

A study of Supracondylar Spur: Clinical correlations with entrapment syndromes

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Abstract

Objectives: Supracondylar spur is a rare skeletal variation first described by Struther. He also mentions a ligament from this spur to medial epicondyle of humerus. Entrapment syndromes have been noted due to this spur and ligament.

Material and methods: 60 dry humerus bones have been observed for any additional spur, tubercle or foramen in the supracondylar region.

Results: Five (8.3%) humerus bones showed variation. Supracondylar tubercle was seen in two humerus. Two humerus showed oblong supracondylar foramen. An elongated supracondylar spur was seen in one humerus.

Conclusion: Supracondylar tubercle, spur and foramen have an evolutionary significance. The proximity to the median nerve and brachial artery make it a possible differential diagnosis in compression neuropathy cases.

Keywords: Ligament of Struther's, Supracondylar spur, Median nerve entrapment syndromes, Oblong supracondylar foramen and Latissimo-condyloideus.

1. Introduction

Supracondylar spur or process was first described by Struther in 1849. It is beak like projection arising from the anteromedial surface of humerus. The Ligament of Struther's is a ligament that extends from it to the medial epicondyle of humerus. At times this associated ligament of Struthers may ossify. Over the years clinical conditions like median nerve and brachial artery entrapment syndromes associated with the supracondylar spur and Struther's ligament have been observed.[1]

The supracondylar spur is also called Supra epitrochlear, epicondylar and epicondylic process. The ligament of Struther's can give insertion to third head of coracobrachialis and also origin to pronator teres. The supracondylar foramen is seen in climbing animals. In members of cat family this foramen transmits the neurovascular bundle. Embryologically, the variant

ligament develops between the tendon of latissimus dorsi and coracobrachialis muscle. Latissimo-condyloideus is a muscle seen in climbing mammals. The ligament of Struther's is a vestigial part of this muscle.[2]

Struther's ligament is a rare finding. Median nerve entrapment syndromes at and above the elbow are not frequently seen. Presence of this bony supracondylar spur presents clinically as entrapment syndromes.

2. Methodology

60 dry humerus bones were observed for any additional process or spur. Length of the process was measured. Distance of the spur from the medial epicondyle was also measured. Vernier caliper was used to carry out the measurements.

3. Results

The supracondylar spur was seen in 5 humera [8.3%] out of 60 dry bones studied (Table 1).

Table 1: Depicts the details of supracondylar spurs observed and their measurements

1.	2/60 Humera showed supracondylar tubercle on the medial supracondylar ridge	Length=1mm
2.	2/60 showed oblong foramina on the medial supracondylar ridge	
3.	1/60 showed a elongated supracondylar spur on the medial border above the epicondyle of humerus	Length = 91 mm

Length of the elongated spur [figure 1] was 0.91 cm. Distance of the supracondylar spur from the medial epicondyle was 5.43 cm. This measurement corresponds to the length of ligament of Struther's.



Figure 1: Humerus showing Supracondylar spur [A]



Figure 2: Showing supracondylar tubercle [B]

Figure 3: Oblong supracondylar foramen[C]

Supracondylar tubercle [figure 2] was seen in 2 right sided humerus. Oblong supracondylar foramen [figure 3] was seen in one right and one left sided humerus. Elongated supracondylar spur was seen in a right sided humerus.[figure 1]

4. Discussion

Supracondylar process or spur is a very rare skeletal variation of humerus. It is reported in 1% population. The supracondylar spur or foramen is a potential site for Compression of median nerve due to entrapment.[3] Symptoms of carpal tunnel syndrome are mimicked. Ischimic pain of forearm due to compression of brachial artery or ulnar artery due to a higher division is seen [4].

Ligament of Struther's is between a bony supracondylar spur and the medial epicondyle. Struther reported the supracondylar spur to be 3.2 to 6.4 cm from the medial epicondyle. This finding coincides with our

measurement of 5.43cm. The length of this spur was about 1.2 to 1.9 cm while in our study we found the length to be 0.91cm.[5]

In a morphometric study of humerus for supracondylar spurs, Shivleela *et al* mention finding a left side humerus with a 1cm long supracondylar spur which was 6 cm from the medial epicondyle. They state that the supracondylar spur represents the vestigial remnant of evolution from climbing animals. Supracondylar spur is many times misjudged as pathology of bone. This usually silent condition may present clinically as median nerve compression and brachial artery claudication cases.[6]

Nag *et al*[7] report a 2.4cm long spur, which was at a distance 5.6cm from the medial epicondyle. The ligament

of Struther's joins the spur to the medial epicondyle. If ossified then the ligament form a supracondylar foramen. The foramen transmits the median nerve and brachial artery. Sometimes in cases of higher division of brachial artery, the ulnar artery passes through this supracondylar foramen.

Bilge *et al* state that struther's ligament is a very rare congenital anomaly. They mention a case where the struther's ligament caused compression of both median nerve and brachial artery. Flexion of the elbow worsened the clinical symptoms. Pulse decreased and pain increased on elbow flexion.[8]

In a cadaveric study by Ganesan Murugaperumal and Melani Rajendran S, the authors found one upper limb with ligament of Struther's. The supracondylar spur was 1 cm long; the length of the ligament of Struther's was 3cm. Authors mention that this variation should be considered while doing venesection at the elbow. In patients of pain and sensory disturbance of forearm and hand, knowledge about supracondylar spur should be used while diagnosing with radiological imaging procedures.[9]

Gunther *et al*[10] state that ligament of struther's must be harmless in a majority of instances. When performing surgical exploration above elbow in cases of suspected median nerve entrapment, the surgeon must be aware of Ligament of Struther's. Even without a palpable supracondylar process, the presence of a ligament of Struther's covered under a large anomalous pronator teres can't be ruled out.

Gustav *et al* in a MR imaging study mention ligament of Struther's as a cause of median nerve compression. Supracondylar spur is a variation seen in reptiles, amphibians and other mammals but very rare in humans. Climbing animals have a tendinous insertion of latissimus dorsi on the medial epicondyle. Ligament of Struther's is a remanent of this muscle. Continuous compression of median nerve may lead to weakness, atrophy and loss of sensations of the affected side.[11]

In a case of bilateral median nerve compression by Struther's ligament, Aydinlioglu *et al*[12] state that ligament of struther's presents with motor loss, sensory disturbances and pain along the median nerve's dermatomal area. Bilateral occurrence of ligament of Struther's is very rare condition. Knowledge of this variation should be used when considering various causes of median nerve compression.

Jeffery Lordan *et al* discuss a case of a 13 year old boy with a palpable mass on the medial border of humerus above the medial epicondyle. He presented with parasthesia of thumb, index, middle and radial half of ring finger. Painful pronation and supination was noted. Surgical release of the median nerve which was compressed by the ligament of Struther's was done.[13]

Subasi *et al*[14] report 3 cases of supracondylar spur. Cases were symptomatic with features of median nerve compression. Surgical assistance helped relieve the clinical features. Authors mention that Ligament of Struther's between supracondylar spur and medial epicondyle can present with features of median nerve and brachial artery compression. If the ligament blends with the fibrous arch between heads of flexor carpi ulnaris then it can present with a very rare condition of ulnar nerve compression.

Our proposed hypothesis is that with evolution the attachment of latissimus dorsi on medial epicondyle and supracondylar ridge is lost. This attachment is seen prominently in climbing animals. In humans this attachment may show remnants like supracondylar tubercle, spur with ligament of Struther's stretching between the two. Ossification of this ligament presents as oblong supracondylar foramen and non ossification remains as supracondylar tubercle and spur.

5. Conclusion

Ligament of Struther's is a very rare condition. The proximity of the ligament and supracondylar spur to the median nerve and brachial artery make it a possible differential diagnosis in compression neuropathy cases. Presences of supracondylar tubercle, spur and foramen have an evolutionary significance. The spur may not be palpable due to muscles covering it, so radiographic investigations are suggested in cases with symptoms of median neuropathy. Surgical intervention to release the nerve compression is required.

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