

Table 2: Comparative data in (%) of supratrochlear foramen humerus

Race	Right	Left
Central Indians	28	35
Eastern Indians	22	35
Japanese	25	27
Korean	06	13
Present study	13.33	21.74

Table 4: Different shapes of supratrochlear foramen

Variables	Number	Total (%)
Oval shape	3	7.89
Round shape	4	10.52

Table 6: Comparative statistical data of supratrochlear foramen of humerus in various studies

Author	Right side (mean)		Left side (mean)	
	VD	TD	VD	TD
Ananthi	4.48	6.5	3.98	5.82
Bhanu	5.75	6.68	4.86	6.92
Blakely	3.79	4.76	4.18	5.94
Diwan	3.6	5.5	3.8	5.5
Krishnamurthy	4	5.26	4.7	6.5
Nayak	3.81	5.99	4.85	6.55
Ozturk	4.56	6.7	4.95	6.86
Patel	4.77	7.31	4.99	7.03
Present study	4.91	4.75	3.75	6.03

TD: Transverse diameter; VD: Vertical diameter

CLINICAL IMPORTANCE

- It depicts evolutionary aspects of the foramen in addition to its surgical and orthopedic significance.
- About 75% of all injuries in children are due to supratrochlear fracture.¹²
- It is associated with narrow medullary canal; the knowledge of presence of supratrochlear foramen may be important for pre-op planning for treatment of supratrochlear fracture.
- Awareness of the morphometry of the shapes may help to avoid misinterpretation of radiology.¹³

CONCLUSION

The present study showed 18.4% supratrochlear foramen incidence in Indian population with left side predominance. We believe that this study will contribute to the literature, anatomical knowledge of supratrochlear foramen, and is beneficial for anatomists, anthropologists, orthopedic surgeons, and radiologists.

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