

Supratrochlear Foramen of Humerus and its Clinical Significance - A Morphological Study in South Indian Population.

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ABSTRACT

Background: Supratrochlear foramen is formed as a result of perforation of bony septum that separates olecranon fossa and coronoid fossa at the lower end of humerus. It is more common in lower animals and primates. The incidence is increasing in different human races. **Aim:** To study the prevalence, shape and morphometry of supratrochlear foramen in south Indian population. **Methods:** 156 Adult dry humeri (84 left and 72 right) irrespective of sex were studied in Department of Anatomy, Government Coimbatore medical college, Coimbatore. Presence of supratrochlear foramen was studied on the basis of its shape, size and dimensions. Also their distance from the epicondyles and lower trochlear margin were noted. **Results:** Out of total 156 bones studied STF was present in 43 humeri (27.5%) more common in left humeri (30.9%). Most common shape reported was oval shape in 21 humeri (48.8%). The mean transverse diameters on right and left side were 9.5 mm and 9.18 mm; while mean vertical diameters on right and left side were 6.7 mm and 6.9 mm. The mean diameter for round foramen was 4.5 and 6 mm for right and left sides respectively. The distance from the STF to medial epicondyle, lateral epicondyle and lower trochlear margin were measured and the values were tabulated. **Conclusion:** The knowledge of STF is important for the anatomists, orthopedicians, surgeons, radiologists and anthropologists. It is helpful for the orthopaedicians in preplanning for intramedullary nailing in supracondylar fracture of humerus.

Keywords: Supratrochlear foramen, distal humerus, supracondylar fracture, Intra medullary nailing.

INTRODUCTION

Supratrochlear foramen is a common anatomical variation formed due to perforation of the bony septum that separates olecranon and coronoid fossa at the distal end of humerus. The incidence of the foramen varies in different populations and it is found to be increasing in Indian population. The present study was done in humeri belonging to south Indian population. The knowledge of morphological features of STF and their clinical importance is highly useful for the anatomists, anthropologists, radiologists and orthopaedic surgeons for clinical practice.

Aim

To study the prevalence of supratrochlear foramen in relation to its shape and morphometry in south indian population.

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MATERIALS AND METHODS

The present study was done on a total of 156 adult humeri (84 left humeri and 72 right humeri) irrespective of age and sex belonging to South Indian population from the Department of Anatomy, Government Coimbatore Medical College, Coimbatore. The bones with fractures and any other pathological changes were excluded from the study. Presence of STF was identified and their various shapes were studied. The transverse and vertical diameter of STF were measured using a vernier caliper the readings are tabulated. Also the distance of STF from medial epicondyle, lateral epicondyle and lower trochlear margin are measured. Presence of translucent septum was identified in bones with absent STF. Their translucency was observed by placing the distal end of humerus against the X-ray view box.

RESULTS

Out of 156 humeri studied, 84 were left humeri and 72 were right humeri. Among these 156, 43 humeri (27.5%) showed the presence of supratrochlear

foramen. In these 43 humeri with STF, 26 humeri (30.9%) were left sided and 17 humeri (23.6%) were right sided.

Table 1: Showing various shapes of supratrochlear foramen in both sides with percentage

Sl No	Shape	Right side	Left side	Total	%
1	Oval	10	11	21	48.8
2	Round	4	11	15	34.8
3	Reniform	2	2	4	9.3
4	Sieve like	1	2	3	6.9

Table 2: Showing mean diameters of supratrochlear foramen of both sides.

Parameter	Left side	Right side
Mean transverse diameter	10mm	7mm
Mean vertical diameter	7.5mm	4.5mm

Table 3: Showing mean distance from foramen to bony landmarks of humerus

Bony landmark	Left side	Right side
Medial epicondyle	25.3mm	26.2mm
Lateral epicondyle	27.1mm	27.2mm
Lower trochlear margin	15.08mm	16.1mm

Table 4: Frequency of STF in various studies

Studies	Presence of STF (%)
Dr. Varalakshmi et al (2014)	25.88%
Senem erdogmus et al (2014)	10.8%
Dr.Dhanalakshmi et al (2015)	34.4%
Dr.Arunkumar et al (2015)	21.4%
Shivaleela et al (2016)	26.7%
Asha Joselet Mathew et al (2016)	24.59%
Gayatri et al (2016)	27%
Vishwajit Ravindra et al (2018)	16.3%
Present study	27.5%

Table 5: Incidence of various shapes of STF in various studies

Studies	Oval	Round	Reniform	Sieve	Triangular
Senem erdogmus et al (2014)	7.8%	1.2%	-	0.6%	1.2%
Dr.Arunkumar et al (2015)	93.42%	2.63%	-	-	3.94%
Shivaleela et al (2016)	42%	47%	-	-	-
Asha Joselet Mathew et al (2016)	51.6%	21.6%	11.6%	8.3%	5%
Gayatri et al (2016)	38.70%	9.60%	-	-	9.60%
Vishwajit Ravindra et al (2018)	9	10	1	-	-
Present study	48.8%	34.8%	9.3%	6.9%	-

The shape of STF were studied and categorized. The most common shape is found to be oval (48.8%) [Figure 1] followed by round (34.8%)

[Figure 2], reniform (9.3%) [Figure 3] and sieve type (6.9%) [Figure 4]. Oval shape was seen in 21 out of 43 humeri with STF of which 11 present in left side and 10 in right side [Table 1]. The mean horizontal and vertical diameter were measured in oval STF. The mean transverse diameter on left and right side were 9.18mm and 9.5mm. The mean vertical diameter on left and right side were 6.9mm and 6.7mm respectively.



Figure 1: Shows oval shaped supratrochlear foramen



Figure 2: Shows round shape supratrochlear foramen

Round STF was seen in 15 out of 43 humeri of which 11 were on left side and 4 on the right side. Mean diameter of round STF was measured and found to be 6mm in left side and 4.5mm in right side. Reniform shape is seen in 4 humeri, 2 on either side.

Mean transverse diameter on left and right side were 10mm and 7mm respectively. Mean vertical diameter is measured from the hilar point to lower

margin of the foramen and were found to be 7.5 mm in left side and 4.5 mm in right side [Table 2]. Distance of the STF from medial epicondyle, lateral epicondyle and lower trochlear margin were measured. Average distance from foramen to medial epicondyle in left and right side were 25.3mm and 26.2mm. Average distance from foramen to lateral epicondyle in left and right side were 27.1mm and 27.2mm. Average distance from foramen to lower trochlear margin in left and right side were 15.08mm and 16.1mm respectively [Table 3]. STF is found to be closer to medial epicondyle than lateral epicondyle.

The sieve type of STF was seen only in 3 humeri (6.9%). Presence of translucent septum is seen in 8 (5.12%) out of 156 humeri [Figure 5]. Translucency is appreciated in this septum.



Figure 3: Shows reniform shaped supratrochlear foramen



Figure 4: Shows sieve-like supratrochlear foramen



Figure 5: Shows translucent septum

DISCUSSION

According to Varalakshmi et al, presence of STF was found in 25.88%, mean vertical diameter on right side and left side were 3.13mm and 3.08mm respectively. Mean transverse diameter on right and left side were 4.46mm and 4.60mm respectively.^[1] Senem erdogmus et al found the presence of STF in 10.8% and the incidence of various shapes like oval, round, triangular, sieve-like were 7.8%, 1.2%, 1.2% and 0.6%.^[2]

Arunkumar et al, found STF in 21.4%, mean vertical diameter on right side & left side were 3.9mm and 3.84mm respectively. Mean transverse diameter on right and left side were 5.67mm and 5.39mm respectively. Incidence of various shapes like oval, round, triangular were 93.42%, 2.63% and 3.94%.^[3]

Dhanalakshmi et al found the presence of STF in 34.4%. Mean vertical diameter on right and left side were 4.5 ± 1.93 mm and 6.97 ± 2.13 mm respectively. Mean transverse diameter on right and left side were 6.18 ± 2.3 mm and 5.39 mm respectively.^[4]

Shivaleela et al discovered the presence of STF in 26.7%, their mean vertical diameter on right and left side were 3.88 ± 2.391 mm and 3.68 ± 3.532 mm respectively. Mean transverse diameter on right and left side were 4.50 ± 3.183 mm and 3.32 ± 3.222 mm respectively. Incidence of various shapes like oval and round were 42% and 47%.^[5]

According to Asha Joselet Mathew et al, presence of STF was found in 24.59%. Mean vertical diameter on right and left side were 3.37 ± 1.25 mm and 3.82 ± 0.07 mm respectively. Mean transverse diameter on right and left side were 5.24 ± 1.76 mm and 4.88 ± 1.63 mm respectively. Incidence of various shapes like oval, round, reniform, sieve-like and triangular were 51.6%, 21.6%, 11.6%, 8.3% and 5%. Distance between medial margin of

STF to medial epicondyle on right and left side were 24.91 ± 2.93 mm and 24.39 ± 3.15 mm. Distance between lateral margin of STF to lateral epicondyle on right and left side were 27.2 ± 2.95 mm and 26.92 ± 2.46 mm respectively. Translucent septum was found in 56.96%.^[6]

Gayatri et al found the presence of STF in 27%, mean vertical diameter on right and left side were 3.9mm and 3.84mm respectively. Mean transverse diameter on right and left side were 5.67mm and 5.39mm respectively. Incidence of various shapes like oval, round, triangular were 38.70%, 9.60% and 9.60%. Presence of irregular shape seen maximum in 41.90%.^[7]

Vishwajit ravindra et al, discovered the presence of STF in 16.3%, mean vertical diameter on right and left side were 4.2 ± 3.1 mm and 4.3 ± 1.7 mm respectively. Mean transverse diameter on right and left side were 5.3 ± 2.7 mm and 6.7 ± 2.3 mm respectively. Incidence of various shapes like oval, round, reniform were 9%, 10% and 1%. Translucent septum was seen in 63.93%.^[8]

In our present study the incidence of STF is 27.5%. The mean vertical diameter on right and left side were 4.5mm and 7.5mm respectively. Mean transverse diameter on right and left side were 7mm and 10mm respectively. Incidence of various shapes like oval, round, reniform and sieve-like were 48.8%, 34.8%, 9.3% and 6.9%. Distance between medial margin of STF to medial epicondyle on right and left side were 26.2mm and 25.3 mm. Distance between lateral margin of STF to lateral epicondyle on right and left side were 27.2mm and 27.1mm respectively. Incidence of translucent septum is 5.12%. The findings in our study coincides with above mentioned studies. Most studies showed the presence of STF more in the left humeri and also it is found closer to the medial epicondyle.

CONCLUSION

The present study showed the incidence of STF in South Indian Population in 27.5% with left side predominance. Knowledge about the presence of STF is useful for anatomists, radiologists and forensic practice. This study is also important for the orthopaedician in planning surgery for distal humerus fracture.

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