Rheumatoid arthritis often produces the characteristic metacarpophalangeal (MCP) joint deformities of volar dislocation and ulnar deviation. Surgical reconstruction for MCP disease typically comprises replacement arthroplasty and soft-tissue rebalancing. Associated MCP flexion contracture is usually mild and is easily corrected by metacarpal head excision. We report on a subgroup of rheumatoid patients with minimal ulnar drift but severe fixed MCP flexion contracture for whom conventional MCP arthroplasty alone was insufficient to correct the deformity. We describe a surgical technique to deal with this clinical problem that uses fractional flexor tendon lengthening in the forearm to correct the severe flexion deformity at the metacarpophalangeal joint. (J Hand Surg 2006;31A:1690–1693. Copyright © 2006 by the American Society for Surgery of the Hand.)

Key words: Rheumatoid arthritis, hand, metacarpophalangeal joint, flexion contracture, fractional lengthening.

For severe wrist and finger contracture in cerebral palsy, Zancolli et al. advocate lengthening multiple flexor tendons via circumferential release of the muscle fascia. Le Viet broadened the application to include Volkmann’s contracture and recommended intramuscular transverse tenotomy at the musculotendinous junction.

Materials and Methods

Thirty-seven patients had MCP arthroplasty over a 30-month period. A retrospective analysis identified 8 of these patients as having severe fixed MCP flexion contractures of 90° to −120°. Associated proximal interphalangeal contracture was seen in some. There were 7 women and 1 man, with a mean age of 68 years (Table 1). Three patients were rheumatoid factor positive and 2 were negative, 1 of whom was anti-nuclear antibody (ANA) positive. The rheumatoid factor status of the others was not documented. There were 5 left hands and 3 right hands; all patients were right-hand dominant. Skin maceration and intertrigo were present in 3 patients with more severely contracted hands, and all patients complained of disabling loss of hand function.

The initial evaluation before surgery included assessment of function, radiographs, and measurement of active and passive ranges of MCP motion. Preoperative grip strength testing was not performed because no patient could grasp the dynamometer.
The average postoperative follow-up period was 17 months (range, 6–31 mo). Evaluation included subjective assessment, active and passive ranges of motion, and grip strength testing with comparison with the contralateral hand.

The surgical procedure included all of the standard features of silicone MCP replacement arthroplasty including metacarpal head resection, ulnar intrinsic tenotomy, volar plate release, capsulotomy, collateral ligation release, and flexor tendon check. If after metacarpal head excision there still was considerable MCP flexion deformity, an FFTL was performed through a separate volar forearm incision. The sublimis were individually lengthened by intramuscular transverse tenotomy and circumferential fasciotomy as described by Zancolli et al.3 and Le Viet.4 In some severe contractures, some or all of the profundii were also lengthened. A successful contracture release was defined as allowing for full, unresisted passive digital extension with the MCP prosthesis in place. No additional procedure was required to correct the proximal interphalangeal contractures when present. All patients had rehabilitation with dynamic extension splinting.

**Results**

Table 1 shows the long flexor tendons that needed to be released at the forearm. The release was performed when the tendon was believed to be tight and notably contributing to the lack of extension. There was no correlation between the extent of FFTL required and the degree of preoperative flexion contracture.

The mean preoperative MCP contracture measured 90° to 120°. The postoperative mean active and passive arcs of motion were 60° and 80°, respectively. The mean active range of motion was from 4° to 63° (Table 2).

Grip-strength values ranged from 8 to 18 kg and were higher at longer postoperative intervals (Table 1). There was no difference between surgically treated and non–surgically treated hands. There was no correlation between the number of tendons lengthened and grip strength. No postoperative complications were recorded. Wound healing and skin hygiene were satisfactory.

On preoperative radiographs, all but 1 patient had Larsen grade 4 or 5 changes, confirming the advanced state of disease in this group.5 After rehabilitation, patients were able to perform simple independent daily activities such as personal hygiene and preparing meals, which were impossible before surgery.

**Figure 1** shows the right hand of one of the study patients. It shows the severe degree of flexion contracture at the MCP joint with very minimal ulnar drift deformity. **Figure 2** shows the maceration in the palm as a result of a long-standing flexion deformity. **Figure 3** shows the forearm incision that was used to perform the fractional flexor tendon lengthening. **Figure 4** shows the first postoperative visit. It shows clearly the amount of extension we achieved in the MCP joint even before starting the physiotherapy and the extension exercises. It is obvious that the left hand has the same deformity and will have the same procedure once the right hand is rehabilitated.

**Discussion**

Local soft-tissue and intrinsic muscle release, metacarpal head resection, and replacement arthroplasty are the conventional means of correcting the well-
known deformity of ulnar drift. We report treatment for the severely contracted rheumatoid MCP joint. Our small group of rheumatoid arthritis patients had finger contractures like those of 3 patients with SLE described by Hastings and Evans1; the clinical photograph in their publication shows a deformity identical to that seen in some of our patients. Some of our patients had a form of mixed connective tissue disease rather than pure rheumatoid arthritis. Our group required MCP arthroplasty to replace damaged and dislocated joint surfaces. Correction of flexion contracture could be achieved simply by additional resection of the metacarpal neck and shaft, but this may produce relative overlengthening of the extensors and some flexors or intrinsics, with secondary loss of grip strength and function. Therefore, to avoid excessive bone resection, we selectively lengthened those extrinsic flexors that were tight.

There is no loss of motion with this procedure compared with conventional arthroplasty. Bieber et al5 reported on 46 postoperative rheumatoid hands with an average flexion contracture of 10° and an

<table>
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<th>Patient No.</th>
<th>Preoperative Contracture, **</th>
<th>Mean AAOM After Surgery, **</th>
<th>Mean PAOM After Surgery, **</th>
<th>Maximum Extension After Surgery, **</th>
<th>Maximum Flexion After Surgery, **</th>
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AAOM, active arc of motion; PAOM, passive arc of motion.
*Values are the average of 4 digits per patient.

Figure 1. The hand in severe flexion deformity.

Figure 2. Skin maceration in the hand.
average active flexion arc of 51°. Our corresponding values of 4° and 60° are slightly better but are unlikely to be statistically significant. The study of Bieber et al.⁶ did not categorize patients by degree of preoperative MCP flexion contracture. It is reassuring that the functional results in our patients are at least as good as those of arthroplasty in rheumatoid arthritis patients who had conventional deformity. No untoward effects occurred as a result of adding FFTL to MCP arthroplasty. Grip strengths were at least maintained if not improved. Most importantly, patients regained basic hand functions that had been lost before surgery.

Thus far, we do not have a good explanation for the pathogenesis of extrinsic MCP flexor contractures seen here. We sent a biopsy of the flexor digitorum superficialis sheath from one of our patients, and it shows evidence of inflammation. This is in keeping with the pathophysiology of rheumatoid disease.

In addition to being a retrospective study, our study has a lack of clinically relevant statistics due to a small patient population size and the absence of a control group. Nevertheless, we conclude that there is a small subgroup of rheumatoid arthritis patients with some features of mixed connective tissue disease who have severe finger flexion contracture. Furthermore, we believe that fractional flexor tendon lengthening is a reasonable adjunctive procedure to metacarpophalangeal arthroplasty in treating this condition. Improved arc of motion and functional outcome, maintained grip strength, lack of complications, and simplicity of the procedure help support this observation.

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References