

Calcaneal enthesophytes (spurs): An observational study on incidence of spur related heel pain in a tertiary care hospital

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Abstract

Background: Calcaneus is the largest of all the bones that constitute the skeleton of the foot. It is also the largest tarsal bone and plays a pivotal role in weight transmission, weight bearing, gait and posture. In professions involving long durations of standing such and in disorders like obesity there may be growth of abnormal bone tissue at the site of tendinous attachments known as enthesophytes or spurs. Radiologically these spurs may differ from naked eye and clinical examinations. The apices of these spurs are often embedded in the plantar fascia of the foot. **Aim:** The aim of the present study was to observe the incidence of calcaneal spur related heel pain. **Methodology:** One hundred adult cases presenting with heel pain were observed in this study. **Result:** Incidence of calcaneal spurs was reported to be 55 out of 100 with laterality of 29 and 25 in right and left sides respectively. Bilateral spurs were observed in only 1 case. Our findings have been compared with those of other researchers. **Conclusion:** Calcaneal enthesophytes or spurs may be related to the nature of work or an orthopaedic pathology. Probable other factors that may increase the incidence of spur formation are uncontrolled weight gain, advancing age and constant use of uncomfortable footwear.

Key Words: Calcaneus, Enthesophytes, Heel Pain, Spurs

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INTRODUCTION

The foot extends from the point of the heel to the roots of the toes. Superior and inferior surfaces of the foot are referred to as dorsum and plantar respectively. The foot is divided into tarsus and metatarsus. The tarsus is the posterior half formed by the tarsal bones. Which are arranged in two rows. The proximal row consists of talus and calcaneus while the distal row consists of cuboid, navicular and cuneiform. Largest of the tarsals, the

calcaneus forms an irregular block of bone.¹ It is also referred to as heel bone and forms a major component of the skeleton of the hindfoot and prominence of the heel.² The calcaneus is the longest, strongest and largest of all the tarsal bones.³ It is the first bone in the foot to ossify and is also the most frequently injured tarsal bone. It transmits the weight of the body to the ground. This bone also provides leverage for action of the posterior calf muscles attached to its broader and non-articular posterior surface.⁴ Very rarely the calcaneum may also present itself with a set of accessory bones.⁵⁻⁶ Being irregularly cuboidal in shape, it presents six surfaces and a shelf-like bony projection the *sustentaculum tali* which as the name implies sustains the head of the talus and also bears the greatest weight per area. The calcaneus bears four tubercles, anterior, lateral and medial which are present on the inferior or plantar surface and a small peroneal tubercle on the lateral surface. Occasionally an enthesophyte has been observed growing anteriorly along the calcaneal tuberosity along the entire width of the bone. Plantar fasciitis is the most common cause of

plantar heel pain. Clinically, the aetiology and pathophysiology of enthesophyte formation in calcaneum has not yet been clearly understood. In spite of different treatment modalities of heel spur, the association of incidence of calcaneal spur with clinical and functional parameters is nonconclusive. It has been suggested that longitudinal traction or vertical compression may be the causative factors. Enthesophyte formation usually occurs at the site of ligamentous and tendinous insertions into the bone. An enthesophyte or spur tends to grow in the direction of natural pull of ligaments and tendons involved.⁷ The lateral and medial tubercles of calcaneus provide sites for origin of muscles of the various layers of the sole. The medial tubercle gives origin to abductor hallucis, flexor digitorum brevis and abductor digiti minimi. The lateral tubercle gives origin to abductor digiti minimi and lateral head of flexor digitorum accessorius. The anterior tubercle provides attachment to the short plantar ligament and the long plantar ligament is attached to the rough strip between the three tubercles. The peroneal tubercle lies between the tendons of peroneus brevis above and peroneus longus below. Variations in gross morphology of the calcaneus have been reported in literature with reference to sex, race and occupation but there are few citable references regarding the observation on tubercles and incidence of calcaneal enthesophytes. Most enthesophytes are encountered radiographically or clinically during surgical procedures but our study

focuses on observing the incidence of spur related heel pain in adults in a tertiary care hospital.

MATERIAL AND METHODS

One hundred adult cases in age group 20-60 years presenting with heel pain attending the outpatient department of Orthopaedics of Madhubani Medical College were observed in this study. Consent was not required as it was an observational study and the anonymity of the case was to be upheld.

Inclusion Criteria

Cases willing to participate in this study. Cases presenting with heel pain. Cases with no past history of calcaneal fracture.

Exclusion Criteria

Cases not willing to participate in this study. Cases with congenital malformation of foot / feet. Cases with history of calcaneal fracture

OBSERVATION

Out of one hundred adult cases of heel pain observed observed ($n=100$) enthesophytes were observed in fifty specimens. Total incidence in this study was 55% out of which 29 were of the right side and 25 were of the left side and 1 case presented with spurs in both feet. Predisposition of spurs was more in women. Incidence of spurs was higher in age group 51-60y with the commonest type being plantar spur.

Table 1: Incidence of enthesophytes related heel pain

Total number of cases observed	Incidence of spur related heel pain
$n = 100$	55%

Table 2: Incidence of laterality of enthesophytes in this study

Laterality of incidence	Laterality of Incidence
$n = 55$	Right = 29/55 (53%)
	Left = 25/55 (45%)
	Both = 01/55 (2%)

Table 3: Incidence of spurs among sexes

Total number of diagnosed cases	Incidence among sexes
$n = 55$	Males = 23/55 (42%)
	Females = 32/55 (58%)

Table 4: Incidence of spurs among age groups

Total number of diagnosed cases	Incidence among age groups	
$n = 55$	21-30y	04
	31-40y	09
	41-50y	18
	51-60y	24

Table 5: Incidence of types of spurs

Total number of diagnosed cases	Incidence of types of spurs		
$n = 55$	Plantar	Achilles	Combined
	36	14	05

DISCUSSION

Enthesophytes were observed in fifty-five out of one hundred cases examined in this study. Enthesophytes may occur in the plantar surface of the bone due to deposition of calcium salts and on the fibrous tissue attached to the tubercles. Many such related studies have highlighted this occurrence of enthesophyte formation based on radiological data of western population. Formation of spurs was due to compression force exerted on the bone due to weight bearing⁸. Irrespective of their origin calcaneal spurs result in heel pain and interfere with daily activities. Calcaneal spurs have also been reported in young individuals⁹. Intra-articular incongruity, varus and valgus misalignment of the heel, widened heel due to lateral bulge, shorter heel height, decreased ankle dorsiflexion and elevated Achilles tendon insertion leading to weakening of the gastrocnemius-soleus complex can result in enthesophyte formation in the calcaneus. The attachment of the plantar fascia to the calcaneus may become ossified or a similar spur may occur related to the insertion of the tendo Achilles. Spurs are usually seen in the middle age or later and are usually asymptomatic¹⁰. All enthesophytes observed had a hook or semi-hook like appearance from the lateral aspect. It could be due to an increased axial load or obesity¹¹. The spur formation is due to repetitive traction of the insertion of the plantar fascia into the calcaneum resulting in inflammation of reactive ossification of the enthesis. But it can also be attributed to be a result of vertical compression instead of traction¹²⁻¹³. The study reveals that the incidence of calcaneal spur in patients presenting to the out-patient department with posterior heel pain to be around 59% of which majority are female mostly affecting the age group between 40-60 years as shown earlier table. Plantar spur seems to be more common than other spurs. It is evident from the study that patients under 30 years of age do not show any presence of calcaneal spurs which could explain the spur formation to be part of a degenerative process resulting in osteophyte formation appearing in the form of bony growth¹⁴. Its prevalence among women could be correlated with footwear, obesity and pregnancy resulting in excessive compressive forces acting at the calcaneum over a period of time. The low incidence of any type of spur in age group less than 30 years suggested that spurs do take a long time to build up¹⁵. This probably is because the enthesis organ dissipates the stress away from the bony insertion, this can explain why the pathological changes take place adjacent to the enthesis as well as at them. The absence of spurs in people below 20 years of age correlates with the common clinical observations that are rarely a feature of degenerative joint disease in young individuals. Calcaneal spurs are related to the type of

calcanei with the highest frequency in Type I and least in Type III (no spurs seen in Type III and least in Type IV. Please refer to observations). Other factors, which increase the incidence of spurs are increasing age and weight, concurrent orthopaedic diseases and heel pain. Gender might be a cofactor leading to spur formation and plantar heel pain. These findings support the theory that plantar calcaneal spurs may be an adaptive response to vertical compression of the heel rather than longitudinal traction at the calcaneal enthesis¹⁶. Therefore, calcaneal spurs are one of the cofactors/associations for heel pain. Our findings shall serve as a guide for podiatrists with who deal with calcaneal enthesophytes.

CONCLUSION

Calcaneal enthesophytes are bony outgrowths of the calcaneus that are common findings on radiographic examinations of the foot and ankle. Such outgrowths can extend on the whole extent of the calcaneus. Knowledge of calcaneal enthesophytes is clinically relevant as these spurs affect the normal alignment of the calcaneus. Misalignments lead to instability and are a frequent cause of heel pain. Enthesophyte formation usually occurs in the medial tubercle of calcaneum and is probably due to biomechanical reasons. Factors that aggravate the incidence of spurs are increasing weight, obesity, advancing age and concurrent orthopaedic diseases. Ethnic and developmental variations must also be considered. Theoretically, calcaneal enthesophytes may be an adaptive response to vertical compression of the heel. Regular wearing of uncomfortable or improper footwear can also be a causative factor.

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