Wrist Series
Technique Guide

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Wrist Arthroscopy Techniques

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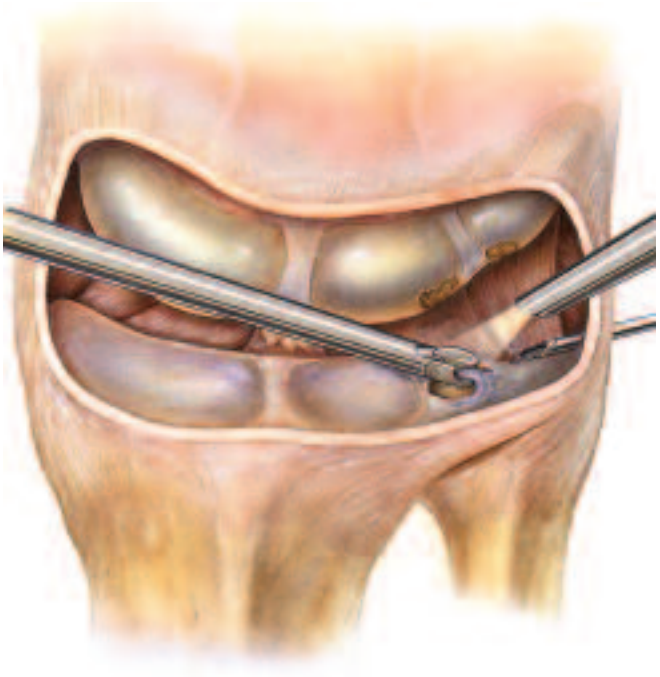

Wrist Arthroscopy Techniques

As described by:
David Auerbach, MD and Gary G. Poehling, MD

Introduction

Historically, wrist arthroscopy has seen the most use as a diagnostic tool. A systematic arthroscopic examination can disclose defects in the wrist joint that may be missed by standard diagnostic techniques, including arthrograms and MRI. Over the last 20 years, the use of wrist arthroscopy in both the diagnosis and treatment of problems in the wrist has grown tremendously.

Today, with continuously improving small joint instrumentation, arthroscopy of the wrist is used to treat a wide array of conditions including those from traumatic, degenerative, or metabolic causes. From simple debridements to more advanced techniques, such as fracture fixation and reconstruction, more and more surgeons are finding wrist arthroscopy to be an important part of their treatment armamentarium.

Indications

In its infancy wrist arthroscopy was used as a diagnostic aid to confirm ligament or cartilage tears, or inflammatory processes. Now many of these problems are also treated arthroscopically. These include synovial biopsies or debridements, debridement or repair of the triangular fibrocartilage complex (TFCC), or stabilization procedures for ligament disruptions and carpal instabilities. Arthroscopic treatment also includes debriding degenerative tissue found in the capsule, the TFCC, ligaments, irregular articular surfaces, or a ganglion stalk; bone resection, including the radial styloid or partial ulnar head; reducing and repairing carpal or distal radius fractures; and removing bone fragments or loose bodies. The indications for wrist arthroscopy continue to grow today.

Spider Limb Positioner

Smith & Nephew TFCC Mender Disposable Suture System

Smith & Nephew Trigger Finger System

Positioning and Preparation

Wrist arthroscopy may be performed with or without a wrist traction device. The patient is supine with the arm on a hand table. Traction through the wrist is applied through finger traps on two to five fingers. This is done either with the forearm flat on the hard table and the traction weights off the end of the table or with the elbow bent 90°, the forearm upright and traction applied through a tower either on the same or opposite side of the OR table. Counterforce on the upper arm may be necessary.

Anesthesia may be general, regional, or, for soft tissue procedures, local with sedation. An optional tourniquet is used on the arm or forearm. Inflow is achieved with the Smith & Nephew DYONICS® 25 Fluid Management System (gravity inflow is also an option). The video monitor, DYONICS 25, and shaver equipment are all placed on the opposite side of the OR table so that the surgeon has a clear view of the monitor.

Instrumentation

A 2.7 mm camera is used for visualization. The integrity of the structures is "palpated" with the use of a probe. There are a variety of biters, graspers, punches, and shavers that can be utilized. Additionally, radiofrequency probes with small and malleable tips have become available for tissue cauterization, ablation, and shrinkage.

External Landmarks and Portal Positions

External landmarks on the dorsum of the wrist are easily seen and palpated. The structures relevant to portal entry are marked before beginning the procedure so they remain apparent after the joint is distended. The major external landmarks and the position of the portals that may be used in wrist arthroscopy are shown in Figure 1.

The primary radiocarpal portal, the 3-4, is located 1 cm distal to Lister's tubercle and just over the distal radius. The adjacent extensor pollicis longus (EPL) angles radially, providing an ideal portal ulnar to the EPL and radial to the extensor digitorum communis tendons, between the scaphoid, lunate, and radius.

The 6-R portal lies radial to the extensor carpi ulnaris (ECU) and distal to the ulnar head. The 6-U portal is just ulnar to the ECU.

The 1-2 portal lies between the first and second extensor compartment tendons and the 4-5 portal lies between the fourth and fifth extensor compartment tendons.

A volar radiocarpal portal is at the radial volar wrist, at the level of the joint just radial to the flexor carpi radialis tendon and ulnar to the radial artery, which is palpated and marked prior to tourniquet inflation.

The midcarpal radial (MCR) portal is on a line along the radial side of the third metacarpal, proximal to the capitate in the soft spot and about 1 cm distal to the 3-4 portal. The midcarpal ulnar (MCU) portal is on a line along the central portion of the fourth metacarpal, proximal to the capitate hamate joint.

These portals afford access to, and visualization of, virtually all the bony and soft tissue structures of the radiocarpal and midcarpal joints, with minimal risk to nerves and blood vessels.

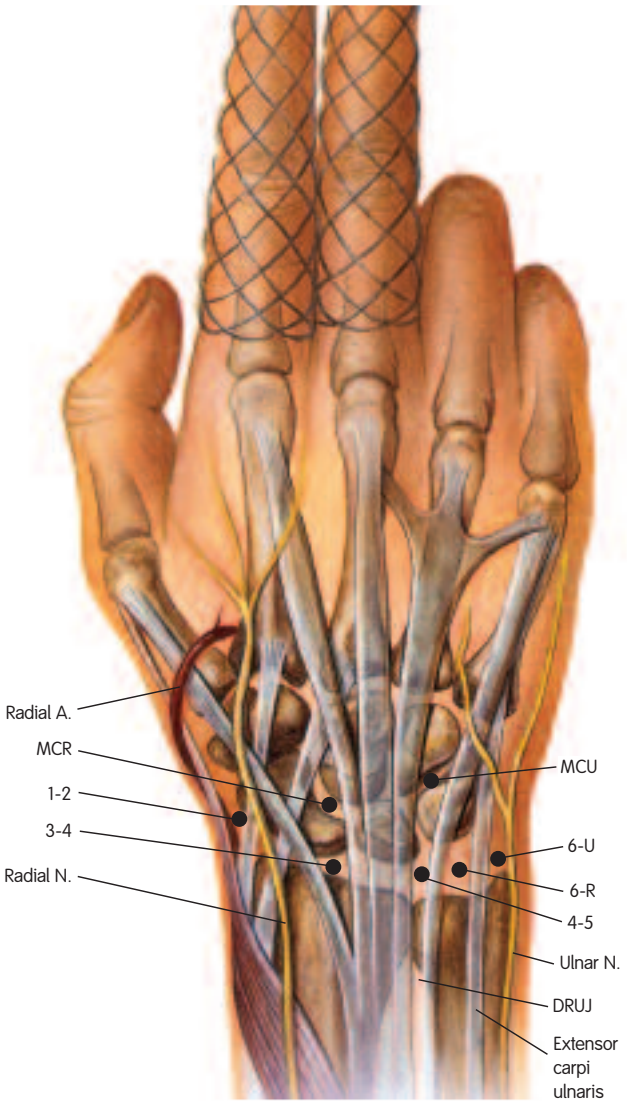

Figure 1. The 3-4, 4-5, 6-U, and 6-R portals provide the access and visibility needed for basic diagnostic wrist arthroscopy. The midcarpal (MC) portals provide a view of the midcarpal joint.

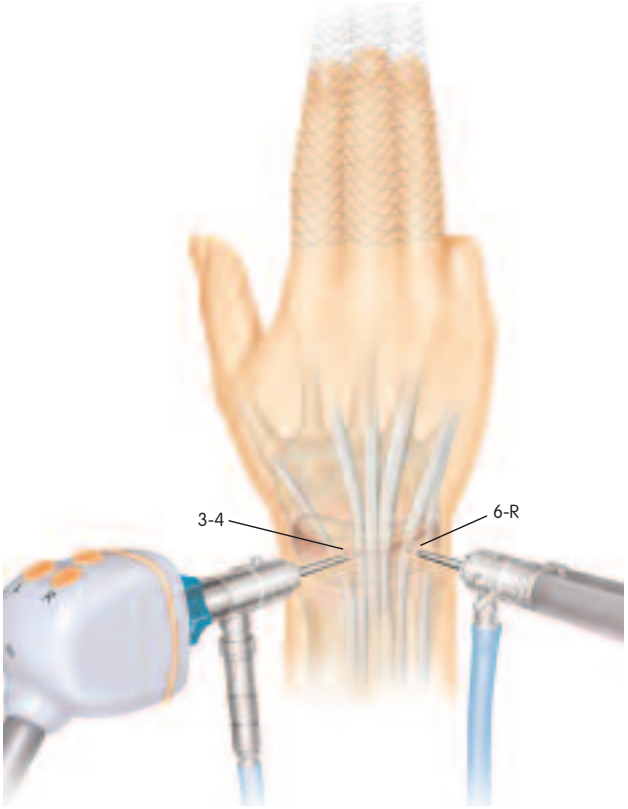

Figure 2. 3-4 portal with inflow cannula and video arthroscope. 6-R portal with operative cannula and Smith & Nephew DYONICS® Mini-Motor Drive.

Technique

1. Establish the 3-4 portal first. Inflate the joint with saline or local anesthesia prior to making the incision. A normal joint will take 5-7 cc of fluid. If local anesthesia alone is used, infiltration of the proposed skin incisions and underlying soft tissue should be done at this point. The 3-4 portal is located at the soft spot, 1 cm distal to Lister's tubercle (Figure 2). Inserting a needle into the joint here helps confirm the exact location for the portal.
2. Use a #15 blade to make the incision just through the skin to avoid harm to cutaneous nerves below. Longitudinal or transverse incisions may be used.
3. Use a mosquito clamp to spread the soft tissues and penetrate the joint capsule. Use the clamp to spread the capsule portal to make access to the joint easier. Injected fluid exiting the wrist through the spread capsule confirms entrance into the joint.
4. Use a blunt trocar to gently place the cannula in the portal. Replace the trocar with the arthroscope and commense inflow. There may be many bubbles present at the initial visualization of the joint. These will be minimized once an outflow portal is established.
5. Prepare to establish the second portal. This is usually the 6-R portal (Figure 2), but can be the 4-5 or 6-U portal depending on the surgeon's preference. Place a needle through the skin at the proposed portal site.
6. Use the arthroscope to view the needle in the joint. Ensure that the portal height is correct and that proposed portal will provide sufficient access to the joint.
7. Repeat steps 2 and 3 to establish the portal. A second cannula may be introduced through this portal or instruments may be passed directly through the portal without a cannula based on surgeon's preference. Multiple portals may be used in order to enhance visibility into the joint.

Normal Anatomy of the Wrist

The normal relationships of bony and soft tissue structures in the radiocarpal and midcarpal joints that are significant in establishing arthroscopic portals and arthroscopic examination are shown in Figures 3 and 4.

Arthroscopic Examination

8. Begin a systematic examination of the joint at the radial side. Move along the volar aspect to the ulnar side, then return along the dorsal aspect. Contouring, or following the edges of structures, reveals the boundaries and relationships of each part. Use the probe as an exploring "finger" to determine structural characteristics such as texture, size, and disruptions.
9. On the volar side, disruptions and other disorders of the ligaments can be observed by scanning the radioscaphocapitate, radiolunotriquetral, radioscapholunate, and ulnolunate ligaments.
10. The articular surfaces of the radius, scaphoid, lunate, and triquetrum can be seen centrally and scapholunate, lunotriquetral ligament, or TFCC tears can be evaluated.
11. Dorsally, capsular synovial tissue can be assessed and the stalk of a ganglion cyst can be identified.

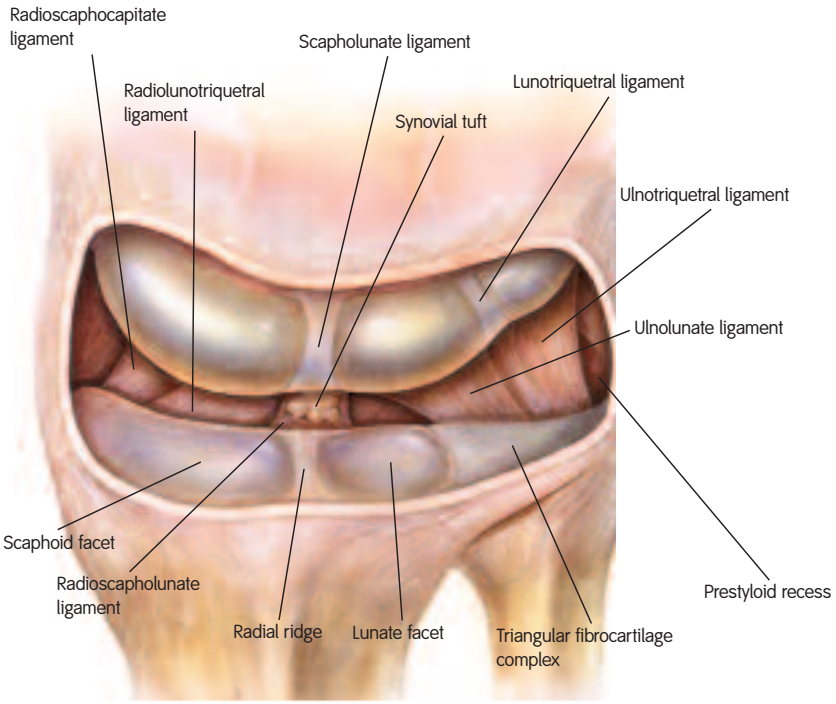

Figure 3. Arthroscopic Appearance of the Radiocarpal Joint
The fat pad, sometimes referred to as the synovial tuft, over the radioscapholunate ligament (ligament of Testut), is usually the first structure seen through the 3-4 portal, and is a convenient landmark for orientation during arthroscopy. The scapholunate ligament is above, and the radial ridge, between the scaphoid and lunate facets of the radius, is below.

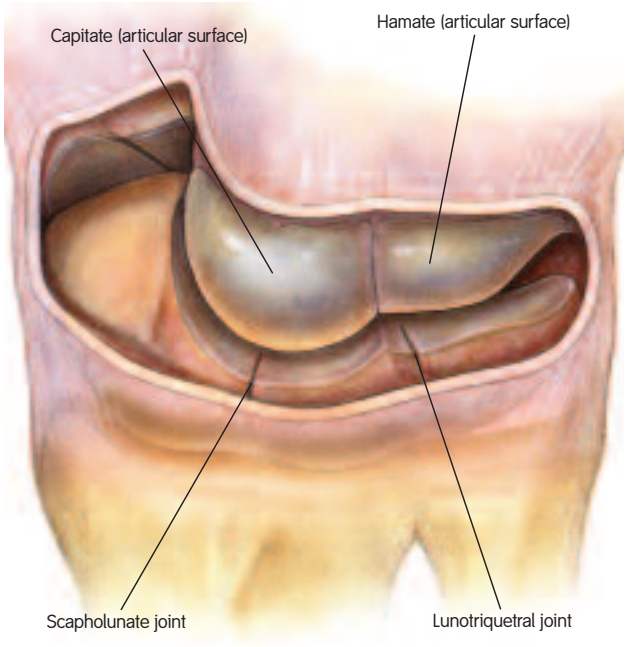

Figure 4. Arthroscopic Appearance of the Midcarpal Joint
All the joints between the proximal and distal rows of carpals, including the scapho-trapezio-trapezoid (STT) joint, the scapholunate joint, the lunotriquetral joint, and the capitate hamate joint may be seen through either of the midcarpal portals.

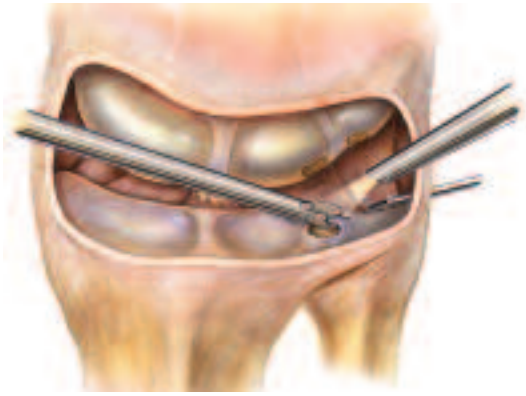

Figure 5A. Triangular Fibrocartilage Tear
Typical degenerative lesion at the center of the TFCC. Erosion of the ulna, lunate, and triquetrum is also evident.

Figure 5B. A 2.5 mm suction punch is in position for removal of degenerative tissue.

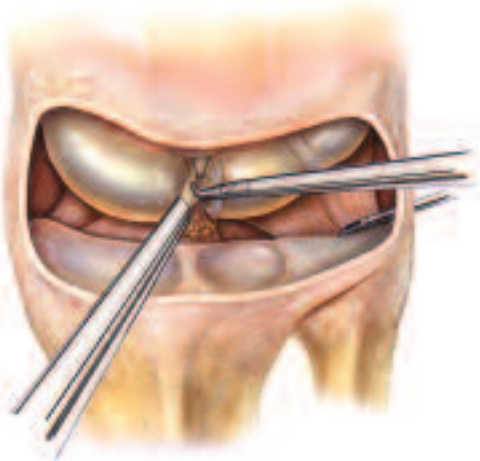

Figure 6A. Disruption of the Scaphonlunate Ligament.

Procedures – Arthroscopic Surgery of the Wrist

When the surgeon has mastered the basic techniques of wrist arthroscopy, a spectrum of therapeutic options becomes available. Basic procedures that may be performed arthroscopically include loose body removals and debridements. Synovial tissue, chondral lesions, or partial ligament tears may be debrided with shavers or biters. TFCC tears may be excised with a banana blade, suction punch, biters, or shavers.

More advanced procedures include use of an abrader for ulnar head wafer resections and radial styloidectomies. Suture techniques have been described for peripheral TFCC tears. Intraarticular fractures of the distal radius and scaphoid can be freshened, reduced, and repaired under direct arthroscopic visualization. Carpal instabilities can be reduced and pinned. Ganglion cysts can be excised as well.

Midcarpal Arthroscopy

The midcarpal portals may be used to identify and treat problems involving the carpal bones, intercarpal joints, and ligaments.The midcarpal joint can be accessed through the MCR and MCU portals shown in Figure 1. Often the 3-4 radiocarpal skin portal can be used for the MCR portal by stretching the skin distally and reentering the capsule 1 cm more distally at the soft spot between the scaphoid, lunate, and capitate. Injection of fluid into the joint prior to establishing the first portal may be necessary if there was no communication through a scapholunate or lunotriquentral ligament tear. Outflow is initially established through an 18 gauge needle placed through the proposed MCU portal. If necessary a 2.0 mm shaver is used in this tighter space.

Radiocarpal and Midcarpal Joint Pathology

Figures 5A, 5B, 6A, and 6B illustrate some of the most common pathologies of the radiocarpal joint seen when the videoarthroscope is positioned in the 3-4 portal. Common pathologies of the midcarpal joint as seen when the videoarthroscope is positioned through the MCR portal are illustrated in Figures 7A and 7B.

Postoperative Management

Local anesthetic infusion pumps and small size cold therapy pads help significantly with postoperative pain and can be incorporated into the dressing. The type of dressing depends on the procedure performed. Splints may be necessary, but the vast majority of patients may require only a soft dressing allowing early range of motion.

Postoperative management is based on the procedure performed, the patient's motivation, and surgeon's preference. If any structures have been fixed (fractures), stabilized (carpal instabilities), or repaired (TFCC) then a period of immobilization will be necessary. A short period of immobilization may be considered for comfort after bone resections (i.e., ulnar head resections). Otherwise, early motion is allowed. This may require the assistance of a hand therapist.

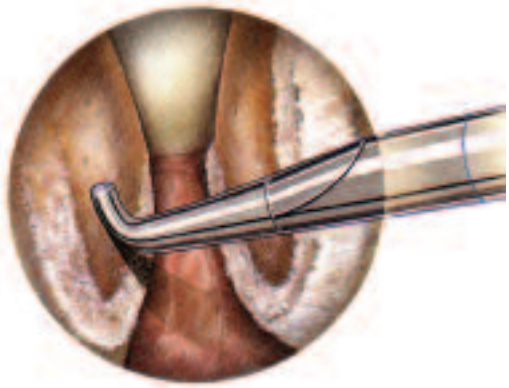

Figure 6B. The capitate is visible through a tear in the scapla-lunate interosseous ligament. A 2.0 mm probe is shown in this position.

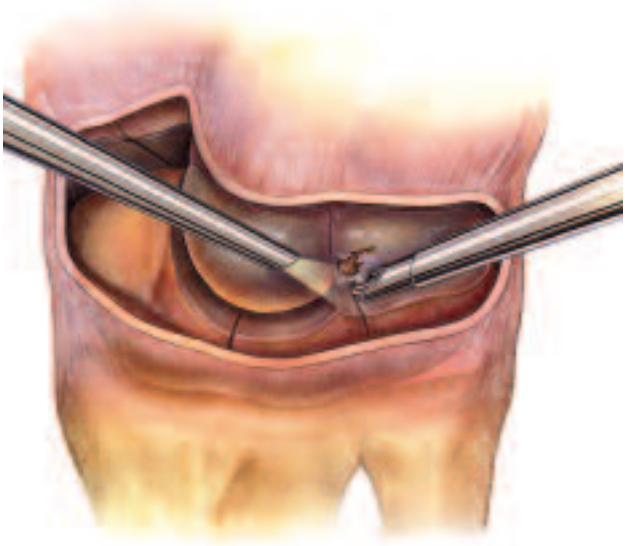

Figure 7A. Cartilage Degeneration at the Hamate.

Figure 7B. The 2.0 mm full radius shaver is positioned through the MCU portal for debridement.

Additional Instruction

Prior to performing this technique, consult the Instructions for Use documentation provided with individual components — including indications, contraindications, warnings, cautions, and instructions.

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Caution: U.S. Federal law restricts this device to sale by or on the order of a physician.

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