

Please note, once printed or downloaded, articles cannot be updated. By bookmarking the article and continuing to access it online, you can be sure you are reading the most up-to-date information and that you are not in breach of copyright laws.

Forefoot pain

1. Forefoot pain

Forefoot pain presents a real diagnostic challenge to many of us in primary care. We'll demystify it here, looking at the most common conditions and thinking about an anatomical framework to aid diagnosis. This article is based on a 2020 BMJ 10-minute Consultation (BMJ 2020;371: m3704).



This article was updated in December 2024.

1.1. Forefoot pain: key history points

The forefoot is defined as the metatarsals and everything distal to them. Location of the pain is key. Ask:

- Is this affecting the 1st ray (big toe) or the rest of the lateral forefoot (2nd–5th rays)?
- Is it the base of the metatarsal, midshaft, metatarsophalangeal (MTP) joint or toes?
- Is the pain plantar or dorsal?
- What's the nature of the pain, e.g. ache, sharp?
- Has there been trauma and is the skin broken?
- Is the pain of acute or insidious onset?
- Other clues, e.g. history of gout, psoriasis, rheumatoid arthritis or other inflammatory condition?

Pitfalls: beware those with peripheral vascular disease, diabetes or known peripheral neuropathy:

- They may present late.
- There is an increased risk of developing limb-threatening complications.
- Consider osteomyelitis in the presence of ulceration.

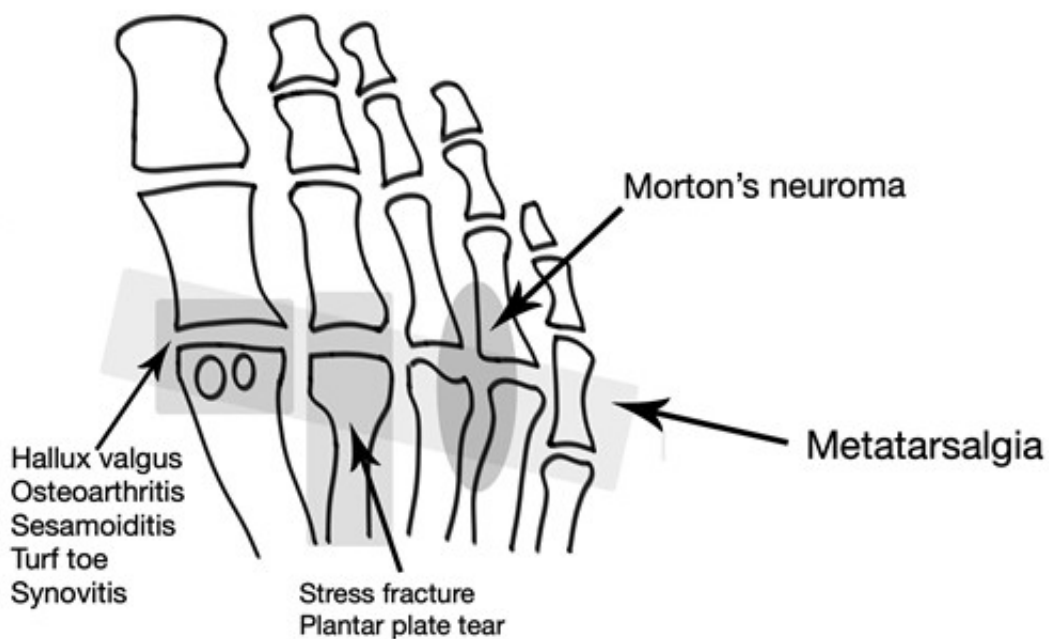
Have a low threshold for referral to your local foot clinic (*do you know your local pathway for urgent diabetic foot assessment?*).

See our article on *Foot care in type 1 and type 2 diabetes*.

1.2. Forefoot pain: differential diagnosis

The common conditions affecting the forefoot are listed in the table below, divided into 1st ray conditions and the rest. The picture illustrates the location of some of these common conditions.

1st ray (big toe) conditions	Lateral forefoot conditions (2nd–5th ray)
Hallux valgus (bunion)	Metatarsalgia (synovitis)
Hallux limitus and rigidus (OA 1st MTP joint)	Morton's neuroma/interdigital bursitis
Sesamoiditis	Stress fracture
Sprain 1st MTP joint (turf toe)	Plantar plate tear
Acute synovitis (most likely gout)	Hammer toes



1.3. Forefoot pain: investigations

- **X-ray** may be useful to aid diagnosis of several conditions, including osteoarthritis,

fracture and hallux valgus. Special sesamoid-specific views may be required in sesamoiditis. Beware the normal X-ray in an early stress fracture; if clinically suspected, an MRI may be required. Inflammatory conditions may generate characteristic erosive changes, e.g. gout.

- **Ultrasound** may help to diagnose Morton's neuroma, although the diagnosis is usually clinical.
- **MRI (secondary care)** may be helpful in diagnosing stress fracture as it has a higher sensitivity for than X-ray.
- **NM bone scan** is a sensitive investigation for stress fracture but has been superseded by MRI.

1.4. Forefoot pain: conditions affecting the 1st ray

Hallux valgus 'bunion'

- A progressive lateral (valgus) angulation of the great toe on a medially-splayed 1st metatarsal.
- Hallux valgus may coexist with a degree of osteoarthritis, which may contribute significantly to symptoms.
- Exostoses form around the MTP joint, which can limit range of movement.
- A bursitis commonly develops over the medial tip due to pressure on footwear.

Who gets it?

- More common in females.
- Family history common.
- More common with increasing age, although *can* develop in the young (Foot Ankle

Spec 2010; 3:10-14).

Pain may develop due to compression of the broad forefoot into a narrow shoe, especially if the heel is high, and is often relieved by removing the shoe.

Investigation and treatment of hallux valgus	
Asymptomatic (may look quite bad!)	<ul style="list-style-type: none">• Simple footwear advice, foot care (nails, corns and callus) and reassurance. NO need to X-ray.
First line	<ul style="list-style-type: none">• Roomy, broad footwear. Not the height of fashion. Training in breaking bad news may be useful!• Bunion shield padding.• Orthoses.• Toe spreaders may help pain but do not slow progression (Prosthet Orthot Int. 2008 Mar;32(1):79-83).
Second line (ongoing pain despite the above)	<ul style="list-style-type: none">• Consider X-ray (no need to X-ray bunions that are not bothersome) and referral to orthopaedic surgeon. There are several surgical options.

Hallux limitus (or...hallux rigidus if little or no movement is possible)

- Osteoarthritis 1st MTP joint:
 - Pain and tenderness around 1st metatarsophalangeal joint line.
 - Bony swelling/osteophytes.
 - Stiffness: range of movement is reduced.

The diagnosis is usually clinical but may be confirmed on plain radiograph.

- Management:
 - Stiff-soled, low-heeled shoes, e.g. hiking boots. Soft upper if possible.
 - Orthotics designed to reduce motion of the 1st MTP joint.
 - Physiotherapy may help to mobilise the joint.
 - Intra-articular corticosteroid injection.
 - Surgery, e.g. cheilectomy (removal of excess bone) or 1st MTP joint fusion.

Sesamoiditis

- Pain from inflammation around the sesamoid bones which lie under the head of the 1st MTP joint.
- Plantar pain, typically during the toe-off phase of the gait.
- The sesamoids may also fracture, become infected or suffer avascular necrosis.
- Specific sesamoid X-ray views may be required, and MRI may be useful to assess further.
- Management may consist of:
 - NSAID.
 - Reduced weight-bearing or immobilisation.
 - Cushioned insoles to specifically off-load the sesamoids.
 - Referral to consider surgical options, e.g. sesamoidectomy.

1st MTPJ sprain (turf toe)

- Acute hyperextension injury of the plantar plate at the first MTP joint (J Foot Ankle Surg. 2020;59(1):112-116).

- Caused by excessive 1st MTPJ loading and pivotal movement; often a traumatic sporting injury.
- Usually presents to A&E unless mild, but may occasionally present to GP.
- More common since artificial turf developed (JBJS reviews: Aug 2019 vol.7).
- Tender and swollen 1st MTPJ +/- pain on drawer testing (manual translation).
- Weight-bearing X-ray (may be normal). MRI may be required to assess severity.
- No evidence-based management guideline. Brukner & Khan (Clinical Sports Medicine 4th Ed., 2012) suggest:
 - Grade I injury (a little bruising/swelling): symptomatic management and early return to sport.
 - Grade II injury (partial tear of plantar structures): crutches, walking boot or stiff-soled shoes, taping on return to sport.
 - Grade III (severe) injuries: may require long-term immobilisation (cast) or surgical reconstruction with rehabilitation.

Acute synovitis 1st MTPJ

- Causes:
 - Acute gout is the most common cause (Am J Emerg Med 2004;22(4);320-1).
 - As part of a more generalised polyarticular inflammatory arthropathy, e.g. rheumatoid or psoriatic arthritis.
 - Inflammatory flare of osteoarthritis.

Important practice point: reassuringly for us in primary care, septic arthritis of the first MTP joint is rarely reported (Injury Extra, 2007, Vol. 38). In the absence of strong indicators, e.g. recent surgery, high fever, local infection, penetrating trauma, it is reasonable to assume that an acute-onset, spontaneous monoarthritis of the 1st MTPJ is gout. Also note that gout may cause a mild fever (Trans Assoc Am Physicians,

1983;96:234-45).

1.5. Lateral forefoot pain (rays 2–5)

Metatarsalgia

- One of those non-specific terms that makes doctors sound clever. It simply means pain in the ball of the foot!
- Not a distinct diagnosis.
- Many possible causes (Orthopaedics 2019 Jan 1;42(1)).
- Possible underlying MTP joint synovitis due to chronic excessive pressure (Clinical Sports Medicine, Brukner & Khan, 4th ed, 2012).

Pain may be like “walking on pebbles, doctor”, and there is usually tenderness around the plantar metatarsal heads. It usually affects the 2nd, 3rd and 4th MTP joints but can be solitary in the 1st MTP joint.

Possible causes (which all overload the forefoot):

- Obesity.
- High heels.
- Pes cavus.
- Toe deformities.
- Tight calf or stiff ankle (leading to a more plantarflexed foot and early heel-lift during walking).
- Transfer of impact force laterally from the first ray (first ray insufficiency), e.g. hallux limitus or a bunion.

A thorough assessment by a physiotherapist or podiatrist may be required to find the

cause, and imaging may be required (plain radiography, ultrasound or MRI).

Management depends on the cause, and may include:

- Correction of the biomechanical contributing factors.
- Padding.
- NSAIDs.
- Orthoses.
- Footwear.
- Surgical opinion is occasionally required.

Morton's neuroma

Morton's neuroma is a misnomer. It is not a true neuroma. It's actually a benign, fibrotic thickening of the nerve, most commonly felt as pain in the third web space and associated with digital artery ischaemia (JAMA 2023;330:2285).

- A common cause of forefoot pain.
- The second most common compressive neuropathy (after carpal tunnel syndrome).
- Typical presentation age 45–54y.
- 4–15 times more common in women.
- It may be caused by constrictive, high-heeled footwear which compresses the forefoot and/or repetitive, heavy impact on the feet.

Symptoms may include:

- Neuropathic-type pain in the forefoot, felt on weight-bearing(JAMA 2023;330:2285).
- It may feel like walking on a pebble; the pain is often relieved by removing the footwear.

- There may be altered sensation in the toes.

Ultrasound or not? Probably not. A study compared the diagnostic accuracy of clinical tests for Morton’s neuroma with ultrasound, and found that clinical assessment was just as good (J Foot Ankle Surg. 2015;54(4)). 97% of patients undergoing surgery for clinical Morton’s neuroma have histologically-proven Morton’s neuroma. Imaging would primarily be used to rule out other pathologies (JAMA 2023;330:2285).

While the famous-yet-tricky-to-elicite ‘Mulder’s click’ only had a sensitivity of 61%, you will be pleased to learn that a simple thumb index-finger squeeze of the webspace had 96% sensitivity and specificity. The size of the pseudo-neuroma was larger in those with a positive Mulder’s click.

Treatment options include:

- Modification of footwear.
- Metatarsal pads (available OTC).
- Trial of NSAIDs.
- If symptoms persist >3 months then referral for a dome orthotic.
- More specialist treatments include corticosteroid injection or surgical intervention. A systematic review reported that around 30% of those having corticosteroid injection eventually undergo operative treatment (Clin Orthop Surg 2021;13:266).

Stress fracture

Stress fracture	
Cause	<ul style="list-style-type: none"> • Overuse injury: <ul style="list-style-type: none"> • Unaccustomed increases in load duration and/or intensity.

	<ul style="list-style-type: none"> • Inadequate recovery periods. • Calf muscle fatigue increases forefoot loading. • Absence of direct trauma. • Low BMD may predispose to this injury (consider female athlete triad).
Site	<ul style="list-style-type: none"> • Most common in neck of 2nd metatarsal. • Ballet dancers – base of the 2nd metatarsal. • 5th metatarsal metaphysis: high risk for complete fracture, need orthopaedic referral.
Symptoms and signs	<ul style="list-style-type: none"> • Gradual onset of pain over a few weeks. • Initially pain towards the end of exercise. • Progressively more constant. • Worse when weight is put on the area. • There may be localised tenderness.
Investigation	<ul style="list-style-type: none"> • X-ray lacks sensitivity (15–35%), especially early in the condition (Acta Orthop Scand 2002;73(3):359-368). • MRI detects almost 100% (Am J Sports Med 2016;44(1)).
Management	<ul style="list-style-type: none"> • Rest followed by activity modification. • Stiff, rocker-soled footwear. • Orthopaedic intervention may be required for: <ul style="list-style-type: none"> • Non-healing fractures. • Those involving the 5th metatarsal.

Plantar plate tear

The plantar plate is a thickening of the capsule under the MTPJ. Repeated overload leads to development of a tear.

- A common cause of pain under the 2nd MT head (but may occur at any MTPJ).
- Pain is usually of gradual onset. May cause neuroma-type pain.
- There may be a positive 'drawer test' (sometimes called 'floating toe syndrome'), and there may be retraction and medial deviation of the 2nd toe, causing a 'V'-sign or 'gapping'. *Note that splaying of the toes sometimes occurs in Morton's neuroma or synovitis, e.g. rheumatoid arthritis, but splaying at the 2nd MTPJ is more likely a plantar plate tear than Morton's neuroma.*
- Pain is worse on dorsiflexion of the joint.

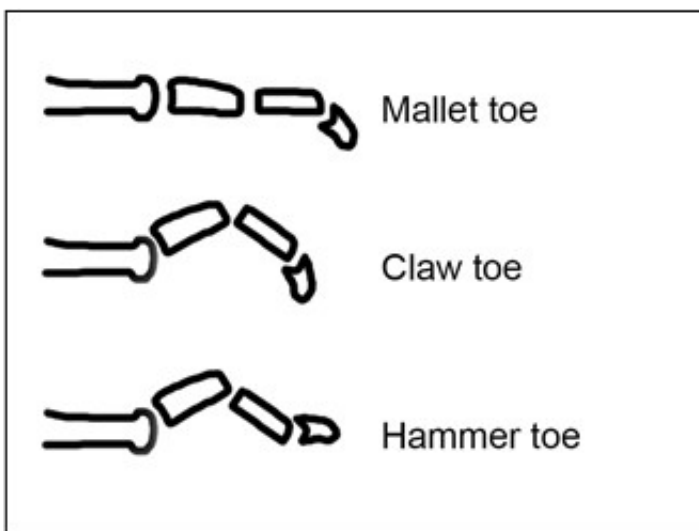
Treatment

- Rest, NSAID and immobilisation may help the pain.
- Strapping the toe to prevent translation may help to stabilise the joint and allow healing.
- Orthoses, e.g. metatarsal dome and a stiff-soled shoe/boot.
- Surgery may be required if conservative measures fail.

1.6. Toe deformities

- Claw toe:
 - Contraction of the tendons of the long toe flexors with hyperextension at the MTP joint (see picture).
 - Usually affects all 4 lateral toes.
 - Often caused by neurological issues, e.g. peripheral neuropathies, rather than tight footwear.

- The clawing itself isn't painful but it can alter forefoot biomechanics and lead to abnormal friction/loading.
- Corns, calluses and ulcers may follow.
- Associated mechanical overloading of the metatarsal heads may cause metatarsalgia (see above).
- Hammer toe and mallet toe:
 - May affect one or more of 2nd (commonest), 3rd or 4th toes.
 - May be caused by tight or high-heeled shoes, trauma or muscular imbalance.
 - Treatment may involve change of footwear, pads or orthotics.
 - Occasionally, surgical intervention is required.





Forefoot pain

- Location of forefoot pain is your greatest diagnostic aid.
- Asymptomatic bunions require only advice; don't routinely X-ray asymptomatic bunions.
- Ultrasound is not usually required for diagnosis of Morton's neuroma.
- Footwear and activity modification, padding, physiotherapy and orthotics manage most forefoot conditions effectively.
- Have a low threshold for referring diabetic patients to foot clinic.



Useful resources:

Websites (all resources are hyperlinked for ease of use in Red Whale Knowledge)

- [British Orthopaedic Foot & Ankle Society \(BOFAS\) – a guide to metatarsalgia and lesser toe deformities](#)

This information is for use by clinicians for individual educational purposes, and should be used only within the context of the scope of your personal practice. It should not be shared or used for commercial purposes. If you wish to use our content for group or commercial purposes, you must contact us at sales@red-whale.co.uk to discuss licensing, otherwise you may be infringing our intellectual property rights.

Although we make reasonable efforts to update and check the information in our content is accurate at the date of publication or presentation, we make no representations, warranties or guarantees, whether express or implied, that the information in our products is accurate, complete or up to date.

This content is, of necessity, of a brief and general nature, and this should not replace your own good clinical judgment or be regarded as a substitute for taking professional advice in appropriate circumstances. In particular, check drug doses, side effects and interactions with the British National Formulary. Save insofar as any such liability cannot be excluded at law, we do not accept any liability for loss

of any type caused by reliance on the information in these pages.

Here is the link to our [terms of use](#).