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Original Research Article

A STUDY ON THE CLINICAL IMPORTANCE OF SUPRA TROCHLEAR FORAMEN OF HUMERUS IN DRY ADULT HUMERI

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Abstract

Background: The Humerus is a bone of the arm and is the longest of long bones of upper limb. It has upper and lower ends an intervening shaft. Upper end consists of head, lesser and greater tubercles, inter tubercular sulcus and neck. Lower end is transversely enlarged forms two condyles. Radial fossa above the capitulum, coronoid fossa above the trochlea is medial to radial fossa present on the anterior surface of lower end [2].. These two fossae are usually separated by a thin bony septum lined by a synovial membrane. Occasionally in some persons the bony septum may become perforated to form an opening called septal aperture or supra trochlear foramen. The anatomical knowledge of STF is important to differentiate normal from pathological conditions of distal/ lower end of Humerus [16] [19]. The knowledge of Supra Trochlear Foramen of humerus is important for clinicians like Orthopedicians, Radiologists, Pediatricians etc for the pre-operative planning of dealing with fractures of lower end of humerus and Elbow pathology.

Keywords: Humerus, Supra Trochlear Foramen, Fractures, Septal irregularities, Intra medullary humeral nailing.

Introduction

The Humerus, the longest and largest bone in the Upper limb has expanded ends and a shaft. [1]. Upper end consists of head, lesser and greater tubercles. [2]. The lower end of humerus is a

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modified condyle, it is wider transversely has articular and non-articular parts. Lower end divided by a faint groove in to a rounded lateral Capitulum and a pulley shaped medial trochlea, [1] coronoid fossa above the trochlea, radial fossa above capitulum and an olecranon fossa present posteriorly, [2]. coronoid fossa and olecranon fossa are separated by a delicate bony septum lined by a synovial membrane. The thickness of bony septum determines its opacity and translucency. Occasionally this bony septum may become perforated and form an aperture / opening named as supratrochlear foramen (STF) or septal aperture. The first person to identify the supratrochlear foramen was Mekel in 1825. It was also named as Intercondylar, Epitrochlear, coronoid – olecranon foramen. [19, 18, 16]
morphologically is a thin plate of bone in the humans Until the age of 7yrs, after it is occasionally [5] absorbed to form the STF. In early days it was considered as negligible structure of humerus.
The presence & anatomical knowledge of STF is important for discerning normal from various pathological conditions of lower end of humerus. STF is most important for Radiologists& Orthopaedicians for proper interpretation of X – Rays, because patient appear as radiolucent shadow & may be mistaken for osteolytic or cystic lesions [17].
Now a days. there has been increased incidence of intramedullary nailing fixation of humerus due to high incidence of pathological fractures and traumatic injuries like supra condylar fractures. [9]. The orthopedic surgeons usually perform a reduction procedure to correct supra condylar fracture through intramedullary nailing, this may be compromised due to the presence of STF. Therefore ruling out the presence of STF is of utmost importance while planning the intramedullary nailing of humerus [3].

Aim: To determine the presence of Supra Trochlear Foramen in dry adult humeri.

Materials And Methods

The Study was carried out after obtaining proper Institutional Scientific and Ethical clearance (ACSR GMC / 050-SRC/2024 /IEC, ECR/961/INST/AP2017/RR”2020/88-06/02-07-24). An observational study was carried out a 200 dried adult human humeri of unknown age, gender and free from bony pathology. which was obtained from bone bank of the Department of Anatomy. ACSR GMC, NELLORE DISTRICT, ANDHRA PRADESH, INDIA. Different morphological features of humeri were observed such as presence and morphometry of STF. Morphometric parameters were measured by using vernier caliper and also different shapes of STF was noted
Inclusion Criteria: Adult dry human humeri with clear and demarcated features
Exclusion Criteria: Fractured bones, macerated bones

Results

Out of 200 Humeri, STF was seen in 50 humeri (25%). The incidence of supra trochlear foramen was more on left side (36%) compared to right side (14%).
According to it’s shape the supratrochlear foramen was further categorized into round 58% > oval 24% > irregular 12% > and sieve 6%.

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Figure 1

Table 1: Distribution of total number of humeri according to presence of the STF

	STF Present	**STF Absent**
Right (n=100)	14 (14%)	86 (86%)
Left (n = 100)	36 (36%)	64 (64%)
Total	50 (25%)	150 (75%)

Table 2: Distribution of humeri with STF according to its shape

Side	**Total**	**Round**	**Oval**	**Irregular**	**Sieve**
Right	14	7 (50%)	3 (21.4%)	3 (21.4%)	1 (7.1%)
Left	36	22 (61.1%)	9 (25%)	3 (8.3%)	2 (5.5%)
Total	50	58%	24%	12%	6%

Discussion

Supratrochlear foramen was first described by Meckel in 1825 [19]. It is relatively a typical anatomical variation in the lower end of humerus and was not given due importance by any of the authors. But in rare cases median nerve passes through this foramen producing compressive symptoms and supracondylar fractures are common in these individuals.[20]

Table 3: Comparative study of sidedness of STF

Sr. No	**Author**	**Year**	**Right**	**Left**
1	Vishwajit Ravindra Deshmukh *et al.* [6]	2018	6/20 (30%)	14/20 (70%)
2	D. Naga Jyothi *et al.* [7]	2017	11/34 (32.4%)	23/34 (67.6%)
3	Jadhav Mayuri *et al.* [8]	2017	12/31 (38.7%)	19/31 (61.3%)
4	Asha Joselet Mathew *et al.* [9]	2016	19/60 (31.6%)	41/60 (68.3%)

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

5	Bhumica Dang *et al.* [10]	2016	12/30 (40%)	18/30 (60%)
6	Shiva leela *et al.* [11]	2016	16/38 (42.1%)	22/38 (57.9%)

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

7	Arun Kumar *et al.* [12]	2015	37/76 (48.7%)	39/76 (51.3%)
8	Jing Li *et al.* [13]	2014	9/27 (33.4%)	18/27 (66.6%)
9	Jaswinder Kaur *et al.* [14]	2013	10/22 (45.5%)	12/22 (54.5%)
10	Rameshkumar Diwan *et al.* [15]	2012	183/428 (57.2%)	245/428 (57.2%)
11	S.R Nayak *et al.* [17]	2009	73/132 (55.3%)	59/132 (44.7%)
12	Present study	2024	14/100(14%)	36/100(36%)

In the present study the frequency of STF on Left side has been reported to be common which is supported by Vishwajit Ravindra Deshmukh (2018) *et al.* , AshaJoselet Mathew (2016) *et al.* , Jing Li (2014) *et al.*, Rameshkumar Diwan (2012) *et al.*

Table 4: Comparative study of various shapes of STF

Sr. No	Author	Humeri With STF	Oval	Round	Sieve	Triangular
1	VishwajitRavindra Deshmukh	20	9(45%)	8(23.5%)	5(14.7%)	0(0%)
2	D. NagaJyothi *et al.*	34	21(61.7%)	8(23.5%)	5(14.7%)	0(0%)
3	Jadhav Mayuri *et al.*	31	15(48.4%)	13(42%)	2(6.4%)	1(3.2%)
4	AshaJoselet Mathew *et al.*	60	31(51.6%)	13(21%)	3(5%)	5(8.3%)
5	Bhumica Dang *et al.*	30	12(40%)	18(60%)	0(0%)	0(0%)
6	Shivaleela *et al.*	38	16(42.1%)	18(47.4%)	0(0%)	0(0%)
7	ArunKumar *et al.*	76	71(93.4%)	2(2.6%)	3(4%)	0(0%)
8	Jing Li *et al.*	27	19(70.3%)	4(14.8%)	2(7.4%)	0(0%)
9	Jaswinder Kaur *et al.*	10	8(80%)	2(20%)	0(0%)	0(0%)
10	Rameshkumar Diwan *et al.*	428	353(82.4%)	65(15%)	10(2.5%)	0(0%)
11	S.R Nayak *et al.*	132	128 (93%)	7(5%)	2(2%)	0(0%)
12	Present study	50	12(24%)	29(58%)	3(6%)	6(12%) (Irregular)

In the present study, we observed round (58%) to be the most common shape and sieve (6%) to be the least common. In most of the studies oval STF was found to be the most common and triangular was least common.

Conclusion

The knowledge of Supra Trochlear Foramen of humerus is important for clinicians like Orthopedicians, Radiologists, Pediatricians etc. in the diagnosis and treatment modalities, in the pre-operative planning of dealing with fractures of lower end of humerus and Elbow pathology.

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