

Supraolecranon Process- A Case Report and Literature Review

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Abstract: The “supraolecranon process” so named because of its location and morphology, is a bony spur (enthesophyte) projected from the posterosuperior part of the olecranon of ulna at the insetion site (enthesis) of triceps brachii at the posterior part of the superior surface. We present an adult dry bone of right ulna bearing an extra process projected from the posterosuperior part of olecranon at the enthesis of triceps brachii measuring 1.2cm in length. In view of its development, functional and clinical importance, the detailed anatomical knowledge is required which will help the orthopaedicians, radiologists and in sport medicine during management of symptomatic olecranon spur and its fracture.

Keywords: Supraolecranon process, enthesis, enthesophyte, olecranon spur, traction spur, traction epiphysis, triceps brachii.

I. Introduction

Olecranon process is the proximal end of the ulna. Its posterior surface is smooth, triangular and subcutaneous, its proximal border being the elbow's point. To its rough posterior two-thirds of the proximal olecranon surface, is attached the tendon of triceps brachii; which may be separated by a smooth bursal area from the elbow joint capsule [1].

Tendons are usually attached at roughened bone surfaces; and wherever any aggregation of collagen in a muscle reaches bone. Surface irregularities correspond in form and extent to the pattern of such tendinous fibres. Such markings are almost always elevated above the general surface, as if ossification advanced into the collagen bundles from periosteal bone. How much secondary markings are induced is uncertain but they may result from the continued incorporation of new Sharpey's (intrinsic) fibres in the bone, necessary for minor functional adjustment. The proximal end of olecranon is ossified from two secondary ossification centres. Traction epiphyses are peculiar to mammals, but genetically established, for their appearance is not arrested by division of structures attached to them. However, experimental evidence in connection with epiphyseal development is limited [1,2].

Olecranon traction spurs are enthesophytes found in the distal triceps tendon at the point of insertion into the olecranon process and are thought to arise as a result of mechanical loading (ie, repetitive traction stress) and have been found to grow by a unique combination of endochondral, intramembranous, and chondroidal ossification [3,4]. Bony spurs (enthesophytes) are well documented at numerous entheses as bony outgrowth that extends from the skeleton into soft tissue of a tendon or ligament at its enthesis. As described by Simillie, they can occur in association with high levels of physical activity. It is site of stress concentration at the hard-soft-tissue interface which makes entheses vulnerable to acute or overuse injuries in sport [5]. Enthesopathies are musculoskeletal stress markers having a strong link with physical activity and increases with age and more on the right side [6]. Although spurs can be features of degenerative, inflammatory and metabolic enthesopathies and are widespread in diffuse idiopathic skeletal hyperostosis; most spurs, however occur in otherwise healthy individuals and are thus not necessarily an indication of disease [7].

The term “supraolecranon process” is introduced for convenient morphological description. Further study is required with respect to its development and factors influencing its formation because of the anatomical, functional and clinical importance eg. in radiology, orthopaedics and sports medicine.

II. Case Report

During routine examination of one hundred ulnas for teaching purpose of undergraduate students, a right ulna is found to bear an extra process on the posterosuperior part of the olecranon process. This process is named supraolecranon process because of its location, morphology and for convenient anatomical description. The process is curved and quadrangular in shape. It measures 1.2cm in length and 1.8cm in breadth projecting upward and then forward from the junction between superior and posterior surfaces of olecranon process. Considering the shape, size, location and morphological continuity with the posterosuperior part of the olecranon, this large spur (enthesophyte) is named as supraolecranon process. This process is having an anterior concave rough surface and posterior convex smooth surface in continuity with the posterior surface of the olecranon. It has superior, medial and lateral sharp borders. There is no abnormal bony projection observed in other part of the bone.

Photographs are taken and documented as shown in Fig; anterior view (Fig.01), posterior view (Fig.02), medial view (Fig.03), lateral view (Fig.04) and the measurement of the length of the supraolecranon process (Fig.05). The findings are discussed and compared with those of the previous workers.



Fig. 01

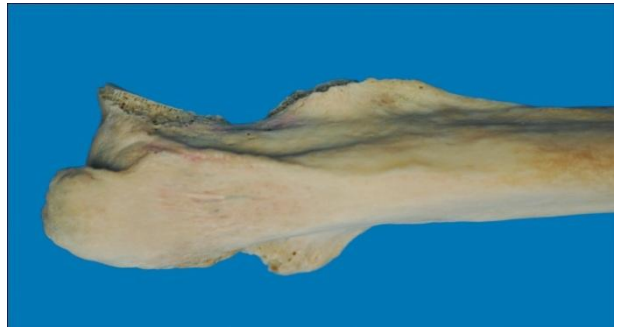


Fig. 02



Fig. 03



Fig. 04



Fig. 05

Fig. Photographs of the supraolecranon process of the right ulna:

Fig.01.Anterior view

Fig.02. Posterior view

Fig.03.Medial view

Fig.04. Lateral view

Fig.05. Measurement of length of the supraolecranon process.

III. Literature Review and Discussion

Evidence suggests that bony prominence may be related to the power of muscles involved and they increase with advancing age, as if the pull of muscles and ligaments exercised an accumulative effect put up over a more limited area. Certainly, surface markings on the bone delineate the shape of attached connective tissue structures such as tendinous fibres. Hence, markings may be facets, ridges, nodules, rough areas or complex mixtures, affording accurate data of junctions of bone with muscles, tendons, ligaments or articular capsules. Where collagen is visibly concentrated, markings appear on the bone surface[1].Enthesophytes and osteophytes can be regarded as skeletal response to stress. Enthesophyte formation was associated with age and was more common in males than females[7].

The supraolecranon process of the present case is enthesophyte located at the junction of the bone and tendon of triceps brachii and it could have developed because of the powerful pull of the triceps muscle over the olecranon but the exact age of the adult bone is not known.

The shape of the enthesophyte is influenced partly by the direction of traction of tendinous fibres and partly by external pressure. The developed enthesophyte has a bony structure, and its lamellae fuse with the trabeculae of the underlying bone [8].The shape of the bony supraolecranon process in the present study can be explained to be influenced by the direction of traction of triceps tendon fibres and external pressure on the tip of the olecranon resulting into the present appearance.

Olecranon traction spur was found in the superficial fibres of distal triceps tendon in all study cases of 12 elbows [9]. Similarly the supraolecranon process of our case study can be considered to occur in the superficial fibres of distal triceps tendon which is deduced from the site of the process from the posterior limit of the superior surface of the olecranon. These findings are consistent with growth of traction spurs at other tendon insertion sites [3].

Enthesophyte may be primary which can occur alone or secondary which occur together with different disorders including inflammatory, degenerative, metabolic and traumatic conditions. One of the common sites of involvement of non-articular manifestation of enthesopathy includes the olecranon [10]. But, in the present study; whether the formation of the supraolecranon process is primary or secondary cannot be explained because of non availability of evidence.

As reported by Rafid Kakel and Joseph Tumilty, enthesophytes are analogous to osteophytes of osteoarthritis. Formation of the enthesophyte is the ossification at the insertion site of tendons, ligaments, and joint capsules as a result of inflammatory reaction eg.in gout.They also reported the presence of olecranon enthesophyte at the tip of the olecranon and its fracture. Bone proliferation at the triceps attachment to the olecranon, however is very rare and seldom reported in osteoarthritis, diffuse idiopathic skeletal hyperostosis, and psoriatic arthritis[8].One of the etiologies of the formation of the supraolecranon process can be secondary to inflammatory reaction of various origin.

Bony spurs can develop in the Achilles tendon without need for preceding microtears or any inflammatory reaction, and they are formed by endochondral ossification of enthesis fibrocartilage. The increased surface area created at the tendon bone junction may be an adaptive mechanism to ensure the integrity of the interface in response to increased mechanical loads[5]. These findings can be applied in the formation of the supraolecranon process of the present case. The similar findings are supported by the previous workers, i.e. olecranon traction spur caused by repetitive strain to triceps insertion [11].

Enthesophyte formation was associated with age and was more common in males than females.Their studies suggested that the observed variation in bone formation could be due to differences in individual ability to form bone in response to stress rather than difference in stress. This suggests a heterogeneity in one of the fundamental aspects of the pathogenesis of musculoskeletal disorders which may be under genetic control [12]. Considering the factors responsible for the formation of enthesophytes; development of supraolecranon process could depend on individual ability to form bone in response to stress and genetic control.

Traction epiphyses occur opposite the sites of attachment of certain muscles and are presumed to pull of these. The proximal olecranon ossifies from two secondary ossification centres[13]. The supraolecranon process of the present study can be considered to be developed as a traction epiphysis by the pull of the triceps brachii.

There is very high chance of similarity in the formation the supraolecranon process (supraolecranon spur) as in case of the spurs in the Achilles tendon without any tear and inflammatory reaction. Small bony spurs develop when ossification at one point on the enthesis outstrips that on either side. They are formed by endochondral ossification of enthesis fibrocartilage. The increased surface area so created at the tendon-bone junction may be an adaptive mechanism to ensure the integrity of the interface in response to increased mechanical loads[14].

Bones are living organs that hurt when injured, bleed when fractured, remodel in relationship to stress placed on them, and change with age [15].The stress produced by the pull of the triceps brachii on the olecranon and age of the individual may be the factors producing the bony process of the olecranon of the present case.

It is important to remember that, in sports and occupational medicine, enthesopathies are well known to be associated with prolonged hyperactivity of muscles. Enthesopathy of triceps insertion at the olecranon occurs in baseball players and woodcutters [8,16]. Olecranon spurs are common in males who are heavy machine operators and saw mill workers [11]. Their view suggests the formation of supraolecranon process of the present study is the result of prolonged hyperactivity of triceps muscle in some particular sports and occupational personals.

IV. Conclusion

Supraolecranon process (supraolecranon spur or supraolecranon enthesophyte) is a bony process which can be developed as traction epiphysis, traction spur, primary or secondary enthesophyte at the enthesis of triceps brachii due to the pull of the muscle. Its formation is considered to be associated not only with pathological conditions but also with traction or stress of triceps brachii, individual response to stress, genetic factor, age and is common in males and also more on the right side. The anatomical knowledge of the process will provide great help in the clinical management eg. in orthopaedics, radiology, sports and occupational medicine.

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