Current Practice

JOINTS AND THEIR DISEASES

Pain in the Ankle

D. A. BREWERTON,* M.D., F.R.C.P.

British Medical Journal, 1969, 3, 99-102

When a patient complains of pain in the ankle he may not understand the local anatomy or know which structures are included in the ankle. He may be describing a pain in the lower leg or the hindfoot anywhere in the area covered by an elastic anklet. In practice the cause may not be local, and is seldom found to be in the ankle joint: it is more likely to be in the ligaments, Achilles tendon, subtalar joint or heel, or possibly the tibia, fibula, tendon sheaths, mid-tarsal joint, or skin.

Anatomy

An outline of the lateral aspect of the ankle is provided in the Figure. To simplify the function of the ankle, the foot can be considered as a static base with the calcaneus and broad forefoot resting firmly on the ground. The talus sits on the calcaneus, and the subtalar joint permits the talus to roll laterally into inversion or eversion. The ankle joint provides flexion and extension, so that between them the two joints act as a linked system allowing the leg to move in all directions on its base, like a joystick. Balance requires a dextrous interplay of all the muscles controlling the ankle, none of which are inserted in the talus. This control is complicated enough in walking; it is almost beyond belief in skilled activities such as ski-ing, playing squash, or ballet dancing, but it is often this degree of function the patient wishes to have restored.

General Examination

Before considering the examination of the ankle it is important to remember that the pain may be part of a general process, perhaps unrelated to the musculo-skeletal system. Rheumatoid disease or ankylosing spondylitis may be diagnosed

only on examining other joints or the spine. Arachnodactyly, general joint laxity, arthrogryposis, or bone dystrophy will be misdiagnosed if examination is confined to the ankles. The correct diagnosis of a monarticular arthropathy may depend on finding iritis, urethritis, psoriasis, mouth ulcers, or clubbing of the fingers. Pain in the ankle can be a complication of steroid therapy, and it has been the first complaint in osteomalacia, Cushing's disease, acromegaly, hyperparathyroidism, and carcinoma. Incompetent veins cause swelling of the ankle and a throbbing ache. Arterial disease can be deceptive when pain is confined to the foot or heel, because the pulses may be palpable and most painful conditions in this region are aggravated by walking. In diabetes mellitus the choice between ischaemia, neuropathy, and infection may be difficult. Nerve root compression can cause isolated pain in the ankle region, but as a presenting symptom this is much less common than isolated pain in the calf or the lateral aspect of the leg. Patients with spontaneous paralysis of the lateral popliteal or sciatic nerve often blame the ankle for their disability. Deformities of the knee due to rheumatoid arthritis or of the tibia after a malunited fracture may impose strains on the ankle, and so can torsion of the tibia, deformities of the foot, or contracture of the calf. In peroneal muscular atrophy discomfort in the hind-foot, pes cavus, and reduced ankle reflexes may be the only clinical findings.

Local Examination

Compared with a patient complaining of a painful wrist the man with ankle pain is at a considerable disadvantage if he is expected to describe his symptoms while his sock and shoe are still on. Early in clinical examination it is wise to get the patient to point out the site of his pain and to demonstrate the activities that aggravate it. It is also important to observe both ankles during function as well as on a couch: at least in standing, standing on one leg, and walking. Examination of the shoe may demonstrate how the patient normally walks.

Pain over the *tibia* or *fibula* may be accompanied by local tenderness or pain on straining the bones. If a bone lesion seems possible radiographs are essential. Often this pain is due to a secondary periosteal reaction, but fractures, bone infection, or tumour may cause "pain in the ankle." An effusion in the *ankle joint* can be difficult to detect, because swelling around the joint may be diffuse and obscure the physical signs. Often the effusion is seen more readily from behind, as a bulge on both sides of the Achilles tendon. Tenderness around the joint

* Consultant Physician in Physical Medicine, Westminster Hospital and Royal National Orthopaedic Hospital.

margin may be helpful, but it may be confusing when the intervening tendons are responsible for the pain. Loss of range of movement is always important: the normal range is approximately 15° of dorsiflexion and 40° of plantar-flexion. At the extremes of range the joint can be nudged gently, straining the soft tissues to elicit pain. This manoeuvre should be repeated for dorsiflexion, plantar-flexion, inversion, and eversion. Sometimes pain can be elicited only on weight-bearing.

The *subtalar joint* is often painful, particularly in rheumatoid disease. To examine its movement first dorsiflex the ankle to prevent lateral movement of the talus at the ankle joint, then grip the calcaneus and move it into inversion and eversion, making sure that the patient is relaxed or actively assisting the movement. Compare the range of movement in both feet. Then try to elicit pain by a firm jog at the extremes of inversion and eversion. Finally observe the degree to which the calcaneus is everted when standing. The *mid-tarsal joint* contributes to inversion and eversion, and its movements are examined by holding the mid-foot in one hand and the calcaneus in the other, and then rotating the mid-foot in relation to the calcaneus. Palpation of the joint margin may reveal tenderness or osteophyte formation.

Inflammation of the *tendons and their surrounding structures* is relatively common, but it is not always easy to diagnose with confidence. Most commonly involved are the posterior tibial, peroneal, extensor digitorum longus, and anterior tibial tendons. Usually the presentation is with a painful swelling due to tenosynovitis; sometimes there is no more than a recurrent painful click, like a trigger finger. Often swelling within the tendon sheath is obscured by a more diffuse overlying oedema, but by palpation the deeper swelling may be felt to follow the line of the tendon. For instance, if there is deep swelling and tenderness behind and beneath the medial malleolus, the likely cause is posterior tibial tenosynovitis. As the *posterior tibial nerve* passes around the medial malleolus it is occasionally compressed under the lacinate ligament, particularly if there is associated tenosynovitis. Pain and paraesthesiae may be felt in the toes and forefoot, or in the heel. This is called the "tarsal tunnel syndrome." Rupture of the *Achilles tendon* is sudden and dramatic, usually occurring during a burst of activity in sport. The patient should be examined kneeling on a chair or lying prone. Place one hand under the forefoot and resist while the patient attempts to plantar-flex the ankle. The tendon becomes taut if it is intact and is easily felt with the other hand. Alternatively, with the patient kneeling and the foot hanging freely over the edge of the chair, squeeze the calf, when the foot will plantar-flex unless the tendon has been ruptured. A partial rupture causes local pain, swelling, and tenderness. Sometimes a diffuse, relatively painless swelling in the Achilles tendon is caused by unaccustomed exercise or the pressure of a boot. In xanthomatosis cholesterol may be deposited around the tendon as a firm swelling with a typical, fine, lobular pattern. Inflamed, painful bursae may be situated just above the insertion of the Achilles tendon, either anteriorly, between the tendon and the calcaneus, or posteriorly, beneath the skin. Inflammation of the anterior bursa usually follows strenuous exercise, and a painful posterior bursa results from pressure by the upper rim of a shoe.

In the *heel* pain and tenderness are common over the posterior, lateral, or plantar aspects of the calcaneus, or near the origin of the plantar fascia. Often the condition is non-specific and self-limited, and the only possible diagnosis is "pain in the heel" or "plantar fasciitis." However, virtually identical clinical findings may be seen as the first manifestation of several rheumatic diseases, particularly rheumatoid disease, Reiter's disease, ankylosing spondylitis, and gout. Radiographs may show bone erosions and a periosteal reaction.

In the *skin* pain may be due to warts, pressure necrosis, ischaemia, chilblains, keratoderma, neurofibromata, rheumatoid nodules, or rheumatoid arteritis.

Diagnosis

Trauma.—This review is primarily of medical conditions, but often it is difficult to decide whether the cause of pain is traumatic or rheumatic. Frequently a patient with an apparently spontaneous ankle pain is referred to a rheumatic clinic and an old fracture is discovered, caused by trauma long forgotten or regarded as a "sprain." Alternatively a patient with early arthritis may attribute it to a trivial injury, and the true diagnosis may be apparent only when recovery is overdue. Consequently the first essential is to decide whether the pain is spontaneous or due to injury. A former Pott's fracture is one of the common causes of chronic ankle pain: the fracture may have entered the ankle joint and left an irregular surface, or diastasis of the inferior tibio-fibular joint may cause chronic instability of the ankle. Degenerative changes in the subtalar or mid-tarsal joints are usually secondary to former trauma or deformity. A fracture of the calcaneus involving the subtalar joint may lead to severe degenerative changes necessitating arthrodesis. Stress fractures of the lower tibia, fibula, or calcaneus occur in athletes, ballet dancers, and others taking strenuous or unaccustomed exercise. A tear of the anterior tibio-fibular ligament due to an external rotation injury may cause chronic pain and tenderness over the front of the ankle. The ankle joint is stable when at a right angle, but when it is plantar-flexed pain may be produced by inversion. After a more severe injury, in which the calcaneo-fibular ligament is torn, there may be instability when the ankle is in a neutral position. In children, and in adults with joint laxity, an apparently simple "sprain" may conceal a subchondral fracture of the dome of the talus which causes persistent ankle pain. The fracture is a small crack under the articular cartilage, a fragment of which may break loose, as in osteochondritis dissecans. This may not be seen on standard radiographs but only with special views of the ankle in plantar-flexion or dorsiflexion. Footballers may develop calcification and degenerative changes in the region of the anterior capsule, presumably from the repeated trauma of kicking with the foot fully plantar-flexed.

Rheumatic Disorders.—*Osteoarthritis* of the ankle, subtalar, or mid-tarsal joints is relatively rare; and it usually results from former injury or disease, or is secondary to deformity. *Rheumatoid disease* is the commonest of several inflammatory polyarthritides which may present in the hindfoot and ankle. It is particularly likely to be the explanation in women, because the main alternatives of ankylosing spondylitis, Reiter's disease, and gout are usually seen in men. Rheumatoid involvement of the heel, tendon sheaths, or subtalar joint is common early in the disease and may cause the presenting complaint. This possibility calls for thorough examination and investigation. Involvement of the forefoot or other joints may be uncovered, or the erythrocyte sedimentation rate may be raised, but occasionally the condition is confined to the hindfoot, even for years. Prolonged, localized involvement of tendon sheaths is commonest in adolescents and young adults. Early involvement of the ankle joint is rare, but it is possible for the disease to present first in the ankle following a local injury. Later in the disease clinical involvement of the subtalar or mid-tarsal joints is five times as common as ankle disease and can be demonstrated in 50% of hospital patients. This subtalar involvement in a patient who is already known to have polyarthritis is usually insidious in onset. Unless this joint is examined regularly and routinely it can progress to ankylosis or valgus deformity before the patient complains of it.

Reiter's disease may cause unexplained arthritis or soft-tissue inflammation in the hindfoot. Once considered, clinical diagnosis may be simple following the relevant questions and inspection of the conjunctivae, skin, and genitalia. When this diagnosis is suspected, a venereologist may be able to establish definite evidence of urethritis even when there are no clinical findings. *Gout* in the hindfoot may be acute, as in the big toe, but sometimes it is a diffuse, prolonged, low-grade process. This may be in the heel, plantar fascia, or anywhere within the

tarsus. Diagnosis is often difficult, but it is important because gout is so treatable. A previous, typical acute attack of pain is almost diagnostic. The presence of hyperuricaemia helps; but if there have been no previous attacks persistent pain in the hindfoot probably has an alternative explanation, despite the hyperuricaemia. Dramatic relief of pain after starting phenylbutazone may help to establish the diagnosis as gout. *Ankylosing spondylitis* should always be suspected when a young man develops pain in one or both heels. *Psoriatic arthropathy* of the hindfoot behaves like rheumatoid disease, except that the prognosis is better. Diagnosis depends on the presence of psoriasis and the pattern of joint involvement elsewhere. The arthropathies of *erythema nodosum*, *sarcoidosis*, and *ulcerative colitis* are particularly likely to present in the ankle and knee joints. *Sudeck's atrophy*, which occurs more commonly in the hand, involves the whole foot and ankle, and is easily mistaken for a form of polyarthritis. It may be a complication of trauma, but it often has no obvious cause. The skin is shiny and sweaty, and may be mildly flushed. Movement of the joints may cause less pain than would be expected with an equivalent degree of arthritis. Radiographs show marked, patchy osteoporosis, particularly in the subchondral areas of the tibia and talus. *Neuropathic arthropathy* of the ankle may be seen with *tabes dorsalis*, *syringomyelia*, disseminated sclerosis, diabetic neuropathy, or congenital indifference to pain.

Infection.—Sudden, spontaneous pain arising within the ankle joint is likely to be due to inflammation, or possibly haemarthrosis. This poses the difficult question: is this a monarticular presentation of a polyarthritis, or is it due to infection? The decision is urgent, because an infective process may destroy articular cartilage rapidly, even if it appears benign. Monarticular arthropathy is occasionally seen in rheumatoid disease, psoriatic arthropathy, Reiter's disease, gout, or pyrophosphate synovitis, but all are comparatively rare, and only gout can be diagnosed clinically with confidence. *Tuberculosis* of the ankle may present with a doughy swelling and little or no pain. It is now seen mainly in immigrants. *Suppurative arthritis*, usually due to staphylococcal infection, is normally clinically obvious, but its onset may be insidious in the elderly and in patients with pre-existing rheumatoid disease or receiving antibiotics or steroids. If after clinical examination the diagnosis is in doubt or infection seems a possibility, diagnostic aspiration of the joint must be performed immediately and appropriate treatment started without delay.

Congenital Anomalies.—The tarsal bones develop from mesenchyme, and occasionally they do not separate completely. The commonest anomalies are the talo-calcaneal bridge and the calcaneo-navicular bridge. Both may be demonstrated by special radiographic projections. They are often asymptomatic, but they can cause chronic pain, acute pain following a foot strain, or local degenerative joint changes. They also cause the condition inaccurately called "peroneal spastic flat foot," in which the foot is held rigidly in eversion due to pain. The same clinical picture may be seen with subtalar rheumatoid arthritis and other painful conditions.

Investigation

With simple sprains, Achilles bursitis, or plantar fasciitis experienced practitioners may arrange treatment without radiographs in the first instance. However, clinical diagnosis in this region is difficult, and there are few occasions when radiographs are certain to be normal. Patients referred to hospital have radiographs taken routinely. Special projections may be required to demonstrate details of particular joints, congenital anomalies, or instability of the ankle joint. If rheumatoid disease is suspected radiographs of the forefeet are required, because these may reveal definite changes even when the symptoms are confined to the hindfoot. The erythrocyte sedimentation rate should be measured whenever the diagnosis is in doubt.

In clinics where this is routine it is frequently the only indication that the condition is more than a simple strain.

Treatment

Specific Measures.—*Acute gout* is treated with phenylbutazone or colchicine. Pain in the heel due to *ankylosing spondylitis* may be relieved most effectively by phenylbutazone 100 mg. t.d.s. or b.d., and to a lesser extent it is the most useful drug for other particularly painful conditions of the heel. Local steroid injections may give gratifying and lasting relief when pain is localized, particularly with injections into painful bursae or tendon sheaths. Steroids should never be injected into the Achilles tendon. Injections for plantar fasciitis are often painful, and only half the patients are improved. Opinions vary on the advisability of injections into the ankle joint, because there is a small risk of destructive changes following steroid injections in any weight-bearing joint. Probably it should be limited to painful synovitis, as in rheumatoid disease, and seldom repeated. Surgery is seldom indicated early in a rheumatic process. Early tendon synovectomy in rheumatoid disease may be very successful. Synovectomy of the ankle joint is technically difficult, but it is sometimes performed in conjunction with a triple arthrodesis in more advanced cases. Late in rheumatoid disease it may be difficult to decide whether to request arthrodesis of a chronically painful tarsus: spontaneous improvement is possible if deformity is slight, but many patients struggle on, long after they should have had an arthrodesis.

Immobilization.—An inflamed joint should never be mobilized. Often the quickest way to mobilize a stiff joint is to immobilize it until the inflammatory reaction has subsided. An acutely painful subtalar joint in rheumatoid disease should be put in a walking plaster for up to four weeks: within a few days of its removal movement may be appreciably increased. Plaster immobilization is better avoided in lesser conditions, such as a sprained ankle, because it makes it more difficult to preserve skilled muscle function. Strapping is traditional and will continue, but experiments have shown that after a few minutes' walking it no longer restricts movements effectively.

Mobilization and Muscle Control.—Usually mobilization can be left to occur spontaneously. Sometimes progressive non-weight-bearing and weight-bearing exercises are prescribed, or a physiotherapist may provide gentle passive mobilization by repeated gentle nudging at the extremes of range. Restoration of skilled muscle control is far more important than muscle strength; unless there is paralysis a "weak ankle" is never due to weak muscles. Lack of muscle control can be demonstrated by getting the patient to stand on one foot with his eyes shut. The resultant wobbling may make obvious why he finds his ankle unreliable or why his arthritic joint is subjected to repeated strains. Physiotherapists use "wobble boards" and a wide variety of balancing exercises to restore stability and skilled ankle control.

Control of Oedema.—Oedema, even when it is not clinically obvious, is one of the most important factors in causing stiffness and discomfort around the ankle. An elastic bandage, elastic stocking, or elevation of the leg are useful measures, whatever the cause of the oedema. Usually an elastic bandage to prevent oedema is more valuable than strapping to prevent movement.

Padding.—Adhesive chiropody felt or foam rubber should be available to relieve pressure from the shoes over the Achilles tendon or other tender areas. For pain under the heel the padding may need to be an inch (2.5 cm.) thick, and a hole should be scooped out over the point of tenderness.

Choice of Footwear.—The main purposes of special footwear and supports are to assist maintenance of correct foot position and to limit movement to avoid pain; but the patient will also want to retain skilled ankle function, and this necessitates freedom to move. The choice is always a compromise: enough

movement but not too much. To control inversion and eversion the heel should be broad and the back of the shoe in good repair, fitting the heel of the foot snugly. Men get relief of chronic ankle pain by wearing boots; women bootees. A crêpe heel reduces jarring.

Foot Supports.—A good support may correct a valgus deformity of the calcaneus and limit valgus strains, but it is useless if inadequately supported by the shoe. Alternatively the calcaneus may be controlled by a "heel seat"—a plastic support made individually to fit snugly around the heel, with a flat base so that it stands rigidly within the shoe. If pain is severe it may be necessary to sacrifice movement and to control the ankle rigidly within a plastic anklet.

Shoe Alterations.—A raised heel may relieve pain produced by dorsiflexion of the ankle joint or by a bursa between the Achilles tendon and the calcaneus. To prevent eversion of the foot, the heel of the shoe may be floated out medially, or the stiffening in the back of the shoe may be strengthened and prolonged anteriorly on the medial side. Only occasionally is

it helpful to provide a lateral wedge of the heel: often this fails to control the foot and simply provides a slightly sloping surface on which to stand.

B.M.J. Publications

The following are available from the Publishing Manager, B.M.A. House, Tavistock Square, London W.C.1. The prices include postage.

<i>The New General Practice</i>	Price 16s.
<i>B.M.J. Annual Cumulative Index, 1967</i> and 1968	Price 30s. each
(15s. each to B.M.A. members)	
<i>Porphyria—a Royal Malady</i>	Price 13s. 6d.
<i>Is There an Alternative?</i>	Price 7s. 6d.
<i>Treatment of Common Skin Diseases</i>	Price 10s.
<i>Charles Hastings and Worcester</i> ...	Price 3s. 6d.
<i>Health Centres and Group Practices</i>	Price 4s.

TODAY'S DRUGS

With the help of expert contributors we print in this section notes on drugs in current use.

Local Corticosteroid Injections

Injections of corticosteroids can be made into most of the joints in the limbs. Some, for instance the knee, elbow, and shoulder, are relatively easy—and fortunately give the most gratifying results. Others are more difficult, and practice is needed before dependable results can be obtained. Soft-tissue lesions, which may appear easy to inject, produce worse results on the whole owing to the difficulty of diagnosis and localization. Most departments of rheumatology and physical medicine have injection clinics, when patients needing intra-articular and other injections are assembled. At a visit to one of these most of the techniques can be seen.

Injection of joints should be performed as a sterile technique, but "no-touch procedures" can produce a perfectly sterile injection without the need for operating-theatre paraphernalia. Inflammatory arthritis, such as rheumatoid arthritis, Reiter's syndrome, psoriatic arthropathy, and gout, responds better to local corticosteroids than osteoarthritis, but it may still be worth trying the effect of injections on osteoarthritis.

Indications

Intra-articular corticosteroid injections rarely form a treatment in themselves; they should be used as an adjunct to other forms of treatment. Intra-articular injections may be combined with a needle biopsy of the synovium.

The indications for local corticosteroid injections may be listed as follows:

- (1) A single joint producing disabling symptoms or with a persistent effusion. The aim is to produce a high local concentration of corticosteroid while avoiding systemic effects.
- (2) Polyarthritis where one or two joints are producing most of the symptoms in spite of otherwise adequate systemic therapy.
- (3) As an adjunct to correcting a deformity by physiotherapy—for example, the straightening of knees or the mobilization of a frozen shoulder.

- (4) To relieve localized soft-tissue inflammation—for example, tennis elbow.

- (5) Tenosynovitis (tendinitis).

Contraindications

- (1) An infected joint must not be injected with corticosteroids. Thus before injecting a monoarticular arthritis a sample of synovial fluid must be withdrawn and inspected. If the fluid is clear and watery it is unlikely that infection is present. Acute flare-up of arthritis in a single joint in the presence of polyarthritis must always be suspected of being due to infection.

- (2) Repeated failure to produce benefit by injection. Further attempts will fail.

- (3) Severe joint destruction—as in advanced osteoarthritis—will not respond to injection.

- (4) Osteoporosis around the joint. Repeated injection into a joint may increase the degree of joint destruction by allowing the patient greater degrees of pain-free movement.

Technique

Hydrocortisone acetate 25–50 mg. is perhaps the most satisfactory and certainly the cheapest form of therapy. Some of the prednisolone derivatives such as prednisolone acetate 10 mg. or prednisolone pivalate (trimethyl acetate) 10 mg. can also be used. Relief tends to be maintained longer with these prednisolone derivatives. However, since doubt exists as to whether the synovial cavity can metabolize synthetic corticosteroids, it is uncertain how effective these forms are locally as distinct from systemically. The longer duration of effect may be due either to delayed absorption and conversion to active products or to the relatively larger doses usually given.

If a local anaesthetic is to be given at the same time 1% lignocaine hydrochloride or $\frac{1}{2}$ % procaine hydrochloride are satisfactory, equal volumes of anaesthetic and steroid being used. Single-dose ampoules are preferable to multidose containers, especially for occasional procedures, because of the risk of contamination.

Disposable syringe and needles are ideal. A small needle (25 gauge) can be used unless the joint is to be aspirated, when a