Surgical Treatment of Talar Neck Fractures
Evaluation of Results

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Abstract
Background: Consideration of gravity of talar neck fractures and evaluation of the treatment results.
Patients and Methods: 22 patients suffering from talar neck fractures were retrospectively reviewed. There were ten type A, six type B, three type C, and three type D fractures according to the Hawkins classification modified by Canale & Kelly. All patients underwent open reduction and internal fixation.
Results: Excellent clinical results were observed in 45.4%, good in 27.2%, fair in 18.1%, and poor in 9.1% of the patients according to the Iowa Ankle Evaluation score. Two patients developed avascular necrosis (AVN) with body collapse, and tibiotalar fusion was required. Furthermore, five patients developed symptomatic subtalar arthritis but did not require subtalar fusion.
Conclusion: Accurate early open reduction is considered the treatment of choice for such types of fractures. AVN is associated with late management, while subtalar arthritis does not necessarily lead to subtalar fusion.

Key Words
Talar fractures · Avascular necrosis · Subtalar arthritis

Introduction
The incidence of talar fractures is between 3–6% of all foot fractures in the literature [1, 2]. Half of them are fractures of the talar neck [1]. The talus has a unique and delicate vascular pattern. Fractures may impair its vascularity thus leading to avascular necrosis (AVN). Other complications of talar fractures are mal- or nonunion, bony ankylosis, impaired joint mobility, tendon trapping, and late development of posttraumatic osteoarthritis, the latter being the most serious one [3–7]. In the past, this led surgeons to various therapeutic procedures including even talus excision or amputation [8, 9]. After the advent of principles of open reduction and internal fixation, early postoperative motion can be initiated, thus enhancing a better outcome. In this study, we present our experience with surgical treatment of talar neck fractures, which are the most common and challenging of talar fractures.

Patients and Methods
32 patients suffering 32 talar fractures were treated in our department in a 9-year period (1991–2000). 26 of them had talar neck fractures, and we were able to reexamine 22 of this group. Four patients were lost to follow-up. One had died from a reason not related to the talar fracture, two were living in remote villages but assured us on the phone that they were “satisfied” with the outcome, and the other did not return our phone calls.

There were 17 men and five women with a mean age of 34.14 years (range 16–64 years) included in this retrospective study. Twelve patients were car accident victims, and in the other ten, a fall from a height > 3 m was reported. Eight were multiply fractured patients: three with fractures of the spine, two with pelvic fractures, and three with fractures of the ipsilateral femur. Three of them were initially hospitalized in the intensive care unit (ICU) for 6–9 days. Nine patients (40.9%) suffered a concomitant fracture in an adjacent bone: four had fractures of the medial malleolus, two a pilon fracture, two a calcaneal fracture, and one fractures of the metatarsals. Two of the talar fractures were open.

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Patients were classified according to the Hawkins classification modified by Canale & Kelly [12] in 1978. In this classification, type A refers to nondisplaced, nondislocated fractures, whose line is extended up to the subtalar articulation between the medial and posterior talar tubercle. Type B refers to displaced talar neck fractures with concomitant subtalar dislocation, type C to displaced fractures with concomitant subtalar and tibiotalar dislocation, and type D to fractures with further talar-navicular dislocation. Among our patients, there were ten type A, six type B, three type C, and three type D fractures.

On admission, almost all patients had a painful ankle, with bruising and swelling at the malleoli and midfoot. Radiographic examination included standard anteroposterior and lateral views (Figures 1 and 2). In several cases we obtained a CT scan of the region for more delicate depiction of the talus and better evaluation of its axis and the relationship of fragments with the adjacent bones (Figure 3). Intraarticular extension of the fracture line was not observed in any patient.

In all cases, a high-energy force was reported. The mechanism of injury was not clear in seven patients. In twelve cases, dorsiflexion of the ankle was mentioned, which resulted in collision of the talar neck on the anterior tibial lip. In the remaining three patients with concomitant medial malleolar fractures, extreme supination of the back of the foot with collision of the talar neck was reported as the mechanism of injury.

Primary fusion was not performed in any of our patients. Autogenous cancellous grafts were used in two cases. Treatment was operative in all patients. Concomitant medial malleolar fractures were fixed with two screws or one screw and a Kirschner wire (K-wire), and pilon fractures were further stabilized with bridging transarticular external fixation. In fractures of the small bones of the foot, we used K-wires, while calcaneal fractures were treated conservatively. The talar fractures were stabilized with screws (cancellous or Herbert) and/or K-wires.

Eight type A fractures were treated with two screws. One patient suffering from type A (no. 6) and one suffering from type B (no. 14) talar neck fracture had a concomitant medial malleolar fracture and one (type A, no. 7) a pilon fracture. One of the two remaining type A fractures was treated with three K-wires (no. 5) and the other (no. 8) with two screws and two K-wires.

In group B, two patients were treated with two screws, one (no. 16) with two screws and two K-wires and internal fixation of a concomitant medial malleolar fracture, two with two screws and iliac bone graft, and one with two K-wires.

Two patients with type C fractures were treated with two screws and two K-wires and one patient with one screw and transarticular external fixation because of a concomitant pilon fracture.

Among the type D fractures, we used two screws in two patients and two K-wires in one.