

Dry Wrist Arthroscopy

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ARTHROSCOPY AFFORDS SURGEONS the ability to evaluate and treat intra-articular pathology in a direct, minimally invasive manner.¹ Wrist arthroscopy has transformed the way physicians approach wrist disorders. The equipment and principles used are based on the techniques of large joint arthroscopy.^{1,2} Using fluid for articular distention and visualization has traditionally been thought of as an essential component of this procedure.^{1,2} This classic (wet) wrist arthroscopy technique was thought necessary to adequately debride bone and soft tissues under direct visualization. Use of fluid instilled either via gravity or pump systems is not without complications, particularly in small joints.³ This effect can hinder concomitant open surgery being performed owing to disruption of anatomical soft tissue planes.² To facilitate distention, arthroscopists have typically limited the size of portals. This limits fluid losses but minimizes portal size and thus instrument size.

Recently, this fluid-based paradigm has been challenged. So-called “dry” wrist arthroscopy (DWA) can circumvent the aforementioned problems while still allowing adequate visualization for each procedure.⁴ It does so by allowing larger portals and thus larger instruments. Fluid can be problematic when reducing intra-articular fractures. Fluid can displace fragments and also track into the fracture site, interfering with reduction. The dry technique facilitates the combination of open procedures with arthroscopic visualization, allowing for more precise fracture reduction. The absence of fluid distention facilitates soft tissue dissection and easier hardware placement.

SURGICAL TECHNIQUE

Contrary to classically described wet arthroscopy, no fluid is injected into the radiocarpal joint for distention before developing portals.² Overall, the process of diagnostic joint arthroscopy is similar to that in the wet technique. Instruments, like burrs and synoviotomes, are used in the same fashion. However, in DWA, one should always ensure the side valve of the arthroscope sheath is open to prevent suction from collapsing the capsule, which would hinder the surgeon’s view. Suction should be used as minimally as needed.^{2,4} Five millimeters to 10 mm of saline may be used to flush any debris that clogs the suction or to achieve better visualization.

Del Piñal et al^{2,4,5} provided critical and helpful technical tips for DWA (Fig. 1; Table 1).

INDICATIONS

Multiple indications for DWA have been described including triangular fibrocartilage complex (TFCC) repair, treatment of distal radius fractures and malunions, and arthroscopic arthrodeses.^{4,6} Possibly the most useful application of DWA, compared with the wet technique, is in the operative management of acute intra-articular distal radius fractures. The lack of fluid distention facilitates reduction. Soft tissues are not swollen, allowing for accompanying open surgery.

DISTAL RADIUS FRACTURES

Arthroscopically assisted distal radius fracture fixation begins with the surgeon’s volar approach to expose the radius’ distalmost aspect without violating the volar ligaments. Once exposure is obtained, a volar locking plate is applied to the radial shaft and standard reduction maneuvers are performed to reduce the epiphyseal and metaphyseal components of the fracture. Once reduction is obtained, the plate should be provisionally secured with K-wires through the plate’s distal holes before application of traction for the arthroscopy. The 3-4 and 6R portals are utilized; the 4-5 portal is avoided owing to its potential interference with dorsoulnar radius reduction. A shaver is inserted into the 6R portal to clear blood and

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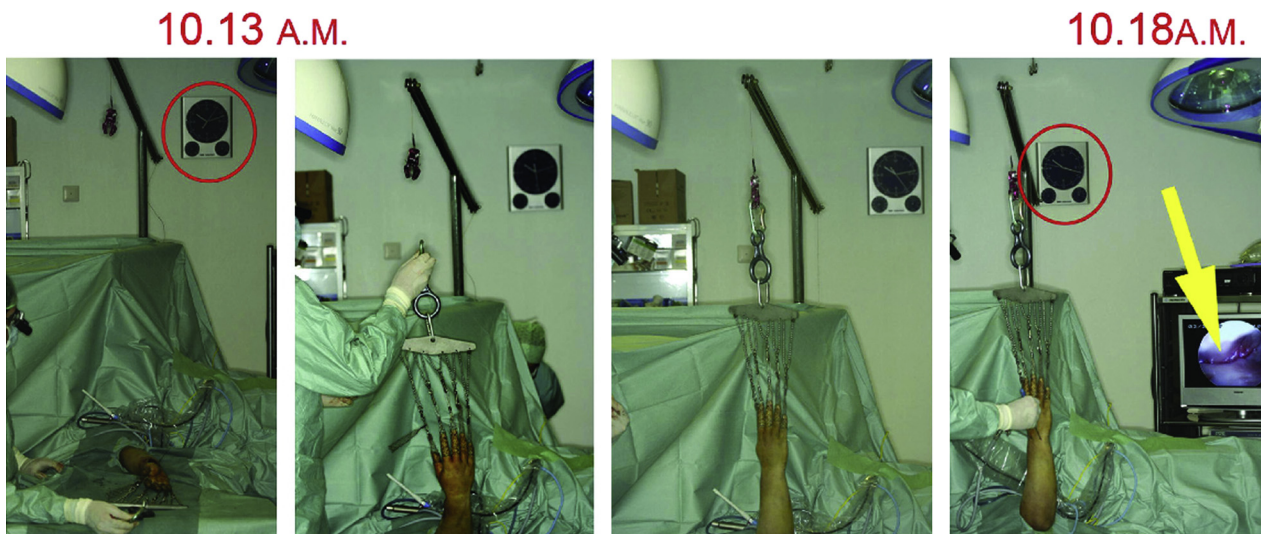


FIGURE 1: This sequence of images shows an alternative wrist arthroscopy technique that allows for ease of changing the arm from a horizontal to a vertical position. (© Copyright 2011 by Dr. Francisco del Piñal. Reprinted with permission from Del Piñal F. Technical tips for (dry) arthroscopic reduction and internal fixation of distal radius fractures. *J Hand Surg Am.* 2011;36(10):1694–1705.)

TABLE 1. Technical Tips

- Ensure valve of the scope’s sheath is open at all times. This will allow free circulation of air and will prevent capsular collapse with the use of shaver’s suction.
- Avoid being too close to the arthroscope when using burrs or osteotomes. This will minimize splashing and loss of visualization.
- Gently rubbing adjacent soft tissue (fat, capsule) with the tip of the scope can improve visualization without the need for excessive irrigation.
- Connect a small syringe of saline to the scope’s valve for intermittent irrigation. It is not necessary to apply pressure to the plunger because negative pressure from the shaver will infuse saline into the joint. Repeat as needed.
- Understand that vision will almost never be completely clear but will be sufficient to safely and effectively perform the procedure.

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debris. Once adequate visualization is obtained, the scope is placed in the 6R portal so it does not interfere with the reduction. The absence of fluid actually improves visualization by avoiding tissue expansion and floating debris. A probe is used through the 3-4 portal to help reduce any malaligned articular fragments. These fragments are reduced by first gradually backing out the provisional distal K-wire(s) in the plate, reducing the fragment, usually distally, with the probe, then reinserting the wire. Once the articular surface is adequately reduced, locking pegs or screws are inserted through the distal plate under direct arthroscopic visualization.⁵

TRIANGULAR FIBROCARILAGE COMPLEX REPAIR

DWA is ideal for repair of peripheral TFCC tears. Larger portals and lack of concern regarding distension

allow for rapid inside-out or fully arthroscopic repair. Yao described an all-arthroscopic technique making use of the 3-4 and 6R portals.⁷ After completion of diagnostic arthroscopy and identification of a peripheral TFCC tear, some surgeons choose to proceed with arthroscopic repair only if there is no substantial distal radioulnar joint instability—also our preference.^{6,8} A shaver in the 6R portal is used to stimulate angiogenesis at the repair site. The arthroscope is then placed in the 6R portal to look down at the periphery of the TFCC and the Fast-Fix device, a delivery device preassembled with a disposable split cannula and packaged with a knot pusher/suture cutter (Smith and Nephew, Andover, MA), is placed through the 3-4 portal. The delivery device creates a vertical mattress configuration, anchoring the TFCC to the ulnar wrist capsule. Once anchoring is complete, a probe is used to evaluate the repair for adequate restoration of the trampoline effect. If necessary, a second implant may be used. If

reinsertion of the TFCC requires arthroscopy along with a semiopen procedure, the dry technique allows a distinct advantage by not having the seepage of fluid leading to visual loss as seen with the wet approach.

FOUR-CORNER ARTHRODESIS

Using the 6R, ulnar midcarpal, and SL portals (midway between 3-4 and radial midcarpal), a 4-corner arthrodesis may be performed with DWA.⁹ Burring out of the scaphoid can be a time-consuming portion of this technique; however, larger portals and thus larger instruments allow quicker excision. After scaphoid resection, further decortication of joints to be arthrodesed continues until healthy cancellous bone is exposed. The hand is taken off traction and the lunate's position is assessed. Using the guidewires for cannulated screws, temporary stabilization of the joints is obtained. Palpation of bony landmarks is difficult with wet arthroscopy owing to swelling but is not a problem with DWA. The wires are backed out slightly and cancellous bone graft is inserted using the scope trocar or a 3.5-mm drill guide. The absence of fluid minimizes potential graft displacement. The guidewires are readvanced, position is confirmed using fluoroscopy, and appropriate length cannulated screws are placed for final fixation.⁹ Four-corner fusion by DWA is technically challenging and has a steep learning curve, but proponents are satisfied with the ability to achieve complex fixation through minimally invasive surgery.

ADVANTAGES OF DWA

- Avoids fluid extravasation and risk of compartment syndrome
- Allows for easier conversion to open technique because tissue planes are dry and undistorted
- Possibly less postoperative pain owing to less soft tissue swelling
- Allows larger portals enabling passage of larger instruments
- Use of larger portals increases the number of surgical procedures amenable to arthroscopic technique (such as partial wrist fusion)

FUTURE CONSIDERATIONS

DWA can be used for many conditions including technically challenging cases such as limited wrist arthrodesis, proximal row carpectomy, and carpal bone fracture and nonunion care. In the setting of symptomatic radial malunion, DWA has been used with some early success.¹⁰ Once again, the larger portals and instruments facilitate this procedure. It can also be more easily incorporated as an adjunct to open wrist surgery. With increasing demand for minimally invasive surgery, DWA may provide treatment for even more complex problems. Ultimately, with proper instrumentation, scapholunate repair may be a reality with a fully arthroscopic technique. DWA, with its undistorted tissue planes, will potentially assist in moving such a procedure forward. As we become more facile with this technique, its role in the treatment of other hand, wrist, and upper extremity conditions will evolve.

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