A New Method for Radiolunate Arthrodesis in Ulnar Translocation of the Carpus in the Rheumatoid Wrist

ANTONIO DE SANTOLO, M.D., DrSc., FACS
Clinical Professor (Orth),
Director Hand Surgery Training,
Chief Hand Surgery Service,
Hospital Universitario of Caracas

MAGALLY ORTIZ, M.D.
Clinical Instructor (Orth),
Hand Surgery Service Hospital Universitario of Caracas

IGOR INDRIAGO, M.D.
Hand Surgeon,
Hand Surgery Service,
Red Cross Hospital of Caracas

HISTORICAL PERSPECTIVE

Limited wrist arthrodesis has been performed on the wrist since O’Rahilly (10) presented a comprehensive review of carpal and tarsal abnormalities.

In 1971, Stack and Vaughan-Jackson (13) described the wrist of a rheumatoid patient in whom ulnar drift of the fingers was preserved by spontaneous radiolunate fusion. Chamay et al. (2) observed spontaneous radiolunate fusion of a rheumatoid wrist, noted that it was beneficial to function, and as a result performed arthrodesis between the lunate and the radius in seven patients.

Linscheid and Dobyns (6) reported spontaneous radiolunate arthrodesis from progressive cartilaginous destruction or from arthrofibrosis with a fixed position of the wrist (6). In their later work (7), they had satisfactory experience with radiolunate arthrodesis in 19 cases, including patients with traumas.

Stanley and Boot (14) observed that this procedure was helpful in the slowly progressive rheumatoid wrist with localized proximal carpal row disease. They used an original plate for the arthrodesis in 6 of 19 cases.

Taleisnik mentions the lunate bone as a keystone in the wrist (16). In rheumatoid arthritis, wrists with ulnar subluxation, or translocation of the carpus, treatment should be directed to relocating and stabilizing the lunate in its normal relationship to the radius by radiolunate arthrodesis (15).

Ishikawa et al. (4) used radiolunate arthrodesis in conjunction with other procedures in rheumatoid wrist. Their results show postoperative changes in the lunocapitate joint in half of their cases, but this finding did not cause any apparent functional difficulty at the follow-up evaluation.

Watson et al. (17) mentions limited arthrodesis of the carpus and concluded that these procedures provide a workable alternative for many patients with localized posttraumatic, localized degenerative, or destructive arthritis of the wrist.

INDICATIONS/CONTRAINDICATIONS

Evaluation

The goals of radiolunate arthrodesis are to decrease pain and increase function by restoring relative carpal alignment and to prevent further maladaptive carpal repositioning.

Ulnar translation of the carpus down the inclined plane of the radius is further accelerated by supination of the wrist.
the carpus, ulna minus deformity, and degeneration of the triangular fibrocartilage complex (7-11).

Limited carpal fusion can be beneficial in treating wrist disorders and decreasing further deformity in the hand. Radiolunate arthrodesis is indicated when the radioscopy and midcarpal joints are relatively well preserved. It gives the wrist good stability and functional mobility.

■ PREOPERATIVE PLANNING

Symptoms included pain, weakness and limited motion of the wrist. Dorsal prominence of the ulnar head is present, and tenosynovitis of the dorsal extensor compartments is usually present as well. The metacarpophalangeal joints are frequently affected, with palmar subluxation and ulnar drift. Some patients experience extensor tendon rupture (Figs. 1 and 2). Synovitis of the carpometacarpal joints and progressive metacarpophalangeal pathology with muscular imbalance produce a pathologic palmar descent of the fourth and fifth metacarpal heads (18). This increases when the patient makes a fist or grasps (Fig. 3). This clinical sign is always present in ulnar carpal translation.

The indications for radiolunate arthrodesis are a painful wrist with radiocarpal instability, progressive ulnar shift of the carpus, or palmar subluxation of the carpus. Additionally, the absence of destructive changes in the proximal scaphoid pole is necessary to exclude this bone from the arthrodesis site (8).

The radiologic preoperative evaluation determines the indication for radiolunate arthrodesis. The radiologic measurement of the carpal translocation is made according to the DiBenedetto method (3–12). According to Larsen et al.’s classification (5), arthrodesis is indicated in patients with classifications II, III, and IV. Normal I or severe destructive radiological abnormality V should not be considered for arthrodesis.

The primary radiological indications for radiolunate arthrodesis are:

1. Preservation of a midcarpal joint space of at least 1 mm with minimal erosions
2. Radiocarpal joint space narrowing and erosions
3. Ulnar translation of the carpus down the inclined articular plane
4. Carpal collapsed patterns, that is dorsal intercalated segment instability (DISI) or ventral intercalated segment instability (VISI)
5. Dorsal subluxation of the ulnar head (7) (Fig. 4)

The main contraindications are rapidly progressive destructive rheumatic process, nonfunctioning or ruptured wrist extensor tendons, and x-ray or intraoperative discovery of significant arthritis involvement of the midcarpal joints (9).
FIG. 4. Preoperative radiograph of the wrist with evident ulnar translocation and DISI.

FIG. 5. After decortication of the radial facet of the lunate and lunate facet of the radius, 0.62 Kirschner wire is introduced in the radius and carpal bones in a neutral position. Rx, control is taken to avoid changes in the alignment and carpal angles.

FIG. 6. Result after arthrodesis.
Radiolunate Arthrodesis

![Diagram of radiolunate arthrodesis]

**FIG. 7.** With the wrist in flexion, after decortication of the facets, 2-mm mini-condylar of t-plate is fixed at the lunate, bone graft from the radius fills the space between lunate and radius, and later the rest of the screws are placed.

**TECHNIQUE**

A radiolunate arthrodesis aims to accomplish the following:

1. Relocate the lunate within the fossa of the radius to prevent further translocation
2. Correct midcarpal malalignment, if present
3. Correct ulnar deviation of the wrist
4. Maintain carpal height (7)

We prefer to use general anesthesia, because arthrodesis is generally performed in conjunction with other procedures.

The procedure is performed through a dorsal longitudinal 4- to 5-cm incision, ulnar and just proximal to Lister’s tubercle. After incision of the dorsal retinaculum between the third and fourth extensor compartments, division of the terminal portion of the posterior interosseous nerve proximal to the radiocarpal joint is realized. A synovectomy of the extensor tendons is performed if needed after the extensor retinaculum is reflected; the wrist capsule is opened transversely, and intraarticular synovectomy is performed. Along with individualization of the lunate, decortication of the radial facet of the cartilage and the facet of the radius with the lunate is performed until the cancellous bone can be visualized on both facets (Fig. 5).

Under the image intensifier, temporary fixation of the arthrodesis is performed with 0.62 K-wire driven in an axial direction through the middle of the lunate bone distally with the wrist in flexion. The lunate is transposed back in its radial facet and the K-wire is passed through to the radius (Fig. 5). At this point, it is necessary to inspect, on the image intensifier or x-ray, the midcarpal angulation, the scapholunate relationship, and the lunate position to avoid any shortening between the lunate and the radius (Fig. 5).

A minicondylar plate (1) or T plate of 2 mm is fixed with one 2-mm screw in the lunate (Fig. 7). The space between the lunate and radius is filled with a bone graft harvested from the distal radius (Fig. 6–8).

After assessing the position of the radiolunate arthrodesis, the proximal and distal screws are inserted (Fig. 6). Wrist mobility should be tested before closing the capsule. The dorsal retinaculum and the skin are closed, and a short palmar splint with soft dressing is applied, leaving the fingers and the thumb free.

At 5 to 7 days, the dressing is changed and a new well-molded short arm cast splint is applied, leaving the digits and thumb free. Rehabilitation begins on the same day.

**FIG. 8.** Peroperative arthrodesis radiolunate with condylar plate; place where bone graft was taken in the radius; rupture of the EPL.
At 4 to 5 weeks, a radiograph is obtained without the cast splint. In all of our cases, the arthrodesis at this point is solid or almost solid, but 2 more weeks of splint protection are recommended to ensure total consolidation.

The postoperative immobilization consists only of an anterior splint that enabled rehabilitation to begin on the seventh day. Total immobilization lasts 4 to 5 weeks. The degree of mobility of the wrist after the radiolunate arthrodesis was on average 40° of flexion and 55° of extension (Figs. 9, 10, 11).

## COMPLICATIONS

We have not experienced any complications. However, considerable complications can occur, such as nonunion of the arthrodesis, bowstring of the extensor tendons, and severe ulnar deviation of the wrist and fingers if the extensor retinaculum is not reconstructed. Rupture of the finger extensors can occur when ulnar head resection is performed in conjunction with this arthrodesis. Infection of the wound and reflex sympathetic dystrophy also can occur. To avoid displacement and loosening of the screw and plate, x-ray consolidation of the arthrodesis is necessary and can be performed 4 or 5 weeks postoperatively.

## CONCLUSION

The authors are pleased with this new technique for radiolunate arthrodesis, using 2-mm minicondylar or T plate, because the time of immobilization is less than with other procedures.

Various techniques have been described, all of which require 6 to 12 weeks of postoperative cast immobilization to achieve rigid consolidation of the radiolunate arthrodesis.
REFERENCES


