Focus On
Rheumatoid Forefoot

Introduction
Rheumatoid arthritis (RA) is a systemic disease affecting not only the joints, but also the connective tissues. As a polyarticular disease, the treating surgeon needs to consider the patient as a whole. Treatment of one joint in isolation can be dangerous if, for example, cervical spinal disease is not considered.

Foot pain and deformity occur as the presenting feature in 20% of patients with RA. Nevertheless, during the course of their disease 94% of patients with RA will have symptoms of pain or stiffness in the foot and ankle. Consequently, the treatment of the rheumatoid foot is important.

Patients with RA are immunosuppressed both by their disease and their medication. At the time of surgery Methotrexate and steroids should be continued. Surgery should be timed to avoid interfering with anti-tumour necrosis factor (TNF) therapy. Before recommending surgery a thorough assessment of the macro- and micro-vascular supply to the feet should be undertaken. Rheumatoid arthritis may present as an ‘overlap syndrome’, and care should be taken to ensure that patients do not have a vasculitis or neuropathy.

Pathophysiology
Patients with rheumatoid feet present with forefoot, midfoot and hindfoot pathology. In general the symptoms are of pain and deformity. Ulceration, in the absence of co-existent vascular disease or neuropathy, is rare. In general it is better to treat proximal limb disease before foot and ankle disease, and to treat the hindfoot before the forefoot. Clearly, if there is ulceration and infection, this may require to be treated before surgery with implants is undertaken. The combination of disuse and long-term treatment with steroids often leaves these patients profoundly osteopaenic.

As with the rheumatoid hand, the forefoot is normally symmetrically affected. The first ray develops hallux valgus; this drives the deformity of the lesser toes, which become clawed. Synovitis of the lesser metatarsophalangeal joints (MTPJ) results in incompetent collateral ligaments, with dorsal subluxation and eventual MTPJ dislocation. The dorsal dislocation of the phalanx pushes the metatarsal head into plantar flexion. This results in increased plantar pressure with the development of plantar callosities and bursae under the lesser metatarsal heads.

Non-operative treatment
Non-operative treatment of the rheumatoid forefoot should be optimised before surgical management is considered. Non-operative treatment consists of pain control, medical management of the disease and shoe modification. A total contact insole and rocker-bottomed shoe can decrease the pressures under the forefoot and give significant relief of symptoms. Intra-articular corticosteroid injections of the rheumatoid forefoot should be used with caution as they are associated with joint instability, and even dislocation of the MTPJ.

Operative treatment
Hallux valgus is the most common deformity of the rheumatoid forefoot. The deformity can be associated with degenerative change and may be managed with a first MTPJ excision arthroplasty, osteotomy or arthrodesis. Correction of the hallux valgus has the dual effect of reducing pressure over the bunion area and also refashioning the first ray. This refashioning of the first ray reduces the plantar contact stresses of the lesser MTPJ’s.

First Ray: Partial excision of the base of the proximal phalanx (Keller’s procedure) and excision of the first metatarsal head (Mayo’s procedure) have been shown to give initial patient satisfaction, but usually lead to late recurrent deformity, pain and functional deterioration. These procedures defunction the first ray, and hence increase the pressures under the lesser rays, which is undesirable. Their salvage is also complex, requiring interposition bone grafting.

Arthrodesis of the first MTPJ offers reliable relief of pain and predictable outcomes. Union rates over 90% are reported. Fusion of the first MTPJ refashions the first ray and offloads the lesser metatarsals. Hence, arthrodesis is preferred to excision arthroplasty for pain relief, cosmetic appearance, shoe fitting, maintenance of alignment, and the restoration of weight bearing under the hallux.

Re-alignment osteotomies may be used in the rheumatoid patient to address hallux valgus. Osteotomy offers the benefit of maintaining MTPJ movement while reducing pain. It should be noted that the combination of osteopaenic bone and the presence of secondary degeneration of the first MTPJ contraindicates the use of a corrective osteotomy. The choice of osteotomy depends on the surgeon’s preference. The authors use a Scarf diaphyseal osteotomy, in those patients with medically well-controlled disease, and a well-preserved joint space (Fig. 1).

Arthroplasty of the MTPJ of the hallux has been proposed as an alternative to resection arthroplasty or arthrodesis for the rheumatoid patient and early case series are now reported in the literature. There is currently no evidence to support this
approach, and the bone loss associated with joint arthroplasty makes revision challenging. **Lesser Rays:** The aim of surgery to the lesser toes is to reduce the MTPJ's and realign the toes, thereby reducing the plantar pressure under the MTPJ's and the dorsal pressure over the proximal interphalangeal joints (PIPJs). It is rare for a single ray to require surgery in isolation. In planning a forefoot reconstruction one should routinely consider all four rays and aim to produce a balanced forefoot. Reduction of the MTPJ is the most important aspect of surgery, and can be addressed by metatarsal head excision, Weil’s metatarsal osteotomy (Fig. 2) or proximal phalangeectomy.

Excision of the metatarsal heads, in a cascade and cut parallel to the floor, is still widely used and addresses the metatarsalgia. It effectively reduces pain.

Barouk and Barouk proposed joint-preserving surgery as an alternative approach to the rheumatoid forefoot. The principle of joint preservation is shortening and realignment osteotomies of all the metatarsals. The Weil’s osteotomy (Fig. 2) is designed to allow shortening without plantar flexion of the metatarsal heads. This reduces the plantar pressure by reducing the joint and the plantar plate.

The final option is the Stainsby procedure. Through a dorsal approach an extensor tenotomy and generous proximal phalangeectomy are performed, excising the proximal half to two-thirds of the proximal phalanx. The plantar plate is mobilised and the toe is held reduced with an axial K-wire. Stainsby originally recommended tenodesis of the extensor and flexor tendons through the phalangeal resection, although this is not universally performed. The Stainsby procedure has been shown to be associated with good functional, if not cosmetic, results.

Distal deformities in the lesser toes at the proximal and distal interphalangeal joints may be addressed by either fusion or excision arthroplasty. We prefer to undertake an arthrodesis as we feel this gives a more durable result.

**Summary**

Forefoot reconstruction should only be performed after thorough investigation and optimisation of medical and orthotic treatment. Forefoot reconstruction should involve correction of the hallux valgus and shortening of the lesser metatarsals. Current evidence supports the use of an arthrodesis of the first MTPJ or diaphyseal osteotomy in combination with either a Weil’s osteotomy, metatarsal head excision or a Stainsby procedure.

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**References**