

## SUBTALAR DISLOCATION

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During the period from 1945 to 1972, 30 cases of subtalar dislocation were reported to the Directorate of Industrial Injuries Insurance in Denmark. The lesions were classified according to type of dislocation showing that the medial inward type predominated by far. According to the findings of the present investigation, the long-term prognosis seems to be more serious than has hitherto been assumed. X-ray and clinical examination disclosed that arthrosis of the subtalar joints was demonstrable in 19 patients. Six of these patients had pantalar arthrosis, the causative factor in two cases being avascular necrosis of the talus. Clinical examination showed that walking was associated with some degree of pain in 21 patients and 15 patients had a more or less pronounced limp.

*Key words:* subtalar dislocation; subtalar arthrosis; avascular necrosis of the talus

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Subtalar dislocation not combined with fracture of the neck of the talus is uncommon and only a few reports of the injury have appeared in the literature. The first case was reported in 1811 by Judey and Dufaurest. Shands (1928), who personally had only one case of this type, reviewed the cases reported before 1927 and analysed 138 cases according to type of dislocation, and age and sex of the patients. Since then, the studies have mainly been concerned with fractures of the talus, and with the exception of a series of 27 cases reported by Kenwright & Taylor (1970), the series discussed have been numerically small (McKeever 1963, Mindell et al. 1963, Pennal 1963, Thomasen 1943).

Great efforts have been devoted to the solution of the problems involved in the

treatment and prognosis of fracture and fracture-dislocation of the talus, whereas the problems involved in subtalar dislocation are considered to be comparatively small. However, in a series of 15 patients examined by Pennal (1963) it was found that subtalar arthrosis had developed in nine cases, while Mindell et al. (1963) observed two cases of avascular necrosis in a series of 10 patients. We intend, with this report, to elucidate the mechanism of the trauma and the prognosis of the injury.

### PATIENTS AND METHODS

During the period from 1945 to 1972, 30 cases of subtalar dislocation were reported to the Directorate of Industrial Injuries Insurance in Denmark where all employers are required to have their employees insured against accidents. Quite

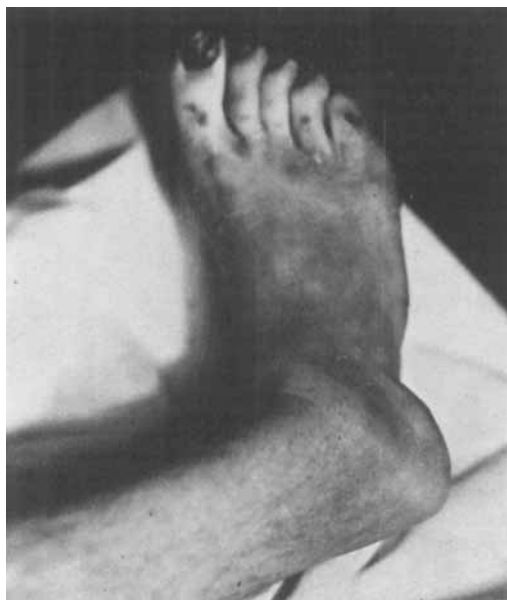


Figure 1. Medial subtalar dislocation.

naturally, a series of this type is predominated by male subjects since housewives who are not employed outside the home are not insured. Thus the series comprises 29 men and one woman, averaging 39 years of age (range: 15–63 years). The mechanism of injury in the 30 cases is shown in Table 1.

Table 1. Mechanism of injury in 30 subtalar dislocations.

| Mechanism of injury    | No. of cases |
|------------------------|--------------|
| Fall from a height     | 14           |
| Weight falling on foot | 8            |
| Twisted ankle          | 5            |
| Traffic accident       | 3            |
| Total                  | 30           |

The individual claims had to be settled within 1–2 years. They were assessed on the basis of supplementary data provided by the referring practitioner and the final declarations submitted by a surgeon and a radiologist. The case records applying to the subjects concerned, together with the radiographs, form the basis of the present study. The period of follow-up, calculated from the time of trauma to the submission of the surgical opinion, covered 23 months on the average (range: 9–73 months).

### Treatment

Most of the dislocations were easily reduced and the joints were immobilized in a below-knee plaster for 8 weeks on average (range: 3–23 weeks; immobilization period unknown in four cases). Open reduction was required in two cases: in one because of buttonholing of the capsule, in the other because of spiking of the lateral corner of the navicular bone into the upper medial part of the head of the talus.

### Initial complications

Nine of the 30 patients had sustained compound injuries, usually associated with considerable skin lesion over the prominent malleolus (Figure 1) through which the malleolus or head of the talus protruded. Skin necrosis was seen in three patients; in one of the latter skin grafting was required.

Deep infection was not seen primarily; in one patient it occurred after the performance of a pantalar fusion.

### Classification

Dislocation of the subtalar joints involved the talo-calcaneo-navicular joints, i.e., subtalar or peritalar dislocation. The dislocation can be medial or lateral. The distribution is seen in Table 2.

Table 2. Type of dislocation in 30 subtalar dislocations.

| Type of dislocation          | No. of cases |
|------------------------------|--------------|
| Subtalar medial dislocation  |              |
| without fractures            | 12           |
| with fractures               | 14           |
| Subtalar lateral dislocation |              |
| without fractures            | 1            |
| with fractures               | 3            |
| Total                        | 30           |

Medial dislocation is most common (Figure 1) and often results in two types of dislocation fractures: (1) Fracture either of the lateral part of the navicular bone or of the upper medial edge of the head of the talus or both, and (2) fracture of the posterior process of the talus. The mechanism is illustrated in Figure 2.

## RESULTS

The late complications were as follows:

*Postural deformation.* In two cases

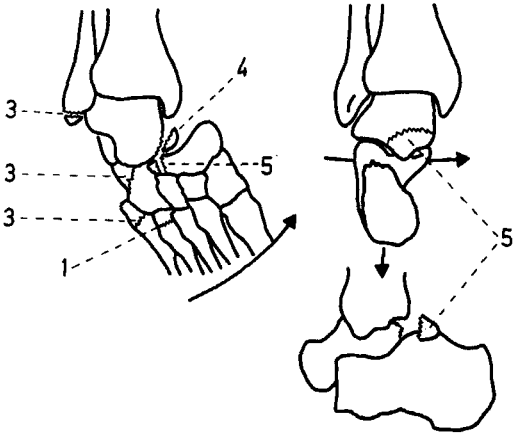


Figure 2. Type and number of associated fractures in 26 cases of medial subtalar dislocation. The mechanism is illustrated.

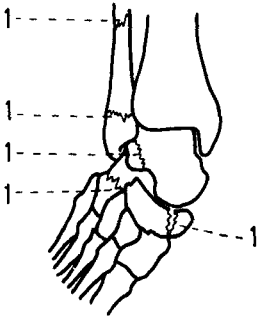


Figure 3. Type and number of associated fractures in four cases of lateral subtalar dislocation.

minor subluxations persisted. Both patients had medial dislocation and walked with the foot in supination.

**Instability.** One patient with medial dislocation complained of a tendency to twist the ankle in supination.

**Avascular necrosis of the talus.** Avascular necrosis occurred in two cases. In one case there was a temporary increase in density, but healing was complete; in the other, an increase in density and partial collapse of the body of the talus subsequently healed. The dislocations were both of the medial type, in one involving fracture of the posterior process of the talus and avulsion from the lateral malleolus, and in the other being associated

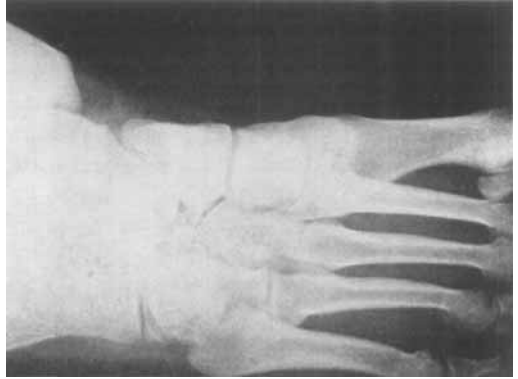


Figure 4. Medial subtalar dislocation with a typical fracture in the lateral part of the navicular bone.

with fracture of the internal edge of the head of the talus and avulsion from the outer malleolus.

**Arthrosis.** Subtalar arthrosis was radiologically verified in 19 patients. Six of these also had talocrural arthrosis. In two of these cases the reason was avascular necrosis of the talus, as mentioned above. Three of the patients had compound lesions with skin necrosis, superficial infection and a long immobilization period. Furthermore, one of them had a fracture in the lateral process of the talus. This latter patient had an ipsilateral compound tibial fracture which was repaired with a plate. Due to infection and prolonged healing, he was not allowed weight-bearing until 23 weeks after the trauma. Subtalar arthrosis developed in all patients with fractures involving the subtalar joints. It was remarkable, however, that subtalar arthrosis was present in 6 patients out of 13 in whom fractures had not occurred.

**Subjective symptoms.** Pain in connection with walking and a limp were the predominant symptoms at follow-up. Atrophy and swelling of the calf were also seen. Nine patients had no complaints even with strenuous activities; 16 patients had moderate complaints, which were most pronounced when they were

walking over uneven ground; nine of these patients had a slight limp. Five patients had severe complaints; their activity was greatly restricted and a limp persisted. A total of 21 patients complained of some pain in connection with walking and 14 patients had a limp.

Eighteen of the patients were engaged in heavy work. Thirteen of the 30 patients were able to resume their previous work; with certain modifications, the same applied to another eight patients; four patients had to change their work and five patients had not yet resumed work at the time when the claim was finally settled, on an average, 23 months after injury.

Subtalar arthrodesis was performed on two patients and pantalar arthrodesis on two. Deep infection occurred in one of the latter and the leg had to be amputated. Two patients had to wear ankle-braces.

## DISCUSSION

The prognosis of subtalar dislocation seems to be more serious than has hitherto been assumed, primarily owing to the development of arthrosis. In agreement with findings previously reported, medial dislocation was the lesion most frequently encountered in the present investigation. The typical dislocation-fractures of the navicular bone and the medial edge of the head of the talus are mentioned by Watson-Jones (1962), but fractures of the posterior process of the talus have not attracted much attention. The posterior talo-calcaneal joint comprises the basal surface of the posterior tubercle that is facing plantar-laterally. This explains why fracture will occur if the calcaneum is forced medially as this will cause avulsion of the tubercle. The mechanism seems obvious and, accordingly, medial distortion of the subtalar joints should be suspected in the presence of a fracture.



*Figure 5. Medial subtalar dislocation with a typical fracture of the posterior process of the talus. Avulsion of the tubercle by the dislocated calcaneum.*

The incidence of avascular necrosis is rather surprising: however, Mindell et al. (1963) observed the phenomenon in two out of 10 patients. Studies of the blood supply to the talus (Haliburton et al. 1958, Mulfinger & Trueta 1970, Petterson et al. 1974) indicate that the body of the talus is supplied mainly by the tarsal canal artery. The latter may be damaged by the dislocation and, in the presence of fracture of the posterior tubercle—as seen in one of our patients in whom necrosis occurred—the vascularization will suffer additionally.

Posteriorly, a network is formed of branches from the posterior tibial artery and the peroneal artery. Branches which run to the posterior process arise from this network, finally to enter into the bone.

From clinical experience it is known that arthrosis easily develops if fractures involve the joints. Thus the high incidence of arthrosis after subtalar dislocation *not* combined with fracture is remarkable. Six patients out of 13 without fractures in the subtalar joints had ar-

throsis. The injury seems to have been more severe in the group of patients with arthrosis as compound injuries were seen in four patients, in two combined with wound infection. By comparison there were only two compound injuries in the group of patients without arthrosis. A comparison of the periods of immobilization is not conclusive, but no patients with arthrosis were immobilized for less than 8 weeks, this being the general treatment in the group without arthrosis. Especially McKeever (1963) stresses the fact that early mobilization will prevent fibrosis and stiffness in the subtalar joints.

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