Disorders of the midtarsal joints

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CHAPTER CONTENTS

The talonavicular and calcaneocuboid joints and the tarsometatarsal joints comprise the midtarsal joints. Functionally, they act as one structure. Movement is possible in six directions: dorsiflexion–plantiflexion, adduction–abduction and pronation–supination. It is important for the ankle and subtalar joints to be stabilized when these movements are performed; this is achieved by dorsiflexion in the ankle joint and strong valgus pressure at the heel.

Due to the obliquity of the joint surfaces and the greater mobility of the talonavicular joint, dorsiflexion is usually accompanied by some abduction, whereas plantiflexion induces adduction.

At the distal (Lisfranc's) joint, considerable rotation round the second metatarsal shaft is possible (Fig. 59.1). Because of the specific structure of the joint line, plantiflexion of the metatarsals will always be accompanied by a movement towards the second metatarsal. Therefore a plantiflexion movement at the midtarsal joint increases the curvature of the anterior arch, whereas dorsiflexion is associated with flattening.

Capsular pattern

The capsular pattern at the midtarsal joints is increasing limitation of adduction, supination, plantiflexion and dorsiflexion (Fig. 59.2). The mid-foot finally fixes in an abducted and pronated position because of a spasm of the peroneal muscles.

Subacute arthritis in adolescence

The sign that first draws attention to this disorder is spasm of the peroneal muscles. Therefore it has been called 'spasmodic pes planus', which is a misnomer because it is not the spasm but the underlying capsulitis that causes the pain. Spasm is never primary but results from inflammation of the joint.

The arthritis is caused by overuse at the midtarsal joints. It is now an uncommon condition that occurs only in boys aged between 12 and 16 years. Cyriax mentioned the cause as being overuse, resulting from standing for long periods, which used to happen in the transition from school to work. Both the midtarsal joints and the talocalcaneal joints are affected. The condition is usually bilateral.

The first sign that draws attention to the disorder is a clumsy gait, which does not go unnoticed by the parents. There is also some discomfort on standing. Walking and running do not cause pain and there is also a complete absence of pain when sitting or lying down.

Clinical examination

Inspection reveals a long, thin foot, sometimes with some degree of pes cavus. An eversion deformity at the heel and the

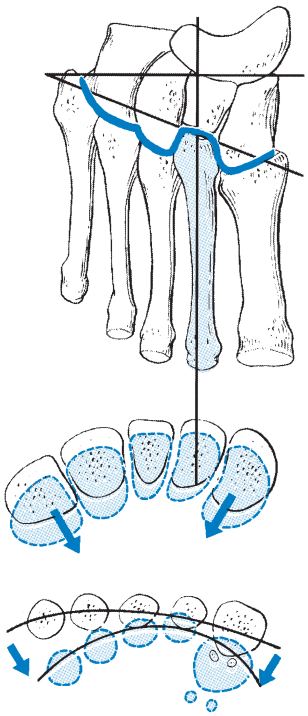

Fig 59.1 • At Lisfranc's joint, rotation round the second metatarsal shaft is possible. Because of the specific joint line, plantiflexion of the metatarsals is always accompanied by a movement towards the second metatarsal.

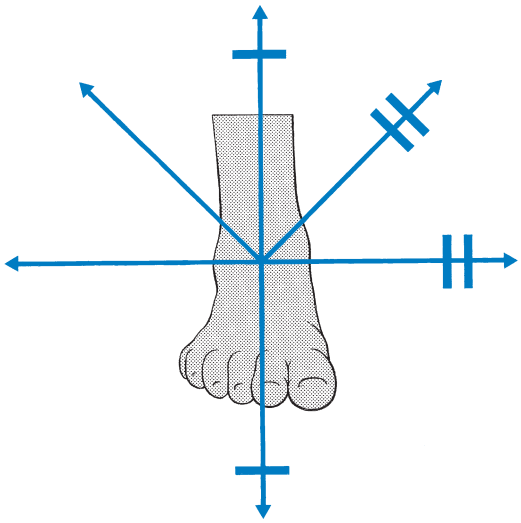

Fig 59.2 • The capsular pattern at the midtarsal joints.

mid-foot is seen to be maintained by a spasm of the peroneal and extensor digitorum longus muscles. In standing, the peroneal tendons are visible as a prominent tight band behind and below the lateral malleolus.

Functional examination shows a limitation of varus at the subtalar joint and limitation of adduction and supination at the midtarsal joints. These movements are prevented by muscle spasm. In long-standing cases, contraction of the joint capsules may increase limitation of the already restricted movements. For diagnosis, it is vital to detect the muscle spasm of capsular contracture during clinical examination in the lying position.

A radiological evaluation of ankle and foot reveals no abnormality.

Natural history

The natural history is for symptoms to subside and cease after 2 years. By that time, the foot has become permanently but painlessly fixed in the deformed position. A limp results. The disorder can also lead to later valgus sprains or lesions of the tibialis posterior and flexor hallucis longus tendons.

Treatment

In the early stage, the essence of treatment is relief of weight bearing and support for the joint. Cyriax[1] (pp. 436–438) advised that: 'The lad … requires (a) a sedentary job, (b) a bicycle, (c) … [an inner] wedge on the heels of his shoes and (d) strapping of the joint.'

The patient is first told how his condition is provoked and he must understand that avoiding weight bearing is the important part of the treatment. He should never stand if he can help it; he must seek a sedentary job, should sit when at home and should use a bicycle rather than walk.

To bring the heels towards a varus position, the shoes are fitted with inner wedges and non-elastic strapping is worn as often as possible. The patient must maintain this regime for 6–12 months until he regains a full range of movement at the subtalar and midtarsal joints. Recurrence is uncommon once this stage is reached.

In advanced cases, the subtalar joint will have become fixed in a valgus position by considerable spasm of the peroneal muscles. Only slight movement can be obtained at the midtarsal joints. If no structural contracture of the ligaments about the talocalcaneal and midtarsal joints has yet occurred and the valgus deformity is only caused by peroneal spasm, immobilization in a plaster cast, with the foot held in varus position, can be tried. The cast, from below the knee to the toes, should be worn for 6 weeks to 2 months. To obtain this position, the peroneal nerve must temporarily be blocked at the point where it curls round the neck of the fibula.

Subacute arthritis in middle age

The patients are usually overweight women in their 40s, 50s or 60s. Overuse is the common cause of the arthritis but sometimes the condition is due to an isolated sprain. The pain, limitation of movement and muscular spasm are less pronounced than in arthritis in adolescence. The condition does not seem to have a natural history: without treatment it appears to continue indefinitely but without much alteration. Cases that have persisted for 2 or 3 years are not uncommon.

Usually the arthritis is unilateral. Clinical examination reveals a capsular pattern of both the subtalar and midtarsal joints: the peroneal spasm restricts varus at the hindfoot and adduction–supination at the mid-foot. The radiological appearances are normal.

Treatment

If only one joint is affected, infiltration with triamcinolone can be successful, provided prophylaxis against recurrence is given.

If more joints are affected, which is usually the case, the following treatment is instituted:

- Modified rest and relative relief from weight bearing
- Strapping the joints in varus and supination
- Tilting the heel in varus position by a medial wedge.

If all these measures are taken, the arthritis can be expected to clear up after 6 months, but the patient should guard against renewed overuse.

Rheumatoid arthritis

Rheumatoid or reactive types of arthritis can attack the midtarsal joints. If the arthritis is severe, the patient can walk only with difficulty, and pain at rest is so intense that sleep becomes disturbed.

As well as marked fixation in valgus and abduction–pronation, clinical examination shows gross synovial thickening, warmth to the touch and tenderness. If the oedema allows, the synovial thickening can be palpated over the dorsum of the joint.

A very effective local treatment is immobilization in a plaster cast, which eases the pain within a few days; however, if the cast is removed too soon, pain quickly returns.

Spontaneous recovery takes 1 or 2 years. During this period, the joint becomes fixed in abduction–pronation.

Non-capsular pattern

Midtarsal strain

If an excessive strain is imposed on the midtarsal joints – for example, as the result of a deformity (e.g. plantaris) – the power of the musculature (tibialis posterior and flexor hallucis longus) becomes insufficient to maintain the longitudinal arches during weight bearing.[2] After some time, the midtarsal ligaments become stretched, elongate and undergo inflammatory changes, so that pain results. Elongation promotes excessive movements at the midtarsal joints, which cause the plantar arch to flatten during weight bearing. As a result, the forefoot dorsiflexes and abducts, which causes the inner side of the foot to become prominent and further overstretches the calcaneonavicular ligament. In due course, the excessive motion of the joints and their poor alignment leads to inflammation of the capsule and to structural damage of the articular surfaces, which finally results in structural deformity and arthrosis.

Mechanism

To understand the mechanism of midtarsal strain, the ankle and foot should be seen as complex structures with an intimate interaction between position and function of their different components.

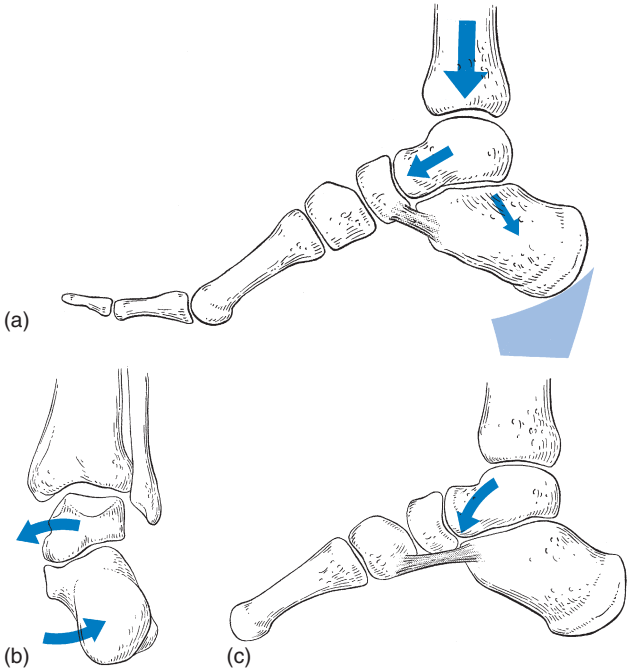

Fig 59.3 • Midtarsal strain: (a) movement of the talus forwards on the calcaneus; (b) medial pressure forcing the calcaneus towards valgus; (c) downward pressure of the talus causes increasing depression of the longitudinal arch and increasing stress on the plantar ligaments.

Initially, the body weight bears on the talus via a downward thrust through the tibia. The talus is supported by the calcaneus, on which it lies obliquely. The former therefore has a tendency to glide in a medial and forward direction, especially in patients with an equinus deformity at the ankle or in patients with too short plantiflexor muscles. In women who wear high, oblique heels, the talus also tends to be pushed forwards on the calcaneus (Fig. 59.3a).

The forward and medial gliding of the talus imposes medial and downward pressure on the anteromedial calcaneal border. The medial pressure forces the calcaneus towards valgus, which may be furthered by a shortening of the Achilles tendon (Fig. 59.3b). The downward pressure of the talus evokes dorsiflexion at the talonavicular joint.[3] This increases the depression of the longitudinal arch and can be responsible for greater stress on the plantar ligaments and the fascia plantaris (Fig. 59.3c). The downward pressure of the talus and the consequent dorsiflexion at the talonavicular joint will initiate a number of other events, which are the source of more deformity and trouble:

- Because of the obliquity of the joint surfaces, each dorsiflexion in the midtarsal joints is accompanied by some abduction. The downward movement of the talus is thus at the origin of an *abduction* deformity in the mid-foot. This dorsiflexed and abducted foot overstretches the inner ligaments (calcaneonavicular ligament and capsule of the talonavicular joint).

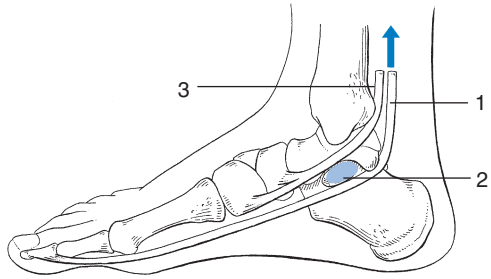

Fig 59.4 • The sustentaculum tali (2) is propped upwards by contraction of the flexor hallucis longus (1); tibialis posterior (3).

- Dorsiflexion at the midtarsal joint also causes spreading out and abduction of the metatarsals. Abduction is the result of obliquity of the joint line. Spreading out is caused by the specific cone-shaped form of the bases of the metatarsals, which move their heads away from the centre during extension (see online chapter *Applied anatomy of the lower leg, ankle and foot*). This flattens the anterior arch and results in a splay foot.

Thus, on account of an initial forward and medial gliding of the talus, a number of events take place:

- Valgus of the calcaneus with possible shortening of the Achilles tendon
- Dorsiflexion and abduction of the mid-foot, with flattening of the longitudinal arch and tension in the plantar and medial ligaments
- Flattening and abduction of the forefoot, with spreading of the metatarsal heads and loss of the anterior arch
- In due course, there will also be some effect on the tendons: that of the tibialis posterior, the first invertor of the foot, suffers strain and becomes inflamed. The tendon of the flexor hallucis longus, which is not only an invertor, but also, through its position under the sustentaculum tali, has a specific function as a stabilizer of the anterior part of the calcaneus, also becomes strained (Fig. 59.4).

The mechanism of midtarsal strain is summarized in Fig. 59.5.

Clinical examination

As midtarsal strain advances, three clinical grades can be distinguished.

Postural pain

The plantiflexion–dorsiflexion range of movement increases and therefore the abduction–pronation range of the foot too. Due to this laxity, the foot becomes 'wobbly', but neither structural changes nor clear signs of overstretched tendons and ligaments appear. There is muscular fatigue and pain after long periods of standing or after prolonged walking. Clinical examination reveals only laxity in the midtarsal joints.

Midtarsal 'strain'

This appears when the joint capsules and the ligaments become inflamed. On account of the excessive mobility and poor alignment of the joints, the protective muscular action of the tibialis anterior and flexor hallucis longus are overwhelmed and they start to become inflamed. There is pain during and after weight bearing. The deformity of the foot is functional only. No structural changes appear at this stage. Clinical examination reveals excessive mobility in the joints, together with pain at the extremes of range, especially rotation. Resisted inversion of the foot and resisted plantiflexion of the big toe may be painful, because of tendinitis of the tibialis posterior or of the flexor hallucis longus.

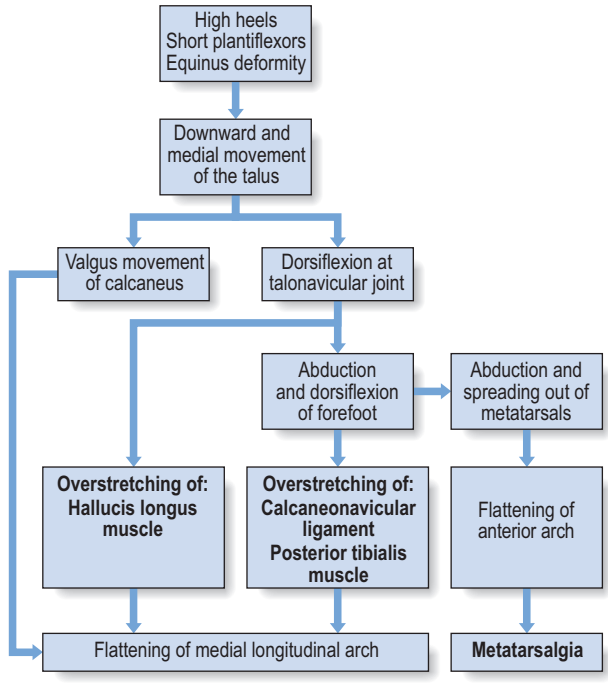

Fig 59.5 • Summary of the mechanism of midtarsal strain.

Structural changes[4]

Due to abduction of the forefoot on the hindfoot, the medial side of the foot becomes prominent. Talonavicular arthrosis supervenes, with osteophytes at the dorsum and the inner side of the joint. As the navicular bone is now permanently depressed, painful and persistent overstretching of the talonavicular ligament results. Apart from the visible deformities at the inner side and the dorsum of the foot, the clinical findings are permanent fixation of the foot in abduction–dorsiflexion, some limitation of rotation with a hard end-feel, and tenderness at the talonavicular ligament.

Treatment

Heel raising

The heel must be raised *horizontally* (Fig. 59.6) so as to allow the forefoot to adopt a more plantigrade position in relation to the talus when weight is borne. A slight medial wedge can be added to correct the valgus position of the heel. Attempts should be made to stretch the triceps muscle if there is shortening.

Exercises for the short plantiflexor muscles

Exercises (faradic and resisted) should be given for the short plantiflexor muscles of the sole, especially the adductor hallucis,

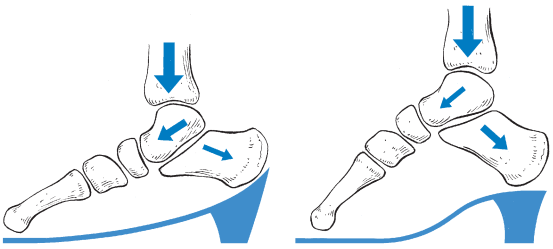

Fig 59.6 • The horizontal raised heel on the right reduces the forwards force on the talus.

flexor hallucis brevis, flexor digitorum brevis and quadratus plantae. The main purpose is to make them adequate to take the strain and thus to relieve some tension on the ligaments.

Exercises for the invertors

Exercises for the invertors should also be given; strengthening them protects the foot against further pronation–abduction. A strong and functional flexor hallucis longus muscle plays a role in 'propping' the talus upwards by lifting the sustentaculum tali (see Fig. 59.4). The posterior tibial muscle, the key dynamic support of the medial longitudinal arch of the foot, should also be strengthened.[5]

Mobilization of the joints

Mobilization of the midtarsal joints aims to allow a full range of motion to be painlessly achieved. During the initial stages, the range of movement is excessive. Nevertheless, repeated strains, followed by healing of minor ruptures, lead to the formation of painful adhesions. The self-perpetuating inflammation in these elongated ligaments is the main reason for the discomfort at the end of range. Therefore treatment also includes manipulation to break the ligamentous adhesions. This is the only area of the body in which manipulations are required at a joint that already has an excessive range of motion.

Technique: manipulation

The patient lies in a supine position on a high couch. The manipulator sits facing the patient's foot. As great strength is required and the manipulator has to work without leverage, a good starting position is vital. The heel of the ipsilateral hand is placed at the dorsum of the first metatarsal bone, and the heel of the contralateral hand is placed at the plantar aspect of the fourth and fifth metatarsal bones. Both hands are clasped about the outer and dorsal aspect of the forefoot. The foot is pressed slightly towards dorsiflexion (Fig. 59.7). Rotation is now imparted to the forefoot by a swinging movement in the shoulders and elbows, which causes the upper hand on the inner side to press towards the manipulator and the outer hand to press away from him. This movement is repeated in a rhythmic manner for a few minutes.

Steroid infiltration

Sometimes there is marked and persistent tenderness of the calcaneonavicular ligament, which calls for infiltration with triamcinolone. The injection is repeated after 2 weeks.

Technique: infiltration

The patient lies in a supine position on a high couch. The sustentaculum tali and the navicular bone are identified.

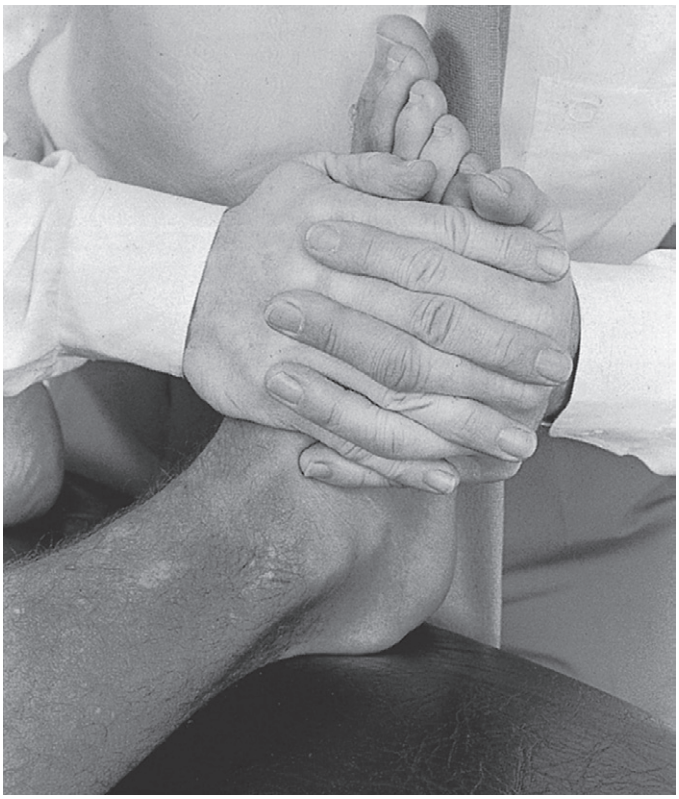

Fig 59.7 • Manipulation to break adhesions at the midtarsal joints.

Between them, the tender ligament can easily be palpated. A thin needle, 2 cm long, is fitted to a 2 mL syringe filled with triamcinolone.

The palpating thumb remains on the tender ligament and the needle is introduced between the thumb and bone (Fig. 59.8). The point of the needle is then aimed towards the calcaneal border of the ligament, where 1 mL is injected. Another 1 mL is then infiltrated at the navicular insertion of the ligament.

Deep friction

If the flexor hallucis longus or the tibialis posterior tendons are at fault, deep friction is indicated (see Ch. 57).

Surgery

If conservative management fails, the painful midtarsal joints are best stabilized by arthrodesis. In the past, triple arthrodesis was used extensively[6]; nowadays, more limited single-joint fusions are used which allow more preservation of the hindfoot motion, resulting in better function.[7–10]

Conservative treatment of midtarsal strain is summarized in Box 59.1.

Aseptic necrosis

Osteochondritis dissecans at the navicular bone appears in boys aged between 4 and 12 years and is known as Köhler's disease I. There is pain and limitation of the midtarsal movements. The diagnosis is made from a radiograph or a bone scan.[11]

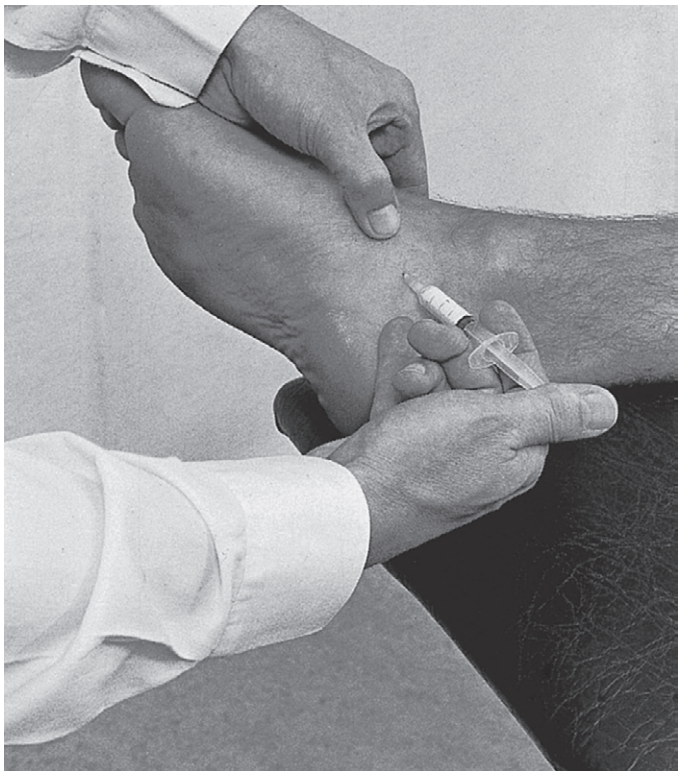

Fig 59.8 • Steroid infiltration of the calcaneonavicular ligament.

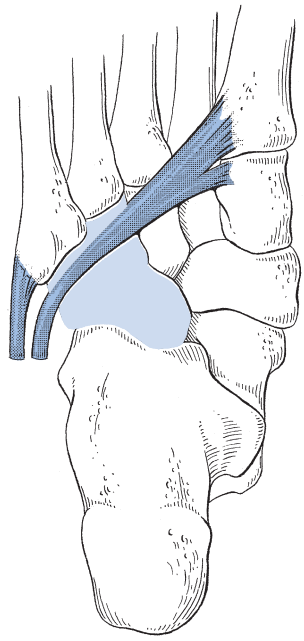

Fig 59.9 • The relationship of the cuboid bone and the tendons of the peronei.

Box 59.1

Conservative treatment of midtarsal strain

- Elevated horizontal heel
- Training of short plantiflexor muscles
- Training of tibialis anterior and flexor hallucis muscles
- Mobilization of the midtarsal joints
- (Infiltrations to the strained ligaments)
- (Deep friction to the strained tendons)

The course of the disease process is benign and self-limiting.[12,13] Treatment is symptomatic and consists of weight-bearing plaster casts over 3 months.[14] With or without treatment, there is spontaneous reconstitution of the navicular bone and excellent recovery of function after an average duration of 15 months.[15,16]

Navicular stress fracture

Navicular stress fractures account for about 15% of all stress fractures.[17] They typically occur in running and jumping athletes, in whom repetitive cyclic loading results in fatigue failure of the navicular bone, the cornerstone of the medial arch. Biomechanical analysis of navicular motion during stride[18] reveals that most of the impingement force is focused at the central third of the navicular bone, which is also an area of relative avascularity.[19] This explains why the characteristic fracture is located in the central third of the bone.

Navicular stress fractures typically present in a running athlete who has gradually increasing pain in the dorsal midfoot, with occasional radiation of pain down the medial arch.

On examination, neither swelling nor discoloration is visible. Rising on tiptoe may be painful, as is the passive plantiflexion–dorsiflexion movement at the midtarsal joints. Clinical suspicion is raised when tenderness is elicited over the 'N spot', a nickel-sized area at the central region of the proximal dorsal navicular bone.[20] Tenderness is strongly associated with navicular stress fractures.[21]

Early diagnosis can be made by ultrasound, which is a good screening test for stress fractures.[22] Computed tomography (CT) is the best tool in the diagnosis of navicular stress fracture. It allows differentiation between stress fracture and stress reaction, and enables accurate fracture definition.[23]

Non-displaced fractures respond well to 6 weeks of non-weight-bearing cast immobilization. Displacement, comminution and delayed or non-union fractures are indications for surgical open reduction and internal fixation.[24,25]

Cuboid rotation

Subluxation of the cuboid bone occurs when a strong pull exerted by the tendon of the peroneus longus muscle causes rotation of the bone[26] (Fig. 59.9). The lateral side of the cuboid is tilted upwards and the medial side becomes depressed. The cuboid is locked in this subluxated position and pain results. Newell and Woodle[27] found this condition in some 4% of athletes complaining of pain in the midtarsal region. The condition seems to be more common in patients who have pronated feet.

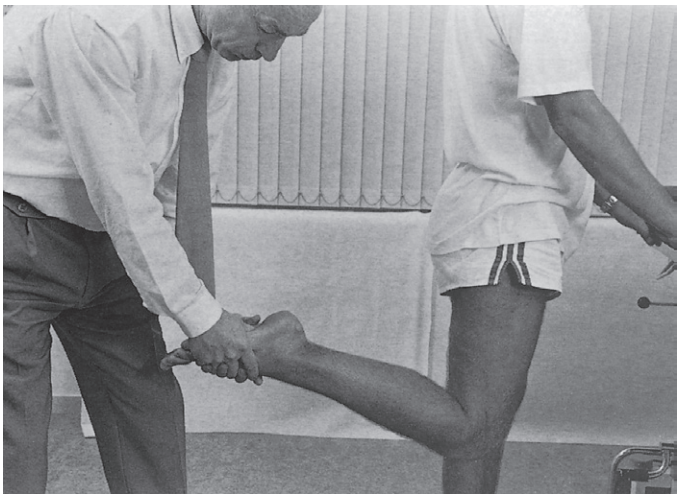

Fig 59.10 • Manipulation for cuboid rotation.

The diagnosis is primarily subjective, and must be made on the basis of the patient's history and physical findings. The patient, most often a long-distance runner or dancer, complains of lateral mid-foot pain during and after activity. Inspection may reveal a subtle forefoot valgus, a shallow depression on the dorsal surface of the foot and a palpable fullness on the plantar aspect of the cuboid. Clinical examination usually shows end-range pain during midtarsal movements and/or some limitation of dorsiflexion–plantiflexion. In addition, pressing on the plantar surface of the cuboid in a dorsal direction produces pain.[28,29]

Documentation by radiograph, CT scan or MRI is difficult. Treatment is manipulation (the 'cuboid whip').[30]

Technique: manipulation[31,32]

The patient stands with the back to the manipulator and holds on to a couch or a chair. The knee is flexed at a right angle. The physician grasps the foot with both hands so that the fingers are placed at the dorsum of the forefoot and the crossed thumbs over the plantar aspect of the cuboid (Fig. 59.10). The manipulation is now performed as a quick upward 'whiplash', while the thumbs, at the plantar aspect, apply strong downward pressure. The manipulator's elbows should be close together and the arms, wrists and hands should be fully relaxed.

In long-standing cases, or when the foot is pronated, it may be necessary to prevent recurrences with an orthotic device.

Midtarsal arthrosis

Arthrosis of the midtarsal joint can be the result of a navicular fracture, an old navicular apophysitis or an ordinary midtarsal strain.

A fracture or apophysitis can lead to gross deformities with serious disturbances to the anatomy of the foot. If this is the case and serious problems result, a steel support moulded accurately to the sole of the foot will minimize movements at the disorganized joints. If this does not lead to improvement, arthrodesis can be considered.

However, the diagnosis 'midtarsal arthrosis' is very often a misnomer because it is based only on deductions from radiological appearances. The common cause of the radiologically visible osteophytes at the dorsum of the talonavicular joint is a long-standing midtarsal strain. Once again, it is neither the osteoarthrosis nor the osteophytes that cause trouble, but rather the underlying ligamentous strain. If the ligaments are strained, treatment for midtarsal strain must be applied, whether there is radiological evidence of osteoarthrosis or not.

Lesions of the cuneiform–first metatarsal joint

The cuneiform–first metatarsal joint permits not only plantiflexion and dorsiflexion movement but also slight rotation around the base of the second metatarsal.

During routine functional examination of the foot, movements at the cuneiform–first metatarsal joint cannot be distinguished from those at the talonavicular and cuneiform–navicular joints. If a lesion of the cuneiform–first metatarsal joint is suspected, the joint must be examined separately after the routine examination.

The disorders that occur at this joint are:

- Osteoarthrosis
- Gout
- Loose body.

Osteoarthrosis

This condition usually results from previous osteochondritis (Cyriax[1]: p. 439). There is a similarity to hallux rigidus, also known to be the result of osteochondritis.[33]

The patient is an adolescent and more girls are affected than boys. The condition is usually bilateral and the onset insidious. One day the patient finds that, if wearing tight shoes, localized pain arises at the site of small projections at the dorsal and medial aspect of the foot. There is no problem unless something catches against the prominences. Rarely, the onset is sudden and the patient says that both joints became tender and swollen for about a week. After this severe phase, there is a permanent and small prominence on each foot.

There is a visible and palpable outcrop at the dorsum of each foot. If the condition is acute, there is also some swelling and local tenderness. Clinical examination is usually largely unrevealing except for slight stiffness of the range of plantiflexion–dorsiflexion. A radiograph confirms the diagnosis.

Treatment

If the arthritis is acute, a few days' rest is advised with weight bearing only in a high-heeled shoe, no part of which should touch the joint. As the condition is harmless and recurrent pain only stems from the pressure exerted when lace-up shoes squeeze the skin against the osteophytes, the treatment is to prevent this pinching. For girls, it is easy to find shoes that have no part touching the joint; alternatively, a felt ring around the

Table 59.1 Differential diagnosis and treatment of disorders at the mid-foot

Disorder	Presentation	Examination	Treatment
Subacute arthritis in adolescence	Boys Clumsy gait/slight pain	Capsular pattern with peroneal spasm	Early cases – prevention: Sedentary job Raised heel Joint strapping Long-standing cases: Plaster cast Immobilization
Subacute arthritis in middle age	Overweight women in their 50s or 60s	Capsular pattern with muscle spasm Differential diagnosis: gout and rheumatoid arthritis	Modified rest Joint strapping and tilting the heel Triamcinolone infiltration
Midtarsal strain	Pain at the mid-foot	Abduction and dorsiflexion in the mid-foot No muscle spasm First stage: 'Wobbly' foot with increased range Pain at the end of dorsiflexion/abduction Later stages: Structural deformity Strained ligaments Strained invertor muscles	Raising the heel, exercise to the short plantiflexor muscles, mobilization of the midtarsal joints
Midtarsal ligamentous contracture	Patients in their 50s and 60s Previous plaster immobilization Pain during exercises	Pain at the end of range No muscle spasm No increase in range of mobility	Infiltration of all the tender ligaments with triamcinolone
Stress fracture of the navicular bone	Long-distance runners Increasing pain during activity	Normal functional examination Local tenderness and pain during application of ultrasound	Rest
Aseptic necrosis of the navicular bone	Boys of 5–12 years	Pain and limitation Diagnosis is established by radiography	Support
Cuboid rotation	Athletes, with midtarsal pain during running	Full but painful range of rotation movements Tender ligaments at the inferior aspect of the cuboid bone	Manipulation
Midtarsal arthrosis	After apophysitis or fracture Gross deformities		Steel support Arthrodesis
Arthrosis at the cuneiform–first metatarsal joint	Teenagers with bilateral bony outcrop at the dorsum of the foot	Normal clinical examination Local tenderness	Prevention of pressure
Gout at the cuneiform–first metatarsal joint		Red, warm, swollen and exquisitely tender joint	Medication
Loose body at the cuneiform–first metatarsal joint	Athletes Sudden pain during a sprint	Normal clinical examination	Sustained traction
Chronic ligamentous adhesions at the calcaneocuboid joint	After an ankle sprain Persistent lateral pain during and after exercises	Pain during inversion/adduction and supination	Manipulation

bony outcrops can be used. For boys, this is sometimes more difficult to achieve and, if the inconvenience continues, the bony prominences have to be removed surgically.

It is important to note that gross osteoarthrosis of the cuneiform–first metatarsal joint may lead to fixation, with considerable plantaris deformation of the first metatarsal (fixation in plantiflexed position). This may, in turn, result in metatarsalgia of the first metatarsophalangeal joint or, more frequently, a lesion of the sesamoid–metatarsal joint. If this occurs, a support must be prescribed to take the weight off the head of the bone (see online chapter *Disorders of the forefoot and toes*).

Gout

It is not uncommon for gout to attack this joint, even before the metatarsophalangeal joint of the big toe.[34] If there is sudden pain, warmth, reddening of the skin, pain at night and extreme tenderness of the joint, gout should be considered.

Loose body

Athletes sometimes complain of sudden twinges at the medial border of the foot during sprinting. These are recurrent and appear in race after race but cannot be repeated voluntarily. Between races, the foot is normal and pain is not present when the foot is examined. However, localization shows that the twinges do not arise from the ankle or the subtalar joint. When the patient rises on tiptoe, subluxation of the metatarsal bone on the cuneiform does not occur.

Some internal derangement is very likely because of the typical history of sudden twinges and because the clinical examination is entirely negative.

Good results can be obtained by sustained traction on the big toe (up to 10 kg) for 30 minutes, two or three times a week.

Differential diagnosis and treatment of disorders at the midfoot are summarized in Table 59.1.

Access the complete reference list online at **www.orthopaedicmedicineonline.com**

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