In this case report we present two cases of injuries to the subtalar joint, specifically chondral defects of the middle facet of the talus and concomitant involvement of middle talocalcaneal or sustentacular articulation. These injuries were both sustained during snowboarding.

**Patient history and imaging findings**

A 26-year-old male snowboarder presents with a history of snowboarding injury 3 weeks prior to being scanned. Scarring and sprain of the anterior talofibular and calcaneofibular ligaments is observed. There is sprain and contusion of the deltoid ligament complex. A small talocrural effusion is seen with capsular sprain and scarring. Synovitis and debris are also seen in the anterior and posterior recesses. Bone edema and impaction fracture of the plantar medial aspect of the talar neck and head are seen with extension to the middle facet. At the sustentacular (middle facet) articulation an impaction fracture of the plantar medial aspect of the talar neck and head is observed (Fig. 1A). Chondral contusion, fracture and focal defects are also noted (Fig. 1B). There is ligamentous injury and partial tearing with sprain involving the talocalcaneal and interosseous cervical ligaments of the sinus tarsi. Bone edema, and impaction injury of the adjacent sustentaculum tali to medial portion of the body of the calcaneus are observed. Multiple chondral fragments are observed adjacent to the sustentaculum tali (Fig. 1C).

A 27-year-old male snowboarder presents with history of recent snowboarding injury. Clinically, a lateral process fracture was suspected. Mild impaction injury of the plantar aspect of the talar head with extension to the middle facet is seen (Fig. 2A). A focal sharply margin-
ated chondral defect is observed (Fig. 2B) with adjacent chondral fragment (Fig. 2C). For the MR evaluation of the ankle joint on the 3T MAGNETOM Verio MR scanner (Siemens Healthcare, Erlangen, Germany), the first of our axial image set is routinely a T2-weighted Turbo Spin Echo (TSE) sequence, paired with an axial Proton Density (PD) TSE fat suppressed (FS) sequence. These are then followed by PD-weighted TSE sequences with and without fat suppression in the sagittal and coronal planes. Details of our imaging parameters are presented in Table 1.

Discussion

There is a large body of radiologic literature describing both osseous and ligamentous injuries, to the ankle and hindfoot particularly involving athletic endeavours such as skiing, basketball, football etc. However, injuries to the subtalar joints do not find their way into these discussions. Furthermore, discussions of involvement of the middle facet of the talus and the middle talocalcaneal sustentacular articulation are even more sparse. This may very well have been due to the “inaccessibility” of the area to imaging examination. The advent of MR imaging and the ability to achieve finer resolution and better signal-to-noise ratios may have changed the landscape. Snowboarding is significantly so different from skiing that the prevalence and distribution of injuries are commensurately different. Snowboarders stand on their boards very similar to skateboarders or surfers. They stand sideways on their board with the rear foot at 90 degrees to the long axis of the board and the front foot positioned between 45 and 90 degrees to the long axis of the board. The snowboarder executes turns by shifting body weight to the front foot and by swinging the tail of the board to swing out. Since poles are not used, the arms and hands are used to break a fall. The bindings, the type of boot, the patterns of the lead foot etc. are believed to be responsible for the patterns of injury. Upper limb and ankle injuries are more common among snowboarders than skiers. Ankle injuries are the third most common injuries in snowboarders (16%) versus skiers (6%). These ankle injuries which are torsional could be accompanied by talocalcaneal/subtalar injuries which may go undetected. Undetected subtalar injuries and attendant instability can set the stage for significant chronic problems. These injuries are better dealt with acutely rather than chronically.

The talus and the subtalar joints are part of a complex biomechanical entity with multiple degrees of freedom where the talocrural (ankle) joint acts in concert with the subtalar and talocalcaneonavic-
27-year-old snowboarder presents with subtalar injury. 2A: PD-weighted Turbo Spin Echo fat suppressed sagittal images through the ankle demonstrate bone marrow edema at the site of the impaction fracture of the middle facet of the talus (long arrow). Chondral defect is noted in the articular cartilage of the middle facet on the inferior aspect of the talus (short arrow). 2B: PD-weighted Turbo Spin Echo fat suppressed sagittal images through the ankle demonstrate the chondral defect in the articular cartilage of the middle facet on the inferior aspect of the talus (arrow). 2C: PD-weighted Turbo Spin Echo fat suppressed axial images through the ankle demonstrate single chondral fragment adjacent to the sustentaculum tali (arrow).

ular joints providing significant complexity and multiaxiality of function. This allows the foot to accommodate to irregular terrain. Patients presenting with ankle/talocuneal joint injuries must be examined carefully for subtalar injuries. The three talocalcaneal articulations can be visualized on standard planes on MR. However, subtle injuries with osteochondral fractures require greater attention to detail with high resolution. The talus is shaped like a truncated cone and ligament stability of the talocuneal and subtalar joints is dependent on the lateral collateral, the cervical and the talocalcaneal interosseous ligaments.

References
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