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Injuries to the tarsal joint: identification and management

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Anatomy
The tarsus is a composite joint with numerous individual bones held together by a variety of ligaments. The fibrous component of the joint capsule forms a sleeve extending from the distal tibia and inserting at the proximal metatarsus. This supporting sleeve contains all of the tarsal ligaments and is much stronger and better developed on the plantar surface compared to the dorsal aspect of the limb. This complex ligamentous support is critically important to the normal function of the joint. As a result many injuries in this area involve these soft tissue supports. These injuries often result from spontaneous over-stress rather than direct injuries from outside forces. The fact that the tarsus is over three times longer in span than the carpus (Taylor) and acts mainly in dealing with propulsive forces generated by the hind limbs are offered as likely reasons for this observed susceptibility to overstress injury.

Clinical Evaluation of the Tarsus
Careful and thorough physical examination is necessary due to the numbers of different problems affecting the joint. Many conditions affecting this joint affect the standing angle of the joint during weight-bearing. Careful attention should be paid to this angle, which is normally 135°-145° in dogs and 115° -125° in cats, considering the actual angle and any differences between the two limbs. Observation and palpation for any swelling and /or pain may localize an injury, as the bones have only sparse soft tissue cover in this area. Many of the injuries encountered result in instability, so careful and systematic checks for any palpable instability are carried out with the joints being stressed in mediolateral, dorsoplantar and rotatory planes. This examination should be repeated when the animal is sedated or anaesthetized. The range of movement of the tarsocrural joint should also be checked and has a range of 39° in flexion to 164° in extension in the normal canine joint and a greater range of 22° (flexion) to 167° (extension ) in the cat. A difference between the conscious examination and the values obtained when the animal is sedated or anaesthetized may indicate guarding of the joint due to pain. Establishing the site of pain, swelling and instability will greatly assist identifying the injury with imaging techniques.

Orthogonal radiographic views may be augmented by various oblique shots depending on area being visualized. Obtaining stress views where a perceived instability is emphasized by placing stress across the joint to demonstrate
abnormality while the radiographic views are obtained, is also very useful in confirming the site of a problem and helping to make a diagnosis.

**Sprains**
Like the carpus, ligamentous injuries are also common. Talocrural joint luxation occurs more commonly in cats and usually involves disruption of one or both of the collateral ligaments. Ligament disruption may be mid substance rupture or fracturing of the bone such as the distal fibula. These luxations are inherently quite unstable and usually require reconstruction of the collateral ligament by surgery.

**Luxations**
Intertarsal luxations can occur at the proximal intertarsal joint or tarsometatarsal joint. These are usually hyperextension injuries with disruption of the plantar ligaments and fibrocartilage, similar to carpal hyperextension injuries. The distal intertarsal joint is protected against this injury because it is spanned by the 4th tarsal bone.

Idiopathic degeneration of the plantar supporting structures of the calcaneoquartal, or proximal intertarsal joint, and/or the tarsometatarsal joint is seen fairly commonly, notably in middle-aged Shetland sheepdogs. Affected individuals are typically overweight and usually have a sedentary lifestyle, so signs may be difficult to detect and they are often presented late, commonly with bilateral involvement. Progressive ligament degeneration allows hyperextension of the proximal intertarsal joint, causing a plantigrade posture and lameness. Such changes may be bilateral; if not, soft tissue swelling can often be detected on the plantar surface of the contralateral proximal intertarsal joint and this frequently indicates incipient hyperextension.

A mediolateral radiograph of the affected hock(s) will confirm the diagnosis, although stressed films, with hyperextension of the proximal intertarsal joint, will facilitate this. Periarticular new bone formation, indicating chronic pathology, is also usually seen on the plantar aspect of the distal calcaneus and this can also be seen as a sign of impending plantar ligament failure in the contralateral limb.
Any type of dog can also suffer traumatic injury to the plantar ligamentous support, usually with obvious local swelling and visible or palpable instability.

The only viable treatment is arthrodesis of the calcaneoquartal joint. Several techniques have been described to achieve this and the most popular are:

- a pin and plantar wire loop
- a lag screw (+/- plantar wire loop)
- a compression plate applied laterally

In each case, articular cartilage should be completely removed from the joint surfaces, a cancellous bone graft should be used and external support should be applied for 6-8 weeks, or until signs of osseous fusion are visible radiographically. In bilateral cases, surgeries should be staged if possible, with an interval of 4-6 weeks between operations.

If a successful arthrodesis can be achieved, the vast majority of dogs will return to a good level of function. The most common complication is failure to achieve arthrodesis and subsequent fixation failure, especially in dogs affected bilaterally. Prolonged external support prior to surgery seems to be associated with a greater risk of post-operative complications, so surgery should normally be undertaken as soon as possible after diagnosis.

The central tarsal bone can also luxate as an isolated injury.

**Calcaneal Fractures**

The calcaneus acts as a lever arm and via the action of the Achilles tendon maintains the hock in extended position. After fracturing of the calcaneus the proximal fragment tends to be distracted by the pull of the Achilles tendon. Repair technique for calcaneal fractures is tension band wiring.

**Central Tarsal Bones Fractures**

Most of these fractures occur in racing greyhounds in the right central tarsal bone. If possible, these are generally repaired with lag screws.
Open Shearing Injuries to the Tarsus

Open traumatic shearing injuries frequently involve the distal tibia, tarsus and metatarsal bones and there can be composite loss of the overlying soft tissues including skin tendons as well as a variable amount of bone. As these are open fractures and heavily contaminated with bacteria and foreign material, such as road dirt, the initial treatment if careful debridement and management as any other open fracture. Initial stabilisation of the joint is with an external fixator. The affected joints are often unstable due to a loss of collateral ligaments. The external fixator allows stabilisation of the bones while allowing access to the tissue for daily debridement and wound changes. Following granulation tissue formation in the wound, it may be necessary to repair or replace damaged collateral ligaments with screws and figure-of-eight suture material. In large wounds free skin grafts might be necessary to cover the wounds whereas others heal by second intention healing and wound contraction.

References