

A STUDY ON OLECRANO-CORONOID SEPTAL APERTURE (SUPRATROCHLEAR FORAMEN (STF) OF HUMERUS)

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ABSTRACT

Introduction: A thin plate of bone separates the olecranon and coronoid fossa which may become perforated in some cases to give rise to a foramen known as 'septal aperture' or 'Supratrochlear Foramen' (STF). Supratrochlear foramen (STF) is an important variation in the lower end of humerus which has been neglected because of paucity of literature. The incidence of foramen ranges from 6-60% in different races.

Materials and Methods: The presence of STF was studied in 100 dry adult humeri of unknown sex from Department of Anatomy, J. J. M. Medical College, Davangere and ESIC Medical College & PGIMSR, Chennai. Each humerus was studied for the presence of the STF, Translucency of septum.

Results: The STF was seen in 10% 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 & clinicians for surgical intervention. The knowledge of the presence of supratrochlear foramen (STF) in a humerus may be important for preoperative planning for treatment of supracondylar fractures.

Key Words: Humerus, Supratrochlear foramen, olecranon fossa, coronoid fossa.

INTRODUCTION

A thin plate of bone separates the olecranon and coronoid fossa which may become perforated in some cases to give rise to a foramen known as 'olecrano-coronoid septal aperture' or 'supratrochlear foramen' (STF). It is also called as intercondylar foramen as it is situated between the two epicondyles. The supratrochlear foramen in humerus was first reported by Meckel in 1825. The incidence of foramen ranges from 6-60% in different races. Supratrochlear foramen are usually oval, round or triangular in shape. Some bones may also present with translucent septum.

Due to high incidence of traumatic injuries and pathological fractures, there has been increased incidence in intramedullary fixation of humerus. Supracondylar fractures are more common in children, it requires proper pinning technique, hence the structure of Humerus and its variations play crucial role in treatment of supracondylar fractures of humerus to avoid operative errors. The knowledge of higher incidence of supratrochlear foramen in Indians will be helpful for orthopedic surgeons and

radiologists in treating and interpreting the pathology in this area respectively

MATERIALS AND METHODS

The presence of STF was studied in 100 dry adult humeri of unknown sex and age collected from Department of Anatomy, J. J. M. Medical College, Davangere and ESIC Medical College & PGIMSR, Chennai. Each humerus was studied for the presence of the STF. Translucency of septum was assessed by placing bone against an illuminated x-ray board. Shape of the supratrochlear foramen was assessed by using vertical and transverse dimensions of STF taken with the help of vernier calipers. Inclusion criteria: Adult bones free from pathology were included for the study.

OBSERVATIONS AND RESULTS

In the present study on 100 humeri we observed supratrochlear foramen in 10(10%) bones out of which 6 were on the left while 4 were on the right side. Translucency was observed in about 15 bones of which 6 were on the right side & 9 on the left side. While remaining 75 bones did not demonstrate translucency. The most

common shape of the STF was oval where the transverse diameter of STF was more than vertical diameter. Incidence of STF was

more on the left side when compared to the right side.



Fig. 1 showing round shaped STF



Fig. 2 showing oval shaped STF.



Fig.3 showing translucency of olecranon coronoid septum.

Table No.1: Showing incidence of STF and translucency of olecranon coronoid septum.

INCIDENCE OF STF	NO OF CASES (TOTAL(N)=100)	% OF CASES
RIGHT SIDE	4	4
LEFT SIDE	6	6
TRANSLUCENCY OF SEPTUM	15	15
OPAQUE SEPTUM	75	75

Table no.2: Showing incidence shape of STF.

Shape of the STF	NO OF CASES
OVAL	8
ROUND	2
TRIANGULAR	NIL

DISCUSSION

The anatomical knowledge of the presence of STF is beneficial for orthopaedic surgeons, radiologists and anthropologists. In the present study incidence of STF was found in 10% of the specimens out of which 4 (4%) of right sided and 6 (6%) were of left sided humeri. In earlier studies by Singal S¹ et al reported incidence of STF in 28%,

Mahajan ²A et. al in 26%, Veerappan V³ et al in 42.85%,Jadhav M⁴ et. al observed in 40.78% .

In the present study 8 (80%) foramens were oval in shape, while 2 (20%) were rounded in shape. Oval shaped STF being more commonly observed coincides with earlier Indian studies by Veerappan V³ et al in 42.85% oval STF's, Jadhav M⁴ et. al

observed in 48.38% oval STFs. Translucency of the septum was observed in 15(15%) bones similar observations were made by Veerappan V³ et. al observed such an incidence in 50%, Jadhav M⁴ et. al observed in 26.31% , Nayak SR⁵ et. al found the translucency in 56.7% .

Presence of STF is associated with narrow intramedullary canal, so special attention may be required during intramedullary nailing procedures. Studies have shown medullary canal to be shorter in bones with STF compared to bones without STF (Paraskevas⁹ et al., 2010). In humerus with STF antegrade intramedullary nailing procedure can be performed instead of retrograde procedure. As STF appears radiolucent area on plain radiograph which mimics like osteolytic or cystic lesion, this should be kept in mind while performing various orthopaedic, surgical and diagnostic procedures.

EMBRYOLOGICAL BASIS

The STF is formed after the age of 6years following incomplete ossification, intralamellar space enlargement or gradual septum absorption (Hirsh⁶, 1927; Ming Tzu⁷, 1935).The etiology of STF has been an issue of controversy over the years. Some authors claimed that STF occurs as a result of incomplete ossification while others attributed the cause to the mechanical pressure from a large olecranon process during hyperextension of elbow. Recent studies counteract the mechanical pressure hypothesis claiming that since large olecranon process are features of males, STF would have been commoner in males.

Some authors are of the opinion that the occurrence of the foramen is attributed to atrophy of the bone after ossification, with the impact of pressure in cases of the extension of the arm. Hrdlicka⁸ et. al contraindicated & said that the intermittent pressure would cause the hyperaemia resulting in strengthening of the bone

instead of becoming weak. Mechanical hypothesis say that it should be more in the old age which is not the observed fact. Incidence found was more on left side as compared to right side.

Racial variations in occurrence of STF support the evolutionary theory. STF has been reported in animals like dogs, horse, and hyena with a similar pattern to that of man. Charles Darwin mentioned STF in humans as one of the characteristics linking origin of man's evolution to lower animals. The STF is commoner in ancient primitive people than modern man, hence the presence of STF can be an invaluable tool to the anthropologists for dating specimens.

CONCLUSION

The anatomical knowledge of STF is beneficial for Anthropologists & clinicians for surgical intervention. The knowledge of the presence of supratrochlear foramen (STF) in a humerus may be important for preoperative planning for treatment of supracondylar fractures. Prior anatomical knowledge about the presence of STF may check erroneous interpretation of X-rays by radiologists, as it appears radiolucent on X-ray which can be confused for an osteolytic or cystic lesion.

In supratrochlear fractures of humerus, the surgeons must keep in mind that it is better to perform an antegrade medullary nailing than a retrograde one; as there is higher chance of a secondary fracture, due to the extreme narrowness of the canal at the distal portion of humerus in the presence of STF. The STF is an important single factor which determines the route and mode of insertion of intramedullary nail during the management of supracondylar fractures. Hence accurate knowledge of the STF is essential for the operating surgeons and radiologists. Presence of STF can also act as a tool for anthropologists in dating of specimens.

REFERENCES:

1. Singhal S, Rao V. Supratrochlear foramen of the humerus. *Anat Sci Int* 2007; 82: 105-107.
2. Anupama Mahajan. Supratrochlear foramen - study in north Indians. *Professional Medical Journal* March 2011;18(1):128-32.
3. Venkateshgobi Veerappan, Suba Ananthi, Narayanan Gopal Kannan G, Prabhu S and Karthikeyan . Anatomical And Radiological Study Of Supratrochlear Foramen Of Humerus. *World Journal Of Pharmacy and Pharmaceutical sciences* 2013;2:313-20
4. Nayak SR, Das S, Krishnamurthy A, Prabhu LV, Potu BK. Supratrochlear foramen of the humerus: An anatomico-radiological study with clinical implications. *Upsala Journal of Medical Sciences*. 2009; 114: 90-94.
5. Jadhav Mayuri, Tawte Aparna, Pawar Pradeep, Mane Smita. Anatomical study of Supratrochlear foramen of Humerus . *Journal of Research in Medical and Dental Science* | Vol. 1 | Issue 2 | October – December 2013
6. Hirsh, S.I. (1927). Cited in Morton, S. H., & Crysler, W. E., Osteochondritis dissecans of the supratrochlear septum. *Journal of Bone Joint Surgery* 27(A) 12-24.
7. Ming-Tzu, P. (1935), Septal apertures in the humerus in the Chinese. *Am.J. Phys. Anthropol.*, 20, 165-170. doi: 10.1002/ajpa.1330200204.
8. Hardlicka A. The humerus septal apertures. *Anthropologie* 1932; 10:34-96.
9. Paraskevas, G. K., Papaziogas, B., Tzaveas, A., Giaglis, G., Kitsoulis, P., & Natsis, K. (2010). The supratrochlear foramen of the humerus and its relation to the medullary canal: a potential surgical application. *Med Sci Monit*, 16(4):119-123.
10. De Wilde, V., De Maeseneer, M., Lenchik, L., Van Roy, P., Beeckman, P., & Osteaux, M. (2004). Normal osseous variants presenting as cystic or lucent areas on radiography and CT imaging: a pictorial overview. *European Journal of Radiology* 51, 77-84
11. Singh, Singh SP. A study of the supratrochlear foramen in the humerus of North Indians. *J Anat Soc India* 1972; 21: 52-56.
12. Lamb DS. The olecranon perforation. *Am Anthropologist* 1890; 3:159-174.
13. Meckel JH (1825) cited by Kate BR, Dubey PN. A note on the septal apertures in the humerus of Central Indians. *Eastern Anthropologist* 1970; 33: 105-110.