Common musculoskeletal foot problems

The burden of musculoskeletal foot pathology in the general population is frequently trivialised but causes patients significant impairment. This article aims to give clinicians who don't specialise in the foot, a basic understanding of how to recognise and provide first line treatment for common musculoskeletal foot pathologies.

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Musculoskeletal foot pathology is endemic in the general population with between 20% and 24% reporting foot pain within the last month and some 60% having had an episode of foot pain in the last six months.[1] Furthermore, a substantially higher proportion has hallux valgus (bunions), hyperkeratotic lesions (corns and calluses) and nail pathologies upon clinical examination.[2] The prevalence of foot problems further increases with age,[1] obesity,[3] female gender,[1,4] inflammatory arthritis,[5,6] and diabetes.[7]

Despite its high prevalence, foot pathology is often trivialised yet there is a growing body of evidence that it is independently associated with a decreased ability to undertake activities of daily living,[8] reduced walking speed,[9] problems with balance[9] and an increased risk of falls.[10,11] People with foot problems consistently report reduced quality of life, suggesting that the impact of foot disorders extends well beyond localised pain and discomfort.[12-14]

Detailed epidemiological data on specific foot pathologies is limited but it is clear that the non-traumatic pathologies account for the majority of consultations (79% non traumatic).[15] Data from GP databases suggest that the most commonly affected regions of the foot were the ankle, heel, toes, and forefoot with only 2% of consultations for the mid foot.[15]

Although some professions such as podiatrists specialise in foot and ankle pathology, access to foot care is unfortunately limited and studies have consistently identified a large unmet need. Only one third of patients with disabling foot pain received professional treatment in the general population,[1] with similar figures reported for higher risk rheumatology patients.[16,17]

Heel pain

Pain in the heel accounts for 35% of foot and ankle consultations in primary care[15] but can have many causes. As with elsewhere in the body, good knowledge of the underlying anatomy is fundamental to correct diagnosis.

Posterior heel pain

Pain from a bony prominence on the postero-superior calcaneal aspect of the calcaneus was first described by Haglund and his name has been synonymous with the condition ever since.[18,19] Prominent exostoses on the superior border of the calcaneus are often still referred to as a "type I Haglund deformity"(Figure 1). Here repeated dorsiflexion of the foot causes friction between the exostosis and Achilles tendon, resulting in tendonopathy and mechanically induced inflammation of the retro-calcaneal bursa: a triad of pathologies sometimes referred to as Haglund's syndrome.[18,20,21] Recent literature recommends moving away from this nomenculture and referring to this syndrome as retrocalcaneal bursitis with an associated postero-superior calcaneal prominence,[20] but this is not yet in widespread use. Patients present with pain and swelling, which is exacerbated by footwear with a hard heel counter, and exercise particularly when running up hill.[20-22] Although diagnostic imaging is not routinely performed at initial presentation, it can be helpful to

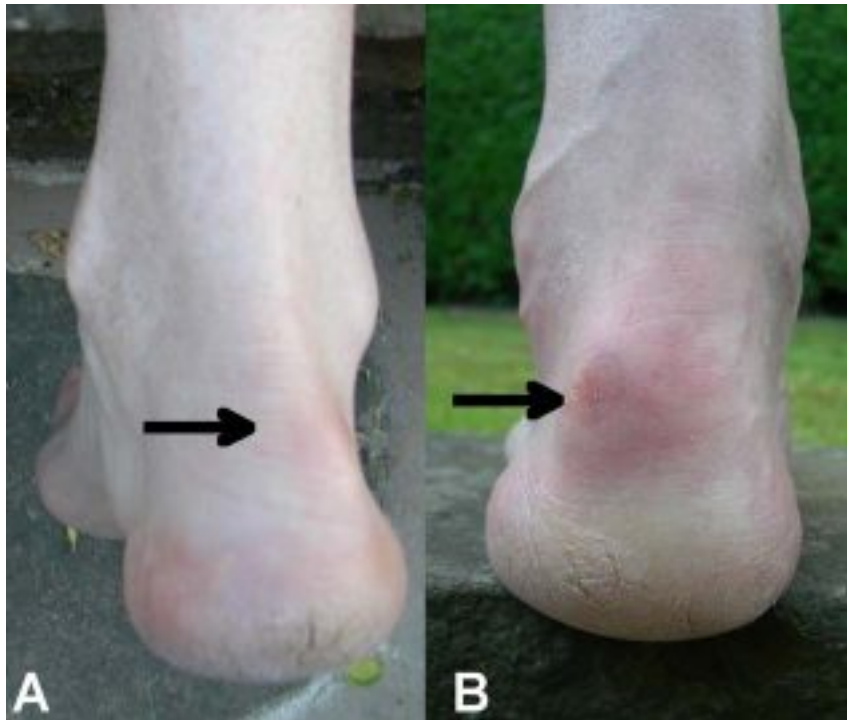

Figure 1. Location of Haglund deformities A: Type I Haglund deformity; B: Type II Haglund deformity

determine the size of the osseous prominence, as well as the degree of tendinopathy and bursitis.[18,19,23]

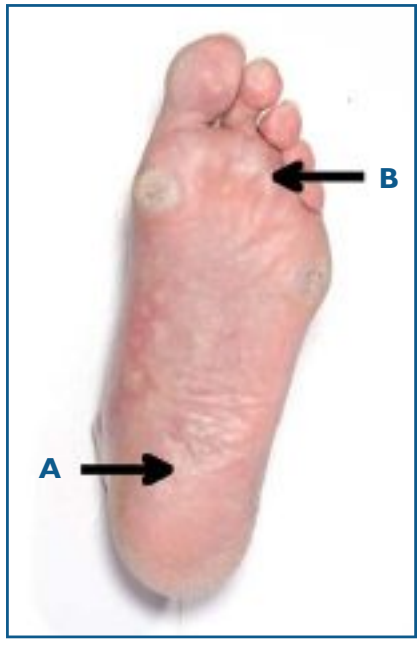

Fig 2: Common locations of maximal tenderness in plantar fasciitis (A) and Morton's Neuroma (B)

Exostoses on the postero-lateral aspect of the calcaneaus, are commonly referred to as a "Type I Haglund deformity", "Pump bump", or more correctly "superficial calcaneal bursitis."[20] These typically occur at the level of the Achilles insertion, and examination may show local skin thickening, callous formation, and an adventitious bursa although involvement of the Achilles is rare [21 22] (See Figure 1). As with the type I deformity, patients complain of pain and tenderness which is exacerbated by certain footwear.

Management of both types of Haglund deformity aims to reduce the local inflammation and external mechanical irritation. In the first instance this is done through avoiding footwear with a rigid heel counter, and use of accommodative padding.[19] Activity modification may also be required in more active patients with modification of training regimes to avoid hard surfaces and hills recommended by some authors.[22] Local inflammation can be reduced through ice, stretching, and NSAIDs as appropriate.[19,22] Where first line therapy fails, referral for heel lifts or functional orthoses should be considered to reduce friction between the Achilles and calcaneus, or correct any rearfoot deformity.[23] Although corticosteroid injection can be very effective in relieving bursitis, injection in such close proximity to the Achilles tendon carries a risk of rupture so should only be performed with ultrasound guidance.[23] After exhausting conservative options, a period of immobilisation should be considered prior to surgical referral.[21]

Plantar heel pain

Although plantar heel pain can have many causes, by far the most common is plantar fasciitis.[24] Classically patients describe their symptoms as pain in the region of the medial calcaneal tubercle, which is worse first weight bearing in the morning in or after sitting. Typically the pain reduces after walking a few steps but then increases with prolonged weight bearing. Little is known about the natural course of the condition, but current best estimates suggest relief of symptoms in over 80% of patients within 12 months.[24-26]

Diagnoses can be made with reasonable certainty on the basis of history and clinical assessment alone. On palpation it is frequently possible to define a localised area of maximal tenderness on the anteriomedial border of the calcaneus at the attachment of the plantar fascia (Figure 2). Imaging can be useful to confirm a diagnosis where there is doubt, but is not routinely needed. In particular, ultrasound is increasingly available

and can identify peri-insertional inflammation, thickening of the plantar fascia, and tears in the bands of the plantar fascia.[27]

The mainstay of treatment in plantar fasciitis is stretching. Typically stretches of both the Achilles tendon and plantar fascia are recommended, but recent evidence suggests plantar fascia specific stretches may be more beneficial.[25,28] There is some evidence that Low-Dye taping can help relieve pain in the short term (three to five days) but it is not practical in the longer term.[29] More robust randomised control trial evidence demonstrates that foot orthoses offer relief from symptoms over a longer period of time (three months), but they offer little benefit over placebo by 12 months.[30] The same study also noted that there was little difference between custom made insoles and cheaper, prefabricated devices. Prefabricated insoles are now widely available, and can be used as a first line therapy by a range of clinicians or even purchased over the counter by patients.

Treatment of recalcitrant plantar fasciitis often involves corticosteroids injected through a medial approach to the insertion of the plantar facia onto the calcaneus.[31] This is a very painful injection, and limited data suggests it provides only a very short term (one month) benefit over local anaesthetic alone[32] but may be associated with an increased risk of rupture.[24,33] Surgery mainly consists of plantar fascial release and should only be considered for a very small subgroup of patients with severe symptoms that fail to respond to aggressive conservative therapy, including a period of immobilisation.[24]

Although plantar and posterior heel pain is predominantly of mechanical origin, clinicians should always be aware of the possibility of systemic disease. The attachments of both the Achilles, and plantar fascia are often referred to as the archetypal entheses in the human body and inflammation in these sites (enthesitis) is a hall mark of the

Box 1: Haglund deformity

- Two subtypes of Haglund deformity but both affect posterior aspect of calcaneus
- First line management should remove external irritation through use of appropriate footwear
- Surgery should only be considered after exhausting all conservative options

Box 2: Plantar fasciitis

- Tenderest point can often be localised to medial tubercle of calcaneus
- Pain is worst on first weight bearing and after rest
- Plantar fascia stretches are mainstay of management but can be combined with taping and orthoses

JANUVIA®▼sitagliptin

PRESCRIBING INFORMATION

Refer to Summary of Product Characteristics (SPC) before prescribing

Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard. Adverse events should also be reported to MSD (tel: 01992 467272).

PRESENTATION

25 mg film-coated tablet containing 25 mg of sitagliptin

50 mg film-coated tablet containing 50 mg of sitagliptin

100 mg film-coated tablet containing 100 mg of sitagliptin.

USES

For adult patients with type 2 diabetes mellitus 'Januvia' is indicated to improve glycaemic control:

as monotherapy

- in patients inadequately controlled by diet and exercise alone and for whom metformin is inappropriate due to contraindications or intolerance

as **dual oral therapy** in combination with

- metformin when diet and exercise plus metformin alone do not provide adequate glycaemic control
- a sulphonylurea when diet and exercise plus maximal tolerated dose of a sulphonylurea alone do not provide adequate glycaemic control and when metformin is inappropriate due to contra-indications or intolerance
- a $PPAR_\gamma$ agonist (i.e. a thiazolidinedione) when use of a $PPAR_\gamma$ agonist is appropriate and when diet and exercise plus the $PPAR_\gamma$ agonist alone do not provide adequate glycaemic control

as **triple oral therapy** in combination with

- a sulphonylurea and metformin when diet and exercise plus dual therapy with these medicinal products do not provide adequate glycaemic control.
- a $PPAR_\gamma$ agonist and metformin when use of a $PPAR_\gamma$ agonist is appropriate and when diet and exercise plus dual therapy with these medicinal products do not provide adequate glycaemic control.

Januvia is also indicated as add-on to insulin (with or without metformin) when diet and exercise plus stable dosage of insulin do not provide adequate glycaemic control.

DOSAGE AND ADMINISTRATION

One 100 mg tablet once daily, with or without food. When sitagliptin is used in combination with metformin and/or a $PPAR_\gamma$ agonist, maintain the dosage of metformin and/or $PPAR_\gamma$ agonist, and administer sitagliptin concomitantly. When used in combination with a sulphonylurea or with insulin, consider a lower dose of sulphonylurea or insulin, to reduce risk of hypoglycaemia. If a dose of Januvia is missed, take as soon as the patient remembers. Do not take a double dose on the same day.

Renal impairment: when considering use in combination with other anti-diabetic products, check conditions for use in patients with renal impairment. No dosage adjustment required for mild renal impairment (creatinine clearance [CrCl] ≥50 ml/min). For patients with moderate renal impairment (CrCl ≥30 to <50 mL/min), the dose of 'Januvia' is 50 mg once daily. For patients with severe renal impairment (CrCl <30 mL/min) or with end-stage renal disease (ESRD) requiring haemodialysis or peritoneal dialysis, the dose of 'Januvia' is 25 mg once daily. 'Januvia' may be administered without regard to the timing of dialysis. Because there is a dosage adjustment based upon renal function, assessment of renal function is recommended prior to initiation of 'Januvia' and periodically thereafter. Hepatic impairment: no dosage adjustment necessary for patients with mild to moderate hepatic impairment. Januvia has not been studied in patients with severe hepatic impairment. Elderly: no dosage adjustment necessary. Exercise care in patients ≥ 75 years of age as there are limited safety data in this group. Children: not recommended in children below 18 years of age.

CONTRA-INDICATIONS

Hypersensitivity to active substance or excipients.

PRECAUTIONS

General: do not use in patients with type 1 diabetes or for diabetic ketoacidosis.

Pancreatitis: Post-marketing experience - spontaneously reported adverse reactions of acute pancreatitis. Inform patients of the symptom of acute pancreatitis: persistent, severe abdominal pain. Resolution of pancreatitis has been observed after discontinuation of sitagliptin, but very rare cases of necrotizing or haemorrhagic pancreatitis and/or death have been reported. If pancreatitis is suspected, 'Januvia' and other potentially suspect medicinal products should be discontinued.

Hypoglycaemia when used with other anti-hyperglycaemic agents: Rates of hypoglycaemia reported with sitagliptin were generally similar to rates in patients taking placebo. When sitagliptin was added to a sulphonylurea or to insulin, the incidence of hypoglycaemia was increased over that of placebo; therefore consider a lower dose of sulphonylurea or insulin to reduce the risk of hypoglycaemia. Renal impairment: 'Januvia' is renally excreted. To achieve plasma concentrations of 'Januvia' similar to those in patients with normal renal function, lower dosages are recommended in patients with moderate and severe renal impairment, as well as in ESRD patients requiring haemodialysis or peritoneal dialysis (see section 'Dosage and administration' above and section 4.2 and 5.2 of the SmPC). Hypersensitivity reactions: Serious hypersensitivity reactions have been reported, including anaphylaxis, angioedema, and exfoliative skin conditions including Stevens-Johnson syndrome. Onset occurred within the first 3 months after initiation of treatment with some reports occurring after the first dose. If suspected, discontinue 'Januvia', assess for other potential causes and institute alternative treatment for diabetes.

Drug interactions

Low risk of clinically meaningful interactions with metformin and ciclosporin. Meaningful interactions would not be expected with other p-glycoprotein inhibitors. The primary enzyme responsible for the limited metabolism of sitagliptin is CYP3A4, with contribution from CYP2C8.

Digoxin: sitagliptin had a small effect on plasma digoxin concentrations, and may be a mild inhibitor of p-glycoprotein in vivo. No dosage adjustment of digoxin is recommended, but monitor patients at risk of digoxin toxicity if the two are used together.

Pregnancy and lactation: Do not use during pregnancy or breast-feeding.

SIDE EFFECTS

Refer to SPC for complete information on side effects

Sitagliptin monotherapy: *Common (≥ 1/100 to <1/10)*: upper respiratory tract infection[1], nasopharyngitis[1], osteoarthritis[1], pain in extremity[1] hypoglycaemia[2], headache; *Uncommon: (≥ 1/1,000 to <1/100)*: dizziness, constipation. Combination with metformin: *Common (≥ 1/100 to <1/10)*: hypoglycaemia[2], nausea, flatulence, vomiting; *Uncommon (≥ 1/1,000 to <1/100)*: somnolence, constipation, upper abdominal pain, diarrhoea, blood glucose decreased. Combination with a sulphonylurea: *Common (≥ 1/100 to <1/10)*: hypoglycaemia[2]. Combination with metformin and a sulphonylurea: *Very common (≥1/10)*: hypoglycaemia[2]; *Common (≥ 1/100 to <1/10)*: constipation. Combination with a $PPAR_\gamma$ agonist (pioglitazone): *Common (≥ 1/100 to <1/10)*: hypoglycaemia[2], flatulence, peripheral oedema, blood glucose decreased. Combination with a $PPAR_\gamma$ agonist and metformin: *Common (≥ 1/100 to <1/10)*: upper respiratory tract infection[1], headache, diarrhoea, vomiting, hypoglycaemia[2], peripheral oedema, cough[1]; *Uncommon (≥ 1/1,000 to <1/100)*: fungal skin infection[1]. Combination with insulin with/without metformin: *Common (≥ 1/100 to <1/10)*: headache, hypoglycaemia[2], influenza; *Uncommon (≥ 1/1,000 to <1/100)*: dry mouth, constipation.

Adverse events with sitagliptin alone in clinical studies, or during post-approval use alone and/or with other diabetes medicines where frequency is not known: hypersensitivity reactions including anaphylactic responses (see section 4.4)[‡,‖], interstitial lung disease[‡], vomiting[‡], acute pancreatitis[‡] fatal and non-fatal haemorrhagic and necrotizing pancreatitis[‡,†], angioedema[‡,†], rash[‡,§], urticaria[‡,§], cutaneous vasculitis[‡,†], exfoliative skin conditions[‡,§] including Stevens-Johnson syndrome[‡,§], arthralgia[‡], myalgia[‡], impaired renal function[‡], acute renal failure[‡].

† Based on incidence regardless of causal relationship.

‡ Adverse reactions were identified through postmarketing surveillance.

§ 54-week time point.

‖ See precautions.

PACKAGE QUANTITIES AND BASIC NHS COST

28 Tablets: £33.26

Marketing Authorisation Number

EU/1/07/383/002 – **Januvia** 25 mg tablets

EU/1/07/383/008 – **Januvia** 50 mg tablets

EU/1/07/383/014 – **Januvia** 100 mg tablets

Marketing Authorisation Holder

Merck Sharp & Dohme Limited

Hertford Road, Hoddesdon, Hertfordshire EN11 9BU, UK

POM **Date of review of prescribing information: March 2012**

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MSD

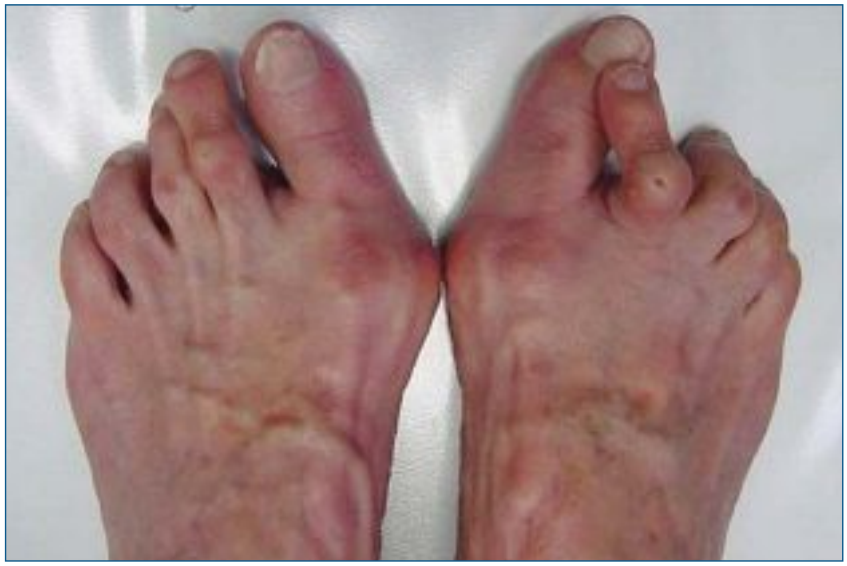

Fig 3: Bilateral hallux valgus with associated lesser toe deformity and hyperkeratotic lesions
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spondyloarthropathies. In particular ankylosing spondylitis, psoriatic arthritis, and reactive arthritis frequently affect entheses in the foot so clinicians should consider referring to rheumatologists in someone with severe and persistent enthesitis at the Achilles or plantar insertion. If there is co-existent psoriasis or inflammatory back pain these are additional clues to inflammatory disease.

Box 3: Morton's meuroma

- Fusiform lesion on intermetatarsal nerve, predominately between the 3rd & 4th metatarsal
- Symptoms can be resolved in milder cases through change in footwear alone
- Treatment usually escalated through three stage protocol if symptoms do not resolve

Forefoot pain

Pain in the forefoot, including the toes, accounts for 21% of non-traumatic foot and ankle consultations[15] but a much larger proportion of the population have clinically important forefoot pathology.[2,14] Pain in the ball of the foot is often described as metatarsalgia, but this in itself is not a diagnosis and can have many causes. Atrophy of the foot's intrinsic muscles along with the plantar fat pad is common in the elderly and results in a loss of natural cushioning under the metatarsal heads.[34]

This is exacerbated in patients with toe deformities and results in areas of increased pressure, which in turn causes pain.[34] Simple cushioning insoles and footwear advice can often be sufficient for many such patients but clinicians should remain alert to more serious systemic disease which can often first present in the forefoot[35,36] as well as having an awareness of the first line management of other common forefoot pathologies.

Morton's neuroma

Morton's neuroma is a benign neuroma of the plantar intermetatarsal nerves, where they branch into plantar digital nerves. They occur more commonly in females and typically affect the third or fourth intermetatarsal space (Figure 2). It is thought that Morton's neuromas are caused by repeated trauma of the nerve and perineural connective tissue elements between the metatarsals. This results in fibrous proliferation of the nerve and the development of a fusiform lesion which includes nerve fasciculi among the lesion.[37,38] Patients typically complain of a sudden sharp, or burning pain in the plantar aspect of their feet in the intermetatarsal space at the level of the metatarsal heads. Other common descriptions include a sensation of walking on a "lump" or "pebble", and feeling an urgency to remove footwear and massage the affected foot to relieve the pain. Pain and paraesthesia often radiate into the contiguous halves of the two toes either side of the effected plantar nerve and can be aggravated by footwear with a raised heel or tight forefoot as this puts more pressure on the forefoot.

The diagnosis of Morton's neuroma can usually be made on account of the highly characteristic history and physical examination alone. Pain can be provoked by squeezing the metatarsals together in a medial-lateral direction and applying pressure to the intermetatarsal space using a thumb.[39] This can also elicit a painful, palpable "Mulder's click" which arises from the plantar displacement of the neuroma from the intermetatarsal space. Imaging can, however, be useful to eliminate alternative diagnoses such

Box 4: Hallux valgus

- Affect over one in three over age of the age of 55 and have marked impact on quality of life
- Limited evidence for conservative therapies but may help reduce pain
- Hallux valgus correction is the most commonly performed foot operation

as bursitis and soft tissue tumours where there is doubt, as neuromas can be detected with both MRI and ultrasound imaging.[39,40]

Evidence to support effective treatment of Morton's Neuroma is lacking but treatment tends to escalate through a three stage protocol if symptoms persist.[41] After the diagnosis is made, patient education should address the role of mechanical trauma in the aetiology of a neuroma and patients should be advised to use suitable flat footwear with adequate width in the forefoot and a well cushioned sole: simply changing footwear can often be enough to alleviate symptoms in milder cases. Orthoses can also be helpful and metatarsal pads are often placed proximally to the neuroma to try to reduce compression between the adjacent metatarsals. Simple conservative measures such as these may be effective in approximately 40% of patients.[41] If symptoms are not adequately controlled, treatment is typically escalated to corticosteroid injections into the intermetatarsal space prior to considering surgical excision.[41] Neuromas can be excised as a day case procedure through a small excision on the dorsum of the foot. Success rates between 80% and 90% are typically reported,[42 43] although symptoms can occasionally return following the development of a "stump neuroma" at the distal end of the transected nerve.[44]

Hallux valgus

Hallux valgus or "bunions" are the most common foot deformity with a prevalence of 36% in people over the age of 55 years.[14] Despite being so widespread, this should not be seen as a benign condition. Hallux valgus can be painful, and has been shown to have a marked impact on patients' quality of life.[14,45,46] The condition has also been shown to have a significant impact on balance[9] and gait patterns,[9] as well as being an independent risk factor for falls in older people.[47,48]

Clinically, lateral displacement of the hallux is accompanied by a medial deviation of the first metatarsal and results in the progressive subluxation of the first metatarsophalangeal joint[49] (Figure 3). As the deformity progresses, lateral deviation of the hallux begins to interfere with the normal alignment of the lesser toes causing hammer toe or claw deformities and accentuating changes in gait. Pressure from footwear can cause painful hyperkeratotic lesions (corns and calluses) on both the plantar and dorsal aspects of the foot, and may also lead to the development of an adventitious bursa on the medial prominence of the bunion.[50]

The aetiology of hallux valgus is not fully understood but thought to be multifaceted. With ~90% of patients reporting a positive family history, there is some evidence of a genetic association,[51,52] but other, modifiable factors such as inappropriate footwear are also thought to play an important role as the condition barely exists (<4%) in unshod populations.[53,54] As such, encouraging patients to wear appropriate footwear to accommodate the deformity is an important aspect of conservative management but this is not a straightforward task due to the importance particularly women, place on the appearance of their footwear.[55-57]

Other conservative therapies such as splints and orthoses are often advocated but appear to have only a limited effect on symptoms and do not correct deformity.[58] Surgery is therefore very common with hallux valgus corrections accounting for the majority of foot operations.[59,60] Although the vast majority of reported outcomes are very positive in terms of reducing pain and deformity, about 30% of patients appear to consistently be dissatisfied with the outcome.[61] This has recently been linked to the women's perceptions of the post-operative appearance of their foot and the range of footwear they are able to wear.[61]

Conclusion

The burden of musculoskeletal foot pathology in the general population is frequently trivialised but causes patients significant impairment. All clinicians should be able to identify a range of common pathologies, implement first line treatments, and be able to refer patients for more specialised interventions when appropriate.

Conflict of interest: none declared

References are available on online version at: www.gmjournal.co.uk