THE RHEUMATOID THUMB

BY ANDREW L. TERRONO, MD

The thumb is frequently involved in patients with rheumatoid arthritis. Thumb postures can be grouped into a number of deformities. Deformity is determined by a complex interaction of the primary joint, the adjacent joints, and tendon function and integrity. Joints adjacent to the primarily affected one usually assume an opposite posture. If they do not, tendon ruptures should be suspected. Surgical treatment is individualized for each patient and each joint, with consideration given to adjacent joints. The treatment consists of synovectomy, capsular reconstruction, tendon reconstruction, joint stabilization, arthrodesis, or arthroplasty.

The majority of patients with rheumatoid arthritis will develop thumb involvement. The deformities encountered in the rheumatoid patient are varied and are the result of changes taking place both intrinsically and extrinsically to the thumb. Synovial hypertrophy within the individual thumb joints leads not only to destruction of articular cartilage, but can also stretch out the supporting collateral ligaments and joint capsules. As a result, each joint can become unstable and react to the stresses applied to it both in function against the other digits or as a result of the deforming forces of the extensor or flexor tendons acting on it. The thumb deformity patterns are the result of imbalances occurring between the various joints. Any alteration of posture at one level has an effect on the adjacent joint.

The 6 patterns of thumb postures described here, unfortunately, do not exhaust the deformities one encounters in rheumatoid arthritis (Table 1). It is possible, for example, for the patient to stretch the supporting structures of a joint, causing a flexion, extension, or lateral deformity. However, instead of the adjacent joint assuming the opposite posture, it may assume an abnormal position secondary to a tendon rupture. Thus, a patient might have hyperextension of both the metacarpophalangeal (MP) and interphalangeal (IP) joints or flexion at both levels. When patients are encountered with adjacent joints deformed in the same direction, it usually implies that a combination of factors have brought about this situation. The examiner should check each individual joint for instability and tendon function.

Disruption of the normal thumb biomechanics often leads to significant loss of the patient’s ability to carry out activities of daily living (ADL). Activities such as buttoning clothing or manipulating small objects are difficult to accomplish if the patient lacks either control or stability of the thumb joints. Surgery can improve thumb function and represents one of the most effective procedures for patients with rheuma-
toid arthritis. The goals of thumb surgery for patients with rheumatoid arthritis are pain relief, enhanced function, prevention of disease progression and improved appearance.3,4 Before discussing treatment, a review of the most common thumb deformities and factors leading to their development will be highlighted.

**TYPE 1 (BOUTONNIERE DEFORMITY)**

The boutonniere deformity is the most common rheumatoid thumb deformity.5 This consists of MP joint flexion and IP joint hyperextension (Fig 1). The pathology in this deformity usually starts with MP joint synovitis stretching the dorsal capsule.5 The overlying extensor hood and extensor pollicis brevis (EPB) tendon insertion become attenuated, resulting in loss of MP joint extension and volar subluxation of the base of the proximal phalanx. The extensor pollicis longus (EPL) tendon displaces ulnarly and volar to the axis of rotation (Fig 2). The patient loses the ability to actively extend the MP joint, although passive extension may be maintained early on. At the same time, articular erosion and collateral ligament laxity occur to varying degrees.

Hyperextension of the IP joint is the result of the altered pull of both the intrinsic muscles and the EPL and occurs secondarily.5 Each time the patient pinches the thumb, a cycle of MP joint flexion and IP joint hyperextension is initiated.3,6 In time, the IP joint deformity approximates the MP joint deformity, and the result is often a 90°/90° deformity.5,6

Other less common mechanisms for a boutonniere thumb deformity include MP joint flexion secondary to rupture of the EPL tendon at the wrist and IP hyperextension from volar plate stretching or rupture of the flexor pollicis longus (FPL) tendon. After EPL function is lost, the MP joint assumes a flexed position and the cycle is started. Stretching of the volar plate of the

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**TABLE 1**

<table>
<thead>
<tr>
<th>Type</th>
<th>CMC Joint</th>
<th>MP Joint</th>
<th>IP Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Boutonniere)</td>
<td>Not involved</td>
<td>Flexed</td>
<td>Hyperextended</td>
</tr>
<tr>
<td>II (Uncommon)</td>
<td>CMC flexed and adducted</td>
<td>Flexed</td>
<td>Hyperextended</td>
</tr>
<tr>
<td>III (Swan neck)</td>
<td>CMC subluxed, flexed, and adducted</td>
<td>Hyperextended</td>
<td>Flexed</td>
</tr>
<tr>
<td>IV (Gamekeeper’s)</td>
<td>CMC not subluxed, flexed, and adducted</td>
<td>1°, Radially deviated, ulnar collateral ligament unstable</td>
<td>Not involved</td>
</tr>
<tr>
<td>V</td>
<td>May or may not be involved</td>
<td>1°, Hyperextended, volar plate unstable</td>
<td>Not involved</td>
</tr>
<tr>
<td>VI (Arthritis mutilans)</td>
<td>Bone loss at any level</td>
<td>Bone loss at any level</td>
<td>Bone loss at any level</td>
</tr>
</tbody>
</table>

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**FIGURE 1.** This is an example of a boutonniere thumb deformity with MP joint flexion and IP joint hyperextension.

**FIGURE 2.** This is an example of a type I thumb deformity with EPL tendon subluxation ulnarly and volarly.
distal joint or rupture of the FPL tendon causes IP joint hyperextension. In this case, the distal joint hyperextension can be primary, and MP joint flexion is secondary. Therefore, when faced with a patient having a type I deformity, one should evaluate the extensor tendons controlling the MP joint and also the flexor tendon controlling the distal joint to determine the primary site of imbalance. Usually the joint with the most deformity is the joint that initiated the deformity. Treatment includes MP joint synovectomy and increasing the extensor force (EPL rerouting) for early correctable deformities or MP fusion or arthroplasty for late involvement. Capsulodesis/sesamoidesis is used for MP joint hyperextension deformities with good flexion, and ligament reconstruction is used for lateral deformities as needed.

**TYPE II AND TYPE III DEFORMITY**

In the original classification of thumb deformities, type II and type III deformities were described. In both, the deformity starts at the carpometacarpal (CMC) joint with subluxation of the first metacarpal, which then assumes an adducted and flexed position. In the type II deformity the MP joint and IP joint assume positions identical to the type I deformity in that the MP joint is flexed and the distal joint hyperextended. This particular combination of metacarpal adduction with MP joint flexion and distal joint hyperextension (type II) is not common and assumes importance only in that it should be recognized as different from the type I deformity because of the CMC involvement and subsequent metacarpal adduction.

A much more common sequence of events after CMC joint subluxation and metacarpal flexion and adduction is MP joint hyperextension and distal joint flexion (type III) (Fig 3). This deformity is the opposite of the common type I deformity in all respects. It has been called a swan neck deformity of the thumb.

In the type III deformity synovitis and articular erosion occur initially at the CMC level. Dorsoradial subluxation and eventually dislocation occurs as the thumb is pinched during daily activities. With the metacarpal base subluxed radially, the abduction forces are reduced and a progressive adduction and flexion contracture of the metacarpal develops.

As the CMC joint subluxation progresses, the likelihood of secondary MP involvement increases. Hyperextension of the MP joint results from a combination of volar plate laxity and the metacarpal adduction/flexion contracture. Metacarpal abduction and extension become limited with a fixed CMC joint deformity. Thus, as the patient attempts to open the first web space to grasp an object, the extension forces are transmitted to the MP joint, resulting in the secondary hyperextension deformity of this joint.

Any attempt to correct the type III deformity requires that the first metacarpal adduction be corrected. If the CMC joint is subluxed, abduction usually can be accomplished only by salvage surgery. With restoration of metacarpal abduction, the MP joint hyperextension deformity may correct itself. However, if hyperextension persists, this joint also must be treated—by capsulodesis, sesamoidesis, or arthrodesis (if fixed deformity or minimal active flexion is present)—in a slightly flexed position.

**TYPE IV DEFORMITY**

The type IV, or gamekeeper’s, deformity results from stretching out of the ulnar collateral ligament of the MP joint from synovitis (Fig 4). As the proximal phalanx deviates laterally at the MP joint, the first metacarpal secondarily assumes an adducted position. Subsequently, the first dorsal interosseous and adductor muscles may become shortened and the web space between the thumb and index finger may become contracted. Although the first metacarpal is adducted in these patients, there is no subluxation at the CMC joint. The main complaints are weak pinch, deformity, and pain. Secondary thenar atrophy and supina-
tion deformity may also occur. The key to treatment with this deformity is to restore stability to the MP in a corrected position and, if needed, to release the first web space contracture (adductor fascia and Z-plasty of the skin). In the early stages stability can be established with a synovectomy and reconstruction of the ulnar collateral ligament. For more advanced stages with articular erosion of the MP joint, arthrodesis and occasionally arthroplasty are most commonly required. Once the thumb MP joint is stabilized, the thenar muscles can abduct and oppose the thumb more efficiently. Surgery is ordinarily not necessary at the CMC joint level.

**Type V Deformity**

The type V deformity results from instability or stretching of the volar plate of the MP joint of the thumb. As a result of this, the MP joint hyperextends and the distal joint assumes a flexed position. In these patients, however, the first metacarpal does not assume an adducted position, and the CMC joint is usually not involved. This particular deformity is best treated by stabilization of the MP joint by a capsulodesis, sesamoidesis, or fusion (if fixed deformity or minimal active flexion) in a slightly flexed position.

**Type VI Deformity**

The final thumb deformity, type VI (Fig 5), involves a major element of structural collapse or loss of bone substance. Patients with arthritis mutilans develop thumbs that become short and are characteristically unstable with what appears to be abundant skin in relation to the underlying skeleton. Although this condition can be isolated at the thumb level, it is ordinarily associated with similar difficulties in the other digits. Treatment involves fusion of the affected joints with bone grafts to restore length. Arthroplasty is not recommended, because continued bone loss may be seen around the implant and because fusion is an excellent alternative for the thumb.

**Tendon Ruptures**

**EPL Rupture**

EPL rupture is common in rheumatoid patients. Rupture of the EPL occurs from either infiltrative tenosynovitis or, more commonly, from attrition on Lister’s tubercle that acts as a bone pulley for this tendon. The functional loss varies and the tendon rupture may go undetected for some time. IP joint extension is a function of both the EPL and the intrinsic muscles of the thumb. The intrinsic muscles alone can maintain almost full extension of the thumb IP joint. However, most rheumatoid patients have some weakness of the EPB secondary to MP joint synovitis and as a result lose some MP extension after an EPL rupture. If there is no deformity, a specific test for EPL function is performed by asking the patient to extend the thumb while resting the palm flat on a table (Fig 6).

A patient presenting with significant functional deficit from an EPL rupture may be treated in several ways. The options include end-to-end repair, tendon graft, and tendon transfer. Most ruptured tendons...
retract, or attrition causes tendon loss and an end-to-end repair is not possible. An intercalated tendon graft that uses the palmaris longus or abductor pollicis longus may be performed if the proximal motor is not contracted.13 The most predictable procedure is a tendon transfer with the extensor indicis proprius (EIP), which is preferred because it can be done without compromising index finger function.11,12 It is important to remove Lister’s tubercle and any other bone spikes to avoid further attrition ruptures.

FPL Rupture
The FPL is the most likely flexor tendon to rupture in rheumatoid patients. It commonly occurs secondary to attrition of the FPL at the level of the volar scaphoid.14 Radiographs usually show a volar osteophyte in the carpal canal arising from the scaphoid (Fig 7). Unlike patients with EPL rupture, these patients detect their loss of thumb function early. Presenting complaints include loss of thumb IP flexion and a weakened pinch.

Treatment options include thumb IP fusion, a tendon graft, or a tendon transfer. The carpal canal should be explored, and any osteophytes on the floor of the canal must be removed to prevent a future flexor tendon rupture.

Preoperative Evaluation
Although recognizing the various thumb deformities and gaining an understanding of their development is valuable, in each case one must evaluate the individual joints of the thumb to determine appropriate therapy. One should, of course, not limit the evaluation to the thumb, but instead assess the whole hand and upper extremity, because the thumb does not act in isolation in hand function.

The evaluation ordinarily includes a recording of the active and passive range of motion (ROM), pinch strength, and grip strength, as well as a functional status of the hand. Although grip strength is important, pinch strength is a particularly important when assessing self-care skills. The function of the FPL and EPL are individually evaluated. Tenderness and stability of each joint and well as passive correctability are evaluated. The CMC is evaluated using the "grind" test that is performed by longitudinally loading the first metacarpal while rotating and translating the basilar thumb joint (Fig 8). Radiographs of the thumb are routinely obtained to evaluate joint position, subluxation, and destruction.

Nonoperative Treatment
Initially the deformities are passively correctable. At this stage, it is important to maintain mobility and protect the joint through splinting and joint-protection procedures. These splints should be changed frequently to prevent any skin maceration. Immobilizing one joint can add stress to adjacent joint, therefore, one must watch for signs of increased synovitis or pain in these areas.

When the CMC joint becomes involved, a CMC joint splint to maintain the thumb web space and to stabilize and protect the CMC joint is helpful. The
CMC and the MP joints are maintained in a corrected position. A short opponens splint may be considered for use during the day for functional activities. To be effective, the splint must extend far enough into the web space to maintain thumb abduction. This position allows the thumb metacarpal to be stabilized against the index metacarpal. In cases where the MP and IP joints are involved, the goals are to prevent the deformity from becoming fixed and to help protect and stabilize the joint from external forces that can produce further joint damage and deformity.

Joint protection is an important part of treatment. The joints of the thumb are subject to significant external stresses during ADLs. Therefore, instruction in general joint protection principles and specifically those that will minimize stress to the joints and soft-tissue structures of the thumb are helpful. Key holders, built-up or large-diameter pens, felt-tip pens, and lightweight built-up utensils will help minimize the stress to the thumb. Certain repetitive activities, such as the use of scissors, are particularly stressful to the CMC joint and should be avoided as much as possible. Patients are also advised to limit or shorten knitting and crocheting sessions.

**Operative Treatment**

Despite the fact that there are various deformities affecting the thumb, which can lead to bizarre alterations in posture at multiple levels, the surgical procedures that are applicable are determined more by the joint involved than by the specific type of deformity encountered. For this reason, I will discuss the surgical procedures commonly performed at each joint level rather than discussing the individual deformities and their specific treatment. Surgical treatment is indicated for synovitis that has been unresponsive to 6 months of medical treatment. In many cases, other reconstructive procedures may be performed simultaneously with thumb reconstruction to accelerate the patient’s treatment program.

**IP Joint**

The terminal joint of the thumb can, as a result of stretching of supporting structures, assume a flexed, extended, or laterally deviated position. Flexion and extension deformities at this level can result from ruptures of the EPL or FPL tendons. In these particular instances, restoration of tendon function is attempted if the articular surface and supporting structures of the joint are intact.

**EPL Tendon Reconstruction**

In the case of loss of extensor power, the tendon usually ruptures at the wrist level. With retraction of the muscle, it may not possible to carry out end-to-end tendon repairs, and restoration of EPL function is ordinarily achieved by transfer of the EIP to the extensor mechanism over the MP joint of the thumb (Fig 9). Occasionally, an intercalated graft is used. In evaluating extensor tendon ruptures of the thumb affecting the distal joint, one must check the extensor apparatus both at the wrist level and at the MP level.

The EIP is harvested through a transverse incision over the index finger MP joint; the EIP will be ulnar to the EDC, and it is detached at the extensor hood.
The extensor hood is closed. The EIP tendon is freed to the retinaculum to allow a straight pull to its transferred position. It is passed subcutaneous to the MP joint and is sutured to the extensor mechanism with an interlace weave. It is sutured tightly with the thumb in full extension and retropulsion and the wrist in neutral position (Fig 9).

After reconstruction (transfer or graft) of a ruptured EPL tendon, the patient’s wrist and thumb are immobilized in a cast for 4 weeks before beginning active motion. The wrist is immobilized in approximately 40° of extension. The MP and IP joints are in full extension. Initially, the patient is instructed in gentle active motion. If the repair is thought to be strong enough, resistance, using a sponge and progressing to light putty, can be added to the exercise program at 6 to 8 weeks after surgery and increased gradually. The protective splint is generally discontinued at 12 weeks with gradual return to normal activities.

**FPL Tendon Reconstruction**

The ruptures of the FPL tendon are common in the rheumatoid patient. The most frequent site of rupture is at the volar scaphoid (Fig 7). A portion of the scaphoid bone erodes through the volar joint capsule and acts as a sharp edge against which the flexor tendon ruptures. When faced with a patient who has lost active flexion of the distal joint of the thumb, which is usually in a hyperextended position, one should assume that the tendon rupture is at the wrist level. In those instances in which the distal joint of the thumb is irregular or unstable so that restoration of active motion does not seem worthwhile, one might consider stabilizing the joint by fusion. Whenever the diagnosis of FPL rupture has been made, the volar aspect of the wrist must be explored to remove any bone spikes. If this is not performed, the adjacent flexor tendons are in jeopardy and, if left untreated, will sustain the same fate of attrition rupture. When one attempts to restore FPL function, it is unusual to be able to carry out an end-to-end repair. Short “bridge” tendon grafts have been found useful or, alternatively, tendon transfers using the superficial flexor of the ring finger may be performed.17

The carpal tunnel is approached through a curved incision parallel and just ulnar to the thenar crease, extending from the transverse palmar crease distally to 3 to 4 cm proximal to the wrist flexion crease. The carpal tunnel is exposed, and a tenosynovectomy is performed. The proximal and distal stumps of the FPL are identified. The proximal stump is the most radial and volar tendon within the carpal canal and may be more proximal than one expects. If the proximal stump is difficult to find then the incision should be extended proximally. Tendon excursion is then evaluated by using gentle constant traction, and often the excursion will increase and be satisfactory. The distal stump can often be found with flexion of the IP joint and gentle attempts at grasping it within the fibroosseous canal. The volar surface of the scaphoid is identified, and a synovectomy and spur debridement are performed. Capsular tissue is mobilized to cover the defect. A bridge graft using the palmaris longus approximates the 2 stumps using a weave technique (Fig 10). The distal juncture is usually performed first. Tension is set with the wrist in neutral position and the IP joint fully flexed. The IP joint should fully extend when the wrist is fully flexed.

When the distal stump cannot be retrieved in the carpal canal, several options exist. A full length tendon graft or sublimis transfer can be performed. A second incision can be made at the MP joint and the distal stump identified. The distal juncture is performed with a bridge graft, with the proximal portion of the graft being passed into the carpal canal by attachment to a silicone feeding tube. The proximal
juncture is then performed through the original incision.

If the palmaris longus is absent, then a portion of the FCR or one of the APL tendon slips may be used as graft material. If muscle excursion is found to be poor, a sublimis transfer must be performed.

Flexor tendon reconstruction in rheumatoid arthritis has variable results, with FPL reconstruction being the most reliable because of the fact that the rupture is usually from attrition, not infiltrative tenosynovitis, and is at the wrist level. Average IP joint motion is 23° with a range of 0 to 45° after FPL repairs or reconstruction.16

After an FPL repair or reconstruction is performed, the patient’s wrist and thumb are protected in a thermoplastic splint or cast for 6 to 8 weeks. The wrist is positioned in neutral if the carpal tunnel has been opened, or 20° of flexion if it has not. The MP and IP joints are positioned in full extension. With reconstruction and a strong tendon junction, active motion is initiated at 3 weeks. Blocking exercises for the MP and IP joints are started at about 4 weeks to enhance tendon gliding and joint mobility. Resistive exercise and functional activity is usually begun at 6 to 8 weeks. Caution is advised with excellent early tendon gliding, because the lack of tendon adhesions may indicate that the repair is more vulnerable to rupture. Therefore, the addition of resistance to the therapy program would be delayed until the repair had gained adequate strength to tolerate an increase in resistance. If there appear to be increased adhesions and difficulty regaining motion, light resistive exercise may be initiated earlier. The patient may also begin light functional activities that encourage IP joint flexion and light pinching activities. The patient is allowed to return to full ADLs at about 12 weeks.

**IP Joint Arthrodesis**

In those patients in whom the joint is grossly unstable with or without intact extrinsic tendons, an arthrodesis is recommended. Fusion of the terminal joint of the thumb does not cause significant functional loss and, in fact, improves the patient’s ability to pinch objects with force. In patients with bone loss, the use of supplemental bone graft is required not only to achieve fusion but also to restore length.

My preferred technique for IP joint fusion fixation is a headless screw. It provides firm fixation, will allow earlier function and minimal splinting, and does not need to be removed. Other techniques include Kirschner wires (K-wires) and/or interosseous wires. An external aluminum splint can be used to protect the joint until the fusion is solid, allowing mobility at the MP joint level.

In patients in whom volar plate instability is present but the joint surface is intact, one could consider a flexor tenodesis using one half of the FPL left attached distally and tenodesed to the proximal phalanx proximally. Arthroplasties for IP joint involvement in the rheumatoid thumb are rarely indicated because of poor lateral stability.

**MP Joint**

The surgical procedures found useful about the MP joint in the rheumatoid patient include synovectomy, EPL rerouting, arthrodesis, arthroplasty, capsulodesis, and sesamoidesis.

**MP Joint Synovectomy.** Synovectomy is advisable in those patients in whom the joint is chronically swollen and radiographic evaluation shows well-maintained joint surfaces.18 When a synovectomy is performed for the rheumatoid thumb, one often encounters a stretching or elongation of the extensor mechanism. In these cases, it is advisable to carry out some shortening of the extensor mechanism followed by splinting so that the rapid onset of a flexion deformity is prevented. In patients in whom a flexion deformity has occurred but passive extension is still possible, a reinforcement of the extensor forces to the MP joint can be performed. A number of techniques

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**FIGURE 10.** A patient with an FPL rupture. The small solid arrows show the proximal and distal tendon stumps. The longer solid arrow points to the scaphoid spur. The open arrow shows the tendon graft.
have been advised, but I have been pleased with the use of an EPL rerouting procedure, in which the EPL is rerouted through the dorsal capsule or attached to the proximal phalanx to provide additional extensor force at this level (Fig 11). A slightly curved longitudinal incision is made over the dorsal MP joint. Radial and ulnar skin flaps are raised, with special attention given to protecting the branches of the radial sensory nerve. The EPL is freed from the EPB tendon and the intrinsic attachment and is divided near its distal insertion. The EPB is elevated off the base of the proximal phalanx and detached from the extensor hood.

**FIGURE 11.** Technique of EPL rerouting. (A) The EPL is separated from the extensor mechanism. (B) The distal flap of capsule is developed, and the EPB tendon is sutured to the EPL. (C) The EPL tendon is passed through the slit in the distal capsule and sutured to itself with the MP joint in extension. (From Feldon, Terrono, et al: Rheumatoid arthritis and other connective tissue diseases. Green’s Operative Hand Surgery, (ed 4). Redrawn with kind permission of Elizabeth Rosellius.)

A complete synovectomy is performed through a transverse capsular incision. A second transverse incision is then made in the thicker distal capsule. The EPL tendon is passed through this opening and sutured to itself under tension with the MP joint in full extension (Fig 12). Alternatively, the EPL can be attached directly to the proximal phalanx. The EPB is then sutured to the looped EPL tendon. A K-wire is placed to hold the MP joint in extension for 4 weeks, followed by another 2 weeks of splinting to prevent an extensor lag. Gentle active ROM is then started, with the MP joint kept in extension between exercise periods with a thermoplastic splint. This protocol is continued for 2 to 4 weeks, depending on the patient’s progress. The faster the motion is regained, the longer the joint is protected. MP joint synovectomy and EPL rerouting do have a high rate of recurrence of 64% at 6 years after surgery. However, this procedure does allow improved function over that period of time.19 With this procedure, the intrinsic muscles of the thumb act to extend the distal joint.

**MP Joint Arthroplasty.** For the MP joint that is grossly unstable or in which the articular cartilage has been destroyed, one must choose between arthrodesis and arthroplasty. For those patients with flexion deformities, one can correct the deformity with silicone implant arthroplasty.20,21 In patients with hyperextension deformities, arthrodesis of the MP joint in a slightly flexed position is advisable because of the lack of volar stability found with silicone implants.

A curved longitudinal incision is carried over the MP joint. The EPL is detached from the extensor
mechanism, and the EPB insertion is elevated off the base of the proximal phalanx. The metacarpal head is resected perpendicular to the shaft axis at the flare while the proximal insertion of the collateral ligaments is maintained, when possible. Usually there is a flexion contracture, and the collateral ligaments and volar plate are released proximally. The base of the proximal phalanx is preserved unless deformed or unless the implant requires more space. The metacarpal canal is broached to the largest size it will accept. The proximal phalanx is then reamed to accept the distal portion of the selected implant. The EPB is reattached through drill holes, with the MP joint held in extension. The EPL is reattached to the EPB and proximal phalanx. Postoperatively, the MP joint is held in a splint for 4 weeks.

Patients undergoing arthroplasties at this level ordinarily are not started on early motion. It is important to splint these thumbs in almost full extension for 4 to 5 weeks before allowing unrestricted motion. After MP joint arthroplasty, exercises are geared toward functional use of the thumb, and stability is the most important goal. One does not need a great deal of MP joint motion to have good hand dexterity and pinch strength. In fact, this joint has a wide variation in ROM in the nonarthritic patient. When MP arthroplasty is performed in conjunction with IP arthrodesis, the resected metacarpal head is used as supplementary bone graft for the IP joint arthrodesis.22

MP joint arthroplasty is best for the low-demand patient with involved adjacent joints. It has a higher incidence of IP deformity and weaker pinch (3.5 lbs) when compared to MP fusion.19 Others have found similar results with 6.5 years of follow-up.23

MP Joint Arthrodesis. MP joint thumb fusion is the most reliable treatment for the rheumatoid thumb and is recommended for the hyperextended position and for flexion deformities with good IP and CMC function. When one is performing an arthrodesis of the MP joint of the thumb, the ideal position is 15° of flexion.2,22 By fusing the MP joint in slight flexion, one takes considerable strain off the CMC joint. This is particularly important in those patients who have undergone or will require an arthroplasty at that level. The incision and exposure are similar to those used for an arthroplasty. Tension band technique for MP joint arthrodesis or screw fixation that needs minimal immobilization and permits earlier function are ideal methods. Other techniques of fixation include cross K-wires, interosseous wiring, and mini-external fixation. Bone graft is rarely required, except in patients with arthritis mutilans.10 Fusion is usually rapid, reliable, and predictable.1,4,24,25 The PIN strength is stronger, and the frequency of IP joint progression is less at 9-year follow-up when compared with alternative techniques.19

It is important in these patients to start early postoperative IP joint motion because of the possible risk of the extensor mechanism becoming adherent at the fusion site.

MP Joint Sesamoidesis/Capsulodesis. In patients with good flexion of the MP joint but in whom with pinch the joint collapses into a hyperextended position, one alternatively can carry out a capsulodesis/sesamoidesis9 to prevent hyperextension. A dorsoradial approach to the MP joint is performed. The accessory collateral ligament is divided to expose the volar plate. The articular cartilage of the radial sesamoid is removed. The subchondral bone is exposed at the opposing surface of the metacarpal neck. Tonkin et al recommend passing a suture to hold the sesamoid in place, but I have found it easier to just pin the MP joint in 30° of flexion for 4 weeks. The pin is then removed, and splinting continues for 4 weeks. Active flexion exercises are started at 6 weeks after surgery. This technique will usually limit extension to 15° of flexion.

CMC Joint

At the CMC joint, the surgical procedures performed include various types of arthroplasties and, in specific instances, arthrodesis. Because rheumatoid arthritis commonly affects multiple joints, it is ordinarily not advisable to fuse the CMC joint. Subsequent involvement at the MP joint level requiring fusion would leave the patient with very little mobility. An exception to this rationale is the patient with lupus erythematosus.26 In this condition, articular cartilage seems to be spared, and the major problem is instability with subluxation of the joints. In this case, arthrodesis of the CMC joint can provide a solid foundation for the thumb.

In most cases, however, surgical treatment of the CMC joint implies some form of arthroplasty. Carpal involvement is common in rheumatoid patients; therefore, bone resection is kept to a minimum. A
Resection arthroplasty is performed in which enough bone (trapezium and metacarpal) is removed to allow the first metacarpal to assume an abducted position. A tendon interposition and a ligament reconstruction arthroplasty as described by Burton and Pellegrini is then performed. Very occasionally, the fascia in the dorsal first web space may need to be released to obtain full adduction. Formal adductor release is rare. The thumb should be maintained in a position of abduction for approximately 4 to 5 weeks before starting motion.

As stated in the discussion of MP joint surgery, it is imperative that a hyperextended MP joint be corrected when performing an arthroplasty at the CMC joint level. If the MP joint is allowed to collapse into hyperextension, the forces are strong enough to adduct the first metacarpal, leading to CMC joint subluxation. The goal in the postoperative management of the patient undergoing MP or CMC joint arthroplasty is to maintain a balance between providing stability for a strong pinch and obtaining a functional ROM.

When thumb motion is initiated after CMC joint reconstruction, exercises consist of MP and IP flexion and extension and CMC joint palmar abduction and opposition. Often these patients have adduction deformities preoperatively. Therefore, abduction must be maintained with a thermoplastic splint. Pinch activities and adduction exercises are delayed until 8 weeks after surgery when light functional activities are added. ADLs are gradually increased over the next 4 to 6 weeks. The splint is generally discontinued by 12 weeks after surgery. The progress of activity is determined by the patient’s tolerance. It generally takes 6 to 12 months to return to full activity.

**Summary**

The majority of rheumatoid patients will present with one or more thumb deformities at some time. The goal of treatment is restoration and maintenance of stable and painless motion. The treatment is based on the type and stage of the deformity.

The boutonniere thumb is the most common deformity. MP arthrodesis is preferred for isolated MP involvement. For advanced cases in a low-demand patient, MP arthroplasty with IP arthrodesis is performed. In the higher-demand hand with an uninvolved CMC joint, arthrodesis of both MP and IP joints may be considered.

The swan neck deformity is usually treated by CMC joint tendon interposition arthroplasty with ligament reconstruction and arthrodesis of the MP joint. Gamekeeper’s deformity is treated with reconstruction of the ulnar collateral ligament. Arthrodesis is recommended for those patients with articular erosion of the MP joint.

FPL and EPL tendon ruptures are common in rheumatoid patients. EPL ruptures are most commonly treated with EIP transfer or observation. FPL ruptures are more disabling and usually require a tendon graft, tendon transfer, or an IP joint fusion in patients with radiographic destruction of that joint. Any bone spike in the carpal canal which caused the rupture must be removed.

**References**

13. Magnell TD, Pochron MD, Condit DP. The intercalated