Diagnostic Wrist Arthroscopy

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KEYWORDS

• Wrist • Ligamentous injury • Diagnostic arthroscopy

KEY POINTS

- After a careful history and physical examination, wrist arthroscopy is the reference standard for identifying and characterizing intra-articular pathology.
- Wrist arthroscopy may be used to confirm the presence of articular wear, capsular and interosseous ligamentous pathology, and triangular fibrocartilage complex (TFCC) changes.
- Arthroscopy is a useful adjunct when determining whether or not a patient would benefit from soft tissue repair, reconstruction, or salvage procedure.
- Degenerative changes may be identified during arthroscopy that may or may not be contributing to a patient's complaints.
- Findings on wrist arthroscopy must be used in context of specific patient complaints and systematic physical examination findings to ensure that the correct treatment is selected.

INTRODUCTION

Although arthroscopically assisted treatments continue to be explored and analyzed for their effectiveness, the use of diagnostic wrist arthroscopy as an adjunct to a careful history and physical examination remains the reference standard in patients with pain thought to be originating from within the wrist.

When examined by an experienced hand surgeon, wrist problems in general and carpal instability are diagnosed approximately 75% of the time by history and physical alone.[1,2] Pertinent history regarding wrist pathology includes mechanism of injury, exacerbating hand and wrist maneuvers, pain-relieving hand and wrist positions/splints, prior corticosteroid injections that had either a positive impact or no impact on symptoms, and prior surgical interventions.

Arthroscopy should be considered in the setting where a patient's pain has persisted despite nonoperative treatment with splinting and/or occupational therapy delivered by a certified hand therapist. A differential diagnosis should be established prior to arthroscopy to increase the probability of identifying a problem that is contributing to a patient's pain. A clinical scenario where this is best illustrated is a patient with dorsal wrist pain, exacerbated by loading and extension of the wrist. Physical examination, including provocative maneuvers, increase the probability that further diagnostic adjuncts will unveil a problem that can be acted on clinically. Using advanced imaging or arthroscopy as a screening tool may not have

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the same clinical impact. Furthermore, although degenerative changes may be apparent on intra-articular examination, treatment may not improve a patient's symptoms. History and focused physical examination remain essential in determining whether or not a patient might predictably benefit from therapeutic intervention.

CLINICALLY RELEVANT ANATOMY

A systematic approach to evaluation of the wrist by arthroscopy starts with a thorough knowledge of the 3-D anatomy of the region. Traditionally, the workhorse arthroscopic portals are positioned over the dorsal wrist, avoiding the risk of injury to the neurovascular structures of the volar wrist. More recently, investigators have described volar arthroscopic portals that can be used to examine and repair dorsal soft tissue structures.[3–8]

The dorsal arthroscopic portals are named for their relation to the extensor compartments: 3-4, 4-5, 6 radial (R), 6 ulnar (U), radial midcarpal, and ulnar midcarpal portals. **Table 1** describes the anatomic structures that can be seen with each associated portal.

WRIST ARTHROSCOPY TECHNIQUE

The correct instrumentation and arthroscopy setup must be confirmed prior to initiating the delivery of anesthesia. Arthroscopy can be performed either with general anesthetic or regional anesthetic and sedation.

The patient is placed in the supine position with the shoulder abducted and elbow flexed at 90°. A tourniquet is placed above the elbow and the arm is padded in preparation for traction. The arm is secured to the hand table using a soft gauze wrap. Traction is applied through appropriately sized finger traps to gently distract the wrist. If the pulley system is positioned correctly, the fingers are directly collinear with the forearm.

The surgeon is seated on the side of the side of the hand table toward the feet of the patient. The arthroscopy viewing tower should be placed across from the surgeon. The assistant, important for stabilizing the forearm and wrist, can be seated on either side of the hand table (**Fig. 1**).

Standard equipment includes a 2.7-mm, 30° angled arthroscope; a 3-mm hook probe; and overhead traction. Instruments that are used in the treatment of intra-articular pathology include a radiofrequency ablation probe and a mechanical shaver. The shaver may be necessary to clear the wrist of synovitis or degenerative soft tissue changes to perform a comprehensive diagnostic evaluation of the wrist.

Traditionally, arthroscopy has been performed using fluid for articular distension and visualization, and wet arthroscopy has been considered reference standard. Recently, surgeons have challenged this paradigm and have elected to perform dry arthroscopy where no fluid is injected into the wrist. Proponents of the dry technique believe that fluid can disrupt normal tissue planes, making conversion to open surgery more difficult. Dry arthroscopy may also have a role in intra-articular fracture reduction and bone grafting.[9,10] This article focuses on wet arthroscopy.

DORSAL PORTALS: 3-4 PORTAL

The 3-4 portal is used to gain entry into the radiocarpal joint. Found at approximately 1 cm distal to the Lister tubercle, the 3-4 portal exists in the soft tissue concavity between the extensor pollicis longus tendon and the extensor digitorum communis tendons. After exsanguinating the extremity, the tourniquet is inflated to 100 mm Hg above the most recent systolic blood pressure (see **Fig. 1**).

An 18-gauge needle attached to a 10-mL saline-filled syringe is inserted into the 3-4 portal at approximately 10° of inclination toward the hand. This assumes that there is normal volar tilt of the radius (11°) (**Fig. 2**).

Careful inspection and palpation of the surface anatomy avoids inadvertent tendon injury. The bevel of the needle should be positioned parallel to the extensor tendons to reduce the risk of tendon laceration. If the needle does not enter the portal in perfect position, it may be difficult to place or manipulate the position of the arthroscope, resulting in poor visualization of wrist structures.

Entry into the joint is felt by a loss of resistance and a distinct pop through the dorsal capsule. The radiocarpal joint can be distended with 5 mL of saline to confirm needle placement. An 11-blade scalpel is then used to increase the size of the skin incision (**Fig. 3**). The blade should be placed along the needle, parallel to the extensor tendons, and used to cut skin only.

After removing the needle, a mosquito or narrow hemostat is directed along the same path into the radiocarpal joint. Gentle spreading of the mosquito will enlarge the capsular opening and permit entry of the arthroscope (**Fig. 4**). A blunt cannula is used to position the 2.7-mm arthroscope within the radiocarpal joint.

The arthroscope should be directed along the path that has been created by the mosquito. If slightly off, the trocar will not pass into the joint and may damage the articular surfaces of the distal radius, scaphoid, or lunate (**Fig. 5**).