

Supracondylar Process, an Institutional Experience of a Rare Case Series

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ABSTRACT

Supracondylar process is a bony projection arising from the anteromedial aspect of distal 1/3rd of humerus. It is a normal variant which is seen in 0.1% to 2.7% population without any genetic inheritance pattern or sex variation. The spur is frequently found to be attached by a thin ligament extending from the tip to the medial epicondyle which is called Struther's ligament. This, being usually asymptomatic and is diagnosed as an incidental finding when the patient presents with pain in the region due to fracture of the process, compression of the median nerve or the brachial artery. Supracondylar process syndrome is a term that is specifically used when the median nerve or brachial artery is compressed under the Struther's ligament showing a constellation of symptoms distally. The most common differentials for this rare condition are osteochondroma, myositis ossificans and hence, they should be ruled out to prevent unnecessary treatment. In this series we present 5 cases of supracondylar process which were found as an incidental finding due to pain in the distal humerus that presented to our institute. 2 cases had the median nerve in close proximity passing under the Struther's ligament causing paresthesia in the forearm without any motor weakness. All cases were treated surgically with excision of the spur along with the ligament attachment with excellent post-operative results. Hence, the knowledge of the condition is of utmost importance for a definitive diagnosis and treatment as the condition is very rare in general day to day basis.

Keywords: Supracondylar process; Struther's ligament; Median nerve

INTRODUCTION

Supracondylar process is a beak shaped projection and a normal anatomical variant seen in 0.1% to 2.7% of the population [1]. It was first described by Struther in 1848 with an associated ligament attached to it [2]. This process and associated ligament forms an osseofibrous tunnel, which serves as a channel for nerves and vessels going to the forearm [3,4]. This process is commonly found 4 cm-8 cm from the medial epicondyle on the anteromedial surface, the Struther's ligament serves as a potential site of nerve entrapment, most commonly the median nerve and also brachial artery compression when these structures pass under the fibrous band resulting in supracondylar process syndrome. Few variations where the ligament can directly attach to the shaft of humerus without any process or a process without any ligamentous attachment can be present [5-7]. Most cases are asymptomatic and most are diagnosed as an incidental finding when they approach a health care facility with symptoms related

to median nerve compression or claudication of brachial artery. Since this is rare variation, knowledge about this condition is very important to diagnose and treat effectively.

MATERIALS AND METHODS

The data was collected from the cases admitted from Bapuji Hospital and CG Hospital affiliated to JJM Medical College, Davangere, Karnataka. A total of 5 cases were admitted during the period from March 2017 to March 2020. All cases were initially managed conservatively on OPD basis. All cases were explained about their condition and written informed consent was taken to be included in the study and treated as per the protocol.

Out of 5 cases, 3 were males and 2 were females. The demographic details are tabulated in Table 1. All the cases were in the age group ranging from 15-30 years. 3 cases presented with pain above the medial epicondyle and 2 cases presented

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with pain and paresthesia in the forearm along the distribution of the median nerve without any motor weakness, the pain and paresthesia aggravated with extension of the elbow and pronation of forearm. A bony projection could be palpated

around 5 cm-8 cm proximal to medial epicondyle. All cases were confirmed to have a bony spur by means of radiographic examination of the affected side elbow and distal humerus in Anteroposterior (AP) and lateral views.

Table 1: Demographic details.

Case	Age/Sex	Side	Symptoms	Duration of Symptoms	Length of Spur (cm)	Distance from Medial Epicondyle (cm)	Median Nerve Relation to Struther's Ligament
1	16/F	Right	Pain	5 months	1	6	Over the Struther's ligament
2	21/M	Right	Pain, Median N (s)	8 months	1.2	4.5	Under Struther's ligament
3	18/M	Left	Pain	3 months	0.7	5.5	Over the Struther's ligament
4	20/F	Right	Pain , Median N (s)	1 year	0.6	5	Under Struther's ligament
5	25/F	Left	Pain	6 months	0.9	7	Over the Struther's ligament

(s): Sensory involvement

Radiologically, the bony spur was consistently pointing towards the elbow joint and located anteromedially as one could appreciate it in both views thus ruling out the chances of osteochondroma which points away from the joint. Spur was situated between 4 cm-8 cm from the medial epicondyle. Ultrasonography (USG) showed the ligament attachment to the spur along with proximity of median nerve and brachial artery without any cartilage cap.

epicondyle and excised along with the spur. Size of the spur ranged from 0.7 cm to 1.2 cm. The distance from the medial epicondyle ranged from 4.5 cm to 7 cm. 2 cases had brachialis muscle attached to the Struther's ligament. The muscle was separated from the ligament during spur excision and was anchored to the humerus after spur excision.

Post operatively, intravenous antibiotics for 2 days and oral antibiotics until suture removal was followed as the standard protocol for all cases with wound dressings on 2nd and 5th day post-surgery. Suture removal was done on the 10th post-operative day. Wound healing was uneventful in all cases. Regular 3 monthly follow-ups till 1 year post-op was followed for all cases to check for recurrence of symptoms and no cases had any signs of recurrence (Figures 1-4).



Figure 1: AP and Lateral radiograph of 16 years female presented with 5 months history of pain in the right distal arm showing a bony spur proximal to medial epicondyle in anteromedial aspect of distal 1/3rd humerus.

Medial approach for the distal arm was used to expose the bony spur along with the attached ligament of Struther's and was identified extending from the tip of spur to the medial epicondyle. 2 cases had median nerve in close proximity and passing under the Struther's ligament without any signs of nerve compression or brachial artery occlusion. Other 3 cases had median nerve passing over the ligament. The spur was excised through the base including the overlying periosteum with an osteotome; the attached ligament was traced to medial

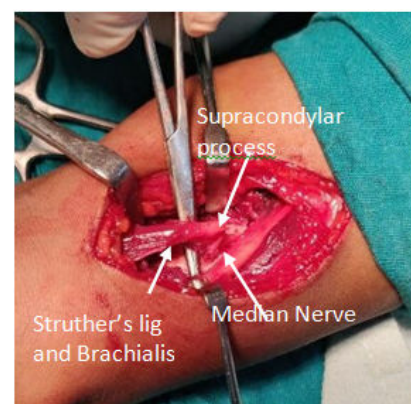


Figure 2: Via medial approach exposure of the supracondylar process with attached Struther's ligament and brachialis muscle with close proximity of the median nerve to the spur.

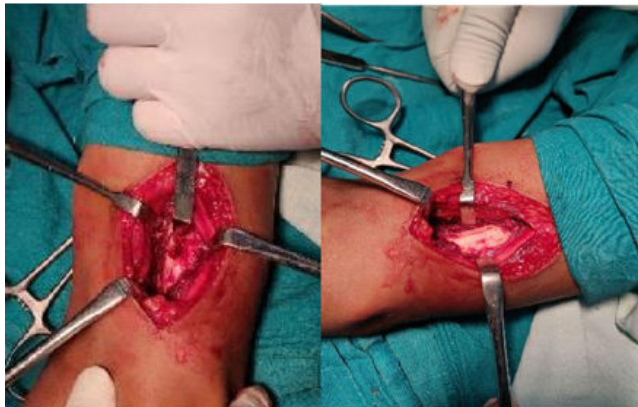


Figure 3: Excision of the spur with an osteotome while protecting the surrounding soft tissue and neurovascular structures.



Figure 4: Post excision of spur showing the ligamentous attachment at its tip and measuring 10 mm in length.

RESULTS AND DISCUSSION

Sir John Struthers in 1848 observed a bony projection on the anteromedial aspect of the humerus, about 5 cm above the medial epicondyle. He described it as a supracondylar process. He also observed a fibrous structure extending from the apex of the spur to the medial epicondyle and described it as the ligament of Struther’s. When such cases cause compression of the median nerve or brachial artery the condition is described as supracondylar process syndrome. It has also been referred to as “supraepitrochlear”, “supracondyloid”, “epicondyloid” process over time by various authors.

The incidence of the supracondylar process of humerus is very less as per the literature given in Table 2. Embryologically, Struther’s ligament is between the tendon of latissimus dorsi and the coracobrachialis which corresponds to the lower part of the tendon of latissimo-condyloideus. This is well formed in climbing mammals like cats, lemurs, American monkeys and reptiles. It extends from the tendon of insertion of latissimus dorsi muscle to the medial epicondyle [4]. Most of these cases are clinically silent unless they present with nerve entrapment symptoms or claudication due to brachial artery compression [7,8]. Most commonly the median nerve and the brachial artery are affected in the entrapment process as they can pass through the fibro-osseous tunnel formed by the anteromedial surface of

the distal humerus, the supracondylar process and the Struther’s ligament. Compression symptoms include paresthesia along the distribution of median nerve, and in severe cases there can be weakness of the muscles supplied, ischemia due to embolization of the distal arm arteries and diminished pulse in radial and ulnar arteries with full extension and supination of the forearm [3,4,9]. Ulnar nerve compression though rare, can occur if the ligament instead of insertion to the medial epicondyle extends to blend with the fibrous arch between the two heads of flexor carpi ulnaris [10-12].

Table 2: Incidence of supracondylar process as per various authors.

Studies	Incidence
Gruber et al. [13]	2.70%
Danforth et al. [14]	0.50%
Adachi et al. [15]	0.80%
Hrdlicka et al. [16]	1%
Dellon et al. [17]	1.15%
Natsis et al. [18]	1.30%

Guptha and Mehta et al. [19] in their study had a mean length of spur measuring 0.3 cm and 6.5 cm from medial epicondyle and Oluyemikayode et al. [20] described spur length of 1.6 cm and mean distance from medial epicondyle 5.3 cm. Prabahita et al. [21] described a spur length of 1.1 cm and distance from medial epicondyle of 4.4 cm. Among the cases from our study the mean length of the spur was 8.8 mm and distance from medial epicondyle was 5.6 cm (as shown in Table 3). The distance of spur from the medial epicondyle can be an important consideration when the median nerve is passing under the ligament, shorter the distance from the spur more chances of compression of median nerve and brachial artery in the tight foramen hence more symptoms can be expected due to unyielding structures.

Table 3: Length of supracondylar process and distance from the medial epicondyle with different studies.

Author	Length of the Spur (cm)	Distance from Medial Epicondyle (cm)
Guptha and Mehta [19]	0.3	6.5
Oluyemikayode et al. [20]	1.6	5.3
Prabahita et al. [21]	1.1	4.4
Jeyanthi et al. [22]	1.3	4.5
Our series	0.8	5.6

Myositis ossificans can mimic a supracondylar process [10]. A very common differential is an osteochondroma. The key

differentiating features are the direction of the spur which is oriented down towards the elbow joint where as in osteochondroma, it points away from it. In supracondylar process there is no discontinuity of the underlying cortex whereas in osteochondroma the cortex of the humerus is in continuity of the tumor. Supracondylar process fracture could also be the cause for pain without any nerve entrapment for which the patient seeks medical attention. These fractures can go into non-union causing chronic pain and is the second most common cause for their incidental finding on routine radiographs [13].

Treatment consists of initial conservative management for mild symptoms to excision of the spur and associated ligament of Struther's in case of severe symptoms. Spur to be removed with its overlying periosteum to prevent chances of recurrence [14].

CONCLUSION

Supracondylar process syndrome is a rare presenting condition and a normal anatomical variation in humans. A thorough knowledge of this is very important for clinicians as it may be overlooked or misdiagnosed to some bony pathology leading to unnecessary treatment options for the patient.

ETHICAL COMMITTEE CLEARANCE

Taken.

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