INTRODUCTION

Rheumatoid arthritis is a chronic inflammatory disease, and approximately 70% of patients with rheumatoid arthritis develop pathologies of the hand, especially of the metacarpophalangeal (MP) joints. Reconstructive hand surgery is well established for the management of rheumatoid arthritis patients. However, hand reconstruction does not restore normal function to the rheumatoid hand. Surgical procedures performed on the rheumatoid hand and wrist can be divided into prophylactic and therapeutic procedures. Prophylactic surgery includes synovectomy and tenosynovectomy to retard disease progression and to prevent tendon rupture. Therapeutic surgery includes tendon surgery, arthroplasty, and arthrodesis to alleviate pain and to improve hand function. The priorities for hand surgery in rheumatoid arthritis patients are first to alleviate pain, second to improve hand function, third to retard progression of the disease or to prevent loss of function, and fourth to improve appearance. With the advent of biologic drugs and methotrexate (MTX), disease activity, including the development of hand deformities, is well controlled. Nonetheless, there remain many patients who need personalized surgery. Patients with hand deformity as a result of burnt-out rheumatoid arthritis have a variety of demands for restoring hand function, depending on their personal needs. Individual treatment plans must be established through discussions among the patient, hand therapist, and surgeon based on the status of the hand and the patient’s needs.

Key Words: hand surgery; musician’s hand; rheumatoid arthritis

CASE REPORT

Rheumatoid Hand Surgery: Reconstruction of a Musician’s Hand

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Background: Reconstructive hand surgery is well established for the management of patients with rheumatoid arthritis; however, with the advent of biologic drugs and methotrexate, disease activity, including the development of hand deformities, is well controlled. Nonetheless, many patients still need personalized surgery. Case: A 61-year-old woman with a 35-year history of rheumatoid arthritis presented with right hand deformity with unstable ulnar deviation of the metacarpophalangeal joints from the index to the little finger and hyperextension of the thumb interphalangeal joint. Her hobby was playing the erhu (a traditional two-stringed bowed Chinese instrument) and she wanted to improve her ability to hold the bow. To play the erhu, the tip of the thumb must touch the index finger to make a circle, and the other fingers must keep the bow horizontal and adjust the tension of the bow hair. We carried out thumb interphalangeal joint arthrodesis, little finger metacarpophalangeal joint arthrodesis, and transfer of the fourth dorsal interosseous muscle to the little finger. After 2 months of rehabilitation, the patient could hold the bow between the thumb and index fingers and adjust the string tension with the middle and ring fingers. Additionally, she could use chopsticks and pens more naturally. Discussion: Each patient with hand deformity resulting from burnt-out rheumatoid arthritis has a variety of demands for restoring hand function, depending on their personal needs. Individual treatment plans must be established through discussions among the patient, hand therapist, and surgeon based on the status of the hand and the patient’s needs.

Key Words: hand surgery; musician’s hand; rheumatoid arthritis
A 61-year-old woman with a 35-year history of rheumatoid arthritis visited our hospital complaining of deformity of the right hand. Informed consent for the publication of this case report was obtained from the patient. The patient was taking weekly MTX and etanercept, and disease activity was very well controlled. She was an amateur erhu (traditional two-stringed bowed Chinese musical instrument) player and wanted to improve her ability to hold the bow. She had unstable ulnar deviation of the MP joints of the index to little fingers and hyperextension of the dislocated IP joint of the thumb (arrow) (Fig. 1). Fortunately, the adducting power of the thumb was preserved. To play the erhu, the tip of the thumb must touch the distal interphalangeal (DIP) joint of the index finger to make a circle. Additionally, the middle, ring, and little fingers must keep the bow horizontal and adjust the tension of the bow hairs (Fig. 2). Preoperatively, the MP joint of the index finger exhibited ulnar deviation and supination. Because of the deformity, the patient had difficulty in holding the bow between the thumb and index finger. Instead, she was using the deformity of the IP joint of the thumb. She was holding the bow hair between the middle and ring fingers because the little finger showed ulnar deviation that prevented the ring finger from attaining the correct position (Fig. 3). When playing the erhu preoperatively, the patient’s body, shoulder, and elbow made unusual movements to compensate for the unorthodox method of holding the bow. These movements caused embarrassment.

We performed thumb IP joint arthrodesis, adductor pollicis elongation, little finger MP joint arthrodesis, and transfer of the fourth dorsal interosseous muscle to the lateral bundle of the little finger, which is termed intrinsic cross transfer (Fig. 4). After the surgery, the limb was elevated to prevent edema. A plaster cast was applied for 4 weeks to immobilize the MP joint of the little finger. Rehabilitation started 2 days after surgery and consisted of mild range-of-motion exercises of the shoulder, elbow, and fingers. After cast removal, the patient was trained to practice tip pinches and pulp pinches between the thumb and index finger. After 2 months of rehabilitation, the patient could hold the bow between her thumb and index finger and could adjust the bow hair tension with her middle, ring, and little fingers (Fig. 5). Additionally, she could use chopsticks and pens in a more natural manner. Before surgery, the patient could hold chopsticks in the first web space, but could not open and close them to allow use during the activities of daily life (Fig. 6). After surgery, the...
shortened version of the disability of the arm, shoulder, and hand (Quick DASH) score improved from 75 to 61.4. The work module of the Quick Dash score underwent no change (score 75); however, the sports/performing arts module improved from 75 to 31.3. The positions of the patient’s index through ring fingers were corrected by the little finger MP joint arthrodesis. Overall, the patient was satisfied with the surgery.

**DISCUSSION**

The aims of the current surgery were first to restore thumb adduction and stabilize the thumb IP joint, second to leave the index finger MP joint dislocated because the index finger MP joint needs to supinate and the proximal interphalangeal joint and DIP joint need to flex and extend effectively, and third to fix the little finger MP joint to prevent ulnar deviation of the middle and ring fingers. Some articles contraindicate lesser MP joint fusion because MP joint activity is crucial to the arc of motion of the finger, and despite the aesthetic advantage achieved by the fusion of the MP joint, the loss

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**Fig. 3.** Preoperative photographs of the patient holding the bow.

**Fig. 4.** Postoperative radiograph showing thumb IP joint arthrodesis, *adductor pollicis* elongation, and little finger MP joint arthrodesis and intrinsic cross transfer.

**Fig. 5.** Postoperative photographs of the patient holding the bow.
of motion can impair the patient’s activities of daily living. 1) Other articles report that arthrodesis is contraindicated for the lesser MP joints; however, it offers excellent benefits in terms of pain reduction, improved alignment, and stability with substantial functional benefit. 5) In our case, MP fixation worked very well to support the middle and ring fingers not only in terms of playing the erhu, but also in terms of the activities of daily life. Because the positions of the patient’s index through ring fingers were corrected by the little finger MP joint arthrodesis, and because she didn’t use her little finger actively in daily life preoperatively, she had no major complaint about the arthrodesis and no decline in the quick DASH score.

Arthroplasty of MP joints was another option. Arthroplasty with MP joint implants improves hand function and appearance by alleviating the painful disfiguring chronic flexion deformities and ulnar deviation associated with the MP joint destruction that results from rheumatoid arthritis. After arthroplasty, patients achieve improvement of MP joint arc of motion from an average of 21° to 31°. 6) Even after arthroplasty, this is far less than that of the normal hand, which ranges from 45° in extension to 90° in flexion. The main goal of MP joint arthroplasty is to change the arc of motion of the fingers to a more extended and functional position at the MP joint, which means that the patient can extend his/her fingers to grasp objects in daily life. 9) Grip strength and key, tip, and palmar pinch strength are reported not to change from baseline after arthroplasty and rehabilitation. 7)

Moreover, contracted structures contributing to ulnar drift are difficult to correct surgically, and it is quite possible that patients with severe deformities at baseline may develop rapid recurrence of the deformity. Because of the possibility of implant fracture and recurrence of deformity following reconstruction, some rheumatologists have a pessimistic view regarding surgical reconstruction. 8) We did not perform MP joint arthroplasty because MP joint extension is not necessary when holding the bow of the erhu, and ulnar drifting and dislocation may recur very soon because of the reaction force from the bow.

The surgeon, hand therapist, and patient must understand the functional needs and limitations of each patient and work closely together to plan the type of surgery and rehabilitation program preoperatively.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this article.

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