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DISORDERS OF THE TARSUS IN THE DOG. I

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SUMMARY

The term tarsus (hock) refers to the region between the crus and the metatarsus, and designates the compound joint comprising 7 tarsal bones. For clinical purposes an account of the gross and radiographic anatomy of this joint has to include the distal extremities of the tibia and fibula, and the bases of the metatarsal bones because these form an integral part of its construction.

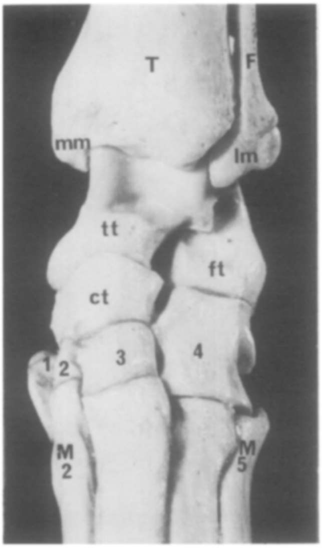
GROSS ANATOMY

The distal articular surface of the *tibia* has two almost sagittal grooves separated by an intermediate ridge, a shape that accommodates the proximal trochlea of the tibial tarsal bone. The medial part of the tibia which extends slightly distal to the articular surface is the medial malleolus and this, together with the lateral malleolus, assists in stabilizing the tibio-tarsal joint. A groove in the medial side of the medial malleolus accepts the tendon of *m. flexor digitorum longus,* and caudally there is a groove for the tendon of *m. flexor hallucis longus.*

The distal end of the *fibula* forms the lateral malleolus, which articulates with the tibia and tibial tarsal bone. Caudally, it has a groove lodging the tendons of *mm. extensor digitorum lateralis* and *fibularis brevis.*

The seven tarsal bones are arranged in two rows: two in the proximal (fibular tarsal and tibial tarsal) and four in the distal (first, second, third and fourth), while between the rows is interposed the central tarsal. The *tibial tarsal* (talus) articulates above with the tibia and fibula, below with the central tarsal and, on the plantar side, with the fibular tarsal. It comprises three zones, the proximal trochlea (body), the distal end (head) which articulates with the central tarsal, and the middle (neck) which joins the two and lies just beneath the skin. The *fibular tarsal* is the largest and longest, forming a stable joint with the tibial tarsal and articulating directly with the central tarsal. Into its proximal extremity *(tuber calcanei)* inserts the calcanean tendon. On its medial side there is a shelf-like process, the *sustentaculum tali,* over which runs the tendon of *m. flexor hallucis longus.*

The *central tarsal* (scaphoid) articulates with all the other tarsal bones. The first is sometimes fused with the first metatarsal. The second is the smallest, and it articulates with the second metatarsal at a higher level than the other adjacent joints. The third articulates with the third metatarsal. The fourth is situated laterally and is as long as the central and third put together. It articulates distally with the fourth and fifth metatarsals (Figs. 1 & 2).



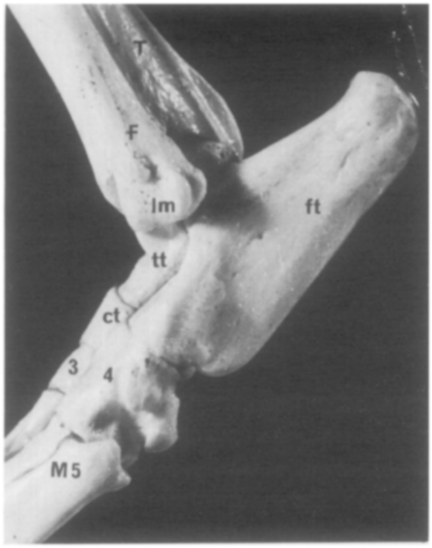


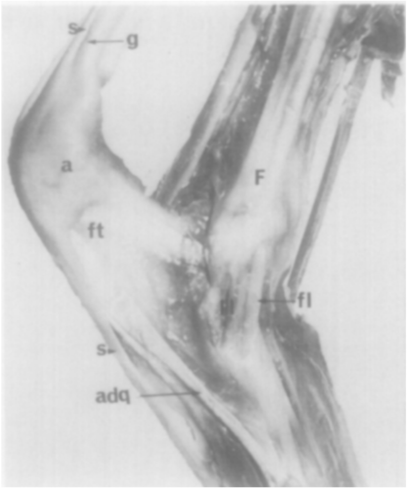
Fig. 1 left. Dorso-plantar view of the left tarsus of a dog. T=tibia, F=fibula, M2/M5=metatarsal bones, mm=medial malleolus, lm=lateral malleolus, tt=tibial tarsal, ft=fibular tarsal, ct=central tarsal, 1,2,3,4,=tarsal bones.

Fig. 2 right. Lateral view of the left tarsus of a dog. T=tibia, F=fibula, M5=metatarsal bone, ft=fibular tarsal, tt=tibial tarsal, lm=lateral malleolus, ct=central tarsal, 3,4=tarsal bones.

Of the five *metatarsals,* the first is atypical taking various rudimentary forms. The second is the shortest, and the third and fourth the longest.

The bones of the hock form a composite joint, with the greatest movement, hinge-like, occurring at the tarsocrural (tibio-tarsal) joint. There are, on either side, collateral ligaments which comprise long and short parts, the long limits extension and the short prevents hyperflexion. The long part of the *tibial* collateral runs from the medial malleolus to the first tarsal, and first and second metatarsals, but also has attachment to the tibial and central tarsals. The short attaches to the long and divides as it passes under it, one section inserting into the tibial tarsal and the other on the first tarsal and metatarsal bones. The long part of the *fibular* collateral extends from the lateral malleolus to the base of the fifth metatarsal but with attachment to the fibular and fourth tarsals; the short comprises one band which attaches to the tuber calcanei and another to the tibial tarsal. A complexity of other ligaments are present dorsally and also on the plantar aspect, the latter being especially distinct and heavy (Figs. 3 & 4).

The outer layer of the tarsal joint capsule extends from the distal end of the tibia and fibula to the proximal ends of the metatarsal bones. It attaches to the bone surfaces and the ligaments, and forms the inner wall of the tarsal canal which houses the tendon and sheath of *m. flexor hallucis longus,* plus the main vessels and nerves to the foot. The synovial lining forms into three lateral, and four medial joint sacs, the largest at the tarsocrural articulation.



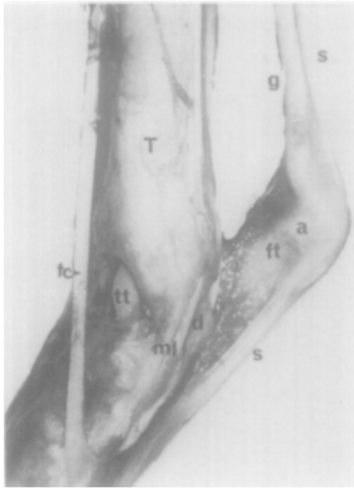
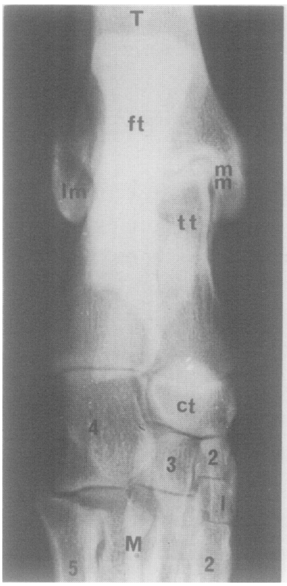


Fig. 3 left. Lateral aspect of tarsus. g=gastrocnemius, s=superficial flexor, a=attachment of sdf to fibular tarsal bone, adq=abd. digiti quinti, fl=fibularis longus, ll=collateral ligament, F=fibula, ft=fibular tarsal bone.

Fig. 4 right. Medial aspect of tarsus. g=gastrocnemius, s=superficial digital flexor, a=attachment of sdf to fibular tarsal bone, tc=tibialis cranialis, d=deep digital flexor, ml=collateral ligament, tt=tibial tarsal bone, ft=fibular tarsal bone, T=tibia.



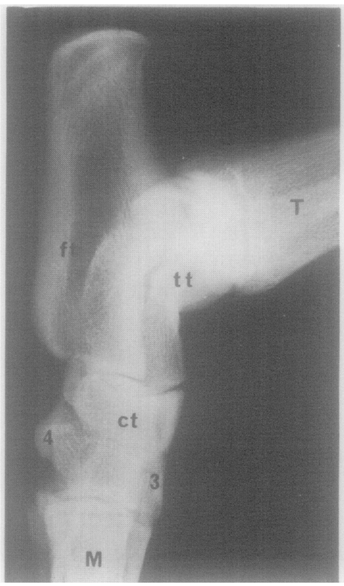


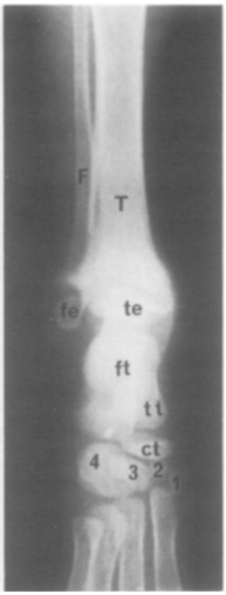
Fig. 5 left. Dorso-plantar radiograph of the right tarsus of a dog. T=tibia, F=fibula, ft=fibular tarsal, tt=tibial tarsal, lm/mm=malleoli, ct=central tarsal, 1,2,3,4=tarsal bones, M5/2=metatarsal bones.

Fig. 6 right. Lateral radiograph of the right tarsus of a dog. T=tibia, ft=fibular tarsal, tt=tibial tarsal, ct=central tarsal, 3,4=tarsal bones, M=metatarsus.

RADIOGRAPHIC ANATOMY

Radiography is essential to the differential diagnosis of tarsal disorders, so the shape and position of the component parts, the times that ossification centres appear, and the times of epiphyseal closures should be appreciated. The multiplicity of bones makes superimposition unavoidable and may make interpretation difficult (Figs. 5 & 6). Routinely, dorso-plantar and medio-lateral views are required but sometimes oblique views are indicated, and radiographs taken with the tarsus under stress help to identify the site of an instability.

Interpretation may be confusing in puppies before ossification centres appear. The centre for the distal epiphysis of the tibia appears at 2–3 weeks, and that for the distal epiphysis of the fibula at 4–5 weeks. Each tarsal bone develops from a single centre of ossification except for the fibular tarsal which has one centre for the body and another for the epiphysis. The centres for the tibial and fibular tarsal bones are present shortly after birth; the fourth appears at 2–3 weeks; the central at 4–5 weeks; and the other at 4–7 weeks. The epiphysis of the fibular tarsal is present at 6 weeks (Figs. 7 & 8). Epiphyseal closure times (earliest and latest) occur as follows (Sumner-Smith, 1966): Distal tibia—5-8 months; Distal fibular—5-8 months; Tuber calcis—11 weeks to 7 months.



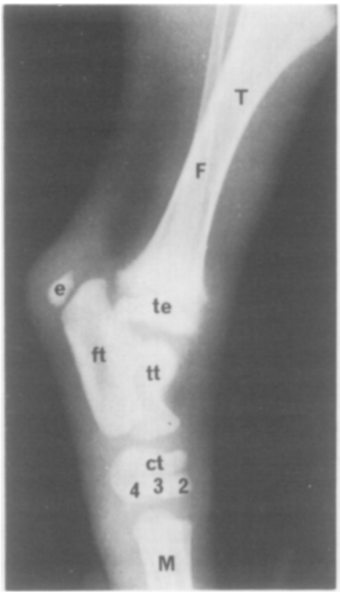


Fig. 7 left. Dorso-plantar radiograph of the right tarsus of a 55-day-old Beagle. T=tibia, F=fibula, fe=fibular epiphysis, te=tibial epiphysis, ft=fibular tarsal, tt=tibial tarsal, ct=central tarsal, 1,2,3,4=tarsal bones.

Fig. 8 right. Lateral radiograph of the right tarsus of a 55-day-old Beagle. T=tibia, F=fibula, M=metatarsus, e=tuber calcis epiphysis, ft=fibular tarsal, tt=tibial tarsal, ct=central tarsal, 2,3,4=tarsal bones.

It is important to realize, however, that there may be marked variation in the appearance of centres and the time of fusion between breeds or even between individuals of the same breed, although the chronological order is reasonably constant.

CALCANEAL (ACHILLES) TENDON INJURIES

The Achilles tendon is a composite structure made up of the tendons of the gastrocnemius and flexor digitorum superficialis muscles, and the conjoint contributions from the biceps femoris, semitendinosus and gracilis muscles. The gastrocnemius tendon inserts into the calcaneal tuber, the superficial flexor tendon has lateral and medial attachments to the tuber, and the biceps femoris tendon inserts into the medial aspect of the tuber.

The injuries sustained by components of the Achilles tendon at hock level are:

1. Severance of the tendon by a sharp object some 2–4 cm proximal to the tuber, or avulsion of the insertion of the gastrocnemius tendon. A severe dysfunction ensues and the hock adopts a characteristic hyperflexed position when weight-bearing is attempted. A similar posture is exhibited, however, if the origin of the gastrocnemius muscle becomes avulsed or if a rupture occurs at the gastrocnemius muscle tendon junction. When avulsion from the tuber is suspected, radiography is essential to determine whether a fragment of bone has become detached with the tendon.

A dual surgical procedure has been found the most effective way of treating these injuries (Vaughan, 1981, 1985a). The hock is first secured in extension by inserting a screw through the fibular-tarsal bone and into the tibia. The severed tendon is then repaired, or the avulsed insertion is re-attached to the tuber using stainless steel wire. A light dressing is maintained on the hock during the healing period and the dog is strictly restricted to prevent stress on the screw. After 4–5 weeks the tendon is usually taut and thick, and the screw is then removed.

2. Displacement of the superficial flexor tendon from the tuber due to rupture of one of its slips of attachment. It is uncommon but the Greyhound and Shetland Sheepdog appear most prone to the condition. In the former it is a racing accident, while in the latter it arises spontaneously with no specific trauma involved. It may be significant that the Shetland Sheepdog is also prone to plantar proximal intertarsal subluxation which suggests its hock joints are vulnerable to stress.

The displacement is most commonly to the lateral side and is accompanied by marked local swelling and lameness. Being able to move the tendon on and off the tuber provides convincing evidence for the diagnosis. Surgical reposition of the tendon on the tuber offers the best means of correction and it should be undertaken early before adhesions and chronic bursal changes have developed. Through an incision just medial to the tuber it is sometimes possible to repair the damaged attachment or to reinforce the local connective tissue so as to maintain the tendon in place. Otherwise a suture of steel wire may be taken through the edge of the tendon and also into a track drilled in the medial border of the tuber. External support, preferably in a light weight cast with the hock in semi-extension, is advisable for 3–4 weeks. A racing animal may, by this means, be returned to active sport.

OSTEOCHONDROSIS (OSTEOCHONDRITIS DISSECANS)

Osteochondrosis occurs less frequently in the hock than in the shoulder or elbow joints. Some breeds appear particularly prone to the condition, notably the Rottweiler, Labrador, Retriever, Mastiff and Bull Terrier.

It may affect one or both hock joints. A mild to moderate lameness is observed at 3–6 months of age but in an active puppy this may be considered the result of a soft tissue injury or some other condition such as hip dysplasia. As the joint changes worsen, the local signs become more obvious. The whole joint is enlarged, often with capsular distension on the medial side, while flexion is reduced and painful. Crepitus is sometimes evident and not uncommonly the hock is hyperextended when the dog stands.

The diagnosis is confirmed radiographically by the demonstration of characteristic articular defects (Figs. 9 and 10). On a dorso-plantar view the medial ridge of the tibial tarsal bone is flattened or distorted and the joint space on this side is greatly increased. Secondary changes are seen on the medial malleolus of the tibia and this may even be fractured. Separated flat or conical bone fragments are sometimes evident in medial joint space, and small ossicles are occasionally found medially or caudally lying free in the distended capsule. On a lateral view the trochlea has a flattened appearance and exostoses may be seen on the distal tibia. The lateral side of the joint is much less commonly affected, but in these cases similar radiographic changes are found. The severity of the abnormalities vary according to the extent of the defect of the tibial tarsal bone and to the duration of the condition. In chronic cases the radiographic features are those of a severe osteoarthrosis.

Fig. 9 left. Osteochondrosis affecting the medial condyle of the tibial tarsal bone (arrow) in a 15-month-old Rottweiler.

Fig. 10 right. Osteochondrosis of the medial condyle of the tibial tarsal bone (arrow) in a 13-month-old Bull Mastiff.

Treatment may be conservative or surgical. Restricting exercise and dieting to reduce body weight are both worthy of consideration especially in relatively mild cases. When there is evidence of separated fragments or free ossicles, their surgical removal with a view to reducing the irritation they cause to the joint is particularly indicated. On occasions, however, the abnormalities are so extensive that surgery is unlikely to prove effective and may even be contraindicated.

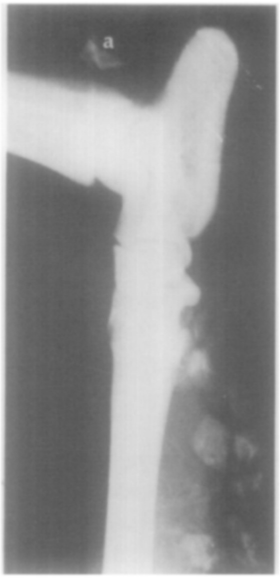
The preferred surgical approach is medial using an incision anterior to the tibial collateral ligament. By keeping the joint in flexion the capsule is rendered more prominent and is thus more readily located. Retraction of the ligament cranially aids exposure but section of the ligament provides an even better view, although this is seldom necessary. Another method involves osteotomy of the medial malleolus. This allows the ligament to be distracted distally; the malleolus has then to be repaired using a fine screw or a tension-band device. Fragments are removed and the trochlear ridge curetted. Closure is in layers using polyglycolic acid sutures, and the application of a soft supporting bandage.

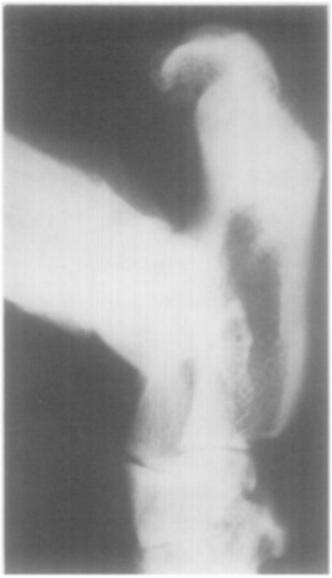
The results of surgery are not as good as they are for osteochondrosis of the shoulder—probably because the hock is a close fitting hinge joint in which articular imperfections, resulting in osteoarthrosis have a profound influence on joint function.

FRACTURES

Fibular tarsal bone

Fractures of the shaft of this bone occur most commonly in racing Greyhounds and in similar animals used for coursing. They are stress-induced injuries and in racing dogs, the right hock is especially vulnerable because when racing anti-clockwise the outside leg bears the greater strain at the bends. Fractures sometimes occur in pet dogs and are usually due to direct trauma—e.g., a road traffic accident. The type of fracture varies, transverse fractures at mid-shaft are most common, but severe comminution is not unusual, with transverse and longitudinal splits and many small fragments. In racing Greyhounds these injuries may be complicated by fracture of the central tarsal bone, producing virtual collapse of the hock. Other possible injuries to the shaft are avulsion of a piece of the tuber at the insertion of the gastrocnemius tendon, and, in puppies, detachment of the calcaneal epiphysis (Figs. 11, 12, 13).





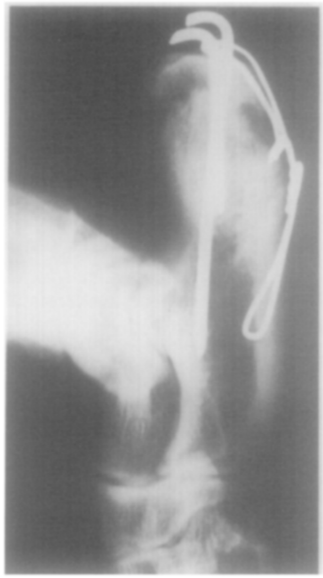


Fig. 11 left. Avulsion of a fragment (a) of the fibular tarsal bone in a 3-year-old Irish Water Spaniel.

Fig. 12 centre. Avulsion of the proximal epiphysis of the fibular tarsal bone in an 8-month-old Borzoi.

Fig. 13 right. Same case as in Fig. 12, following repair with a tension band.

Fractures at the distal end of the bone are infrequent but a transverse fracture of the distal 3–4 mm is seen in Greyhounds (Figs. 14 & 15) or, at this level, the bone may be disrupted into several fragments. These latter injuries may be associated with ligament disruption causing instability and hyperextension.

Fig. 14 left. Fracture of the distal extremity of the fibular tarsal bone in a 1-year-old Greyhound.
Fig. 15 right. Same case as in Fig. 14, following repair with a screw.

The subcutaneous position of the fibular tarsal bone renders it easy to palpate so the recognition of fractures is relatively straightforward. A disabling dysfunction is produced because the calcaneal tendon distracts the proximal fragment(s) and the hock remains hyperflexed. Local swelling, pain, bruising and distortion are accompanying features.

Radiographs in two planes are essential to identify the lines of cleavage and the degree of fragment displacement. Sagittal fissures in the shaft are not readily observed because of bony superimposition, particularly if the radiograph is not satisfactorily exposed. The full extent of the fragmentation that may be present is not always determined radiographically, as has been demonstrated by macerating specimens from Greyhounds which were destroyed because of the injury (Figs. 16 & 17).

Conservative treatment. Using external support in splints or casts to maintain the hock in extension, offers little hope of realigning the calcaneus sufficiently to enable a racing dog to return to active sport. Furthermore, even in pet dogs, unless the bone is adequately reconstructed leg use will be deficient because despite union the bone is left distorted.

Surgical treatment. Surgery aimed at accurate reconstruction provides the best prospects for a return to good limb function, and even to racing, particularly if the degree of comminution is slight and the central tarsal bone is not also fractured.

A variety of procedures has been advocated: a screw or pin driven vertically along the shaft for transverse fractures; a Sherman or Venable plate attached to the calcaneus or

Fig. 16 left. Fracture of the tibial tarsal, central tarsal, third tarsal bones in the right tarsus of a 2-year-old Greyhound; racing injury.

Fig. 17 right. Same case as in Fig. 16, after maceration of the bones. 4=fourth, ct=central tarsal bone.

along the full-length of the hock, for transverse and comminuted fractures. The introduction of ASIF techniques however, has made these older methods redundant and have improved the chances of successful repair.

(i) For transverse shaft and tuber fractures, the tension band technique is ideal, especially for small- and medium-sized dogs. The fracture is approached through a plantarolateral incision, and displacement of the superficial flexor tendon from the tuber improves the exposure and aids the placement of the pins. The tension band should be closely applied to the bone and the end of the pin(s) well seated. A combination of this method and lag screwing of separated fragments is a possibility for some comminuted fractures (Figs. 18 & 19).

(ii) A 3·5 mm or 2·7 mm ASIF plate is applied to the lateral aspect depending on the size of the dog, placing three screws in the calcaneus, one in the lower tarsal bones and three in the base of the fourth and fifth metatarsal bones. The plate has to be bent to accommodate it to the shape of the tarsus, and the bone may have to be levelled in places using an osteotome to improve apposition. Sagittal splits may be compressed using the lag screw technique for the upper three screws, and separate lag screws may be employed to deal with large fragments of both the fibular and central tarsal bone.

It is essential during wound closure to cover the plate adequately with tissue or else wound dehiscence may occur. The fascia and sucbutis are closed in separate layers, and finally the skin is repaired. A well-padded rigid cast extending from the proximal tibia to the foot with the hock in semi-extension is an added precaution and should be maintained for four weeks. Activity has to be strictly curtailed. The implants are left *in situ* unless they loosen or cause a local problem.

Fig. 18 left. Fracture of the fibular tarsal bone in the right tarsus of a 19-month-old Whippet; injury at exercise.

Fig. 19 right. Same case as in Fig. 18, after tension band wiring.

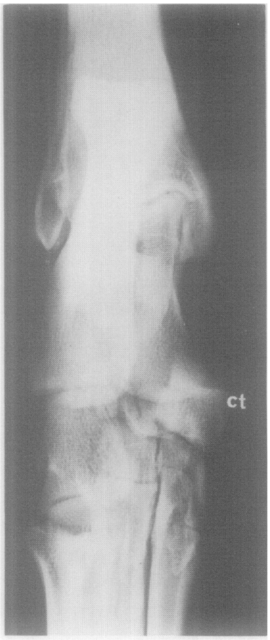
Central tarsal bone

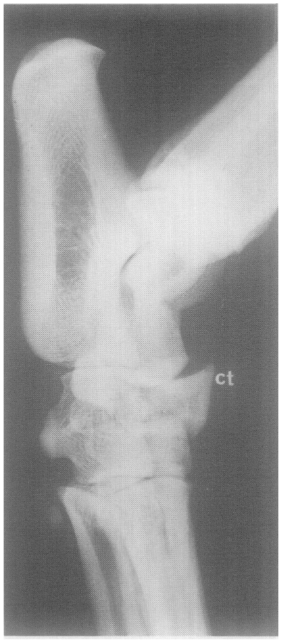
Fractures of this bone occur almost exclusively in racing Greyhounds, and usually involve the right hock for the same reason as those of the fibular tarsal bone. Other fast moving dogs, such as coursing Greyhounds and Whippets, are also vulnerable and either hock may then be affected. Comminution is frequent, and it is not uncommon for the fibular tarsal and fourth tarsal bones to have fractured at the same time.

The diagnosis is usually straightforward, based on a history of an acute lameness associated with a race or some violent activity, together with evidence of pain, swelling, bruising, crepitus and instability at mid-tarsus. Radiography is mandatory whenever the suspicion of a fracture is raised, and two views are essential. The degree of fragmentation and displacement varies, but often there are two large fragments, one displaced anteriorly and the other medially. Simple fissures also arise and could, without adequate radiographs, be mistaken for sprains. The maceration of such fractures has shown that fragmentation may be quite considerable (Figs. 20, 21, 22).

Displacement of one large fragment should not be mistaken for dislocation of the bone, the latter being relatively rare and more likely to be found in pet dogs.

Treatment. A variety of methods, conservative and surgical, have been advocated. For simple fissures the application of a rigid cast or splint and restriction of exercise for 3 months will often suffice. Fractures involving minor displacement have also been treated in this way: the fragment(s) being repositioned manually under general anaesthesia and a rigid support applied to secure the hock in normal alignment. Experience has shown, however, that the displacement is likely to recur, and the outcome may be less than satisfactory.





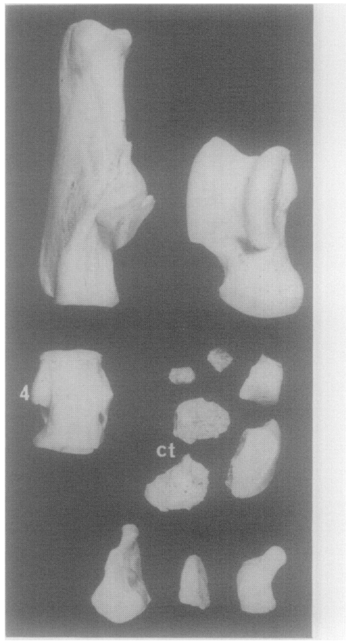


Fig. 20 left. Fracture of the central tarsal bone in the right tarsus of a 2$\frac{1}{2}$-year-old Greyhound (dorso-plantar view); racing injury. ct=central tarsal.

Fig. 21 centre. Same case as in Fig. 20 (lateral view).

Fig. 22 right. Same case as in Figs. 20, 21, after maceration of the bones. (4=fourth, ct=central tarsal).

Surgical treatment is preferable with a view to reducing the fragments and holding them in place during healing, and by so doing to preserve hock alignment. If the fracture gap is not adequately filled, the tarsus tends to collapse becoming bowed with the convexity lateral, and a dysfunction remains which prevents a return to racing. For many years the use of one or two self-tapping screws to fix large fragments in position has been the method of choice and has enjoyed success in racing animals. Formerly, Bateman (1958, 1960) pioneered other techniques such as the insertion of a metal stud or an acrylic replacement 'bone' to fill the gap caused by the fracture and thus keep the hock straight, but these procedures did not stand up to extended trial and have been discarded.

With the advent of ASIF bone repair techniques it is now preferable to use 2·7 or 3·5 mm screws, placed in lag fashion, to replace the main fragments (Figs. 23 & 24). Even when comminution is severe, there is often a slab of bone which is large enough to accept a screw and it can be used to fill the fracture gap. The fracture is approached through a dorso-medial incision and the main fragments are readily located. Reduction of the fragments is facilitated by bending the hock laterally and thus opening the gap. A delay of 3–4 days tends to make the reduction more difficult and it may be necessary to remove blood clot or some of the very small fragments to enable the reduction to be completed. Each large piece is fixed with a screw driven horizontally through its mid-section and into the adjacent fourth tarsal bone (Figs. 25 & 26).

A Robert Jones bandage is applied and the animal must be closely confined for a month before light walking exercise may begin. Satisfactory progress is judged by the vertical posture of the calcaneus as viewed from behind, and the stability of the fracture. Speed work is not allowed for another two months. Seldom is it necessary to remove the screw.

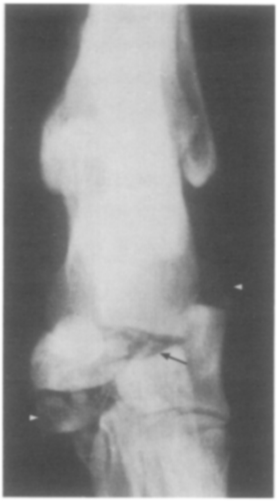


Fig. 23 left. Fracture of the fibular tarsal and central, third and fourth tarsal bones (arrowhead and arrows) in the left tarsus of a 5½-year-old Whippet; injury at exercise.

Fig. 24 right. Same case as in Fig. 23 after fixation with a 2·7 mm screw.

Fig. 25 left. Fracture of the fibular and central tarsal bones (arrows) in a 3-year-old Greyhound; racing injury.

Fig. 26 right. Same case as in Fig. 25, after lag-screw fixation.

Medial and lateral malleoli

In either case joint instability results and there may be an associated dislocation of the tarsocrural joint. Occasionally, both malleoli fracture at the same time.

The injury is suspected when a dog is severely lame after a car accident or having caught its leg when jumping. Swelling, pain and bruising are found at the distal end of the tibia/fibula. Instability is demonstrated by manual rotation of the tarsus so as to open the joint on the injured side. Radiography, in two places, is essential for diagnosis.

If displacement of the malleolus is minimal, a cast may be used to support the hock for four weeks while repair takes place. Displacement has to be dealt with surgically with a view to fixation of the fracture and repair of any soft tissue injury. Bone screws or K-wires driven along the middle of the malleolus from below may be employed according to the size of the dog. A tension band device is another satisfactory option (Figs. 27 & 28). External support in a cast is a sensible added precaution.

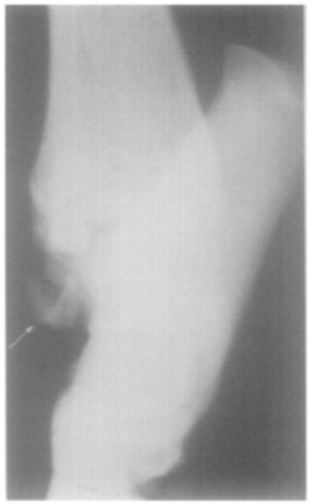


Fig. 27 left. Fracture of the lateral malleolus (arrow) in a 2-year-old Labrador.

Fig. 28 centre. Same case as in Fig. 27, after tension band wiring.

Fig. 29 right. Fracture of the tibial tarsal bone (arrow) in a 1-year-old Borzoi.

Tibial tarsal bone (talus)

Fractures are relatively uncommon but may affect the neck, base or body of the bone. They are usually caused by severe wrenching—e.g. the leg is caught during a jump—and are accompanied by severe lameness, local swelling and pain, and instability. Well-positioned and adequately-exposed radiographs are essential and even then superimposition may make it difficult to identify the injury precisely—especially in small dogs (Fig. 29).

When the neck fractures the body of the bone is often displaced anteriorly and the best repair is by screw fixation of the displaced piece to the fibular tarsal bone. For fractures of the articular condyles K-wires are taken through the articular surface and are then countersunk. Exposure of the trochlea requires osteotomy of the malleolus on the same side as the fractured condyle, and this has later to be repaired with a screw or a tension band wire.

Fractures in the body of the talus are difficult to repair with satisfactory rigidity because the bone is often too small to accept other than K-wires driven in cruciate fashion from below.

Most of the repairs of the talus benefit from support for four weeks in a light, rigid cast.

Third tarsal bone

In racing Greyhounds a slab may fracture from the dorsal surface of the third tarsal bone in the right hock. The clinical signs are a moderate degree of lameness, with a localized, slight swelling and pain. These signs often diminish rapidly and unless radiographs are taken the injury may be misdiagnosed as a sprain. With exercise, however, the lameness returns, and after a while there may be little local evidence except for a slight fibrous thickening over the third tarsal bone.

The slab is usually quite thin and the amount of separation is slight. Conservative measures such as supporting the hock in a light cast is considered by some to be sufficient to aid healing. There is little doubt, however, that lag-screwing with a 2·7 mm screw will provide more rapid union and an earlier return to function. If the fracture was not originally discovered and no support applied, a considerable periosteal reaction may develop and the fracture often fails to unite. In such cases removal of the fragment offers some chance of improving leg use.

Another condition which affects the third tarsal bone in the right hock of racing Greyhounds involves a periosteal reaction without a fracture fragment and also a partial or complete ankylosis with the central, second and fourth tarsal bones. Animals present with mild but persistent lameness, and a localized firm enlargement may be palpable over the distal row of tarsal bones. Radiographic findings of a chronic condition may be difficult to distinguish from those of a longstanding slab fracture of this bone so great care is needed over interpretation. It is resistant to treatment and often leads to retirement from racing. This condition has been called 'spavin' because its location, and the tendency for exostosis and ankylosis to occur, is similar to a long-recognized hock syndrome in horses (Salazar, Rodriguez & Cifuentes, 1984). Use of this nomenclature is better avoided, it is not particularly instructive regarding the aetiology or pathology of the condition and until more is known, the condition could, with some reason, be considered as a trauma- or stress-induced periostitis.

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