Dislocation of the calcaneocuboid joint presenting as lateral instability of the ankle

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A 16-year-old professional female ballet student sustained a plantar flexion-inversion injury to her left ankle while dancing. Clinical examination and MRI suggested subluxation of the tibiotalar joint. However, accurate diagnosis was hampered by a transient palsy of the common peroneal nerve. It was subsequently established that she had also sustained a dislocation of her calcaneocuboid joint, a rare injury, which was successfully stabilised by using a hamstring graft. The presentation and management of this rare condition are discussed.

Calcaneocuboid dislocation is rare because of the inherent stability of the joint, conferred by the surrounding ligaments, fibrous capsule, bony architecture, and proximity to the peroneus longus tendon. Isolated cases have been reported in Ehlers-Danlos syndrome, after trauma, and spontaneously. Chronic calcaneocuboid subluxation, rather than recurrent dislocation is more common after injury of the ankle, with a series of six cases reported by Lohrer and Nauck. Although no clear diagnostic criteria for this condition have been reported, a specific stress radiological technique for the calcaneocuboid joint has been developed and normal ranges of joint laxity have been defined. Because of the difficulty in diagnosis it is likely that this condition is under-reported. We describe a case of calcaneocuboid dislocation with delayed presentation following trauma and discuss the management of this condition.

Case report
A 16-year-old girl presented following an injury to her ankle while ballet dancing four weeks earlier. While undertaking pointe work she had abruptly rotated, lost her balance, and sustained a plantar flexion-inversion injury to her left foot and ankle. Despite pain and swelling, she attempted to continue dancing for approximately 15 minutes before she stopped. Immediately after injury she also described an area of numbness over the lateral border of the foot, extending into the outer two toes. During the subsequent week the range of movement of the ankle remained poor. She developed a foot drop and there was persistent numbness of the first web space and medial plantar aspect of the foot. She also described the painful feeling of a bone ‘popping out’ from the lateral aspect of her ankle when she bore weight on that foot. This was accompanied by giving-way and inversion of the foot. She had been taught to reposition this bone by her ballet school physiotherapist.

Our initial diagnosis was subluxation of the tibiotalar joint, a diagnosis that was supported by an MR scan, which demonstrated oedema and rupture of the anterior and lateral ankle ligaments. No bony injury was seen on either plain radiographs or MRI. Her medical history was unremarkable, with no previous joint dislocation.

On examination there was tenderness over the lateral aspect of the ankle, weak dorsiflexion and an apparent foot drop. Neurologically there was a local sensory deficit and gross weakness in the peroneal muscles, flexor hallucis longus, flexor digitorum longus and extensor hallucis longus. She had a maximum joint hypermobility score on the Beighton scale. She was very apprehensive on weight-bearing, and described giving-way of the ankle.

Although there was evidence of a significant injury to the lateral ligament complex, it was unclear whether this was the sole cause of instability. Electromyography was used to investigate the suspected neuropaxia and a formal examination under anaesthesia of the ankle was planned in order to clarify stability. During this period she was mobilised in an Aircast boot (Aircast, Vista, California) for ankle support.
After both a normal examination under anaesthesia and electromyographic studies, the diagnosis was eventually facilitated by the patient, who demonstrated spontaneous midfoot dislocation on bearing weight without her Aircast boot. An immediate dorsoplantar shoot-through radiograph in this position revealed a calcaneocuboid dislocation (Fig. 1). The cause of the apparent lateral instability was, therefore, a recurrent calcaneocuboid joint dislocation. Because of the persistent symptoms operative stabilisation of the calcaneocuboid joint was undertaken. This was performed through a lateral incision, the joint being readily exposed. Two parallel extra-articular dorsoplantar bone tunnels were drilled into the calcaneal neck and cuboid, a gracilis tendon graft being harvested from the ipsilateral knee, passed through the tunnels, and the ends tightened and fixed in the tunnels using an Arthrex Bio-Tenodesis Screw System (Arthrex Inc., Naples, Florida).

Rehabilitation involved four weeks in a below-knee plaster-of-Paris cast, followed by four weeks in an Aircast brace (no eversion or inversion possible) and intensive physiotherapy beginning at four weeks. She returned to ballet dancing six months after the procedure, and reported no instability.

**Discussion**

Our patient displayed maximum joint hypermobility which, when combined with the stresses of ballet, may have predisposed to calcaneocuboid subluxation. Indeed, calcaneocuboid subluxation has been described as a relatively common but poorly recognised condition in ballet dancers.\(^9\) The transient peroneal nerve palsy presumably reflected a traction neuropraxia of the common peroneal nerve, caused by the initial plantar flexion-inversion injury.

Andermahr et al\(^{10}\) have devised a grading system for calcaneocuboid instability based on the calcaneocuboid angle and measured on anteroposterior (AP) varus stress radiographs of the foot. It is difficult to apply this classification accurately to our patient, as she had complete calcaneocuboid dislocation on weight-bearing with inversion of the midfoot.

A variety of techniques have been used to stabilise the calcaneocuboid joint, including arthrodesis,\(^8\) reconstruction using the tendon of either plantaris or peroneus brevis,\(^{10}\) and a periosteal flap repair.\(^{11}\) We have found no description of reconstruction using the tendon of gracilis in the literature, nor have we found an operative case involving a ballet dancer.

In summary, recurrent calcaneocuboid dislocation is a rare cause of apparent lateral ankle instability, but should be considered if the tibiotalar articulation appears stable and neurological tests are normal. Diagnosis may be simplified by asking the patient to demonstrate the dislocation and then taking an immediate radiograph. However, this is uncomfortable for the patient, so we recommend that clinicians stress the calcaneocuboid joint under anaesthesia following normal stress testing of the ankle joint itself. Once diagnosed, an anatomical hamstring reconstruction is a robust method of joint stabilisation.

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**References**