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. Furthermore, a substantially higher proportion has hallux valgus (bunions), hyperkeratotic lesions (corns and calluses) and nail pathologies upon clinical examination. The prevalence of foot problems further increases with age, obesity, female gender, inflammatory arthritis, and diabetes. 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, reduced walking speed, problems with balance, and an increased risk of falls.

People with foot problems consistently report reduced quality of life, suggesting that the impact of foot disorders extends well beyond localised pain and discomfort.

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). 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.

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, with similar figures reported for higher risk rheumatology patients.

Posterior heel pain
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determine the size of the osseous prominence, as well as the degree of tendinopathy and bursitis.\textsuperscript{18,19,23} Exostoses on the postero-lateral aspect of the calcaneus are commonly referred to as a “Type I Haglund deformity”, “Pump bump”, or more correctly “superficial calcaneal bursitis.”\textsuperscript{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 \textsuperscript{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.\textsuperscript{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.\textsuperscript{22} Local inflammation can be reduced through ice, stretching, and NSAIDs as appropriate.\textsuperscript{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.\textsuperscript{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.\textsuperscript{23} After exhausting conservative options, a period of immobilisation should be considered prior to surgical referral.\textsuperscript{21}

**Plantar heel pain**

Although plantar heel pain can have many causes, by far the most common is plantar fasciitis.\textsuperscript{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 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.\textsuperscript{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 anteromedial 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.

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. 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. 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. 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 fascia onto the calcaneus. This is a very painful injection, and limited data suggests it provides only a very short term (one month) benefit over local anaesthetic alone but may be associated with an increased risk of rupture. 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. 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 hallmark 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
150 mg film-coated tablet containing 150 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 contraindications or intolerance.
  - a PPARγ agonist (i.e. a thiazolidinedione) when use of a PPARγ agonist is appropriate and when diet and exercise plus the PPARγ 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 PPARγ agonist and metformin when use of a PPARγ 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 inulin (with or without metformin) when diet and exercise plus stable dosage of inulin do not provide adequate glycaemic control.

DOSEAGE AND ADMINISTRATION
One 100 mg tablet once daily, with or without food. When sitagliptin is used in combination with metformin and/or a PPARγ agonist, maintain the dosage of metformin and/or PPARγ agonist, and administer sitagliptin concurrently. When used in combination with a sulphonylurea or with inulin, consider a lower dose of sulphonylurea or inulin, 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 severe renal impairment (CrCl <30 mL/min) or 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. Discontinue if acute 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-glucoprotein inhibitors. The primary enzyme responsible for the limited metabolism of sitagliptin is CYP3A4, with contribution from CYP2C8. Dialysis: sitagliptin had a small effect on plasma drug Cmax concentrations, and may be a mild inhibitor of p-glucoprotein in vitro. No dosage adjustment of dialysis is recommended, but monitor patients at risk of dialysis 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 infections, nasopharyngitis, otitis media, pain in extremities, hypoglycaemia, headache, insomnia, dizziness, constipation. Combination with metformin: Common: 1/100 to <1/10: hypoglycaemia, 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. Combination with metformin and a sulphonylurea: Very common (1/1000): hypoglycaemia. Common: 1/100 to <1/10: constipation. Combination with a PPARγ agonist (pioglitazone): Common: 1/100 to <1/10: hypoglycaemia, fluid retention, peripheral oedema, cough, uncommon: 1/1000 to <1/100: fungal skin infection. Combination with inulin with without metformin: Common: 1/100 to <1/10: headache, hypoglycaemia, influenza, uncommon: 1/1000 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). Islet cell antibodies, vomiting, acute pancreatitis, fulminating and non-fatal haemorrhagic and necrotising pancreatitis, angioedema, rash, urticaria, cutaneous vasculitis, exfoliative skin conditions, including Stevens-Johnson syndrome, erythema, 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. II 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
Mercia Sharp & Dohme Limited
Hertford Road, Hoddesdon, Hertfordshire EN11 9BU, UK

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PL J54 ALL.12.9.UK.3615

References:
2. IMS Health, NPA Monthly, TrEs, October 2006—November 2011
3. Ferreira JCA, et al. Efficacy and Safety of Sitagliptin versus Glipizide in Patients with Type 2 Diabetes and Mordulate to Severe Chronic Renal Insufficiency, PN 005, Poster, 2011 EASD.
4. Ferreira JCA, et al. Efficacy and Safety of Sitagliptin vs. Glipizide in Patients with Type 2 Diabetes Mellitus and End-stage Renal Disease on Dialysis: A 54-week Randomized Trial, PN 073, Poster, 2011 EASD.

Januvia (sitagliptin)
spondyloarthopathies. 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.

**Forefoot pain**

Pain in the forefoot, including the toes, accounts for 21% of non-traumatic foot and ankle consultations but a much larger proportion of the population have clinically important forefoot pathology. 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. This is exacerbated in patients with toe deformities and results in areas of increased pressure, which in turn causes pain. 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 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.

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. 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 as...
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34 although symptoms can occasionally return following the development of a “stump neuroma” at the distal end of the transected nerve.\textsuperscript{44}

**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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{41} If symptoms are not adequately controlled, treatment is typically escalated to corticosteroid injections into the intermetatarsal space prior to considering surgical excision.\textsuperscript{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,\textsuperscript{45,43}

although symptoms can occasionally return following the development of a “stump neuroma” at the distal end of the transected nerve.\textsuperscript{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.\textsuperscript{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.\textsuperscript{14,45,46}

The condition has also been shown to have a significant impact on balance\textsuperscript{9} and gait patterns,\textsuperscript{9} as well as being an independent risk factor for falls in older people.\textsuperscript{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\textsuperscript{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.\textsuperscript{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,\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{58} Surgery is therefore very common with hallux valgus corrections accounting for the majority of foot operations.\textsuperscript{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.\textsuperscript{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.\textsuperscript{62}

**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