

Supracondylar process of humerus bone

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Abstract

Background: The supracondylar process of the humerus (scp) is a congenital variation of the distal third of the humerus, also termed supracondyloid, supraepitrochlear, supra-trochlear or supracondylar spur, epicondylar or epicondylic process. **Aim and Objectives:** The aim of the present study is to present a rare case of supra condylar process. The objective of the study is to discuss the possible clinical implications of the variants and to review the current literature. **Material and Methods:** during routine osteology classes for the first year professional students a rare variant was observed in the humerus bone as it was an interesting feature we conducted this study. 152 bones from the department of anatomy narayana medical college nellore were taken. The bones were examined for any osseous projection from distal part. Only one humerus of right side was found with an osseous spine on its distal anteromedial surface. Dimensions of the projection were recorded by a vernier caliper and photographed. **Results:** Of these 152 humerus bones only one bone showed an bony spine on its anteromedial surface of left humerus. It was 5.0 cm proximal to the medial epicondyle, was projecting 2.2 cm from the surface and the base, 2 cm long vertically and 2.2 cm broad. The spine was directed forwards and medially. The distance between the tip of the spine to medial condyle was 5 cm. The distance of spine from nutrient foramen was 4 cm. The total length (from the lowest tip of the trochlea to the highest point of the head) of this humerus was 30 cm. The incidence calculated in this study was 0.65%. **Conclusion:** It is usually asymptomatic but occasionally may compress underlying structures such as the median or ulnar nerve, the brachial artery or its branches. It is of significance for surgeons because it may alter the fracture pattern at the region and thus their management.

Keywords: Acromion, scapula, acromial process, acromial morphology.

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INTRODUCTION

The supracondylar process is a congenital variation of the distal third of humerus, also termed as supracondyloid process, supraepitrochlear, supra trochlear or supracondylar spur, epicondylar or epicondylic process (Newman, 1969; terry, 1921). morphologically, usually it a beak like osseous or cartilaginous prominence that arises from anteromedial surface oh the humerus,3-7 cms proximal to the medial epicondyle, and is directed distally, medially and anteriorly (kolb and moore,1967; marquis *et al.*,1957). Its length varies from few mm to

20mm (ivins, 1966; laha *et al.*, 1977). The reported incidence of the trait ranges from 0.28% (newman,1969) to 2.78%.the reported incidence of the trait ranges from 0.28% (newman, 1969) to 2.78% (adachi, 1928) in the general population; it is usually an incidental finding in plain radio graphs of the distal humerus (subasi *et al.*, 2002). The process, band and shaft of the humerus form a ring or canal through which the median nerve and the brachial artery (or a branch of it) may be transmitted (soames, 1995). The process and the ligament of struther's may give insertion to a portion of the abnormally low fibers (the third head) of coracobrachialis muscle and may also give origin to the pronator teres muscle(last rj,1984). The median nerve and/or brachial artery may become compressed causing clinical symptoms. Struthers (1881), solieri (1929), and aydinlioglu *et al.*, (2000) have described cases of median nerve entrapment. Compression and claudication of brachial artery has been reported by hafid *et al.* (hafidhalha, 1987) and thompson and edwards, (2005). Quain (1844) described a rare case of ulnar artery compression. Spinner (1994) discussed fractures of

supracondylar process. In 1818 and 1819, tiedemann reported the occurrence of this process in apes and monkeys and the first illustration of a supra-condylar process appears in 'tiedmann's tabulae arterium'¹⁰. The incidence varies from 0.1% to 5.7% (1928). Terry (1921) reported finding a supracondyloid process in 6 of 515 (1.16%) whites, but only once in 1,000 (0.1%) Negroes. It is a normal anatomical structure in climbing animals (aydinlioglu *et al.* (2000). It represents the embryologic vestigial remnant of climbing animals and is seen in many reptiles, most marsupials, cats, lemurs and american monkeys (parkinson c, 1954). The present study is carried out to study the incidence of the supracondylar process of the humerus in south indians and discuss its clinical implications.

MATERIAL AND METHODS

During routine osteology classes for the first year professional students a rare variant was observed in the humerus bone as it was an interesting feature we conducted this study. 152 bones from the department of



anatomy narayana medical college nellore were taken. The bones were examined for any osseous projection from distal part. Only one humerus of right, mp side was found with an osseous spine on its distal anteromedial surface. Dimensions of the projection were recorded by a vernier caliper and photographed.

RESULTS

Out of 152 dried humeri examined, we found only 1 humerus of the left-side with an osseous spine on the anteromedial surface. It was 5.0 cm proximal to the medial epicondyle, was projecting 2.2 cm from the surface and the base was 2 cm long vertically and 2.2 cm broad. The spine was directed forwards and medially. The distance between the tips of the spine to medial condyle was 5 cm. The distance of spine from nutrient foramen was 4 cm. The total length (from the lowest tip of the trochlea to the highest point of the head) of this humerus was 30 cm. The incidence calculated in this study was 0.65%.



Figure 1

DISCUSSION

The incidence of the supracondylar process of the humerus is very low and the percentage of incidence, as given by different authors varies [table3]. The dimensions of the supracondylar process in our study are markedly different from other studies done by gupta rk (2008), oluyemi ka (2007) and others [table3]. There is a high incidence of unilateral supracondylar process of the humerus in 'cornelia de lange syndrome', an autosomal recessive trait, occurring in approximately one in every 10,000 live births barnard lb *et al.* (1946) .it is usually clinically silent, but may become symptomatic by presenting as a mass or can be associated with symptoms of median nerve compression and claudication of the brachial artery. The scp is a congenital variation of the distal third of the humerus. It is usually a hook-shaped anomalous bony or cartilaginous prominence that arises at acute angle from the anteromedial surface of the humerus and is usually directed distally, medially and anteriorly towards the medial epicondyle (kolb and

moore,1967;marquis *et al.*, 1957). Such a process has been mentioned in the 16th century by coiter, as cited by marquis *et al.* (marquis *et al.*, 1957), but it was first described in apes and monkeys by tiedemann (1818) and later in humans by knox (1841). The scp is rarely found bilaterally (spinner *et al.*, 1994; subasi *et al.*, 2002); it is more common on the left side (90%) and in males (60%) (natsis, 2008). A band of fibrous tissue, which occasionally can be ossified, known as "struthers' ligament", sometimes connects the tip of the scp with the anterior aspect of the medial epicondyle, thus forming a supracondylar foramen through which the median nerve passes accompanied by the brachial, or ulnar, or even radial artery if a high bifurcation is present (smith and fisher, 1973; spinner *et al.*, 1994). Proximal fibers of the pronator teres, as well as the distal fibers of the coracobrachialis may arise from the scp or struthers' ligament (sener *et al.*, 1998). Furthermore, the ligament may be present without the presence of an scp (smith and fisher, 1973). The scp rarely causes any clinical symptoms, it can be found incidentally during plain radio

graphic examination or palpation of the region by the patient or his/ her physician (laha *et al.*, 1977). The clinical syndromes possibly associated with scp are median nerve entrapment with or without brachial artery compression, ulnar nerve with or without median nerve entrapment and fracture of the process (ivins, 1996; laha *et al.*, 1997; newman, 1969). Simultaneous compression of the median and ulnar nerve is infrequent (mittal and gupta, 1978; thomsen, 1977). The variability of entrapment symptoms depends on the distribution of the median or ulnar nerve and on the degree of entrapment of the brachial artery (sener *et al.*, 1998). The symptoms usually are exacerbated by pronation of the forearm (sener *et al.*, 1998) or by extension and pronation/supination of the forearm as in the repetitive action of catching a baseball (thompson and edwards, 2005). Nerve compression usually induces intense pain, paresthesia, sensory loss and muscular weakness in the area of median nerve distribution (ivins, 1996; koppel and thompson, 1963). Although the ulnar nerve lies posterior to the scp, it may be compressed over the spur during flexion of the elbow originating symptoms of ulnar neuropathy (tzaveas *et al.*, 2010). Further more, the median nerve and the brachial artery may be stretched over the bony process on extension and supination of the forearm and originate symptoms in cases with scp lying posterior to them (ay *et al.*, 2002). In rare cases of localized brachial artery compression due to scp, ischemic symptoms such as claudication and coldness, and reduced radial or ulnar pulses can be detected (ivins, 1996; thompson and edwards, 2005). The diagnosis can be proposed on palpation, although it may escape in patients with well-developed musculature, but confirmation by radio graphic imaging is mandatory (laha *et al.*, 1977). Electrophysiological studies as well as doppler evaluation may be helpful to confirm the diagnosis (subasi *et al.*, 2002). Fracture of the process after a traumatic incident may evoke localized compression phenomena (spinner *et al.*, 1994). In symptomatic cases, the nerve or arterial impingement caused by the presence or fracture of the scp can be relieved after surgical resection of the process; the underlying periosteum should be also resected to prevent scp recurrence (ivins, 1996; thompson and edwards,

2005). Differential diagnosis includes bony formations that may mimic scp such as osteochondroma and myositis ossificans (fragiadakis and lamb, 1970; subasi *et al.*, 2002). It has been reported that the median nerve can be entrapped by struthers' ligament alone even in cases where there is no scp (smith and fisher, 1993).

CONCLUSION

Although the trait of scp is familiar to anatomists and anthropologists, it remains quite unknown to clinicians, since it is overlooked in most standard text-books. The awareness of scp is important for the orthopaedic surgeons, as it may affect the preoperative planning in case of distal humerus fracture, the possibility of a scp must be suspected in patients presenting with symptomatology of median or ulnar nerve entrapment, as well as with brachial artery obstruction. Furthermore, radiologists need to be familiar with the variants in order to avoid misdiagnosis during interpretation of plain radiographs and computed tomography scans of the distal third of the humerus.

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