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Original Research Article

Morphometric Analysis of Supratrochlear Foramen of Humerus in South Indian Population

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Abstract: Olecranon and coronoid fossae of lower end of humerus separated by thin plate of bony septum (0.5 to 1 mm thickness). Sometimes the bony septum may shows perforated clear foramen is referred as Supratrochlear foramen (STF). STF is always associated with narrow medullary canal, in that case it is not easy to perform intramedullary fixation of the humerus in traumatic injuries and pathologic fractures is very difficult. Present study conducted on 160 humerus (82 right side and 78 left side), bones were collected from department of anatomy, KFMS&R, coimbatore, Tamilnadu. Results: Oval shaped foramens were more common, the mean length and standard deviation of vertical and transverse diameter are analysed. This study focused on morphometric analysis of STF. The anatomical knowledge of STF is beneficial for orthopaedic surgeons, radiologists and anthropologists in day to day clinical practice.
Keywords: Supratrochlear foramen, Humerus, Diameter, south Indians

INTRODUCTION

The humerus is the longest and largest bone of the upper extremity; it is divisible into a body and two extremities [1]. Many workers have studied the morphometric data for the humerus in both sexes and statistical assessment of the value of this metrical study for sex determination of humerus. Supratrochlear foramen (STF) was first described by Meckel [2], since then it has been described in various animals like cattle, dogs, hyenas and other primates. A thin plate of bony septum (0.5 to 1mm thickness) is present between olecranon and coronoid fossae at the lower end of the humerus [3]. Sometime this bony septum may shows several perforations and in some bones it shows clear foramen named as septal aperture, which is commonly referred as STF. Individual with the presence of STF can overextend the elbow joint. Septal aperture name was termed by Hridlicka [4]. STF has been designated by a variety of names septal aperture, intercondylar foramen, olecranon foramen.

Studies indicates that STF is always associated with narrow medullary canal, such cases is not easy to perform intramedullary fixation of the humerus in traumatic injuries and pathologic fractures is very difficult [5]. A thin bony plate is always between the olecranon and coronoid fossae until the age of seven years, later which the bony septum becomes absorbed to form the STF. STF is evaluated radiologically for pathologic lesions and abnormal cyst [6]. Several authors have been reported about STF, the percentage of occurrence of STF is variant based on races and region [7]. The current study focused on highlighting the percentage of incidence of STF in south Indian population. The knowledge about the presence of STF may be useful for anthropologist, orthopaedic surgeons and radiologist in routine clinical practice.

MATERIALS & METHODS

The present study was conducted in department of anatomy, KFMS&R, Coimbatore. Total 160 humerus (82 right side and 78 left side) of unknown sex and age mostly of south Indians of Tamilnadu. The presence of STF was identified, analysed morphologically and morphometrically. Damaged and Pathologically defected bones were excluded from the study, all these bones were carefully screened to observe the presence of STF and the shape of STF (Oval or Round) is also noted. The Transverse and Vertical diameter of STF was measured by using vernier caliper. In bones where septum was absent, translucency of septum was noted by placing lower end of humerus against X-ray lobby.

RESULTS

Out of 160 humerus (82 right side and 78 left side) studied 38 (23.7%) bones showed presence of STF. Oval shaped foramen's were more common than vertical and rounded ones. The mean length of transverse diameter were 5.4 mm and 6.2mm on right

and left sides respectively. The mean length of vertical diameter were 3.8mm and 4.6 mm on right and left sides respectively. The presence of STF was greater on left side (26.9%) compared to right side (20.7%). Translucency of septum was seen in 72(45%) humeri with 39% on right side and 51.2% on left side.

Table 1: Showing Frequency of STF and Translucent Septum

Side	Number of bones	Incidence of STF (%)	Translucent septum (%)
Right	82	26.9	39
Left	78	20.7	51.2

Table 2: Showing Different Measurements of STF

Diameter	Right Side		Left Side	
	Mean	SD	Mean	SD
Transverse diameter (mm)	5.3	2.2	6.8	2.3
Vertical diameter (mm)	4.3	1.6	4.9	1.5

Fig-1: Showing Opaque septum (A), Tanslucency septum (B), Supratrochlear foramen (C)

DISCUSSION

The STF of the humerus has been a neglected topic in anthropology, standard anatomy and orthopedics text books. The incidences of STF were not described clearly, it may due to atrophy of septum or may be mechanical [8]. According to the opinion of previous authors the occurrence of STF is due to atrophy of the bony septum after ossification; atrophy of the bony septum is due to the impact pressure in cases of the extension of the arm in straight line direction. Its occurrence in adults varies from 6-47% in population of India. The STF, since it was first described by Meckel [2] in 1825 4, has been identified in many groups, present study is mainly focusing on presence of STF and its morphological and morphometric analysis in south Indians of tamilnadu region. There are previous studies in the Indian population which reported the incidence to be 32%, 28%, 27.5%, and 27.4% in central Indians, south Indians, North Indians, and Eastern Indians, respectively [4, 8, 9]. Our study on south Indians of Tamilnadu population showed an incidence of 19.2%, which is slightly lower prevalence than earlier studies.

The incidences of STF are most common in cattle, dogs, hyena and other primates because of the posture used by animals while tearing morsels of food [10]. Racial incidence of the septal aperture as shown in represents evolutionary aspects of the foramen in addition to its clinical significance [2, 10]. 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 [11]. Anthropologists say that STF is more in ancient primitive people than recent civilization.

In cats septal aperture is absent because supracondylar aperture is most common in cats. If the mechanical stress is the causative agent, then it should be more on right side. In contrast, it is more common on left side according to the present and previous studies. It can be explained that it is a phylogenetic characteristic feature frequently found in primates [12].

CONCLUSION

The percentage of occurrence of STF is an crucial variation in the distal end of humerus. The incidence of STF is more common on left side than right side humerus. The present study can add data in to anthropology and anatomy text books regarding STF and it explains the knowledge of understanding anatomical variation of distal end of humerus. The anatomical knowledge of STF is beneficial for anthrolopolgists, orthopaedic surgeons and radiologist in day to day clinical practice.

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