The Journal of Foot & Ankle Surgery 56 (2017) 1339–1342

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Lateral Ligament Reconstruction for Ball-and-Socket Ankle Accompanying Lateral Ankle Instability: A Case Report and Literature Review

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ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:
ball-and-socket
lateral ankle joint instability
tarsal coalition

ABSTRACT

The ball-and-socket ankle joint is a rare deformity characterized by the loss of concavity in the trochlear surface of the talus with rounding of the articular surfaces of the distal fibula and tibia. Frequently, tarsal coalitions, fibular hypoplasia, and shortening of the limb accompany this deformity. To date, no data have been reported on surgical treatment of lateral ankle joint instability and peroneal tendon dislocation concomitant with a ball-and-socket ankle joint. In the present study, we report the case of a 43-year-old male patient with right lateral ankle joint instability and peroneal tendon dislocation in a ball-and-socket ankle joint, with accompanying tarsal coalition. This was surgically treated by lateral ankle joint ligament reconstruction and tenodesis.

A ball-and-socket ankle joint is known to occur from the loss of concavity in the trochlear surface of the talus, with rounding of the distal tibial and fibular articular surfaces (1). This condition was described by Politzer (2) in a German study in 1931 and Lamb (3) in an English study in 1958. The ball-and-socket ankle joint is an extremely rare condition, and the exact incidence is unknown (4). The etiology of the deformity is controversial but it has been reported to result from primary germplasm malformation or be secondary to an adaptive response to abnormal subtalar joint structure and function (1,5–7).

Poor development of the lateral malleolus, shortening of the limb, and tarsal coalitions can accompany the deformity (8–10). Patients are usually asymptomatic; however, increased ankle mobility, recurrent ankle sprains, persistent lateral pain, and decreased motion in the subtalar and mid-tarsal joints has been observed (11,12). Rarely, arthrosis of the ankle and/or subtalar joints will occur (13).

The treatment strategies depend on the patient's complains. Asymptomatic patients might be observed without any treatment and/or treated conservatively with orthesis (14,15). Different approaches are available for surgical treatment, including debridement of the impinging osteophytes, subtalar arthrodesis, corrective osteotomy, and ankle joint arthroplasty, for symptomatic cases (6,11,13,16).

We present the case of a 43-year-old male patient who underwent treatment with lateral ligament reconstruction and peroneal tenodesis for lateral ankle joint instability and peroneal tendon dislocation accompanying a ball-and-socket ankle joint. To the best of our knowledge, the present report is the first of a case of a ball-and-socket ankle joint treated with lateral ligament reconstruction of the ankle joint.

Case Report

A 43-year-old male patient reported localized pain on the lateral aspect of the right ankle and recurrent spraining. The patient complained of intermittent pain after a sports injury that occurred when he was 20 years old. The patient had been treated with several analgesic medications and ankle splints for 20 years. He reported that he had no close relatives with any type of bone deformity.

On physical examination, he had minimal tenderness on the lateral aspect of his right ankle joint. The lateral malleolus was more prominent on the right side than on the contralateral side. The longitudinal length (between the back of the heel and the longest toe) of the right foot was 3 cm less than that of the left foot. The right ankle dorsiflexion was 15° and plantarflexion was 45°. The alignment of the hindfoot was normal. The length of the lower extremity was measured from the anterior superior iliac spine to the medial malleolus of the tibia. The right lower extremity was 2 cm shorter than the left side. Peroneal tendon dislocation was demonstrated when dorsiflexion and eversion against resistance was performed. However, he had no ligamentous laxity, and the neurologic examination revealed normal results.

Financial Disclosure: None reported.
Conflict of Interest: None reported.
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http://dx.doi.org/10.1053/j.jfas.2017.06.023

A ball-and-socket ankle joint and concomitant tarsal coalition was diagnosed from the posteroanterior and lateral radiographic images (Fig. 1). Synostosis was present between the fourth and fifth metatarsal bones. The right proximal fibula was hypoplastic. The contralateral foot and ankle joint images were normal. A talocalcaneonavicular coalition was confirmed by computed tomography (Fig. 2). On the magnetic resonance imaging scan, the anterior talofibular and calcaneofibular ligaments were not seen, and synovitis was present in the ankle joint. The patient underwent surgery for ankle joint instability and peroneal tendon dislocation.

Synovectomy using ankle arthroscopy was performed. No cartilage irregularities were seen during the arthroscopic evaluation. Tunnels were created through the talus, fibula, and calcaneus for reconstruction of the anterior talofibular and calcaneofibular ligaments. Lateral ligament reconstruction was performed using a fresh-frozen fascia lata allograft (17). Next, peroneal tenodesis was performed.

A short leg splint was applied for 3 weeks in the early postoperative period. The patient was allowed partial weightbearing with crutches. At the sixth postoperative week, he was mobilized with full weightbearing. At the 2-year follow-up examination, his daily activities, such as climbing stairs, were well tolerated by the patient. He had not experienced further ankle joint sprains after the operation.

Discussion

A ball-and-socket ankle joint is an extremely rare condition. Unilateral involvement is frequent; however, the presence of a bilateral deformity has been reported to be 6% to 40% in different case series (5,6,18,19). Although the underlying etiology is controversial, a defect during the early embryogenesis or adaptive alterations has been postulated for the occurrence (1). Germplasm malformations during early embryogenesis were reported as the cause of congenital occurrence of this rare deformity (6,13). In contrast, a ball-and-socket deformity has also been reported as a secondary response to increased mobility of the ankle joint resulting from movement limitation in the subtalar and mid-tarsal joints owing to an accompanying tarsal coalition (1,5,19,20).

The occurrence of some uncommon anomalies accompanying the ball-and-socket ankle joint deformity have been reported in published studies (1,3–16,18–24) (Table). A ball-and-socket ankle joint is usually

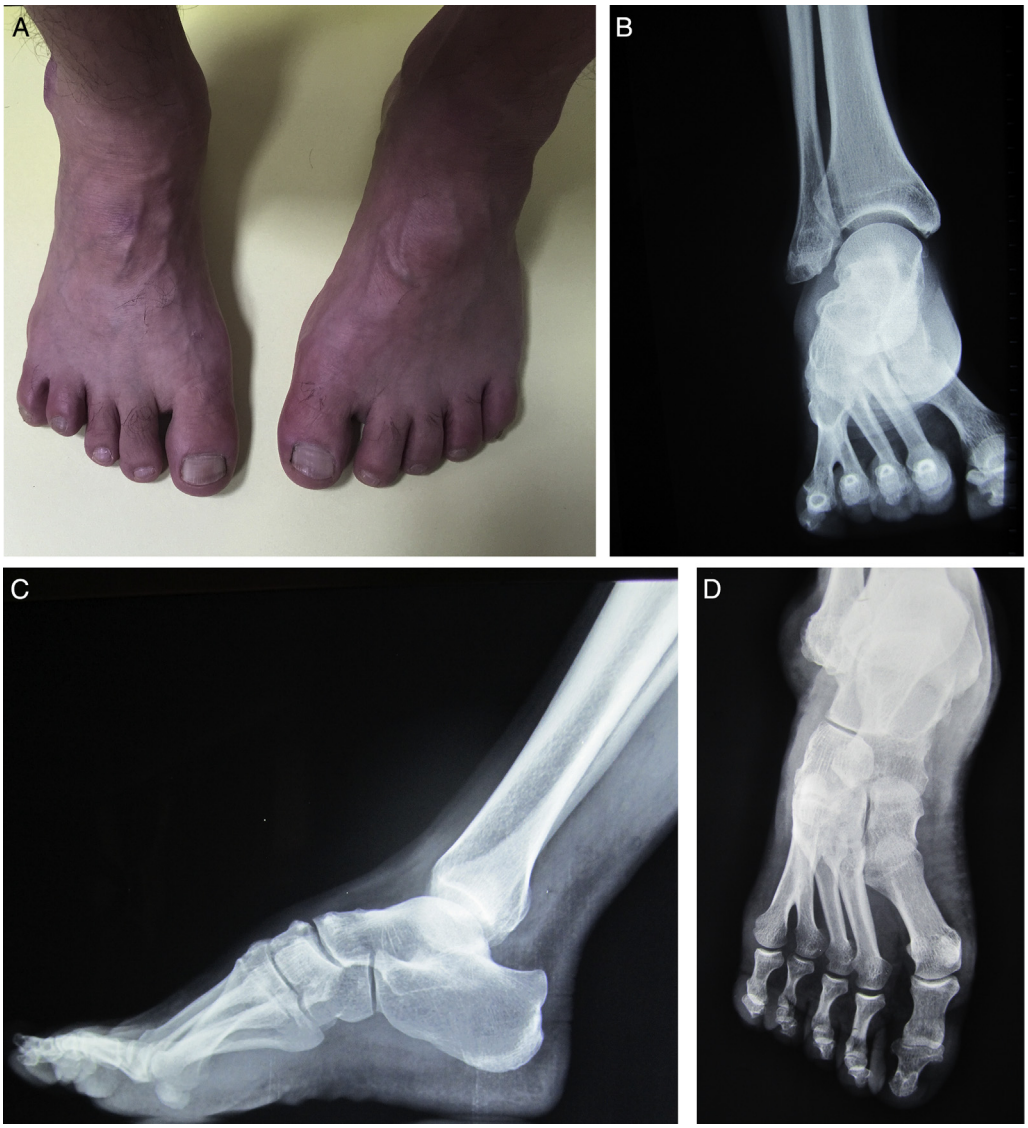

Fig. 1. (*A*) Ball-and-socket ankle deformity of the right ankle in a 43-year-old male patient. (*B*) Anteroposterior and (*C*) lateral images of the ankle joint. (*D*) Synostosis seen between the fourth and fifth metatarsal bones on the anteroposterior image.