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Posterior Subtalar Dislocation

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Subtalar dislocations are a rare form of dislocation and, according to Leitner, account for no more than 1% of all traumatic dislocations.[1] Posterior dislocations, in particular, are extremely rare, and as far as we were able to determine in our search of the literature, only seven cases recorded in detail have been reported (Table 1).[2–7] They amount to a mere 0.8% of all subtalar dislocations. In this paper, we report two cases of posterior dislocation of the subtalar joint and describe the pathomechanics, diagnosis, and treatment.

CASE REPORTS

Case 1

The patient was a 48-year-old man who, while driving a truck, collided with the truck in front of him, and was injured by jamming his left foot on the floor pedal. There was an open wound less than 2 cm long in front of the ankle joint. A lateral view radiograph of his foot showed complete dislocation of the subtalar joint with posterior displacement of the foot, perching of the head of the talus on the dorsal margin of the navicular, impingement of the posterior process of the talus on the posterior subtalar facet of the calcaneus, and fragments at the posterior margin of the posterior subtalar facet of the calcaneus (Fig. 1*A*). On a frontal view, there was slight medial displacement of the foot, but no major fractures, only small avulsions (Fig. 1*B*). Debridement and manual reduction were performed under lumbar spinal anesthesia. Reduction could be performed easily by positioning the knee in flexion, plantar flexing the ankle joint, and drawing the foot anteriorly. The ankle was immobilized in a plaster cast for 6 weeks, and full weight bearing was begun at 14 weeks. Seven months after the injury, the active range of motion of the ankle joint was 15 degrees dorsiflexion and 45 degrees plantar flexion on the left (20 degrees and 55 degrees on the right), and the active range of motion of the subtalar joint was 20 degrees (30 degrees on the right). There was no evidence of aseptic necrosis on the radiograph. The patient had no pain, no limping or other complaints, and returned to his former job.

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Case 2

The patient was a 60-year-old woman who injured her right foot when she fell as she stepped backward on a terraced field. On a lateral view radiograph, the foot was completely dislocated below the talus and displaced posteriorly, the head of the talus was perched on the dorsa margin of the navicular, the posterior process of the talus impinged on the posterior subtalar facet of the calcaneus, and an os-trigonum-like fragment was left at the posterior margin of the posterior subtalar facet of the calcaneus (Fig. 2*A*). Slight medial displacement was observed on a frontal view (Fig. 2*B*). Avulsion fractures of both malleoli were present, but no major fractures were observed. Reduction was achieved in a manner similar to that in case 1 by manipulating the calcaneus with a skeletal traction pin and bow. The ankle was immobilized in a plaster cast for 4 weeks, and full weight bearing was begun at 8 weeks. At present, 3 years after the injury, active range of motion of the ankle joint is 10 degrees dorsiflexion and 40 degrees in plantar flexion on the right (20 degrees and 50 degrees on the left), and active range of motion of the subtalar joint is 10 degrees (30 degrees). Aside from slight pain when the patient walks long distances, there is no impairment of activities of daily living. However, arthrosis-like changes are visible on the subtalar articular surface on plain radiographs (Fig. 2*C*).

DISCUSSION

Broca,[8] in 1852, classified subtalar dislocations into three types according to the direction of displacement of the foot in relation to the talus: medial, lateral, and posterior. Later, in 1855, Malgaigne[9] added anterior subtalar dislocation. In reports on frequency according to type, medial dislocations are described as the most common, accounting for 72%, followed by lateral dislocations at 22%, and anterior dislocations at 1%, whereas posterior dislocations accounted for less than 1%.[1,10–13] Shands,[14] in 1928, attributed the first reports of subtalar dislocations to Judey and Defaurest in 1811. He reviewed 10 cases of posterior subtalar dislocation from 138 subtalar dislocations cited from previous reports without details or radiographs. References were provided for only three of the 10 cases in his review, i.e., Luxembourg,[2] Richarz,[3] and Bolling,[4] and the diagnosis was confirmed on lateral view radiographs, but not anteroposterior view radiographs, in every case. Leitner,[1] in 1954, reported one case without details or radiographs. Reports of posterior subtalar dislocation recorded in detail have consisted of two cases reported by

TABLE 1. **Posterior subtalar dislocation**

Author	Sex Age	X-Ray Orientation[a]		Cause	Wound	Associated Fractures	Treatment	Immobilization	Follow Up	Result
		Lat.	A-P							
Luxembourg 1907	F 30	+	−	Fall from height	Closed		Closed reduction	10 days	6 weeks	No pain
Richarz 1908	M 21	+	−	Fall from height	Closed		Closed reduction	7 days		
Bolling 1923	M 27	+	−	Auto accident	Closed	Chip fracture in calcanum and talus	Open reduction	5 weeks	4 months	No pain
Larsen 1957	F 31	+	−	Auto accident	Closed	Chip fracture in lateral malleolus and navicular	Closed reduction	11 weeks	5 years	No pain
Larsen 1957	M 54	+	+	Fall from height	Closed		Closed reduction	11 weeks	5 years	No pain
Dunn 1974	M 34	+	+	Fall from height	Open	Medial malleolus	Manipulative reduction	10 months	1 year	Infection, foot in varus
Edmunds 1991	M 33	+	−	Auto accident	Open	Talar neck and cuboid	Open reduction	7 weeks	8 years	Pain on walking, fusion
Inokuchi 1996	M 48	+	+	Auto accident	Open		Manipulative reduction	12 weeks	5 years	No pain
Inokuchi 1996	F 60	+	+	Fall from height	Closed		Closed reduction	6 weeks	3 years	No pain

[a] Lat., lateral; A-P, anterior-posterior.

Larsen[5] in 1957, one case by Dunn[6] in 1974, and one case by Edmunds[7] in 1991. Larsen[5] presented both frontal and lateral view radiographs of the ankle in case 8 in his series but no radiographs for case 7. Medial displacement and medial rotation of the calcaneus and forefoot to almost 45 degrees were revealed in the frontal view for case 8 in his series, and perching of the head of the talus on the navicular and dislocation of the foot backward were revealed in the lateral view. Dunn[6] reported posterior subtalar dislocation in case 3 in his paper and provided clinical records and radiographs. Lateral radiographs revealed that the entire foot was displaced behind the ankle, and a frontal view showed that the foot was rotated medially at a right angle. This case could be diagnosed as a "posterior subtalar dislocation," but it is an atypical case in terms of Broca's[8] criteria and could be considered an "incomplete amputation." Edmunds[7] reported a right posterior open subtalar dislocation with disruption of the ankle and fractures of the talar neck and cuboid bone. However, subtalar dislocation with a fractured neck of the talus should be diagnosed as a fracture–dislocation of the talus, not a subtalar dislocation, because the talonavicular joint usually remains intact.

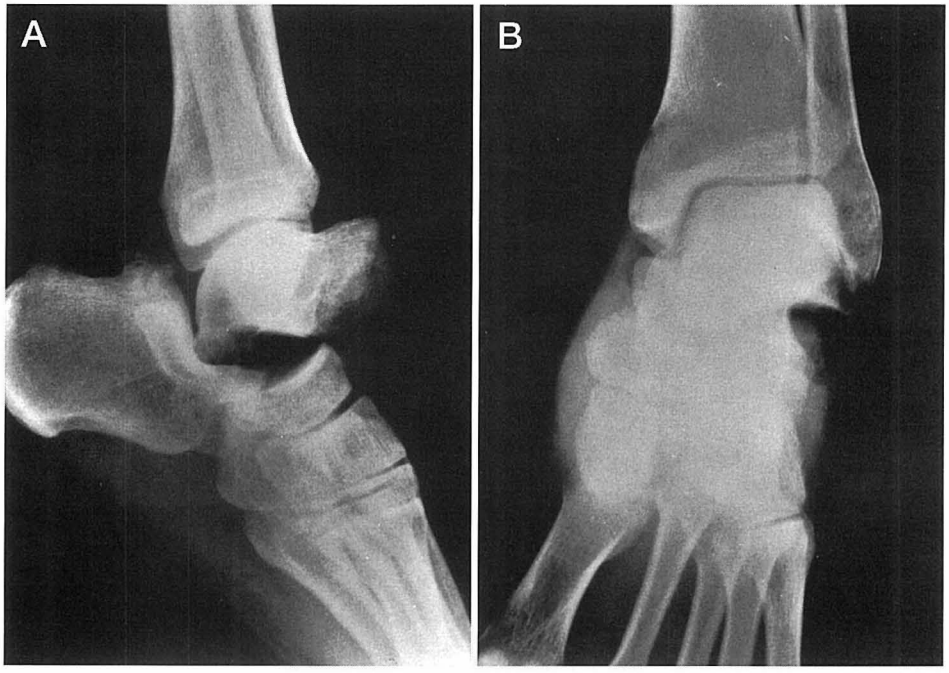

FIG 1. **Case 1: (*A*) Lateral view showing that both the subtalar and talonavicular joint are dislocated and the foot displaced is backward. (*B*) Frontal view showing slight medial displacement of the foot and no major fractures, only avulsions.**

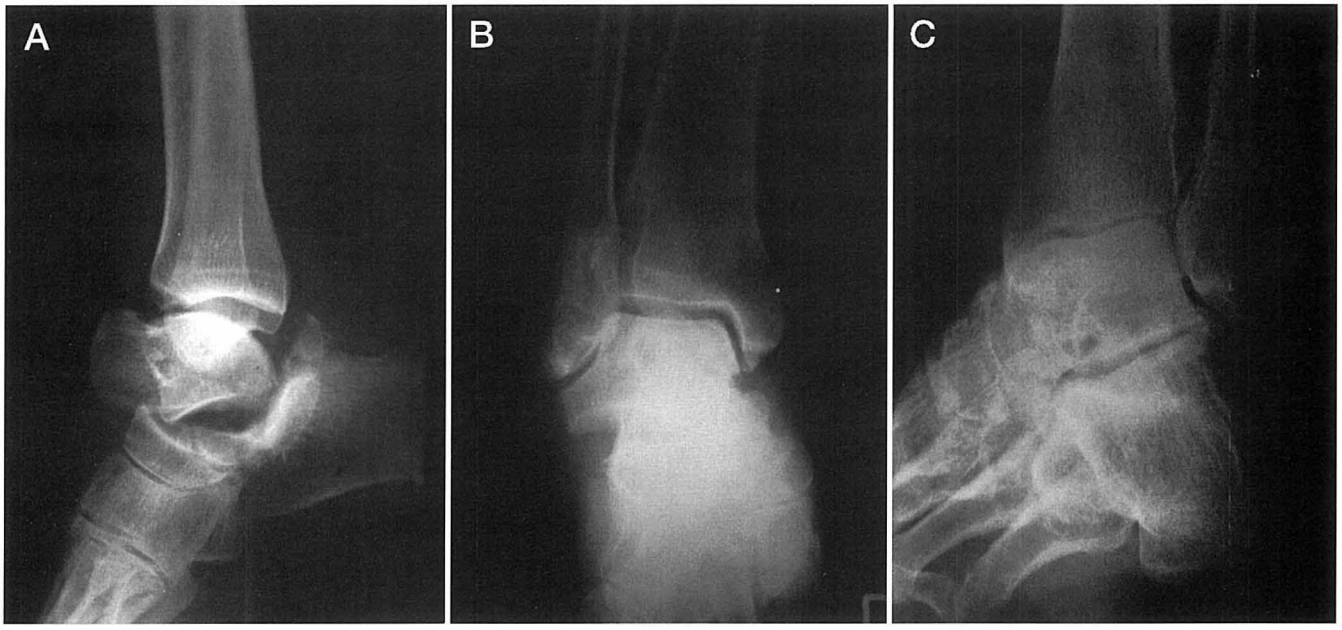

FIG 2. Case 2: (*A*) Lateral view showing posterior subtalar dislocation with fracture of the posterior process of the talus, but no major fractures. (*B*) Frontal view showing slight medial displacement of the foot. (*C*) Oblique view showing arthrosis-like changes on the subtalar articular surface.

A diagnosis of posterior subtalar dislocation should be made when the lateral view reveals that the head of the talus is perched on the back of the navicular, and the posterior portion of the talus rests in the posterior subtalar facet of the calcaneus. Frontal views should not show significant medial displacement or rotation of the foot. However, in medial dislocation the head of the talus is displaced on the lateral side of the navicular and is seen overlapping. The posterior portion of the talus does not ride on the posterior subtalar facet of the calcaneus and is shown overlapping the calcaneus. Therefore, I suggest that a diagnosis of posterior subtalar dislocation should be made when the talar head is perched on the back of the navicular and does not slip down beside it, even if there is slight medial displacement of the foot.

The main cause of posterior dislocation may be a hyperplantar flexion force that tears the interosseous ligament and the medial and lateral ligaments of the ankle joint, leaving the head of the talus on the back of the navicular. That there was a wound in front of the ankle joint in case 1 supports this pathomechanism. There was a fracture of the posterolateral tubercle in case 2 in our series and in case 8 in Larsen's series. This finding indicates that the posterior portion severely abraded the posterior edge of the subtalar facet, resulting in fracture, and also supports this pathomechanism. If only minor rotation force is added to the plantar flexion force, slight medial displacement or internal rotation of the foot is seen in addition to dorsal subtalar dislocation in frontal view radiographs. It is easier for the talar head to dislocate to the lateral side of the navicular than to the dorsum of the navicular. Posterior subtalar dislocations are very unstable because the talus is balancing on two points, the dorsum of the navicular and the previous facet of the calcaneus. Dorsal subtalar dislocations can easily convert to medial subtalar dislocations. These may be reasons why posterior subtalar dislocations are so rare.

De Lee[10] recommended early closed reduction followed by immobilization for 3 weeks and active range-of-motion exercise of the subtalar joint after cast removal. We treat medial and lateral subtalar dislocations by immobilizing the ankle in a plaster cast, usually for 3 or 4 weeks, followed by active exercise, and allow full weight-bearing after an additional 4 weeks. We treated case 2 in the manner described above, and slight pain persisted and arthrosis-like changes are visible on the subtalar articular surface. The force causing dorsal subtalar dislocations may be more than the force causing medial or lateral subtalar dislocation, and it may cause shearing between the talus and the calcaneus, resulting in damage to joint cartilage and fractures around the posterior process and head of the talus. For these reasons, we immobilized the ankle in case 1 for 6 weeks and allowed full weight-bearing after additional 8 weeks, but the results are just preliminary.

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