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Original Research Article

A morphological and morphometric study on supratrochlear foramen in human humerus with its clinical implication

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Abstract

Background: The supratrochlear foramen (STF) is an aperture present at the bony septum in the lower end of humerus that separates olecranon fossa from coronoid fossa. Although it holds significant clinical importance, it has not been extensively studied.
Aim: The present study is carried out to assess incidence, morphologic and morphometric variation of the supratrochlear foramen (STF).
Materials and Methods: The study was carried out on 200 dry, unpaired, adult human humeri of unknown sex, in the Anatomy Department, NRSMC, Kolkata. They were observed macroscopically for the incidence, location, shape & dimensions of the supratrochlear foramina. The opacity/ translucency of the bony septum was observed in those bones where the foramen was absent.
Results: The supratrochlear foramen was present in 36 humerus (18%) and was more on the left side (26). The commonest shape observed was oval (19) followed by a circular & triangular shape (12 & 5 in number respectively). In majority of bones the supratrochlear septum was opaque. The mean transverse (MTD) and vertical diameter (MVD) of the foramen was measured separately on both sides. The mean distance of the foramen from lateral epicondyle of humerus was 23.08 ± 1.62 mm on left side and 21.59 ± 1.70 mm on right side. The mean distance of the foramen from medial epicondyle of humerus were found to be 21.59 ± 1.88 mm on left side & 20.59± 1.54mm on right side.
Conclusions: This study was helpful not only for Orthopaedic Surgeons in preoperative planning of intramedullary nailing in Supracondylar fractures but also for Radiologists, Anatomists & anthropologists. The STF is radiolucent area in radiograph & the knowledge about this feature prevents from misinterpreting it as an osteolytic or cystic lesion.

Keywords: Lower end of Humerus, STF, Morphology, Intramedullary nailing, Radiolucency.

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1. Introduction

Supratrochlear foramen (STF) is occasionally present at the distal end of the humerus. The humerus articulates with the ulna to form the humero-ulnar part of the elbow joint. There are coronoid fossa and olecranon fossa which come into contact with coronoid and olecranon processes of ulna during flexion & extension of joint respectively.[1] These fossae are separated by a bony septum known as supratrochlear septum whose thickness determines its opacity or translucency. Usually, the thickness of the septum varies from 0.5 -1 cm.[2] If the septum is perforated, STF is formed in the lower end of humerus. STF is also named as epitrochlear foramen, intercondylar foramen, septal aperture and supratrochlear aperture.[3] Meckel (1825) was the first person to note this foramen. Shape of the foramen may vary (oval, round or triangular) or sometimes there are many perforations like sieve. Its incidence varies between 0 – 60% among different races.[4] Individuals with this modification are able to overextend their elbow joints.[5] According to Hirsh (1927) the supratrochlear septum is always present up to seven years of age, after which it may be absorbed to form the supratrochlear foramen.[6] It has been studied in cattle, dog, rats and other primates.[7,8] Darwin considered the presence of STF as a proof of evolution of humans from lower primates as it was also present in cattle, dog, rats and other primates.[9]

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There may be many factors like genetic or mechanical stress that lead to the development of this foramen. The genetic theory was proposed by Chapman et al in 1996.[10] According to this theory the role of T-Box genes is important. That was also affirmed by Hirsh.[11] The mechanical theory was proposed by Glanville.[12] He stated that repetitive flexion and extension of elbow joint may cause damage. However, which factor plays a more significant role still remains ambiguous.[13]

The humerus with STF was found to have narrow intramedullary cavity.[14] Supracondylar fracture is very common in children and usually treated by intramedullary nailing. If STF is present antegrade nailing is preferable than retrograde to prevent iatrogenic fracture.[15] So the bony defect plays a significant role in altering treatment and outcome of the fracture at lower end of humerus. Supratrochlear foramen increases susceptibility to fracture on mild trauma.[16]

For radiological interpretation one must be careful as this area of STF appears more radiolucent and can be mistakenly diagnosed as cystic or osteolytic lesion.[17]

2. Aims and Objective

To study the prevalence and morphometry of supratrochlear foramen and to compare them with the existing literature.

3. Materials and Methods

The present study was done on 200 randomised, dried, adult unpaired humeri (100 left sided and 100 right sided) of unknown gender and free of pathological changes, available in the Department of Anatomy, NRS Medical College, Kolkata, West Bengal during the study period (August 2023 to January 2024). The bones with fractures were excluded from the study. Measurements were made only on humeri with fused upper epiphyses (i.e. >20 years of age, which means the growth is complete in the bones under study). In each humerus presence of the supratrochlear foramen was identified and their various shapes were studied. The transverse and vertical diameter of STF and their distance from medial and lateral epicondyle were measured with vernier calipers. All data were recorded.

True cases of foramina were differentiated from post-depositional damage. The STFs, observed in this study, are of three different shapes i.e. oval, circular & triangular**.** The transverse diameter (TD) & vertical diameter (VD) of the foramen and the distance from the lateral margin of the foramen to the lateral epicondyle (LM-LE) & from the medial margin of the foramen to the medial epicondyle (MM-ME) was also noted carefully. The translucency and opacity of the septum was noted by throwing white LED light behind the supratrochlear septum to the anterior direction in those humeri where foramen was absent.

Each measurement is taken by one investigator to avoid inter-observer bias. Each measurement is taken thrice and then their mean is recorded.

All the observations are tabulated using Microsoft Excel Software. Statistical analysis was done for the association of different groups by using SPSS version 20 and mean, standard deviation and range were calculated. The level of significance was set at 0.05.

4. Result

Out of the 200-humerus studied, 36 cases (18 %) showed the presence of STF. The foramen is present in 26 (26%) cases on the left side and in 10 (10%) cases on the right side **(Table 1)**.

The incidence of STF was greater on the left side (26%) as compared to the right side (10%). The STF was absent in 164 cases (82%) in total. Among them, they are absent in 74 cases (74%) on the left side and 90 cases (90%) on the right side.

Regarding the shape, there were 19 oval (14 on left side & 5 on right side), 12 circular (9 on left side & 3 on right side) and 5 triangular (3 on left side & 2 on right side) cases, respectively (**Graph 1**).

Out of 36 humeri with STF majority of the foramina (19 i.e.52.78%) were of oval shape, 12 foramina (33.33%) were circular in shape and 5 (13.89%) are of in triangular shape**.**

Graph 1: The frequency of various shapes of STF.

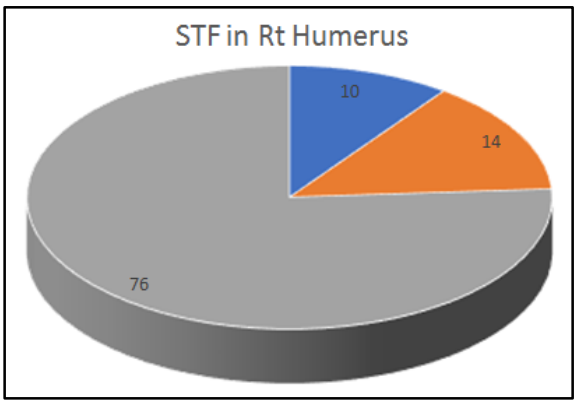
Out of the 200 bones studied, 36 cases (18 %) showed the presence of STF. Only 31(15.5%) humerus bones showed translucency of the septum present between coronoid & olecranon fossa. Out of them 17 (8.5%) belonged to left side and 14 (7%) belonged to right side. Rest of the bones had opaque bony septum present between coronoid fossa and olecranon fossa, 57 (42.86%) on left side & 76 (57.14%) on right side **(Graph 2, Graph 3).**

Table 1: Incidence of supratrochlear foramen in present study (200 humeri i.e. 100 right and 100 left sided).

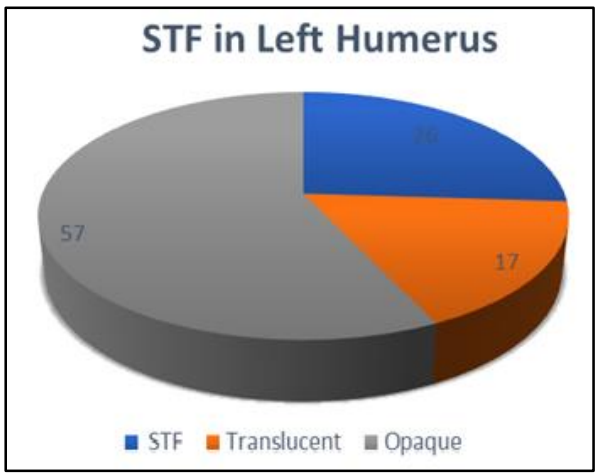
	Right (N - 100)		Left (N - 100)		Both sides taken together	
Types of humerus	**Number**	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
With STF	10	10%	26	26%	36	18%
Without STF	90	90%	74	74%	164	82%
Total	100	100%	100	100%	200	100

Table 2: Mean transverse & vertical diameter (Distance) of STF and mean distance between the margins of STF and corresponding epicondyles in right, left side of humerus.

In mm	Right		Left	
	Range	**Mean**	**Range**	**Mean**
MTD	3.8-6.0	5.03+/-.68	3.8-6.2	5.1+/-.76
MVD	2.9-5.7	3.99+/-.91	3.1-5.8	4.2+/- .68
LM-LE	18.7-24.1	21.59+/-1.70	20.2-25.7	23.08+/-1.62
MM-ME	18.5-23.7	20.59+/-1.54	16.9-24.3	21.59+/-1.88



Graph 2: Frequency of STF, translucency & opaque septum in right humerus.



Graph 3: Frequency of STF, translucency & opaque septum in left humerus.

When the both sides are considered separately, on right side, MTD & MVD are 5.03+/-.68 and 3.99+/-.91 respectively. On left side, MTD & MVD are 5.1+/-.76 and 4.2+/-.68 mm respectively (**Table 2**).

On right side, correlation coefficient (r) of MTD & MVD is +0.5. Correlation coefficient (r) of MTD and LM-LEC & MM-MEC are +0.104 and +0.134 respectively. Correlation coefficient (r) of MVD and LM-LEC & MM-MEC are +0.30 and +0.043 respectively.

On left side, correlation coefficient (r) of MTD & MVD is +0.48. Correlation coefficient (r) of MTD and LM-LEC & MM-MEC are +0.41 and +0.29 respectively. Correlation coefficient (r) of MVD and LM-LEC & MM-MEC are +0.25 and +0.21 respectively.

When both sides bone taken together, the Mean transverse, vertical diameter of STF The mean Distance between the lateral margin of Foramen and Lateral Epicondyle (LM-LE) of humerus (when both sided bones are considered together) noted in **Table 3.**

Table 3: Mean transverse & vertical Diameter (Distance) of STF and mean distance between the margins of STF and corresponding epicondyles - (Both side taken together).

	Range (in mm)	Mean
MTD	3.8-6.2	5.08+/-.73
MVD	2.9-5.8	4.15+/-.75
LM-LE	18.7-25.7	22.67+/-1.76
MM-ME	16.9-24.3	21.31+/-1.83

Correlation coefficient (r) of the parameters is calculated. Correlation coefficient (r) of MTD & MVD is +0.041. Correlation coefficient (r) of MTD and LM-LE & MM-ME are +0.02 and -0.13 respectively. Correlation coefficient (r) of MVD and LM-LE & MM-ME are +0.072 and +0.01 respectively.

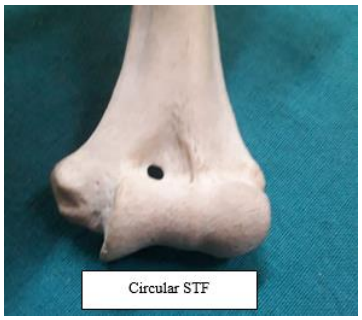


Figure 1: Circular STF

Figure 2: Oval STF

Figure 3: Triangular STF

Figure 4: Translucent STF

Figure 5: Opaque STF

Figure 6: Measurement with slide caliper

5. Discussion

The bony septum present between the olecranon and coronoid fossae of the humerus could be completely opaque at one extreme. Conversely, it may be fairly translucent at the other extreme of the spectrum. In the case where the septum is completely absent it forms supratrochlear foramen (STF) or supratrochlear aperture.[18]

No neurovascular structure passes through STF. According to Glanville EV only the openings through which neurovascular structures pass should get the status of foramen. So, supratrochlear foramen should better be considered as aperture rather than foramen.[12] However, a patient presented with pain and weakness in superior extremity was detected to have median nerve passing through STF.[19] In fact, in subhuman species (like cats) STF is more regular feature and carry neuro-vascular structure without complication. Darwin had opined this feature as a sign of evolutionary connection between human and subhuman species.[20]

Some have opined that bone atrophy after ossification is the reason behind the formation of STF.[21]

Anthropologists suggest that STF was more prevalent among our ancestors as they had to perform heavy load work. The intermittent pressure between the bony processes during strenuous work had caused absorption of bony tissue leading to generation of foramen.[11]

The incidences of STF among different races represent both aspects, evolutionary as well as clinical significance.[21-23] Desmoulins had considered STF as racial abnormality or atavistic in origin.[23]

Akabori had observed the incidences of STF were very rare in embryo or infant. He also found this feature was very low among above 60-year aged persons.[22]

Hardlicka had a different view stating that intermittent pressure should cause hyperaemia in bony tissue resulting in their strengthening rather than making it weak. For this reason, STF was not more prevalent in old population.[24]

Many researchers had suggested that if STF was a product of mechanical stress they should be more commonly seen on right side. But, from their study they had concluded that this feature was observed less in stronger limb. So, they considered this as a phylogenetic and atavistic feature.[25,26]

One report has suggested that although primarily pressure from olecranon process act as strengthening factor later insufficient blood supply result in degeneration followed by foramen formation. In some studies, it has been found that STF starts appearing after 7 years due to insufficiency in blood supply though it is absent in embryonic life.[27]

Impingement of olecranon and coronoid processes on lamina of humerus in weaker lax joint resulting in laminar perforation leading to STF formation.[13,28,29]

In many studies, it is observed that the formation of supratrochlear foramen is more prevalent in weaker and lighter bones.[26,30-32]

Higher frequency of Supratrochlear foramina in females and nondominant extremity as observed by Nayak G et al. in their study.[32]

The knowledge of STF is very important in surgical field. It acts as a stress riser resulting in supracondylar fracture of humerus.[16] Kuhn et al. have proposed that the supracondylar fracture remains stable if the periosteum, ligaments and fibrous capsule around the elbow joint remain intact.[34]

On the other hand, Sahajpal and Pichora have proposed that humerus with STF is prone to supracondylar fractures of humerus which may be of unusual fracture pattern types. Special care has to be taken during management of the fracture. Furthermore, due to more bilateral involvement of STF, the contralateral extremity should be checked for the presence of STF & also inform the patient of the potential risk of a low energy fracture.[16]

The supracondylar fractures are very common (17%) in the paediatric age group.[35,36] They are treated by intramedullary nailing with retrograde approach.

Table 4: Comparison of data (MTD & MVD) of current study with some previous studies:

Authors	Left side Transverse Diameter (mm)	Left side Vertical Diameter (mm)	Right side Transverse Diameter (mm)	Right side Vertical Diameter (mm)
Mathew et al.[15]	4.88 ± 1.63	3.37 ± 1.25	5.24 ± 1.76	3.82 ± 1.07
Arunkumar et al.[17]	5.39±1.57	3.84±1.2	5.67±1.71	3.9±1.32
Nayak G et al.[32]	6.57 ± 2.50	5.28 ± 1.60	5.0 ± 1.58	3.20 ± 0.8
Nayak et al.[35]	6.55 ± 2.47	4.85 ± 1.64	5.99 ± 1.47	3.81 ± 0.97
Krishnamurthy et al.[42]	6.50 ± 2.59	4.70 ± 1.69	5.26 ± 2.47	4.0 ± 1.52
Bhanu and Sankar[43]	6.92±2.00	4.86±1.20	6.68±0.80	5.75±1.50
Dang et al.[44]	5.21±2.13	3.94±1.40	5.14±1.165	3.79±0.68
Joshi et al.[45]	6.48±2.47	4.68±1.43	5.5±2.89	3.75±1.48
Bahsi Ilhan[46]	5.64±1.96	4.82±1.33	6.55±2.84	4.81±1.38
Present study	5.1 ±0.76	4.2±0.68	5.03 ±0.68	3.99±0.91

Table 5: Comparison of data (Shape of the STF) of present study with some previous studies:

Authors	Humeri with STF	Oval	Round	Triangular
Arunkumar et al. [17]	76	71(93.4%)	2(2.6%)	3(4%)
S R Nayak et al. [35]	132	123(93%)	7(5%)	2(2%)
Dang et al.[44]	30	12(40%)	18(60%)	0(0%)
Thejeshwari H G et al.[47]	140	128(91.4%)	7(5%)	5(3.5%)
G. Sailaja et al.[48]	124	81(65.32%)	39(31.45%)	4(3.2%)
Present study	36	19(52.78%)	12(33.33%)	5(13.89%)

The endosteal diameter of medullary canal of humerus is 6 or 7 mm. The isthmus is found at the junction of middle and lower third of the shaft. The medullary canal extends distally with a fairly constant diameter up to the supracondylar region.[37]

Apkinar et al. have reported humeri with septal aperture having very narrow medullary canal.[38] Chhabra P K et al. have also found a significantly smaller canal width in bones with STF in their study.[39]

Parakevas et al. have concluded that the distal part of medullary canal in humerus with STF was narrower and shorter than humeri without STF which can result in secondary fractures during retrograde intramedullary nailing. So, they perform an antegrade medullary nailing in these cases if surgery is required.[14]

In the present study, the percentage of STF was found to be 18%. Different studies on the Indian population have shown varying incidences from 19.2% to 34.4%.[3,15,18,35] The incidence for the STF varies among different populations like, 57% in Libyans, 47% in Africans, 18.1 % in Japanese and the lowest prevalence is found in Greeks (0.304%). Therefore, it could be utilized as an important tool for racial differentiation.[12,23,28,40]

Various shapes of the STF were identified and noted. In this study, the data derived from mean diameters for the STF (vertical and transverse) and the measurements of distances of STF from medial and lateral epicondyles were of immense use during surgical management of the supracondylar fractures, i.e., the choice of nailing procedures in operative intervention. This information prevents radiologists from misinterpreting STFs as cystic or osteolytic lesions.[41] Collected data of present study compare with the previous studies. (**Table 4**, **Table 5**)

A case of osteochondritis dissecans, a necrotic lesion of bone, involving the supratrochlear septum, has been mentioned in the literature.[28]

De Wilde et al described STF as “Pseudo lesion” in an X ray & CT imaging of the upper limb and which could be mistaken as an osteolytic or cystic lesion.[49]

6. Limitation of Study

Our study evaluated from dry humerus bone only. It is thought that studying on a wider population of living individuals using radiologic imaging methods (X-ray & CT Scan) will contribute the more precise data of a particular region about incidence, shape & dimension of STF. Because the proper knowledge of STF is essential for orthopaedic surgeon for preoperative planning in fractures management of distal end of humerus and to choose ideal nailing procedure. The concept of STF, if present in mind there will be less chance of the Radiologists to misdiagnose it as osteolytic or cystic lesions.

7. Conclusion

In the present study, the percentage of STF was found to be 18%, more in left side of humerus. The data obtained from the present study corroborate the findings of the previous studies. The STF is one of the evolutionary link between the lower animals and humans. The knowledge of STF is essential for Anatomist, Anthropologist, Orthopaedic Surgeon & Radiologist.

8. Source of Funding

None.

9. Conflict of Interest

None.

References

1. Standring, S. Pectoral girdle & Upper limb. In: Gray’s anatomy. 40th Ed. Elsevier Churchill Livingstone, New York, 2008:850
2. Varlam H, St Antohe D, Chistol RO. Supracondylar process and supratrochlear foramen of the humerus: a case report and a review of the literature. *Morphologie*. 2005;89(286):121–5.
3. Diwan RK, Rani A, Chopra J, Srivastava AK, Sharma PK, Verma RK, et al.. Incidence of Supratrochlear foramen of Humerus in North Indian Population. *Biomed Res*. 2013;24(1):142–5.
4. Ndou R, Smith P, Gemell R, Mohatla O. The Supratrochlear Foramen of the Humerus in a South African dry bone sample. *Clin Anat*. 2013;26(7):870–74
5. Veerappan V, Ananthi S, Kannan NG et al: Anatomical and radiological study of supratrochlear foramen of humerus. *World J Pharm Pharm Sci*. 2013;2(1):313–20
6. Hima BA, Narasinga RB: Supratrochlear foramen-a phylogenıc remnant. *Int J Basic Appl Med Sci*. 2013;3(2):130–2
7. Haziroglu RM, Ozer M. A supratrochlear foramen inthe humerus of cattle. *Anat Histol Embryol*. 1990;19:106–8.
8. Riesenfild A, Somon M. Septal apertures in humerus of normal and experimental rats. *Am J Phys Anthropal*. 1975;42(1):57–61.
9. Benfer RA, Tappen NC. The occurrence of the septal perforation of the humerus in three non-human primate species. *Am J Phys Anthropol*. 1968;29(1):19–28.
10. Chapman DL, Garvey N, Hancock S, Alexiou M, Agulnik SI, Gibson-Brown JJ, et al. Expression of the T-box family genes, Tbx1-Tbx5, during early mouse development. *Dev Dyn*. 1996;206(4):379–90.
11. Hirsh SI. Cited in Morton SH and Crysler WE. Osteochondritis dissecans of the supra -trochlear septum. *J Bone Joint Surg*. 1945;27-A:12–24.
12. Glanville EV. Perforation of the coronoid-olecranon septum humero-ulnar relationships in Netherlands and African populations. *Am J Phys Anthropol*. 1967;26(1):85–92.
13. Mays S. Septal aperture of the humerus in a mediaeval human skeletal population. *Am J Phys Anthropol*. 2008;136(4):432–40.
14. Parakevas G, Papazlogs 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*. 2010;16(4):BR119–23.
15. Mathew AJ, Gopidas GS, Sukumaran TT. A study of the supratrochlear foramen of the humerus: anatomical and clinical perspective. *J Clin Diagn Res*. 2016; 10(2):AC05–8.
16. Sahajpal D, Pichora D. Septal aperture: an anatomic variant predisposing to bilateral low-energy fractures of distal humerus. *Can J Surg*. 2006;49(5):363-4.
17. Arunkumar K, Manoranjitham R, Dhanalakshmi V, Morphologi cal study of supratrochlear foramen of humerus and its clinical implications. *Int J Anat Res*. 2015;3(3):1321–25.

18. Das S. Supratrochlear foramen of the humerus. *Anat Sci Int*. 2008;83(2):120
19. Roaf R. Foramen in the humerus caused by the median nerve. *J Bone Joint Surg*. 1957;39B(4):748–49.
20. Singhal S, Rao V. Supratrochlear foramen of the humerus. *Anat Sci Int*. 2007;82(2):105–7.
21. Sunday OO, Olusegun OS, Oluwabunmi BM. The Supratrochlear Foramen of the Humerus: Implications for Intramedullary nailing in distal humerus. *J Biol Agric Healthcare*. 2014;4(7):136–9.
22. Akabori E. Septal apertures in the humerus in Japanese, Ainu and Koreans. *Am J Phys Anthropol*. 1934;18(3):395-400.
23. Comas J. In manual of physical Anthropology. Springfield, Ill. Thomas. c1960.
24. Hardlicka A. The humerusseptal apertures. *Anthroologie, X (Praque)*. 1932:34–96.
25. Papaloucas C, Papaloucas M, Stergioulas A. Rare cases of humerus septal apertures in Greeks. *Trends Med Res*. 2011;6(3):178–83.
26. Kubicka AM, Myszka A, Pointek J. Geometric morphometrics: does the appearance of the septal aperture depend on the shape of ulnar processes? *Anat Rec (Hoboken)*. 2015;298(12):2030–8.
27. Myszka A. Septal aperture aetiology still more questions than answers. *Folia Morphol (Warsz)*. 2015;74(2):219–24.
28. Silveira FBC, Junior VM, Fazen VPS. Anthropometric evaluation of the humerus in the presence and absence of septal foramen. *Int J Morphol*. 2007;25:158.
29. Benfer RA, Mc Kern TW. The correlation of bone robusticity with the perforation of the coronoid- olecranon septum in the humerus of man. *Am J Phy Anthropol*. 1966;24(2):247–52.
30. Lamb DS. The olecranon perforation. *Am Anthropol*. 1890;3(2):159–74.
31. Myszka A, Trzcinski D. Septal aperture and osteoarthritis-the same or independent origins. *Adv Anthropol*. 2015;5(2):116-21.
32. Li J, Mao Q, Li W, Li X. An anatomical study of the supratrochlear foramen of the Jining population. *Turk J Med Sci.* 2015;45(6):1369–73.
33. Nayak G, Mohanty BB, Sahoo N, Das SR, Panda SK, Chinara PK. Supratrochlear Foramen of Humerus, A Morphometric study with Surgical and Radiological Relevance. *J Krishna Inst Med Sci Univ*. 2018;7(4):38–44.
34. Kuhn JE, Lois DS, Lorder RT. Divergent single column fractures of the distal part of the humerus. *J Bone Joint Surg Am*. 1995;77(4):538–42.
35. Nayak SR, Das S, Krishnamurthy A, Prabhu LV, Potu BK. Supratrochlear foramen of the humerus : an anatomico-radiological study with clinical implications. *Ups J Med Sci*. 2009;114(2):90–4.
36. Morton HS, Crysler WE. Osteochondritis dissecans of the supratrochlear septum. *J Bone Joint Surg Am*. 1945;27:12–24.
37. Brumback RJ. Therationales of interlocking nailing of the femur, tibia and humerus. *Clin Orthop*, 1996;324:292–320
38. Akpinar F, Aydinlioğlu A, Tosun N, Doğan A, Tuncay I, Unal O. A morphometric study of the humerus for intramedullary fixation. *Tohoku J Exp Med*. 2003;199(1):35–42.
39. Chhabra PK, Yadav S, Jangir RK, Mehta R, Anand M. The Impact of Supratrochlear Foramen on Humeri's Medullary Canal Diameter and Its Surgical Implications. *Cureus*. 2023;15(8):e43864.
40. Macalister A. Anatomical notes and queries. Series II. 1. Perforate humeri in ancient Egyptian skeletons. *J Anat Phys*. 1990;35:121–2.
41. Deshmukh VR. The Supratrochlear Foramen of The Humerus: Formation And Clinical Implications. *Int J Sci Res*. 2018;7(2):27–9.
42. Krishnamurthy A, Yelicharla AR, Takkalapalli A, Munishamappa V, Bovinndala B, Chandramohan M. Supratrochlear foramen of humerus: a morphometric study. *Int J Biol Med Res*. 2011;2(3):829–31.
43. Bhanu PS, Sankar KD. Anatomical note of supratrochlear foramen of humerus in south costal population of Andhra Pradesh. *NMJ*. 2012;1(2):28–34.
44. Dang B, Malik VS, Parmar P. Supratrochlear foramen: incidence, importance and clinical implications in North-Indian Population. *Int J Intg Med Sci*. 2016;3(4):265–9.
45. Joshi MM, Kishve PS, Wabale RN. A morphometric study of supratrochlear foramen of the humerus in western Indian dry bone sample. *Int J Anat Res*. 2016;4(3):2609–13.
46. Bahsi l. An Anatomic Study of the Supratrochlear Foramen of the Humerus and Review of the Literature. *Eur J Ther*. 2019;25(4):295–303.
47. Thejeshwari HG, Praksh KG, Krishna G. The Supratrochlear Foramen of Adult Humerus and its Clinical Considerations. *Indian J Anat*. 2020;9(3):201–4.
48. Sailaja G, B. Sireesha, K Deepika. An Anatomical Study on Supratrochlear Foramen of Humerus. *Eur J Cardiovasc Med*. 2023;13:(1):1514–9.
49. 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*. 2004;51(1):77–84.

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