

Study of Supratrochlear Foramen of Humerus in South Indian Population

Dr. Raghavendra V. P.¹, Dr. Benjamin W²

¹Associate Professor, Department of Anatomy, J. J. M. Medical College, Davangere, Karnataka, India

²Postgraduate, Department of Anatomy, J. J. M. Medical College, Davangere, Karnataka, India

Abstract: *Background:* Supratrochlear foramen (STF) is located on the bony septum that usually separates the coronoid and olecranon fossa at the lower end of humerus. *Materials and Methods:* The present study was conducted on 100 humeri (50 left, 50 right) of unknown sex collected from the Department of Anatomy, J. J. M. Medical College, Davangere. The presence of STF was noted, the transverse and vertical diameters of STF was measured by using digital vernier caliper. *Results:* The STF was observed in 28% of humeri. The incidence was more common on left side (34%) as compared to right side (22%). The shape of STF was oval and round, among which oval shape was found to be maximum. The mean transverse and vertical diameter of STF was 3.02 ± 0.96 mm and 2.11 ± 0.82 mm respectively. *Conclusion:* The knowledge of STF is important for orthopedic surgeons and radiologists in treating and interpreting the pathology in this area in their day to day clinical practice.

Keywords: Humerus, supratrochlear foramen, translucent septum.

1. Introduction

The coronoid and olecranon fossa of humerus are usually separated by a thin translucent plate of bone. In certain bones this bony septum may become perforated to give rise to a foramen known as *supratrochlear foramen* as described first by Meckel in 1825 [1]. As this foramen lies between the two humeral condyles, it is also known as intercondylar foramen. A thin plate of bone is always present until the age of seven years separating the coronoid and olecranon fossa, after which it becomes absorbed occasionally to form STF [2].

The septal aperture in humerus has been described in various other animals like dogs, hyenas, cattle and primates [3]. The detailed knowledge of STF is important for surgeons during preoperative planning of intramedullary fixation in fractures of distal end of humerus due to narrow medullary canal [4] [5]. On plane radiographs the STF may appear as osteolytic lesion. Anatomical knowledge of this STF is important during evaluation of any pathological lesions in distal end of humerus to prevent faulty interpretation of radiographs [6].

The present study on south Indian population is an attempt to highlight the incidence, morphological features and clinical importance of STF which may be beneficial to orthopedic surgeons and radiologists.

2. Materials and Methods

This present study was conducted in 100 (50 left and 50 right) dried humerus bones free from pathological changes and of unknown sex obtained from Department of Anatomy, J. J. M. Medical College, Davangere. The incidence and shape of STF was noted on the left and right side humeri and only those foramen having regular margins were considered. Digital vernier caliper was used to measure the maximum transverse and vertical diameter of STF. In bones where STF was absent, translucency of septum was noted by observing the lower end of humerus under X-ray lobby.

3. Results

Out of 100 humeri studied, only 28 humeri (28%) showed the presence of STF out of which STF was present in 17 left sided (34%) and 11 right sided (22%) humeri (Table I). The shape of STF was found to be oval in 24 humeri and round in 4 humeri (Figure 1). The mean transverse diameter was 3.02 ± 0.96 mm and the mean vertical diameter was 2.11 ± 0.82 mm. Remaining 72 humeri showed bony septum out of which translucency was observed in 56 humeri and 16 humeri had an opaque bony septum (Figure 2).

Table 1: Incidence of STF, translucent septum & opaque septum

		Left	Right	Total
Incidence	STF	17 (34%)	11 (22%)	28 (28%)
	Translucent septum	25	31	56
	Opaque septum	8	8	16

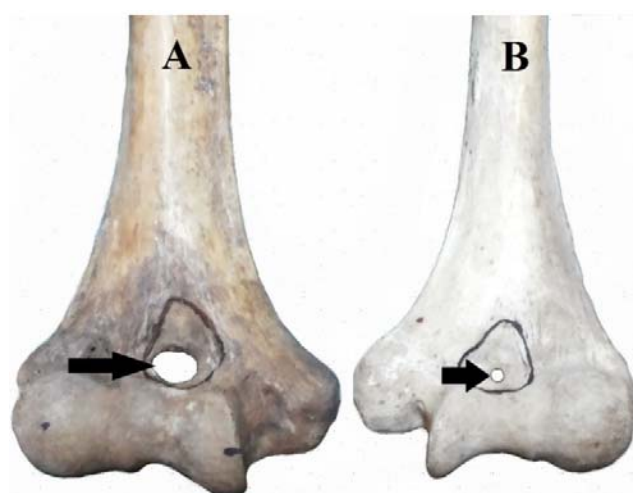


Figure 1: Photograph showing various shapes of STF A: Oval, B: Round.



Figure 2: Photograph of X-ray showing translucency of bony septum.

4. Discussion

The frequency of STF varies from 6% to 60% in different human populations and is racial dependent [7]. In the present study incidence of STF was observed in 28 humeri specimens (28%) out of which 17 humeri were left sided and 11 humeri were right sided. The previous studies in worldwide population showed an incidence of 6.9% in Americans [8], 7.9% in Egyptians [6], 8.6% in Turkish population [9], 18.1% in Japanese [10], 34.4% in Indians [11] and 58% in Arkansas Indians [12]. The previous studies in Indian population also showed an incidence of 27.4% in Eastern Indians [13], 32% in Central Indians [1], 27.5% in North Indians [14], 28% in South Indians [15] and 34.4% in overall Indians [11].

The STF is formed after the age of 6 years following incomplete ossification or gradual septum absorption. The etiology of STF has been an issue of controversy over the years. Some authors claim 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 [2].

Incidence of STF 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 horse, dogs and hyenas with similar pattern to that of humans. Charles Darwin mentioned STF in humerus as one of the characteristics linking origin of human evolution from lower animals [3]. The STF is more common in ancient primitive people than modern man. Hence the presence of STF can be a reliable tool for the anthropologists for dating specimens.

Presence of STF is associated with narrow medullary canal, so special attention may be required during intramedullary nailing procedures [4]. STF appears as a radiolucent area on plain radiograph which mimics like osteolytic or cystic lesion. These should be kept in mind while performing various orthopedic and diagnostic radiological procedures.

5. Conclusion

This present study focused on STF which is an important variation in the distal end of humerus. Incidence of STF in South Indian population is 28% with left side prominence. The awareness of STF in humerus is important for the orthopedic surgeons, for preoperative planning in case of supracondylar fractures and other fractures of distal end of humerus. Radiologists should be more familiar with the variants in order to avoid misdiagnosis during interpretation of plain radiographs of the distal end of the humerus. Presence of STF can also act as a tool for anthropologists in dating of specimens

References

- [1] Kate BR, Dubey PN, "A note on the septal apertures in the humerus of central Indians", *Eastern Anthropologist*, 33, pp. 270-284, 1970.
- [2] Morton HS, Crysler WE, "Osteochondritis dessicans of the supratrochlear septum", *J Bone Joint Surg Am*, 27 (1), pp. 12-24, 1945.
- [3] Hazirolu RM, Ozer M, "A supracondylar foramen in the humerus of cattle", *Anat Histol Embryol*, 19 (2), pp. 106-108, 1990.
- [4] Paraskevas GK, Papaziogas B, Tzaveas A, Giaglis G, Kitsoulis P, Natsis K, "The supratrochlear foramen of the humerus and its relation to the medullary canal – a potential surgical application", *Med Sci Monit*, 16 (4), pp. 119-123, 2010.
- [5] Braauer CA, Lee BM, Bae DS, Waters PM, Kocher MS, "A systematic review of medial and lateral entry pinning versus lateral entry pinning for supracondylar fractures of the humerus", *J Paediatr Orthop*, 27 (2), pp. 181-186, 2007.
- [6] De Wilde V, De Maeseneer M, Lenchik L, Van Roy P, Beeckman P, Osteaux M, "Normal osseous variants presenting as cystic or lucent areas on radiography and CT imaging – a pictorial overview", *Eur J Radiol*, 51, pp. 74-84, 2004.
- [7] Ozturk A, Kutlu C, Bayraktar B, Zafer ARI, Sahinoglu K, "The supratrochlear foramen in the humerus (Anatomical study)", *Ist Tip Fak Mecmuasi*, 63, pp. 72-76, 2000.
- [8] Benfer RA, Mckern TW, "The correlation of bone robusticity with the perforation of the coronoid-olecranon septum in the humerus of man", *Am J Phys Anthropol*, 24, pp. 247-252, 1966.
- [9] Koyun N, Aydinlioglu A, Gumrukcuoglu FN, "Aperture in coronoid-olecranon septum – a radiological evaluation", *Indian J Orthop*, 45, pp. 392-395, 2007.
- [10] Akabori E, "Septal apertures in the humerus in Japanese, Ainu and Koreans", *Am J Phys Anthropol*, 18, pp. 395-400, 1934.
- [11] Soubhagya R Nayak, Srijit Das, Krishnamurthy A, Latha VP, Potu BK, "Supratrochlear foramen of the humerus - an anatomico-radiological study with clinical implications", *Ups J Med Sci*, 114 (2), pp. 90-94, 2009.

- [12] Hirsh IS, "The supratrochlear foaramen – clinical and anthropological considerations", Am J Surg, 5 (2), pp. 500-505, 1927.
- [13] Chatterjee KP, "The incidence of perforation of olecranon fossa in the humerus among Indians", Eastern Anthropol, 21, pp. 270-284, 1968.
- [14] Singh S, Singh SP, "A study of the supratrochlear foramen in the humerus of North Indians". J Anat Soc India, 21, pp. 52-56, 1972.
- [15] Singhal S, Rao V, "Supratrochlear foramen of the humerus" Anat Sci Int, 82, pp. 105-107, 2007.

Author Profile



Dr. Raghavendra V. P. has completed MBBS and M.D in Anatomy from J.J.M. Medical College, Davangere. He is presently working as an Associate Professor in the Department of Anatomy JJM Medical College, Davangere, Karnataka, India



Dr. Benjamin W. has completed MBBS from Dr. B. R. Ambedkar Medical College, Bangalore and is studying postgraduate degree in M. D Anatomy in JJM Medical College, Davangere, Karnataka, India