

# Painful feet in rheumatoid arthritis

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**Summary:** Pain in the feet is an important diagnostic feature and a major management problem of rheumatoid arthritis. Of 50 hospitalized patients, 28% recalled painful feet as the sole presenting symptom of their disease.

Rheumatoid disease commonly affects the feet: 90% of the patients studied complained of foot pain at some time during the course of their disease, 86% had clinical involvement and 92% had radiological changes in their feet.

The forefoot is most frequently involved. Midfoot involvement was noted in 68% but was symptomatic in only 22%. Changes in the ankle were least common but always symptomatic.

**Résumé:** Le pied douloureux dans l'arthrite rhumatoïde

La douleur dans les pieds constitue un élément diagnostique important de l'arthrite rhumatoïde et, en même temps, pose un problème thérapeutique d'envergure. Sur 50 malades hospitalisés, 28% signalaient qu'une douleur dans les pieds était le seul symptôme présent de la maladie.

La maladie rhumatoïde affecte couramment les pieds. Des malades observés, 90% se sont plaints, à un moment donné, d'avoir des douleurs aux pieds, 86% d'entre eux présentaient une atteinte clinique et chez 92% la radiographie révélait des modifications pathologiques.

L'avant-pied est le plus souvent touché. Le pied moyen était affecté dans 68% des cas, mais n'était symptomatique que chez 22% des malades. Les modifications au niveau de la cheville étaient moins fréquentes, mais toujours symptomatiques.

Although pain in the feet is the presenting symptom in 15.7% of patients with rheumatoid arthritis,<sup>1</sup> and eventually 90% of patients with rheumatoid arthritis have involvement of the feet<sup>2</sup> very few direct observations on the nature of the foot involvement have

appeared in the literature. This study is an analysis of painful feet in 50 patients admitted to the University of Toronto Rheumatic Disease Unit for control of rheumatoid arthritis.

Fifty patients who had been hospitalized in the Rheumatic Disease Unit during March and April of 1972 were interviewed, examined and their laboratory and radiographic data analysed. All patients had rheumatoid arthritis as defined by the American Rheumatism Association.<sup>3</sup> The technique of the clinical examination followed that described by Beetham *et al*<sup>4</sup> and the results were tabulated. Laboratory and radiographic examinations were performed as part of the routine assessment.

Thirty-six of the patients were women and 14 were men. The average age was 55 with a range of 21 to 82 years. The average duration of disease was 15 years with a range of 6 weeks to 50 years. Eighty-eight percent of the patients had classical rheumatoid arthritis, 4% definite rheumatoid arthritis and 8% probable rheumatoid arthritis as defined by ARA criteria.<sup>3</sup>

At the time of assessment 72% of the patients were found to have active disease in numerous joints. Eighty-six percent had an elevation of the erythrocyte sedimentation rate, and 50% were taking potent anti-inflammatory medication in addition to salicylates (40% prednisone, 8% azathioprine and 2% cyclophosphamide).

## Symptoms

In 28% of the patients the sole presenting symptom of their rheumatoid disease was painful feet. Forty-six percent recalled foot pain as part of a more generalized onset of disease. Ninety percent of the patients had had painful feet at some time during the course of their disease and 8% described foot pain as their major disability. Seventy-eight percent of the patients described their foot pain as intermittent and 12% had had constant pain in their feet since the onset of their disease.

Forefoot pain was the initial symptom of rheumatoid disease in 34% of the patients, and in 16% this was the only symptom. Two patients (4%) had had midtarsal pain at the onset. Twenty percent had had ankle pain initially and 10% no other joint involvement.

At some time during the course of their disease 84% had had pain in the forefoot, 22% in the midfoot and 38% in the ankle area.

## Surgical procedures

Twenty-six percent of the patients underwent surgical procedures on their feet. Twenty percent had had metatarsal head resections, resulting in immediate relief from pain which was maintained in most cases. However, two patients quickly developed painful callosities over the metatarsal stumps. One patient developed ischemic ulcers of the toes following resection and spent most of the ensuing two years in hospital.

Three patients had had triple arthrodeses to correct progressive painful hindfoot deformity and all had done well.

## Clinical findings

All of the patients had clinical or radiological evidence of rheumatoid disease in their feet (Table I).

Table I—Clinical involvement in rheumatoid feet

	% of patients
<b>Pain</b>	
Forefoot	84
Midfoot	22
Hindfoot	38
<b>Clinical findings</b>	
Forefoot spread	86
Hallux valgus	62
Hammer toes	58
Flexible flat foot	52
Rigid flat foot	16
Ankle involvement	16
Tenosynovitis	4
Nodules	4
<b>Radiographic changes</b>	
Periarticular osteoporosis	68
Generalized osteoporosis	68
Joint space narrowing	92
Periarticular erosions	80
Secondary osteoarthritis	48

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Forefoot abnormalities were the most common with forefoot spread in 86% of the patients. This finding was based on the history of rapid increase in shoe size, the finding of a flattened anterior arch in the resting position and the presence of callosities under metatarsal heads. Hallux valgus (an angle of greater than  $20^{\circ}$  between the longitudinal axis of the first metatarsal and the proximal phalanx of the first toe) was present in 62% of the patients. Hammer toes (dorsal subluxation of the proximal phalanx and a fixed flexion contracture of the interphalangeal joints) were noted in 58%.

Midtarsal and subtalar involvement was noted in 68% of patients. Damage to these joints resulted in collapse of the longitudinal arch of the foot on weight-bearing, resulting in abduction

through the subtalar joint and pronation to the midtarsal area. In 52% of patients this flattened foot was still flexible and returned to normal in the absence of weight bearing. Sixteen percent of patients had rigid flat foot with significantly reduced inversion and eversion.

Ankle joint involvement was observed in 16%. The ankle showed thickened synovium anteriorly, mild to moderately reduced joint motion, and synovial crepitus. This was difficult to distinguish from tenosynovitis about the ankle joint. Four percent of the patients had swelling that was local-

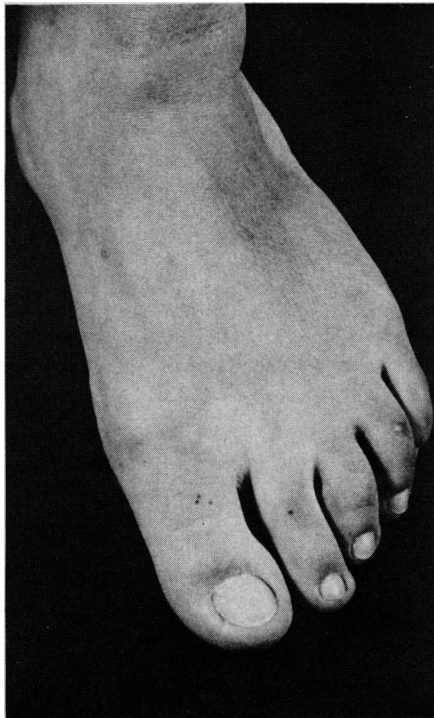


FIG. 1A—Left foot of patient L.M. Note forefoot spread.

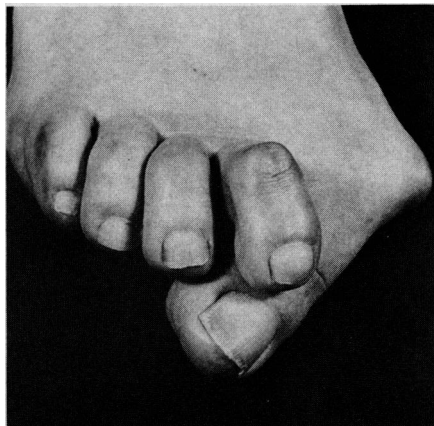


FIG. 2A—Right foot of patient M.P. Note hallux valgus, forefoot spread and dorsal subluxation of toes.



FIG. 1B—Radiograph showing metatarsal head erosion (patient L.M.).



FIG. 2B—Radiograph showing osteoporosis, metatarsal head erosion and forefoot disorganization.

ized to the course of the tendons and pain when the action of the muscle was opposed. These patients were classified as having tenosynovitis rather than ankle joint involvement.

Two patients had rheumatoid nodules over bony prominences. One patient had multiple vasculitic ulcers and another patient had arterial insufficiency with ischemic ulcers.

#### Gait abnormalities

Eighty-eight percent of the study group had a characteristic shuffling gait. There was absent heel strike, the foot being placed flat on the floor; the knee and hip were maintained in slight flexion. The forefoot push-off was absent and the foot was slid forward. There was often antalgic lurch if excess pressure was placed on the metatarsal heads. Both swing and stance phases were short, resulting in a shortened stride.

#### Radiological changes

Osteoporosis was found in the periarticular area in 68% and generalized osteoporosis in 68%. Loss of cartilage (joint space narrowing) was found in

92% and periarticular erosions were found in 80% of the patients. Secondary osteoarthritic changes were noted in 48%.

#### Case reports

The following case reports illustrate the main clinical types of foot problem found in rheumatoid arthritis.

*Case 1, Mrs. L.M.:* This 23-year-old woman with a two-year history of seropositive rheumatoid arthritis was seen while her disease was in exacerbation, uncontrolled by salicylates, prednisone or chloroquine. The first symptom of her disease had been painful swelling of metatarsophalangeal joints. The pain was markedly increased by walking or stand-

ing. Within several months she needed wider shoes and found that she was constantly standing on the lateral borders of her feet to reduce the pain.

Examination confirmed the flattening of the arch with pain on compression of the forefoot, and radiographs revealed periarticular osteoporosis with erosions at the margins of the MP heads (Figs. 1A and 1B).

*Case 2, Mrs. M.P.:* This 67-year-old woman had had seropositive rheumatoid arthritis for 18 years. Her disease had been mild until three years prior to admission when it became chronically active and deforming.

She stated that she had had mild discomfort in the feet for many years, particularly in the metatarsal area. This pain was made worse by prolonged standing or walking. In the preceding three years she had developed more pronounced discomfort over the midtarsal area which was brought on by short periods of weight-bearing and was relieved only by several hours of rest.

The forefoot showed widening with loss of the anterior arch. There was a bunion with a 70° hallux valgus resulting in dorsal subluxation of the second and third toes. The medial arch was flattened and there was slight calcaneal abduction. She walked with a characteristic rheumatoid shuffle. Radiographs showed generalized and periarticular osteoporosis. Metatarsus varus was present as a predisposing factor to the hallux valgus. Marked erosive changes were noted in the MP joints with subluxation (Figs. 2A and 2B).

*Case 3, Mrs. J.V.S.:* This 66-year-old woman had had chronic, progressive, seropositive rheumatoid arthritis for 33 years. She had been taking steroids for 12 years and during that time had had multiple fractures. She recalls having, two years after the onset of her disease, bilateral metatarsalgia associated with swelling. Over the past few years the pain had moved proximally and was felt over the dorsal aspect of the foot in the midtarsal region. The pain was accentuated by weight-bearing and relieved by rest. There was slight flattening of the anterior arch as well as pronation of the forefoot and restriction of the midtarsal and subtalar joints. Her gait was characteristically abnormal and radiographs revealed osteoporosis, metatarsal head erosions and marked narrowing and sclerosis of the talonavicular joints (Fig. 3).

*Case 4, Mrs. M.N.:* This 70-year-old retired schoolteacher had had seropositive rheumatoid arthritis for 30 years. She was admitted to hospital following a spontaneous compression fracture of the 12th thoracic vertebra. Generalized osteoporosis was believed to be due to 20 years of oral steroid therapy. Her initial problem had been pain in the right midtarsal joint. Within six months she was treated by triple arthrodesis (1939). Over the next few years she developed pain and swelling in the left ankle which was initially intermittent and more recently continuous. Deformities in her forefoot with painful callosities had developed over the years with gradual increase in the width of her

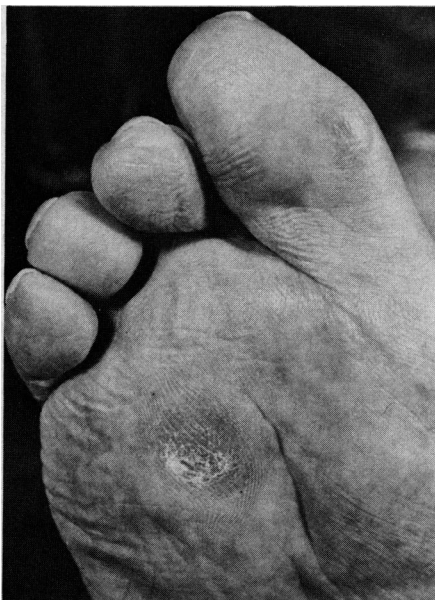


FIG. 4—Right foot of patient M.N. Note callosity under middle metatarsal head.



FIG. 5—Radiograph of left ankle of patient M.N. showing osteoporosis and secondary osteoarthritis of the tibiotalar joint.



FIG. 3—Radiograph of patient J.V.S. showing marked generalized osteoporosis, metatarsal head erosions and secondary osteoarthritis of talonavicular joint.

foot. Her major symptoms were arising from her left ankle and from metatarsal head callosities. On examination, flattening and spreading of the forefoot with slight pronation was observed. The second to fifth toes were dorsally subluxated owing to prominent metatarsal heads and callosities on the plantar aspect (Fig. 4). The movements of the ankle joint were restricted to 30° flexion and extension bilaterally. Radiographs revealed loss of cartilage with secondary osteoarthritis of her left ankle joint (Fig. 5).

## Discussion

Foot pain and particularly metatarsalgia is an important diagnostic feature of rheumatoid arthritis. The New York diagnostic criteria for rheumatoid arthritis<sup>5</sup> require bilateral swelling, limitation, subluxation or ankylosis of three limb joints which must include the hand, wrist or foot. The emphasis on the foot is further strengthened by the study of Thould and Simon<sup>2</sup> in which 16% of the patients were found to have radiological changes in their feet without changes in the hands, and equally significantly, no patient had changes in the hands without also having changes in the feet. In the present study 74% of the patients described painful feet at the onset of their disease, and in 28% painful feet was the sole presenting symptom.

Therefore careful study of the feet is mandatory in making the diagnosis of rheumatoid arthritis.

The pathological mechanisms that result in the foot deformities in rheumatoid arthritis have not been carefully analysed. Whereas the forces acting on the hand have been studied extensively, the foot has escaped attention.

Calabro<sup>6</sup> ascribed the changes in the foot to damage to supporting ligamentous structures and mechanical pressures of footwear or bed clothes. Recently, Gheith and Dixon<sup>7</sup> noted the lateral dislocation of the sesamoid bones under the great toe in rheumatoid arthritis and attributed this to laxity of the supporting ligamentous structures. Careful dissection of the rheumatoid foot will be needed to study these changes.

Most patients described their initial symptom as pain under the metatarsal heads accentuated by walking and in particular with the forefoot push-off. Some patients stated that they consciously inhibited any flexion of the toes while walking to avoid increasing the pain. Such inhibition of plantar flexion results in a combination of extensor overactivity and mechanical pressure forcing the toes into dorsal subluxation.

Symptoms and signs of forefoot involvement were found in 85% of the

patients. Pain in this area was seldom disabling. Clinical changes in the mid-foot were more frequent than symptoms. Flexible flat feet seldom caused midfoot discomfort. Ankle pain was more common than clinical findings. Patients considered ankle pain to be the most disabling in that it could not be modified by special shoes or a change in gait.

Management of painful feet in rheumatoid arthritis has been described by Dixon,<sup>8</sup> Sedar,<sup>9</sup> Godfrey<sup>10</sup> and Jones.<sup>11</sup> The basic principles are (a) control of the inflammation through rest and drugs; (b) protection of the inflamed or damaged foot by limited weight-bearing and by carefully designed footwear; and (c) surgical reconstruction of the painful, damaged foot. Unfortunately, in many patients very little attention has been paid to their feet until disorganization has occurred, and then the painful foot is subjected to a variety of reconstructive surgical procedures.<sup>12</sup> In this study the surgical procedures were relatively successful in relieving pain. All three patients who had a triple arthrodesis did well. All 10 patients who had metatarsal head resections had immediate relief of pain, but three eventually developed painful callosities and felt that their feet were worse than preoperatively.

This study confirms that painful feet are a major problem in rheumatoid arthritis. They have important diagnostic significance and present a challenge in management. Further studies are required to assess the mechanisms of deformities described in this study and thereby improve management.

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# Kantrex\* KANAMYCIN SULFATE Injection

**PRESCRIBING INFORMATION.** For complete information, consult official package insert.

**Indications:** Infections of the urinary, respiratory and gastrointestinal tracts and of skin, soft tissues, bone periosteum and blood due to sensitive organisms.

**Contraindications:** A history of hypersensitivity to the drug. Prior auditory damage by kanamycin or other agents may be a contraindication if effective alternative therapy is available.

**Warnings:** Renal malfunction can cause abnormally high serum levels of kanamycin—assess renal function periodically both before and during therapy. If renal insufficiency exists, decrease frequency of doses. Discontinue kanamycin and check hearing if azotemia increases. In older patients and patients receiving a total dose in excess of 15 Grams, watch carefully for signs of ototoxicity.

**Precautions:** If mycotic or bacterial superinfection occurs, discontinue kanamycin and initiate appropriate therapy. Cumulative ototoxic effects may be produced by concurrent or consecutive use of other ototoxic drugs. High doses may cause irritation at injection sites. The drug *should not* be physically mixed with other antimicrobials.

**Adverse Reactions:** Severe, irreversible hearing loss can occur. Stop therapy if tinnitus or hearing loss occurs. Signs of renal irritation may occur (casts, cells, proteinuria). If renal function is normal such irritation is reversible and is not necessarily an indication for stopping therapy. Skin eruptions have been noted rarely. To avoid respiratory depression, postpone intraperitoneal instillation in postoperative patients until recovery from anesthesia and muscle relaxants is complete.

**Usual Dosage:** 15 mg./Kg./day I.M. in divided doses preferably at 12-hour intervals. Average adult dose is 1 Gram daily. Do not exceed 1.5 Gram even in the heaviest patients. Reduce frequency of doses when renal insufficiency is present. Patients should be well hydrated to minimize renal irritation. Inject deeply into the upper wall, outer quadrant of the gluteal muscle.

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