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The foot and ankle in rheumatology

Philip Helliwell, Heidi Siddle, Anthony Redmond
Foot and Ankle Studies in Rheumatology Group, Section of Musculoskeletal Disease, Leeds Institute of Molecular Medicine, University of Leeds

- **Foot problems are common in rheumatology**
- **Foot problems are often missed in rheumatology because of lack of confidence or competence in assessing the feet**
- **A simple but comprehensive clinical assessment of the foot can be performed in around 1 minute**
- **Many rheumatological foot problems can be managed by the patient, with judicious advice on footwear and simple orthoses**
- **In people with systemic diseases, foot problems are complex and often require referral and appropriate multidisciplinary care. Although this model of care is supported by NICE and other bodies, need currently outstrips supply**

Introduction

Despite the high prevalence of foot symptoms in people with rheumatic diseases, the foot and ankle remains a neglected area in rheumatology. Part of the problem is a lack of appropriate training in clinical examination techniques.[1] Also, the foot and ankle are relatively inaccessible: to expose the feet may require much effort for someone with arthritis and may not be prioritised by the examining clinician. It is often much easier, therefore, to ignore the potential for foot problems or to simply refer problems unseen to an allied service such as podiatry. While there may be a perception among some clinicians that foot treatments should be delegated to appropriately qualified professionals, all clinicians should be able to assess the feet competently in an outpatient setting. Our aim in this review is to provide an evidence-based guide to the assessment, understanding and treatment of the foot and ankle in the more common rheumatic diseases.

Anatomy

The foot consists of 26 bones (Figure 1) that can be simplified into three interrelated units: the hindfoot (consisting of the ankle, talus and calcaneus), the midfoot (talus/navicular/cuneiforms and cuboid) and the

forefoot (metatarsals and associated digits). The important soft tissue structures controlling acceleration and deceleration are the Achilles tendon posteriorly and tibialis anterior (combined with the extensors of the hallux and digits) anteriorly. Mediolateral stabilisation is provided by the peroneals laterally and tibialis posterior on the medial side (Figure 2). As the regions of the foot are interrelated functionally, the stability of distal regions (i.e. the midfoot and forefoot) is dependent on the regions proximal to them and vice versa. During normal walking or running the healthy foot goes through a pronation/supination cycle, with physiological pronation in early stance allowing adaptation to uneven surfaces and absorption of shock, while a subsequent resupination late in the stance phase produces a more rigid lever for propulsion and a subsequent conservation of energy. During normal function the centre of mass passes over the weightbearing surface of the foot from the posterolateral aspect of the heel through the midline of the midfoot and moves medially, exiting the forefoot through the hallux.

In pathological states the pronation/supination cycle may be impaired, resulting in overpronation (foot flattening), which leads to midfoot/forefoot instability and excessive medial weightbearing, or oversupination (often manifest as a cavus/cavoid foot type), which leads to excessive rigidity and poor shock attenuation along with a lateral deviation in the path of the centre of mass (Figure 3). Importantly, any change in the load distribution can lead to localised increases in pressures under the forefoot (and to a lesser extent the midfoot and hindfoot), causing joint pain, soft tissue change such as bursitis, or skin change such as corn or callus formation.

Assessing the foot in rheumatology clinics

Clinical assessment

The general neglect of foot problems in rheumatology highlighted above starts with poor clinical assessment. This is often justified in terms of the time required to undertake the assessment. It is our contention, however, that a basic assessment takes approximately 1 minute per foot when performed with the requisite knowledge, skill and practice. The British Society for Rheumatology (http://www.rheumatology.org.uk) organises an annual 2-day Foot and Ankle Course, usually held in Leeds, which is very much a hands-on practical course that covers the techniques needed for this assessment.

We have published a straightforward 'Look, Feel, Move' model (Figure 4) for assessing foot problems

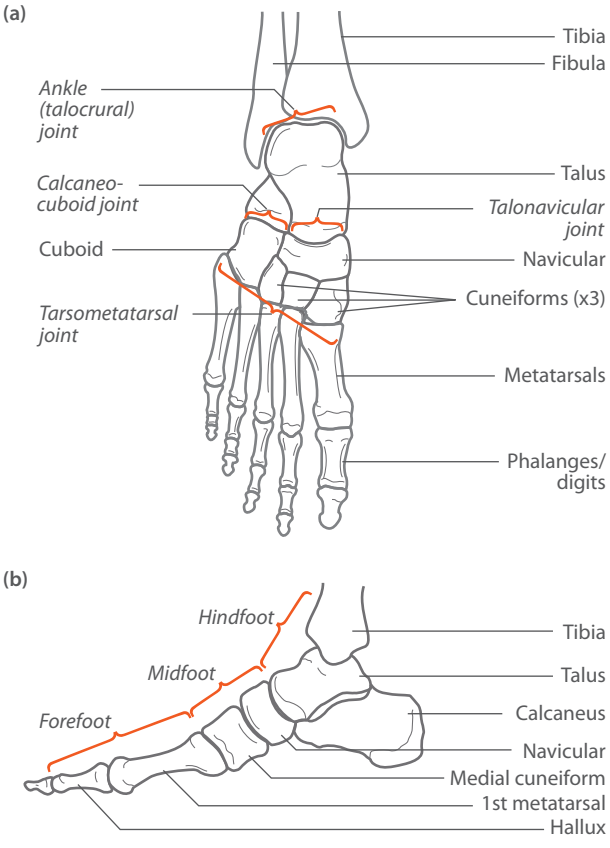

FIGURE 1. (a) Anterior and (b) medial view of the bony anatomy and joints of the foot and ankle.

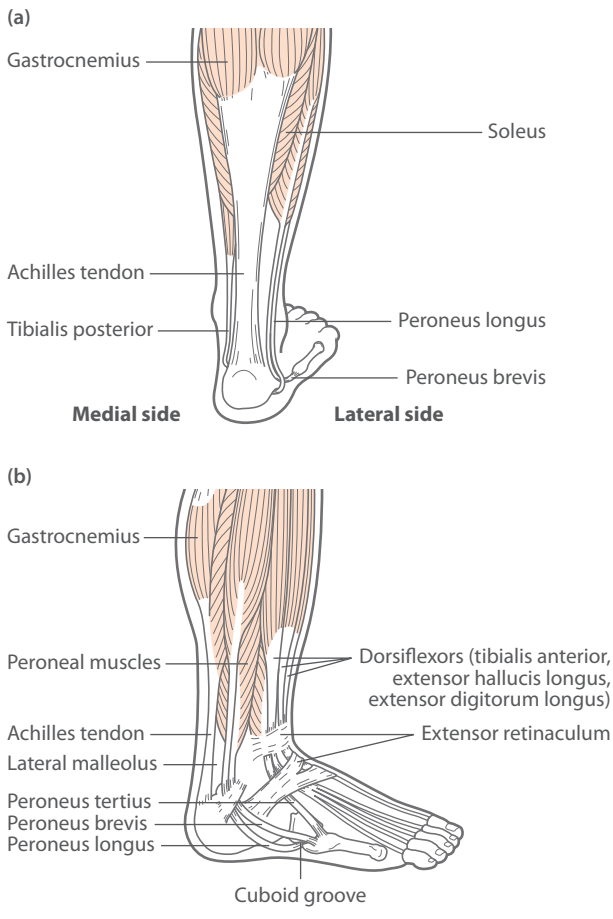

FIGURE 2. (a) Posterior and (b) lateral view of the key soft tissue structures around the foot and ankle.

suitable for all clinicians.[2-3] The assessment starts with a simple but systematic observation of the overall foot shape and palpation of the relevant joint margins, soft tissue structures and insertions to identify inflamed or damaged tissues. Next, active movement of the foot is evaluated, assessing the direction, range and quality of motion and any related pain. Finally, the assessment is completed with clinician-mediated passive motions of ankle, subtalar, midfoot and forefoot joints, noting pain and again the direction, range and quality of movement. Using a 1-minute protocol it is possible to identify the soft tissue structures involved, differentiate ankle involvement from subtalar disease, identify midfoot disease and isolate and quantify forefoot joint involvement.

Imaging

The utility of plain x-ray is limited to the assessment of bony anatomy and joint damage. Foot x-rays can be taken either non-weightbearing – the norm in most centres – or weightbearing. Non-weightbearing views allow, for example, the evaluation of forefoot joint damage but have limited use in evaluating structural alterations or change over time. Weightbearing views are more representative of the foot in its functional state and allow monitoring of postural change over time but they require non-standard radiology protocols and there is often reluctance to perform them.

Other imaging techniques used in the assessment of foot and ankle problems are computerised tomography (CT), magnetic resonance imaging (MRI), ultrasound (US) and scintigraphy.[4] These modalities are used less often than plain x-rays because of cost and access, but they can provide more useful diagnostic information, particularly about the soft tissues (Table 1). Scintigraphy, widely used in the past in the diagnosis of stress fractures in the feet, has largely been superseded by MRI. Expertise in interpretation of MRI imaging of the foot may not, however, be available in all units. US is used increasingly in rheumatology practice and can be very useful in imaging foot problems. Use of US has the immediate benefit to the practitioner of forcing an improvement in the knowledge of local anatomy, and in a region with complex anatomy comprised of small structures it is often very helpful to use the high resolution afforded by US to identify precisely which tissues are associated with presenting symptoms. Features such as power Doppler are also valuable in differentiating between active inflammation and non-inflammatory or mechanical disorders.[4]

Other assessment techniques

The past 10 years have seen considerable developments in the technologies available to quantify foot function in health and disease. Vascular pathology can be quantified accurately in the clinical setting, using affordable hand-held Doppler ultrasound or photoplethysmography units which can provide a permanent and detailed record of arterial and venous blood flow. Neurological status can also be assessed simply and quickly using monofilaments or vibration perception meters, and many clinicians are now incorporating this type of assessment into their practice. Assessment of musculoskeletal function has also improved enormously, with technologies available to quantify overall functional capacity, the motions and forces occurring in specific joints, and the forces and pressures underneath the feet. Many of these technologies remain prohibitively expensive, however, and while they can provide quantification of pathology – typically a requirement of a research setting – in day-to-day clinical practice they offer relatively little over a keen eye and experience. They are unlikely to enter the mainstream until the cost and complexity fall considerably. One arguable exception is the measurement of plantar pressures, which give a cost-effective insight into the distribution of loads under the foot and may provide insight into the aetiology of symptoms and related treatments.

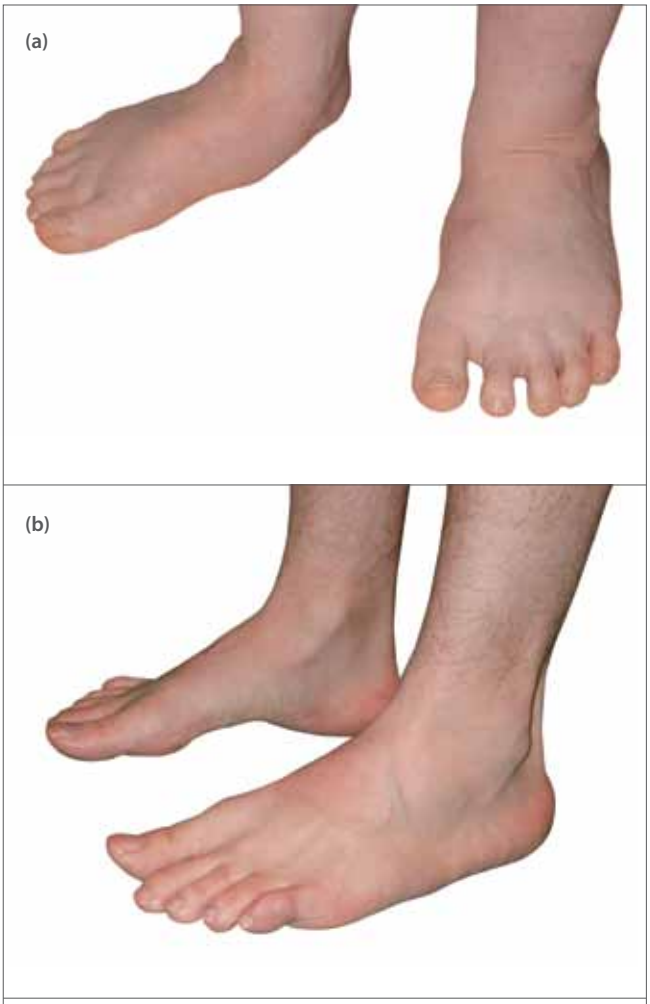

FIGURE 3. Typical presentation of (a) an overly pronated foot and (b) a supinated/cavoid foot.

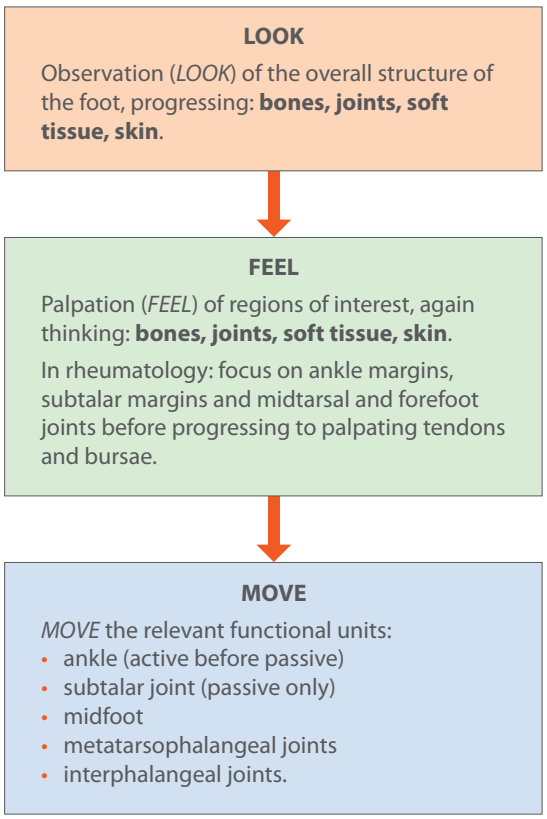

FIGURE 4. A simple assessment schema for a 1-minute clinical examination of the foot.

Foot problems present in many forms in rheumatology practice. The main rheumatological conditions associated with specific foot problems are rheumatoid arthritis, psoriatic arthritis and other spondyloarthropathies, connective tissue diseases, osteoarthritis, gout and hypermobility.

Rheumatoid arthritis

The foot contains many synovium-lined structures which can be affected in rheumatoid arthritis (RA). Consequently the foot is involved in about 80–90% of people with RA,[5-7] with the forefoot, and in particular the metatarsophalangeal (MTP) joints, the most commonly involved region.[8-10]

Even in early disease foot involvement is common (estimates range from 32% to 75%[5,9-12]), occurring almost as frequently as early hand symptoms. Involvement of the ankle joint proper (the talocrural joint) is relatively uncommon in RA, occurring in only 10–20% of people with established RA. Conversely, subtalar joint involvement is common, with 33–75% of people with longstanding RA affected in this small and complex joint. These figures highlight the need for knowledge of anatomy and careful assessment of the foot. Soft tissue pathologies are also common, and up to 25% of patients complain of soft tissue pain around the hindfoot such as plantar fasciitis, peroneal tendinitis or bursitis.[5,6,8,13,14]

Articular damage in the foot in RA is the result of synovitis compounded by the considerable mechanical stresses occurring in this weightbearing structure. When un- or undertreated, synovitis combined with mechanical stress in the subtalar and talonavicular joints results in characteristic irreversible structural changes such as flattening of the medial longitudinal arch, valgus deformity of the calcaneus, and tibialis posterior dysfunction.[8,13,14] With better disease-modifying anti-rheumatic drug (DMARD) therapy and earlier intervention, this classic 'rheumatoid foot' is likely to become less common, although it must be remembered that not all patients do well, even on biologics. Furthermore, in a small proportion of cases our experience is that good disease control elsewhere in the body is not matched by equally good disease control in the weightbearing joints of the feet.

In the forefoot, signs of synovitis include the 'daylight' sign (Figure 5) resulting from synovial inflammation which causes stretching and weakening of the joint capsule and loss of integrity of the stabilising structures in the forefoot.[15,16] Subluxation and eventually complete dislocation of the MTP joints occurs due to joint damage, in combination with capsuloligamentous instability.[17] When the MTP joint dislocates, the plantar fat pad which usually lies beneath the MTP joints is pulled distally, exposing the metatarsal heads to increased pressure and pain during gait.[18] DMARD therapy aims to attenuate this process, although a recent study is disappointing in that both the prevalence and the severity of forefoot joint

FIGURE 5. 'Daylight sign' associated with significant synovitis in the 2nd and 3rd metatarsophalangeal joints.

TABLE 1. Pros and cons of current modalities in the imaging of foot pathology.

	Indications	Strengths	Weaknesses
Plain film x-ray	Determining structural change in bones and joints (e.g. osteoarthritis)	High resolution; low cost; ubiquity	Documents permanent damage, not ongoing change; limited to 2D views; consider ordering weight-bearing foot views to document positional relationships
Ultrasound (US)	Documenting soft tissue pathology, identifying inflammation	High resolution; high sensitivity to inflammation/blood flow; direct observation of effusion	Operator training-dependence; inability to image within bone/ joint
Computerised tomography (CT)	Suspected tumour, fracture	High resolution; definitive for many bony lesions especially where structural change is evident	High exposure to x-ray; high cost; low availability
Magnetic resonance imaging (MRI)	Multiple	Sensitive to change in bone and soft tissue physiology	Moderate resolution; high cost; limited availability; difficulties in acquiring/interpreting foot images; may need intravenous contrast
Scintigraphy	Stress fracture, metabolic bone change	Few. Mostly superseded by MRI	Exposure to x-ray; needs intravenous injection

damage progressively increased in a cohort of patients with RA followed for 8 years.[19] Presumably the lack of effective joint protection in the foot is a contributing factor.

Soft tissue structures of the foot that may be involved in RA include tendon sheaths, bursae and entheses.[20] Tenosynovitis of the tibialis posterior tendon may be florid, as may the same pathological process in the common peroneal tendon sheath. Bursitis may also occur, particularly the retrocalcaneal bursa which may present as swelling either side of the Achilles tendon just above the insertion and which may cause inflammation in adjacent structures, such as the tendon itself.

Due to external mechanical forces nodules may occur in the soft tissues, typically at the Achilles tendon, at the heel pad and over bony prominences. Other extra-articular features of RA may also be manifest in the foot: vasculitic rashes, peripheral neuropathy and entrapment neuropathies (such as tarsal tunnel syndrome).

There is a large regional variation in the provision of foot health services for rheumatology patients, and a significant unmet demand for even basic foot health services.[21] In 2008 the Podiatry Rheumatic Care Association (PRCA) *Standards of care for people with musculoskeletal foot health problems* highlighted the need for assessment and management of foot problems in RA, particularly in early RA,[22] and the National Institute of Health and Clinical Excellence (NICE) guideline for the management of RA in adults recommended that all patients with RA and foot problems should be referred for podiatry assessment.[23]

There is good evidence that foot orthoses reduce foot pain and improve functional ability in people with RA,[24] although a critical review of foot orthoses in patients with RA demonstrated a lack of consensus on the precise choice of orthosis.[25] The provision of footwear for patients with RA is supported by national guidelines and therapeutic footwear has been shown to provide good alleviation of foot symptoms and improvement in walking in patients with RA. Compliance with prescribed footwear can be poor, however, due to dissatisfaction with fit, comfort and style, particularly for women.[26] A new design of footwear based on priorities identified by patients with RA[27] has been compared with traditional footwear and a significant improvement in foot pain, foot function and general foot health was reported.[26]

Finally, painful plantar callosities can build up over metatarsal heads due to subluxed MTP joints which are subject to excessive shear and compressive stresses during gait. Regular scalpel debridement is the treatment of choice, providing immediate relief of symptoms: this is usually undertaken by a podiatrist. Callus reduction should, however, be combined with other interventions such as provision of foot orthoses to prevent recurrence of disease.[28] Multidisciplinary foot clinics addressing these multiple needs are becoming common and there is widespread acknowledgement that an integrated approach between patients, medical staff and other health professionals benefits people with RA.

Psoriatic arthritis and other spondyloarthropathies

Little systematic clinical research has been carried out on the foot and ankle in psoriatic arthritis (PsA) and the spondyloarthropathies. The spondyloarthropathies are heterogeneous disorders that affect joints, entheses, bone, tendons and ligaments, bursae and connective tissue, all of which may be represented in a dactylitic digit. PsA is the major spondyloarthropathy affecting the feet, and accounts for most of the clinical studies in this area. PsA alone is discussed in this review, although it is reasonable to extrapolate the conclusions to other spondyloarthropathies. Articular involvement in PsA may vary from isolated involvement of a mid- or hindfoot joint to a destructive polyarthritis with extensive bone loss. Isolated foot symptoms, including plantar heel pain, metatarsal pain, dactylitis, and involvement of the ankle and midfoot, have been described as the initial manifestation of PsA.[29] In contrast, in established disease a higher incidence of forefoot deformity (95%), including hallux valgus and claw toe, and hindfoot deformity (pes planovalgus in 65%) has been reported.[30]

Involvement of the midtarsal joints may cause considerable pain and disability, and this may be hard to assess clinically. Imaging with both ultrasound (US) and magnetic resonance imaging (MRI) has shown inflammation in these joints in PsA, which often appears as a single unit on the scan, rather like the carpus.

Enthesitis is seen most often at the insertions of the Achilles tendon and plantar fascia but clinical and radiological assessment shows enthesopathy at other sites, notably the insertions of the tibialis posterior tendon at the tuberosity of the navicular, and the peroneus brevis at the base of the 5th metatarsal. Inflammation at these four sites has been described in around 25% of patients with established disease[30] and in early PsA the prevalence of plantar fasciitis and Achilles enthesitis has been reported as 12% and 6% respectively.[31] The changes seen at the Achilles – difficulty with walking due to pain at the insertion, together with painful enlargement – are characteristic of spondyloarthropathy and may be the only reliable clinical sign of enthesitis. People presenting with isolated, recurrent or bilateral Achilles enthesitis should suggest a diagnosis of spondyloarthropathy. The bone underlying the enthesis may also be involved, as seen on MRI. However, this osteitis is under-recognised clinically, although it may cause considerable pain. Osteitis may also occur in the sesamoid bones, which can be an occasional cause of severe pain under the 1st MTP joint.[32]

FIGURE 6. The Bauer digit: inflammation in the interphalangeal joint of the toe with adjacent psoriatic nail dystrophy. (Reproduced with permission from: Siddle H, Helliwell P. Involvement of the foot and ankle in psoriatic arthritis. CML Rheumatology 2009;28(3):49-55.)

Dactylitis is seen more commonly in the feet than the hands. In the feet, the 4th toe is most frequently involved.[33] The presence of any dactylitis is associated with more severe disease, including arthritis mutilans (unpublished data from the Classification of Psoriatic Arthritis (CASPAR) study). In one study MRI was used to observe the changes in psoriatic dactylitis in 17 patients, 13 of whom had dactylitis of the toes:[34] widespread inflammation of bone, joint, enthesis, tendon and soft tissue were found.

Classical psoriatic plaques can occur on the dorsum of the foot, but two other dermatological features are more frequently associated with articular disease. Nail involvement, with onycholysis, pitting and hyperkeratosis, is typical, and when occurring in the big toe along with arthritis of the interphalangeal joint is referred to as a Bauer digit (Figure 6). Sometimes patients present with palmoplantar pustulosis, a rash that has certain similarities with and may be clinically indistinguishable from keratoderma blenorrhagica.[35]

PsA is a heterogeneous disease, although 66% of patients have progressive disease and will require DMARDs. First-line treatment with non-steroidal anti-inflammatory drugs (NSAIDs) may be considered for control of symptoms. Patients should be considered for DMARDs if they do not respond to first-line treatments, and biologics may be required in severe articular disease. Systemic corticosteroids are not recommended in the treatment of PsA. Intra-articular steroid injections may be used to treat persistent mono- or oligoarthritis.

The management of enthesitis and dactylitis is largely empirical, the only trial evidence coming from the trials of biologic agents in PsA that were powered for articular outcome measures. An escalating regime has been recommended, starting with NSAIDs, then

FIGURE 7. Spontaneous rupture of the Achilles tendon insertion following repeated injection of corticosteroid into the retrocalcaneal bursa and at the insertion of the Achilles. This has been repaired by screw fixation. (Reproduced with permission from: Siddle H, Helliwell P. Involvement of the foot and ankle in psoriatic arthritis. CML Rheumatology 2009;28(3):49-55.)

DMARDs, and ultimately biologics.[36] In enthesitis, depot steroids can be used with good effect at the insertions of the peroneus brevis, tibialis posterior and plantar fascia but – particularly in the latter case – it is recommended that these injections are performed under US guidance. The use of depot steroids at the insertion of the Achilles tendon is discouraged because of the catastrophic risk of rupture (Figure 7). An alternative is to inject the often inflamed retrocalcaneal bursa, as this extends down to the insertion at the calcaneus. The best site for administering steroid injections in dactylitis is not known. One approach is to try to identify the tissue that is contributing most to the inflammation, be it the joint or the tendon and its sheath (these being the two most available targets). However, it is likely that wherever the steroid is deposited there will be some diffusion and (beneficial) effect on other nearby tissues.

Clearly, management of the foot in PsA should be holistic with involvement of podiatry care where possible. As with RA there is a significant unmet demand for even basic foot health services.[21] Hyslop et al reported that only 24% of their PsA patients had received any treatment for their foot problems and only 6% had undergone surgical intervention, despite 65% self-reporting foot pain.[30] Unfortunately, there is currently no specific evidence to support the use of podiatry interventions such as the provision of footwear and orthoses in PsA. However, clinical experience and the evidence-based strategies for managing foot and ankle disease in patients with RA strongly suggests that it is important to address both the inflammatory and the mechanical factors that affect the feet of patients with PsA. The use of splints can be beneficial for stabilising and immobilising hindfoot and ankle enthesitis and peripheral arthritis. Functional foot orthoses can be used as in RA. These foot health interventions are often most beneficial when combined with interventions to reduce local inflammation and physical therapies to strengthen muscles and stretch soft tissues. Surgical treatment should be considered when conservative management fails.

Connective tissue diseases

Joint and tendon problems do occur in the feet in connective tissue diseases (CTDs), but the major lower limb manifestations of these disorders are vascular. Patients with CTDs may have inflammatory arthropathy in the feet,[37] usually non-erosive. Tendinopathy can be seen, especially in the Achilles.[38] Vascular disease can be seen in 90% of people with CTDs, with Raynaud's phenomenon, telangiectasia and purpura all common in the feet. Vasculopathy and ulceration affect between 10% and 20% of people with CTDs, usually in the hands but often in the lower extremity.[39] In addition to small vessel vasculopathy, large vessel vasculopathy and accelerated atherosclerosis can occur in the CTDs, leading to gangrene and risk of amputation.[40,41] Localised ulcerative skin lesions may occur due to a combination of skin, neurological and vascular disease. These lesions are often intensely painful, contrasting with the relatively painless neuropathic ulceration seen in diabetes. The healing process can be slow and is often through necrosis and fibrosis rather than granulation and re-epithelialisation.

Among the CTDs SSc often gives rise to the most significant foot problems, and is therefore reviewed in more detail here. The initial presentation is often with Raynaud's phenomenon accompanied by oedema of the hands or feet. The skin in the extremities thickens and tightens over time, leading eventually to sclerodactyly. Flexion contractures may impair mobility and calcified nodules may manifest on the digits or other areas of mechanical stress. Synovitis may be present, but tends to affect larger joints more than the foot.[42] Involvement of the foot in SSc is less common and less severe than in the hands[43] although the foot is involved in about 75% of patients with progressive SSc. Onycholysis and pitting of the nails may be seen, similar to that encountered in psoriasis. Splinter haemorrhages may also be seen in the nail beds, reflecting the vascular involvement.

Skin and subcutaneous fibrosis combined with changes in the underlying skeletal structures can

lead to difficulties with shoe-fitting[44] and patients may need assistance finding adequate footwear. We contend that all patients with SSc should undergo annual checks of their foot health and should have ready access to foot health services when needed.

Osteoarthritis

Epidemiological studies of OA in the foot yield different estimates for prevalence depending on how this disorder is defined. Studies using radiological or pathological definition generally lead to higher estimates of prevalence than those using clinical diagnostic criteria (e.g. pain). Pathological changes are very common,with one cadaveric study of 100 lower limbs reporting moderate or severe degeneration in 24% of older hips, 66% of knees and 47% of 1st MTP joints.[45] While involvement of the 1st MTP joint is very frequent, the other joints of the foot and ankle seem less susceptible to primary OA, although involvement of other joints occurs secondary to trauma or systemic disease.[46] Acknowledging the limitations of case ascertainment, the best clinical estimates for joint pain, swelling and stiffness in the feet range from 11% to 15% in adults over 55 years of age.[47]

Symptoms of OA are stiffness and pain in the affected joint, and there may be tenderness at the joint margins on palpation.[48] Crepitus may be felt on passive movement. Radiological assessment allows confirmation of the clinical signs and some evaluation of the severity of joint damage. Menz et al have developed a formal classification system for foot joint OA, based on an atlas of plain film x-rays.[49]

As noted above, the 1st MTP joint is the most common site for OA in the foot. This presents as limitation, fixation or deformity of the hallux joint (hallux limitus, hallux rigidus or hallux valgus). Periarticular osteophyte causes thickening of the joint, sometimes with an overlying bursa. Disease-modifying therapies are not yet developed for foot OA and so NSAIDs and rest remain the initial treatments of choice, along with advice on exercise, weight loss and footwear. Orthoses and therapeutic footwear may be of benefit and are recommended by NICE as adjunct therapies. Where conservative care fails, surgical intervention can be definitive. Replacements for foot joints have not enjoyed anything like the success of those for hips and knees and so arthrodesis remains the most effective surgical option for most foot joint OA. At the 1st MTP joint 'bunion' surgeries have become more sophisticated, however, and a number of joint-sparing techniques have developed in the past 20 years that have resulted in significantly better outcomes.

Gout

Gout presents in two ways: acute gout and chronic (often tophaceous) disease. Acute gout may be seen in any of the joints of the foot although it is most commonly seen in the 1st MTP joint (podagra). The presentation is of an acute, hot, swollen joint which is exquisitely tender (so much so that just the minor vibration produced by a closing door may be intolerable), often appearing overnight. Weightbearing is often impossible. An untreated attack settles in 10–14 days. The main differential diagnosis is infection; the diagnosis of podagra is usually made clinically, but if there is uncertainty aspiration allows infection to be ruled out and crystal synovitis to be confirmed, although aspiration may be technically difficult in a small joint. Systemic symptoms such as fever may occur and inflammatory markers such as C-reactive protein (CRP) may be markedly elevated. It is important to recognise that the serum urate may be normal in an acute attack and that an elevated serum urate either during or after an episode is not diagnostic of gout. Common predisposing factors are renal impairment, diuretic use, a high alcohol intake and a positive family history.

Chronic (tophaceous) gout (CTG) may occur insidiously and is often polyarticular, involving large and small joints. CTG has the same risk factors as acute gout. The chronic form is much more likely to be associated with abnormalities on plain x-ray, such as erosions that are typically juxta-articular and punched out ('rat bite' erosions). Tophi may occur in the Achilles tendon and in a juxta-articular position, associated with deformity and swelling. Chronic discharging tophaceous gout is a terrible condition and is associated with much pain and disability (Figure 8).

FIGURE 8. Chronic tophaceous gout in the left 2nd toe: the tophus is ulcerated and discharging a 'paste' of monosodium urate crystals.

Hypermobility

Flexible flat feet are common, either in isolation or in association with systemic disease such as Ehlers–Danlos syndrome or joint hypermobility syndrome (JHS). In its milder forms, a flattened foot simply represents one end of the normal population distribution of foot postures and requires no intervention unless symptomatic. The degree of flat foot can be quantified using a range of measures, including our own Foot Posture Index,[50] and the more recent publication of normative values provides the clinician with a reference to support the choice of either watchful waiting or more active intervention.[51]

Exclusion of underlying pathology is an important step in assessing the flat foot. Common causes of potentially pathological flat foot include tarsal coalition, posterior tibialis tendon disorder, inflammatory arthropathy, antalgia and systemic hypermobility. Where a flattened foot posture is thought to be isolated or a consequence of a relatively benign systemic problem such as JHS, the assessment can focus mainly on the mechanical factors and their management. The association between underlying joint hypermobility and foot symptoms is incomplete but JHS accounts for a large proportion of rheumatology referrals (far more than ankylosing spondylitis or PsA) and we have shown both that people with JHS have greater foot impairment than matched controls and that the severity of symptoms correlates with severity of systemic hypermobility.[52,53] Various systems have been proposed for the quantification of general hypermobility but the most commonly used by far is the 9-point Beighton score.[54] Hypermobility produces more instability in the midfoot than the hindfoot, and this instability is more apparent during walking than in quiet standing.[53] Consequently we consider a dynamic evaluation, such as observation of walking, to be an essential part of the examination of the hypermobile patient.

Treatments are aimed at improving mechanical stability. Improving muscle strength may be advantageous and Pilates-type approaches seem generally helpful in hypermobile patients, although evidence is scant. Barefoot walking can be encouraged where safe and comfortable, and exercises involving repeated raising onto tiptoe may help strengthen intrinsic musculature and improve proprioception. Paradoxically, hypermobile joints may lead to undue tightness of surrounding muscles and tendons, so gentle, controlled stretching may be useful. Footwear choice is highly important and unstable ankles and overly flexible feet can benefit from greater control provided by the shoe, and impacts on joints and soft tissues can be lessened through the judicious use of shock-absorbing and cushioning materials.

Many of the characteristics of the ideal shoe for the hypermobile foot are found in the more supportive types of trainers. A strong heel counter provides stability, a robust upper and strong fastenings give midfoot control, and a cushioned midsole absorbs shock. For settings where trainers are not appropriate, getting the patient to give some consideration to any of these features may be helpful.

If exercises and footwear changes are not helpful then functional foot orthoses may be used. Most functional orthoses combine three characteristics: a contoured shell, a stabilising heel cup and one or more wedges to influence joint positions. Simple foot orthoses that can be obtained over the counter at pharmacies or sports shops may suit many people. However, if there is severe instability bespoke prescription orthoses may be required.

Conclusion

The foot and ankle are commonly involved in rheumatic diseases but are often under-assessed and undertreated. This reflects, in part, suboptimal provision of specialist multidisciplinary foot care within the NHS. However, outcomes could be improved if assessment of the foot and ankle was a core component of every rheumatological consultation. Simple, rapid and comprehensive assessment of the foot and ankle is easily learned and is straightforward to implement in the clinic. Management of foot and ankle problems in rheumatic disease follows the same principles as for systemic disease; in particular, control of inflammation is crucial in minimising damage. However, the complex biomechanical demands placed on the foot by weightbearing and walking have to be taken into account when managing foot problems, and effective treatment strategies aim to minimise these stresses as well as treating the underlying rheumatological disorder.

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St Mary's Gate, Chesterfield
Derbyshire S41 7TD

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