



Short report

Supratrochlear foramen of humerus – a morphometric study

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ABSTRACT

Keywords:

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Introduction: STF is an important variation in the lower end of humerus which has been neglected because of paucity of literature. **Aims:** This study contributes in adding consistent data in anatomy and anthropology. **Methods:** 180 humeri of unknown sex and age were collected from Department of Anatomy, Mamatha Medical College, Khammam, Andhra Pradesh. STF was measured using a vernier caliper. **Results:** The STF was seen in 23% of humeri, oval shape being more common and present more frequently on left side compared to right side humeri. **Conclusion:** The anatomical knowledge of STF is beneficial for anthropologists, orthopaedic surgeons and radiologists.

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1. Introduction

A thin, transparent plate of bone known as supratrochlear septum varying in thickness from 0.5mm to 1cm in thickness, which is lined in fresh state by the synovial membrane of elbow joint separates the olecranon and coronoid fossae. This septum may contain several perforations and in some cases may become perforated to form an aperture known as 'supratrochlear aperture' or 'supratrochlear foramen' [STF] [1]. According to Hirsh [2] the septum is always present until seven years of age after which it is occasionally absorbed to form STF. Individuals with this variation may be able to overextend the elbow joint [3]. Since then it has been described in various animals like cattle, rats, dogs and other primates [4, 5]. This foramen is of great interest to anthropologists who claim it as one of the points in establishing relationship between man and lower animals. This study contributes to increase anatomical data and consistency in anthropology and also for clinicians.

2. Materials and Methods

STF was studied in 180 humeri (84 right sided and 96 left sided humeri) of unknown sex and age mostly of South Indians of Telangana region of Andhrapradesh. These bones were obtained from the bone bank of Anatomy Department of Mamatha Medical College, Khammam, Andhra Pradesh. The STF were morphologically and morphometrically analysed. The STF varied in different shapes such as a round and oval (figure No 1). The transverse and vertical diameter of STF was measured using vernier caliper. In bones where septum was absent, translucency of septum was noted by placing lower end of humerus against X-ray lobby.

Figure 1: Lower end of humerus showing Supratrochlear foramen of different shapes



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3. Results

Out of 180 humeri (84 right sided and 96 left sided humeri) studied (42 bones) 23% of bones showed presence of STF. Oval shaped foramens were more common than vertical shaped ones. The mean lengths of transverse diameter were 5.2 and 6.5mm on right and left sides respectively. Similarly, the mean lengths of vertical diameter were 4 and 4.7mm on right and left sides respectively (table 1). The incidence of STF was greater on left side (28%) compared to right side (18%). Translucency of septum was seen in 92(66.6%) humeri with 40.2 % on right side and 60.1% on left side (table 1)

Table 1. Measurements of supratrochlear foramen

Side	Transverse diameter of STF(mm)		Vertical diameter of STF(mm)	
	Mean	SD	Mean	SD
Right	5.26	2.47	4	1.52
Left	6.5	2.59	4.70	1.69

Table 2. Comparative data (in %) of septal aperture in humerus, race-wise

Race	Percentage
Australians	46.5
Egyptians	43.9
Mexicans	38.7
Central Indians	32
American Indians	29.6
Eastern Indians	27.4
Eskimos	19.8
American Negroes	18.4
Japanese	18.1
Koreans	11
Italians	9.4
Germans	8.8
American Whites	6.9
Present study	23

4. Discussion

Detailed look at literature showed that STF was first described by Meckel in 1825[6]. Recent studies by S.S. Singhal et al [7] and Anupama mahajan [8] showed an incidence of 28% and 26% respectively which is more than our study which is 23%. Translucent septum is seen in 66.6% which is in conformity with the reports of Anupama mahajan (62%) and more as reported by Soubhagya Nayak et al (56.7%) [9].

Hirsh quotes examinations by martin which revealed the presence of STF in 58% of Arkanas Indians, 21.7% of African Negroes and 4.2% in White Americans. The same authority states that STF is more common in female by 38%-10% on left side by 25-5% [2].

The cause of STF has been debated by many authors, some authors considered it to be due to mechanical pressure during hyperextension or

by large olecranon process. If mechanical pressure due to olecranon process was the causative factor then it would have been more common in males and on right side. Some opine that STF is formed by resorption from anterior surface of the septum. Others say it arises from impingement on humeral septum by coronoid and olecranon process [10].

Racial incidence of the septal aperture as shown in (Table II) represents evolutionary aspects of the foramen in addition to its clinical significance [2, 7, 13]. STF is found only in mammals and is inconstant in various species. Darwin mentions this foramen in humans as one of the characteristic that show man's close relationship to lower forms. Anthropologists say that STF is more in ancient primitive people than recent civilization.

5. Clinical Significance

Supracondylar fractures account for 75% of all injuries in the paediatric age group [11]. Intramedullary humeral nailing is done to treat supracondylar fractures which become more difficult in presence of STF leading to secondary fractures. There is a lot of debate about route of pin entry in cases with STF because STF is always associated with narrow medullary canal at the distal end of humerus. Therefore, the knowledge of presence of STF may be important for preoperative planning for treatment of supracondylar fractures and perform antegrade medullary nailing rather than retrograde medullary nailing [12].

X-ray is performed to detect bone cysts, tumours and other lytic lesions in day to day clinical practice. On X-ray, STF presents as radiolucent areas simulating an osteolytic or cystic lesion. Such pseudolesions may lead to false positive diagnosis of an osteolytic or cystic lesion [3]. Hence knowledge of STF may check wrong interpretation of X-rays by radiologists.

6. Conclusion

This study focused on STF which is an important anatomical variation in the distal end of humerus. The incidence is 23% and more common on left side which agrees with the studies of other authors. The anatomical knowledge of STF is beneficial for anthropologists, orthopaedic surgeons and radiologists in day to day clinical practice.

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