

39 Wrist Rheumatoid Arthritis

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Synonyms

Rheumatoid arthritis
Rheumatism
Inflammatory arthritis

ICD-9 Code

714.0
Rheumatoid arthritis

Definition

Rheumatoid arthritis is a systemic disease of the connective skeletal system as well as the lymphatic and circulatory systems. This is a slowly progressive disorder that affects virtually any joint in the body and can have a profound effect on the hand and wrist. Rheumatoid synovitis in the wrist releases lytic substances in clearly designed patterns that destroy articular cartilage as well as joint capsule, bone, or tendon sheath. The disease can take three different forms: monocyclic, polycyclic, and progressive, and it is difficult to predict which pattern the patient's condition will follow. Although the primary treatment for this condition is medical, surgery is an option for cases of progressive deformity and failure of medical treatment to stem the synovitis or impending tendon rupture.

Symptoms

The patient's chief complaints are generally joint pain, stiffness, and joint fatigue. During an exacerbation phase, the wrist may feel warm to the touch with the presence of either localized or diffuse edema. Morning stiffness is common. Patients may also complain of cosmetic issues, including joint swelling and deformity.

Physical Examination

The most common forms of wrist deformity observed are wrist flexion, deviation, and palmar subluxation (Fig. 1). Relative dorsal subluxation of the ulnar head occurs as the carpus supinates away from it, leading to the disruption of the distal radial ulna joint and displacement of the extensor carpi ulnaris tendon volarly, which in turn compromises ulna stability during wrist extension. Ankylosis of the intercarpal and carpal joints may occur as well, producing the inability to cup the hand. During an exacerbation phase, the wrist range of motion, particularly at the end range, is extremely painful with weakness on motor testing. There may be localized swelling about the extensor retinacular involving the fourth extensor compartment, occasionally involving the extensor pollicis longus. It begins beneath the extensor retinaculum and may extend distally over the dorsum of the hand and envelop the extensor tendons of the wrist and fingers. Lysosomal enzymes may digest and weaken the dorsal tendons and wrist ligaments and may directly invade the tendons themselves. If

left unchecked the synovitis can cause tendon rupture and the palmar collapse deformity mentioned previously. Thus, patients may present with inability to extend the wrist or the fingers.

Strength may be limited by pain, disuse, or deformity (e.g., making grasping difficult); however, the remainder of the neurologic examination should be normal.

Functional Limitations

Functional limitations include inability to perform heavy lifting and gripping because of pain and inability to perform fine motor functions because of limitations of range of motion of the wrist. Patients may have difficulty with gripping a steering wheel or a grocery bag. They may have problems with cooking and cleaning due to difficulty with gripping tools. Activities of daily living such as shaving, shampooing the hair, etc., may be curtailed as well.

Diagnostic Studies

The "gold standard" for imaging remains the plain x-ray. Collapse of wrist architecture occurs in characteristic patterns in rheumatoid arthritis. These patterns are governed by the close proximity of synovial patches to supporting wrist ligaments. Collapse of the joint also results from articular cartilage and subchondral bone erosion. In the distal radial ulnar joint, synovitis can destroy the joint capsule and the triangular fibrocartilage complex. The head of the ulna becomes grossly deformed by destruction of the articular surfaces, and a relatively dorsal subluxation of the ulna occurs as the remaining carpus collapses volarly to the ulna head. This is known as the caput ulnae syndrome.¹ Other areas of involvement include the radial carpal joint, where intercarpal collapse patterns predominate. The destruction of the articular cartilage, the radial scaphoid, and radial lunar articulation will result in joint space narrowing. Insufficiency of the radial scaphoid lunate ligament may cause rotatory subluxation of the scaphoid and carpal malalignment, eventually leading to bony ankylosis. In addition, the distal carpal row rotates radially with the metacarpals giving rise to a zigzag deformity of the digits, radial deviation of the carpus, and ulnar deviation of the metacarpophalangeal joints. The subchondral collapse of the scaphoid fossa of the distal radius can cause proximal migration of the scaphoid into the radius (Fig. 2). The proximal migration of the capitate through a scaphoid lunate diastasis is a direct result of the weakening of the interosseus scaphoid lunate ligament.

Differential Diagnosis

Septic arthritis	Enteropathic arthritides
Lyme's disease	Osteoarthritis
Systemic lupus erythematosus	Gout
Psoriatic arthritis	Pyrophosphate deposition disease

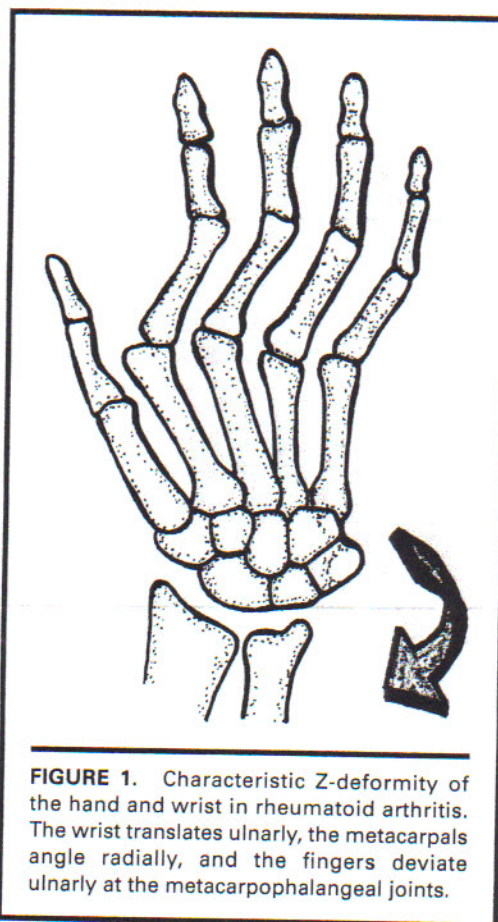


FIGURE 1. Characteristic Z-deformity of the hand and wrist in rheumatoid arthritis. The wrist translates ulnarly, the metacarpals angle radially, and the fingers deviate ulnarly at the metacarpophalangeal joints.



FIGURE 2. Advanced rheumatoid arthritis of the hand. Note the eroded distal ulna (arrow), loss of carpal height, erosions of the distal radius, loss of joint space, and periarticular erosions involving the metacarpophalangeal joints. (From Jebson PJL, Kasdan ML: *Hand Secrets*. Philadelphia, Hanley & Belfus, 1998, with permission.)

Treatment

Initial

The initial treatment of rheumatoid arthritis of the wrist may include the use of NSAIDs/COX-2 inhibitors, adjunctive antirheumatic agents, or oral steroids (see Chapter 134). Initial treatment may also include the use of intra-articular corticosteroid injections to cool down an acute synovitis.²

During the acute or postoperative phase the use of ice may be appropriate to decrease pain.

Patient education regarding the avoidance of exacerbating activities and the use of appropriate equipment at home and work to minimize pain and swelling and optimize function is important.

Rehabilitation

When initiating treatment of the rheumatoid wrist the clinician should be aware of the patient's clinical status since management in the acute and chronic stages are different.

Hot paraffin baths and whirlpool can be effective in increasing circulation and mobility. Splints such as wrist cock-up splints may improve deformity at the earliest stages of disease by providing relief from pain and swelling and thus maintaining proper alignment to the joints. During an exacerbation, general range-of-motion exercises are performed to prevent joint stiffness while avoiding the painful arc of movement. The therapist should be careful not to overstretch the joint because it can cause tissue

damage. Active assisted range-of-motion exercises are appropriate, and strengthening should be limited to static exercise while the joint is inflamed. When inflammation subsides dynamic exercises may be initiated to promote movement and function. Strengthening of the wrist extensors will maintain hand function. Patients should be encouraged to perform as many functional activities as they can tolerate to prevent deformity and to take frequent rest periods during exercise and daily activity. When home exercises are prescribed, the patient should be instructed to perform short periods of exercise throughout the day rather than one long period of exercise.

The postoperative regimen for wrist reconstruction depends entirely on the nature of the procedures performed. For soft tissue reconstruction, if pins are used, they usually remain for 8 to 12 weeks. After removal of the pins, gentle passive and active range-of-motion exercises can mobilize the wrist. Strengthening exercises are typically done early in the course of treatment and often are progressed for up to 3 months after surgery. Functional and job retraining can be done after 8 to 12 weeks depending on the work demands. Baseline function may not resume until 6 to 8 months postoperatively.

Rehabilitative treatment must be dovetailed with sound medical management.

Procedures

The wrist may be injected to improve function and pain. Typically this can be done 2 to 3 times a year, but is not recommended repeatedly. Many of the small joints of the wrist have interconnecting synovial spaces, which make it possible to successfully inject the wrist via a

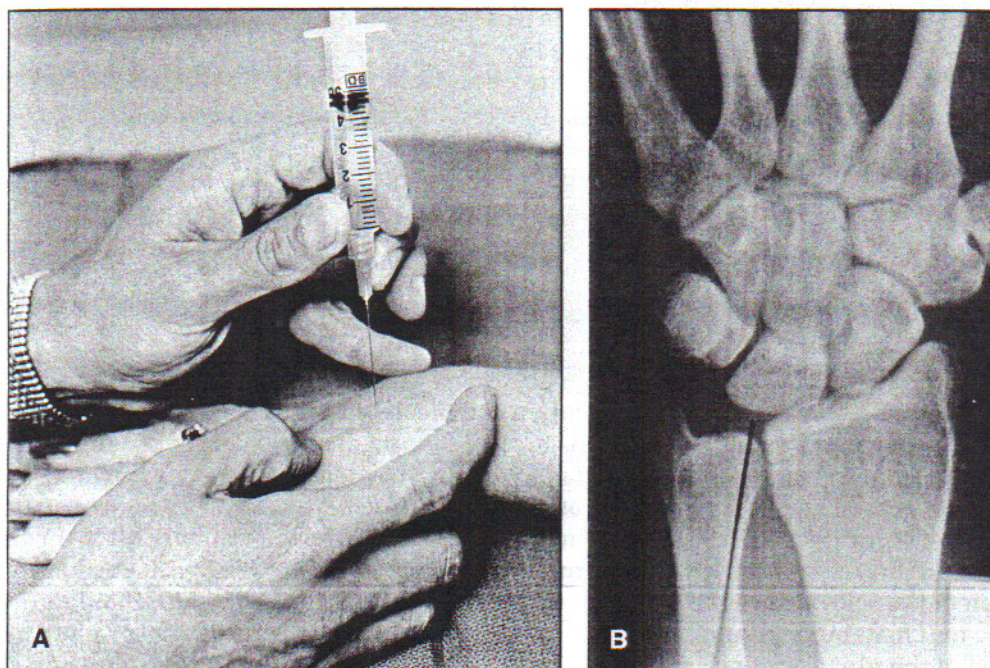


FIGURE 3. A, Dorsal wrist approach. The needle is inserted medial to the extensor pollicis longus tendon. B, Anteroposterior x-ray of the wrist demonstrating proper needle placement into the wrist using a dorsal approach. (From Lennard TA: *Pain Procedures in Clinical Practice*, 2nd ed. Philadelphia, Hanley & Belfus, 2000, with permission.)

number of approaches. The site of inflammation or desired anatomic area may determine the desired route.

The dorsal approach is often the preferred method for wrist injection (Fig. 3). This can be done best with the patient's wrist in slight flexion (over a rolled towel). Under sterile conditions, direct a 25- or 27-gauge needle just medial to the extensor pollicis longus tendon. Inject a mixture of local anesthetic (e.g., 1 cc 1% lidocaine) and corticosteroid (e.g., 1 cc triamcinolone).

Postinjection care may include local icing for 5 to 10 minutes and splinting for up to 1 week. Patients should avoid heavy lifting or carrying items after the injection.

Surgery

Tenosynovitis

Flexor and extensor tendons crossing the wrists are common sites of the relentless tenosynovitis that slowly destroys them. The tenosynovitis occurs as a result of direct invasion by rheumatoid pannus or lysosomal enzymes that digest the tendons. Sharp, bony prominences such as the ulnar head, Lister's tubercle, or the scaphoid tubercle form a mechanical shearing device that assists in this process. Digital extensor tendons that cross over the caput ulnar are affected most commonly. Ruptures usually affect the ulnar digits first and progress radially. Clinically, this could manifest suddenly and without pain. The extensor pollicis longus can be affected independently. Tenosynovitis can be cured and is of an urgent nature, especially if some of these tendons have begun to rupture. Flexor tendon ruptures must be distinguished from tendon subluxation and the possibility of radial nerve palsy secondary to rheumatoid tissue infiltration on the radial nerve. These can be evaluated by the "tenodesis" effect. If the digits cannot be extended at the metacarpophalangeal joint by flexing the wrist, the tendons likely have been ruptured. In the

early stages of the disease the tendons can be repaired in a side-to-side fashion to intact extensor tendons. Direct end-to-end repair may work in very early stages but will become impossible later. If all the extensor tendons have been ruptured on the dorsum, reconstruction becomes increasingly difficult and will require tendon transfer from the volar side, usually a digital flexor. Flexor tendon rupture is much more difficult to treat. Tendon transfers or grafts are secondary and reconstruction may be necessary because direct repair is usually impossible. Fusions of the distal interphalangeal joint may be required when profundus tendon rupture becomes irreparable.³

Reconstruction of the Collapsed Wrist

Synovitis in the wrist characteristically starts on the ulnar aspect, and repair usually involves the distal radial ulnar and the radial carpal joint and spares the midcarpal joint. A dorsal wrist synovectomy is indicated for painful, poorly controlled synovitis and minimal articular damage. Following a synovectomy the dorsal retinaculum can be placed beneath the extensor tendons to reinforce the capsule and relocate the extensor carpi ulnaris dorsally. This is usually considered in patients in the early course of disease after about 6 months of medical therapy in which there is persistent pain, swelling, and loss of function as a result of inflammation.⁴ Patients usually gain a strong sense of securing grip and do not mind the relative increase in stiffness after the procedure. Recently the arthroscope has been used to affect synovectomy of the wrist with minimal destruction of the soft tissue envelope. However, if the synovitis in the distal radioulnar joint progresses and instability results, a dorsally protuberant ulna can cause extensor tendon rupture. Shortening of the ulna; hemi-excision of the radial side of the ulna, leaving the ulna styloid intact; or excision of the distal 1 cm of the ulna head may be considered (Darrach procedure). The Darrach procedure has lost favor in the reconstruction of post-traumatic distal radial ulna joint problems in younger patients but affords older rheumatoid patients increased movement with less pain and removes the risk of extensor tendon rupture. There have been many attempts to reconstruct the ulna head with silastic prostheses to support the ulna carpus. This technique has had problems with implant fragmentation and silicone synovitis. In general, a well performed Darrach procedure is all that is necessary in this setting to achieve good results.⁵

Arthroplasty/Arthrodesis

As wrist disease progresses and pain and instability become more prominent, the clinician needs to consider arthroplasty or arthrodesis (Fig. 4). An arthrodesis will create a strong, painless wrist that is devoid of motion in the flexion extension and the radial ulnar plane. This can be problematic if the patient has another ankylosed joint in that extremity. To preserve wrist motion, numerous *arthroplasty* procedures have been described. These include synovectomy with stabilization, temporary pinning of the wrist, and creation of a fibrous ankylosis between the radius and the proximal carpal row. Silastic implants have been devised; however, although short-term results have been promising, these techniques over the long term have proven to be quite problematic. The elastic end of prostheses can fracture and can cause silicone synovitis.

A more permanent and stable solution is the wrist *arthrodesis*, either total or partial. Complete wrist radial carpal arthrodesis is indicated for severe wrist pain with deformity, bone loss, and ruptured extensor tendons. The best position for wrist fusion is neutral with slight flexion. The wrist joint is stabilized with pins (Fig. 4). This procedure has excellent long-term results with relief of pain and preservation of hand function.⁶ This can also be performed in conjunction with a Darrach procedure.

Potential Disease Complications

Disease related complications include permanent loss of movement in the fingers, with collapse of the fingers secondary to tendon rupture; volar grip collapse with chronic pain; flexion deformity; and severe loss of activities of daily living.

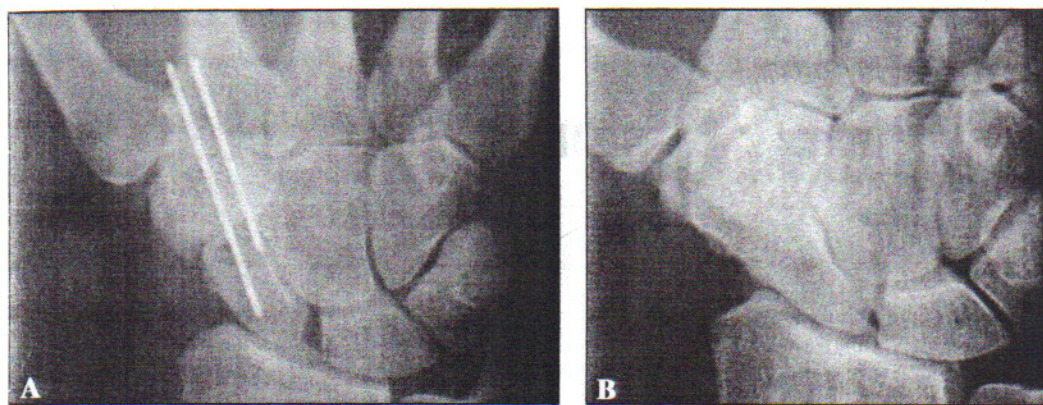


FIGURE 4. Triscaphe (STT) arthrodesis. A, Radiographic examination 6 weeks after triscaphe arthrodesis demonstrates typical pin placement and adequate bony consolidation. B, Three months after triscaphe fusion, the arthrodesis is radiographically solid. (From Weinzweig J: *Plastic Surgery Secrets*. Philadelphia, Hanley & Belfus, 1999, p 619, with permission.)

Potential Treatment Complications

Medical treatment complications are discussed in detail in Chapter 134. Surgical treatment complications include silicone synovitis from the use of silastic wrist; hardware loosening; and backing out, such as seen in wrist arthrodesis. These can secondarily puncture through the skin, creating infection. Non-union of the arthrodesis has been seen. The possibility of fracture about the wrist dramatically increases as the bones about the wrist become increasingly osteopenic.

Complications following total wrist replacement vary from 15% to 40%. In addition, bone resorption, component loosening, radial ulnar imbalance, and attritional tendon rupture have been seen.⁷

References

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