

## THE ACCESSORY TARSAL SEAPHOID

### *Clinical Features and Treatment.*

By

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#### INTRODUCTION

The accessory tarsal scaphoid (syn. os tibiale externum, os naviculare secundarium) is a supernumerary bone of the foot. It is of varying size and shape, usually, round or triangular and situated medially in the tarsus, behind the tuberosity of the scaphoid. It is connected with the tendon of the tibialis posterior. The latter may surround the bone or be inserted on it by some of its fibres. The connection with the scaphoid may be fibrous, fibrocartilaginous, or an actual bony union may exist. A true joint has never been observed.

This accessory bone is said to have been first described by *Bauhin* in 1605. Towards the end of the 20th century, *Pfitzner* in a systematic study on variations in the skeleton of the foot, found the incidence to be 14.9 % in females and 8.3 % in males.

These anatomical studies were not followed by reports on the clinical significance of this bone. According to *Francillion*, however, *Jabulais* called attention to its clinical significance as early as 1889. The introduction of radiography occasioned numerous reports on this supernumerary bone. Evidently, the clinicians were not aware of the previous anatomical descriptions, as they first interpreted the condition as a fracture. *Haglund* reported several instances of pain in the inner border of the foot in girls, aged 12–15, after folk dancing. He interpreted the X-ray appearances, viz. a bony shadow on a level with the tuberosity of the scaphoid, as a fracture. He was vigorously opposed by *Gaugele* and by *Lilienfeld* who maintained that typical accessory tarsal scaphoid were present. The discussion was carried on in pretty violent terms as far as *Haglund* was concerned. In the end, however, he conceded that *Lilienfeld* was right and apologized.

The author will now briefly review previous studies on the clinical significance of the accessory bone and report his own series of 173 cases.

#### PREVIOUS INVESTIGATIONS

There has been a marked conflict of opinion regarding the clinical significance of the accessory tarsal scaphoid. According to some, *int. al. Simon*, its clinical significance is slight and the complaints are due only to its situation on a level with the most prominent site of the arch of the foot. In cases of valgus deformity pressure symptoms are, therefore, apt to occur. He does not consider the bone to be the cause of the valgus deformity. Others, *e.g. Peltesohn* and *Uhrmacher* believe that it predisposes to valgus deformity. The mechanism is, according to *Uhrmacher*, that the bone dislocates the tibialis posterior tendon to above the sustentaculum tali. This, he says, makes the tendon too long and insufficient. *Zadek's* explanation of the insufficiency of the tibialis posterior muscle is that the greater part of its tendon is attached to the accessory bone and only a minor portion to the under surface of the scaphoid and cuneiform bones. Thereby the arch of the foot loses a good deal of its stability.

The tenderness over the prominent accessory scaphoid has been attributed to periosteal reaction (*Gaugele*), to tenosynovitis in the tendon (*Erik Jensen*), and to "arthritis" in the false joint (*Swenson & Wilner*).

In addition to these pathogenetic considerations, ontogenetic and phylogenetic studies are also worthy of mention. The bone has aroused the interest of numerous anatomists who have suggested that it might be the vestige of a 6th metatarsal, a prehallux. *Monahan*, who has done much work on the subject, believes that its presence is a sign of a weak and degenerated foot.

*Grubers* and *Manners-Smith* have dealt with the development of the bone, and in Denmark *Dyre Trolle* has published a thorough study of its development through histological studies of foetal feet.

*Radiological studies* by *Reischauer* and *Saupe* have revealed small translucencies in the distal part of the accessory tarsal scaphoid and the adjacent portion of the scaphoid. According to *Anspach & Wright* these changes are transitory, and they compare them with Köhler's aseptic bone necrosis.

*Histological studies* have been published by *Latten*, *Francillion*, and others. In the histological examination of operation specimens from two patients, aged 13 and 17 years, *Latten* found spongy bone tissue, covered with a thin layer of hyaline cartilage. The space be-

tween the accessory bone and the scaphoid consisted of vascular connective tissue with islets of cartilage. *Francillion* maintains that he has found signs of irregular growth and that the pain is due to growth disturbances. The question of *fracture versus accessory bone* has been discussed int. al. by *Marti* and by *Kirchner*. An isolated fracture may occur, but it is rare. Distortion, on the other hand, may be followed by prolonged and annoying pain due to tears in the syndesmosis between the scaphoid and the supernumerary bone. This may occur even following minor trauma. *Güntz* has reported the case of a 33 year old man who developed severe pain over the arch following distortion. X-ray showed accessory tarsal scaphoids in both feet, but on the affected side the cleft separating the accessory scaphoid from the scaphoid was broader. The finding was interpreted as a tear in the syndesmosis. On operation signs of a fresh injury, with an unmistakable tear and remnants of hæmorrhage in the syndesmosis were revealed. In *Schjøth-Iversen's* case, a 40 year old man sustained a distortion and developed persistent pain in the arch which yielded to plaster cast and arch supports.

*Treatment.* *Uhrmacher, Zadek, Francillion, Swenson & Wilner* feel that surgical removal of the bone is indicated. However, they usually try conservative treatment first with arch supports.

According to *Simon* and *Peltesohn*, surgery is seldom required, arch supports in the shoes being sufficient.

#### THE WRITER'S INVESTIGATIONS

During the period 1936–1948 a total of 173 patients with accessory tarsal scaphoids were treated in the Orthopædic Hospital, Aarhus. Only patients applying to the hospital because of local pain in the arch of either foot were included in the series. The treatment was conservative in 96 cases while in the remaining 77 surgical removal of the supernumerary bone was undertaken. Surgery was not reserved for the severe cases, for the difference indicates only a radical surgical attitude during one period and a conservative attitude during another. This series should, therefore, be suitable for comparing the two methods of treatment.

All but 14 patients were followed-up during the period 1947 to 1950. In a few instances, only the replies to a questionnaire are available. The follow-up was intended to show whether the bone can be assigned clinical significance or whether it must be considered an accidental finding. After such a long follow-up period (10 years in the



*Fig. 1.*

Heart-shaped accessory scaphoid bone  
with small translucencies.



*Fig. 2.*

Round accessory scaphoid bone.

earliest cases) one might expect that any other morbid condition of the foot, undetected at the first examination, would have given rise to marked objective changes.

*Sex ratio.* Among the 173 patients, 141 were females and 32 males. Of the 152 cases who had X-rays of both feet, 135 showed the accessory bone on both sides. In other words, the condition was bilateral in about 90 % and unilateral in about 10 %.

*Age distribution.* One hundred and thirty patients ranged in age from 11 to 15, 18 from 16 to 20, and 25 were 21 or over. The oldest patient operated on was 48 years. A total of 80 % were first seen when 11 to 15 years of age.

#### CLINICAL FEATURES

The patients complained of pain and tenderness over the arch of the foot, where a nodule had developed. They often relate the symptoms to stress or distortion.

The tenderness may be a simple bunion tenderness over the prominence of the accessory bone. In that case, the skin is reddened and thickened. The pain is strictly localized to the accessory tarsal scaphoid. It occurs upon weight-bearing and during walking. The same pain may be elicited on pressure from the arch towards the accessory bone in the dorsal direction or by pronation or supination of the foot.

The presence of an accessory tarsal scaphoid can be determined with a fair amount of certainty at the physical examination. The bony



*Fig. 3.*

Accessory scaphoid bones appearing as fragments.



*Fig. 4.*

Same case as Fig. 3 after fusion had taken place.

prominence is palpable, and it is more mobile than one representing the tuberosity of the scaphoid. During weight-bearing the longitudinal arch is usually preserved, but the foot usually assumes a valgus position. As mentioned above, most of the patients are growing girls, and many are of the asthenic type, with long and narrow feet.

*Radiography* in the dorso-plantar view shows the accessory bone as a shadow of varying shape and size, ranging from millet seed to hazel nut. It may be round or be shaped like a triangle with the base directed anteriorly towards the scaphoid. The shape may also be irregular, bipartite, tripartite, or the X-ray may suggest several small flakes. The distance to the scaphoid varies. If the accessory scaphoid is round, the distance is longer and the two bones are bridged only by fibrous tissue. If the shape is triangular or heart-shaped, the distance is short, consisting of a cleft resembling an epiphyseal space. In the present material, the bone was round in 30 %, heartshaped or triangular in 60 %, and irregular in 10 %.

Thirteen patients exhibited cornuate scaphoid bones (*os naviculare cornuti*), on both sides in 4 and on one side in 9 instances. As might be expected, these phenomena represented accessory scaphoid bones which had fused together with the scaphoid. Repeated X-ray examinations in 18 cases at 4 year intervals showed the development of this fusion in 5, bilateral in 2 and unilateral in 3. In other words, fusion occurred in about 20 %.

The present material does not offer exact data regarding the incidence of this fusion. As it occurred only in the heart-shaped and irregular bones, never in the round, more distant ones, the maximum chance of fusion may be calculated as 70 %. But it is not as high as that. True, *Zadek* believes that it equals 80 %.

The malacic changes reported by *Reischauer*, *Saupe*, and others are common. These radiological changes were definitely proved to be related to well-defined, indirect tenderness, the latter being the more severe, the more pronounced the changes. The latter are visible as translucent patches around the zone surrounding the two bones, in the accessory bone as well as in the adjacent part of the scaphoid, and occur only in young patients. When fusion occurs, resulting in a cornuate scaphoid bone, the indirect tenderness disappears, whereas the bunion tenderness may persist.

At the follow-up, the non-operated cases proved to have been relieved of pain in a few months, averaging four. Seventy-six were provided with arch supports, but one could not wear them. Three had several pairs of supports. The effect of the supports must be due to a diminution of the traction of the tibialis posterior tendon on the accessory bone.

Four patients still had periodical symptoms. Two exhibited cornuate scaphoid bones with bunion pain, and surgery seems to be indicated. One patient suffers from a habitual tendency to turn his ankles with associated temporary tenderness of the scaphoid. The last patient was a male, aged 30, whose tenderness of the accessory bone had arisen following distortion.

The four patients who had not been relieved of symptoms ranged in age from 19 to 30.

The late results following operation were on the whole less satisfactory. Of the 70 patients included in the follow-up, 20 experienced trouble. The bunion had recurred in 7, and 13 still had tenderness. In two cases, the trouble was so severe that re-operation was performed. In 11 cases, small fragments of the bone had been left behind, but they gave rise to symptoms only when reaching a certain size. Two patients exhibited other foot disorders—which may have been the actual cause of the trouble—viz. rigid flatfoot due to calcaneo-navicular coalition treated with subastragalar arthrodesis.

The surgical procedure consisted in the chiselling away of the supernumerary bone and the most prominent part of the tuberosity of the scaphoid, damage to the tibialis posterior tendon being avoided. The patient is kept in bed for three weeks with the foot in a plaster cast in slight supination. Operation revealed the tendon to be split around the bone with a part attaching itself to the accessory bone.

In the group of older patients, 7 had histories of severe distortion after which an existent accessory scaphoid began to cause pain. No definite mechanism was found in this distortion, the damage occurring on supination, pronation, as well as dorsal flexion.

The common symptoms are well-defined tenderness over the accessory bone, swelling over the arch, and severe pain when weight-bearing is relieved. These traumatic cases are often extremely refractory to treatment, the pain persisting and disabling the patient for a long time.

X-ray revealed no signs indicating fracture. And operation revealed no tears in the syndesmosis.

Three case histories serve to exemplify the traumatic cases:



*Fig. 5.*

Cornuate scaphoid bone on one side and heart-shaped accessory on the other.

Case rec. 12005. Female, born Jan. 11, 1915. Admitted Dec. 10, 1943. Following distortion during the black-out, she developed pain and swelling over the arch of the right foot. The pain persisted for six months. X-ray examination revealed a triangular accessory tarsal scaphoid at a fairly long distance from the scaphoid. The pain was relieved by operation.

Case rec. 24518. Male, born Nov. 24, 1915, seen on Feb. 5, 1945. On Nov. 24, 1944, the patient had sprained his left ankle in supination. This gave rise to swelling and tenderness over the arch. When first seen, the patient suffered from tenderness over the accessory scaphoid bone and pain when weight-bearing was relieved. X-ray showed a triangular accessory scaphoid with a sclerosed zone. The patient was supplied with arch supports, but was not relieved of symptoms. He refused operation.

Case rec. 46982. Female, born Mar. 10, 1901, admitted on Jan. 28, 1949. One month before admission, dislocation of the left foot in pronation occurred when the medial border of the foot hit the curb-stone. Ever since, the patient had been unable to support herself on the foot owing to pain localized to the medial border.

The physical examination revealed well-defined tenderness at the site of a large accessory scaphoid on the left. The pain could also be elicited by pronation of the foot.

At operation, an accessory scaphoid was removed. Swelling of the ankle persisted after the operation. The patient complained of pain in the operative area. It was not relieved, and at the follow-up in July 1951 the subastragalar mobility was considerably limited on the left, and the patient was admitted for subastragalar arthrodesis.

To sum up, these three traumatic cases show that in such instances pain may be persistent. Surgery may be indicated, but the last case with subastragalar stiffness after the operation goes to show that prognostic scepticism is not out of place, if the patient is not relieved of pain soon after the operation. Operation was performed in five traumatic cases.

In four instances, the removed bones were examined *histologically*. All showed pronounced sclerosis of the bony tissue which proved extremely difficult to decalcify. None exhibited signs of bone necrosis. In one of the traumatic cases, rec. 12005, there appeared to be signs of callus formation.

#### DISCUSSION

In the present series, an accessory tarsal scaphoid occurred partly in the form of a sesamoid, rounded bone at some distance from the scaphoid, partly in the form of an apophysis-like bone of triangular shape with the base towards the scaphoid. The opposing surfaces are irregular, suggesting an epiphyseal space on the X-ray film.

The two varieties have never been found to co-exist. According to *Bentzon*, this appears to indicate a phylogenetic (apophysis) and a neogenetic factor (sesamoid bone).

The symptoms were in some cases mild, in others severe. The majority of the patients were growing girls in whom the pain was moderate and transitory. X-ray examination showed in many cases small translucencies in the accessory scaphoid and in the adjacent parts of the tuberosity of the scaphoid. The tenderness was most severe in the presence of these changes.

Probably, the pain originates from the fibro-cartilaginous bridge between the two bones. The beneficial effect of arch supports is probably due to a diminution of the traction exerted by the tibialis posterior tendon, when the arch is supported.

The older patients usually develop pain following distortion. No patient exhibited signs of fracture of the accessory scaphoid or of the tuberosity of the scaphoid. A rupture probably occurs in the fibro-

cartilaginous bridge between the two bones, as reported by *Günz*, but this phenomenon was not observed in the present series. The injury is no doubt due to traction, as distortion results in violent traction by the tibialis posterior tendon. The traumatic cases are obstinate and often require prolonged treatment, but even in these instances, conservative corrective measures appear to be the best treatment. Injection of novocain was not employed in the present series, but is probably worth trying.

At operation, there is a marked risk that part of the bone may be left behind, particularly in young patients whose bones are still more or less cartilaginous.

The inference to be drawn from these investigations is as follows: An accessory tarsal scaphoid gives rise to mild symptoms during the period of growth, mainly in young girls. The symptoms are transitory, and operation is not required and inadvisable.

In older patients, the symptoms are usually of traumatic origin. Surgical removal of the bone may be indicated, if conservative measures, i.e. plaster cast and arch supports, prove ineffective. The patients are entitled to compensation following distortion, even though an accessory scaphoid exists.

Valgus deformity was encountered in a certain proportion of the material, but probably not more often than in a "normal" series.

A large bunion due either to an accessory scaphoid or to a cornuate scaphoid should be removed surgically, if it prevents the patient from wearing ordinary shoes.

#### SUMMARY

The results of a follow-up study including 173 patients with accessory tarsal scaphoids are reported. The supernumerary bone gave rise to symptoms in a number of cases during the period of growth, and in later life, following distortion. The treatment should be primarily conservative. Surgical removal of the bone is not indicated, unless conservative measures fail.

#### RESUME

Compte-rendu du réexamen de 173 malades ayant des scaphoïdes tarsiens accessoires. L'os surnuméraire provoqua des symptômes dans un certain nombre de cas durant la période de la croissance, suivis plus tard de distortion. Le traitement primaire doit être conservateur. L'extirpation chirurgicale de l'os n'est indiquée que si le traitement conservateur se montre insuffisant.

## ZUSAMMENFASSUNG

Die Ergebnisse einer Nachuntersuchung an 173 Patienten mit os tibiale externum werden vorgelegt. Der akzessorische Knochen gab in einer Reihe von Fällen während der Wachstumsperiode und im späteren Leben nach Fussverrenkungen, Anlass zu Symptomen. Die Behandlung sollte in erster Reihe eine konservative sein. Entfernung des Knochens auf chirurgischem Wege ist angezeigt, wenn konservative Behandlung sich als vergeblich erwiesen hat.

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