Proximal Row Carpectomy
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HISTORICAL PERSPECTIVE

Proximal row carpectomy is a recognized treatment option for arthritic disease of the proximal carpal row. Since its original description in 1944, proximal row carpectomy has been a controversial surgical alternative and has had an intermittently questionable reputation in the literature.¹ The complex link joint biomechanics of the wrist are converted to a sloppy ball-and-socket joint by removal of the proximal carpal row.¹ Criticism has included: loss of motion and strength, progressive radiocapitate arthritis, and unpredictability of outcome; however, much of this criticism has been anecdotal.² Recent investigations have reported successful results that appear to be similar to those reported for more complex reconstructions or other salvage procedures.³⁻¹⁰

Patient satisfaction and pain relief are noted in a high percentage of patients. Wrist motion has been shown to be equal to, or slightly less than, that noted preoperatively. Grip strength has been shown to range between 64% and 100% of the contralateral normal wrist.⁴,⁷,¹¹⁻¹⁵ Normal longitudinal compressive loads across the radiolunate articulation have been reported as 40% and those across the radioscaphoid articulation as 60%. Following proximal row carpectomy, the initial load across the lunate fossa to capitate articulation is 100%, however, as dead space diminishes and is replaced by scar formation, this new tissue more evenly distributes the compressive load across a broader area. The radius of curvature of the capitate is about two-thirds that of the lunate fossa, motion between the capitate and the radius is translational, and the onset and progression of radiocapitate arthrosis have been demonstrated radiographically by Imbriglia; progression of arthrosis has not been of clinical consequence, however.¹⁵

Arthroscopy has developed into an established tool in orthopaedic surgery. Over the last several years, with the advent of smaller-diameter arthroscopes and instruments, wrist arthroscopy has resulted in significant improvement in the care and treatment of wrist pathology. In addition to using arthroscopy in diagnosis and treatment of triangular fibrocartilage complex (TFCC) tears, radiocarpal fractures, cartilage damage, loose bodies, and debridement and synovectomies, bony resections—including radial styloidectomy and proximal row carpectomy—can be performed. The latter technique involves removal of the scaphoid, lunate, and triquetrum, thus allowing the capitate to migrate proximally and articulate with the lunate fossa of the radius.

Literature pertaining to the results of arthroscopic proximal row carpectomy is sparse; the majority of the literature mentions arthroscopy as a technique for proximal row carpectomy without discussing clinical results.⁵,¹⁶⁻¹⁹

INDICATIONS AND CONTRAINDICATIONS

The same indications hold for arthroscopic proximal row carpectomy as for the standard open technique. Proximal row carpectomy is an option for patients with symptomatic arthritic disease secondary to a number of diseases, including scaphoid nonunion, scapholunate dissociation, and osteonecrosis of the lunate. It has also been described in the treatment of failed carpal implants, cerebral palsy, spasticity, acute and chronic fractures and dislocations, and replantation. We do not currently recommend arthroscopic proximal row carpectomy in this latter subset of patients. Relative contraindications to the procedure include preexisting arthritis of the proposed radiocapitate articulation, multicystic carpal disease, and preexisting ulnar translocation of the carpus.²⁰ Due to the overwhelming majority of poor results of open proximal row carpectomy in their patients with rheumatoid arthritis, both Culp et al and Ferlic et al do not recommend its use in rheumatoid patients.⁴,²¹

SURGICAL TECHNIQUE

Arthroscopic proximal row carpectomy can be carried out under general or regional anesthesia, as bone grafting is not necessary and operative times are generally under 120 minutes. In the operating room, the video monitor, light source, power source, and inflow pump are positioned contralateral to the limb on which surgery is being performed. The patient is positioned
supine on the operating table with a radiolucent hand table in place.

After prophylactic antibiotics, routine skin preparation, and sterile draping around a well-padded arm tourniquet, the arm is placed into a sterile traction tower. The forearm is suspended in finger traps and, via the traction tower, distraction is accomplished by a strap placed above the elbow, securing the arm to the tower base. This tower allows the surgeon to “dial in” the amount of distraction, most commonly 10 to 15 pounds. After distraction is obtained, landmarks are outlined on the dorsum of the wrist, and the portals are made. The tourniquet is routinely inflated without additional exsanguination.

 Routinely the 3-4 portal is the first viewing portal. Longitudinal incisions, breaching only the skin, are used. To avoid tendon and nerve injuries, a hemostat is used to spread through the subcutaneous tissue down to and, with the tips of the hemostat closed, through the capsule. Then, using the blunt trocar, the arthroscopy cannula is introduced into the joint, directed along the sagittal plane, at an angle of approximately 11 degrees proximal to the perpendicular of the long axis of the radius. This angle approximates the normal volar inclination of the distal radius articular surface.

After the 2.7-mm arthroscope is placed into the joint, outflow is established through the 6-R portal, identified by triangulation and direct visualization upon entering the joint at the prestyloid recess. A mechanical pump is used to maintain a constant intra-articular pressure and flow rate. First, a routine evaluation of the joint is carried out; particular attention is given to the lunate fossa of the distal radius. The radial volar extrinsic ligaments, particularly the radioscapophocapitate ligament, are identified and will be preserved during the procedure.

The arthroscope is then directed ulnarly, and the TFCC and extrinsic ulnar ligaments are identified. Next, the midcarpal joint must be well visualized to ensure an adequate proximal capitate cartilaginous surface. If the status of the capitate joint is questionable, then an alternative procedure is performed: 4-corner fusion, capitulunate arthrodesis, proximal row carpectomy with interposition arthroplasty, or wrist arthrodesis. Assessment of the midcarpal articular surfaces is accomplished through the radial midcarpal portal, which is approximately 1 cm distal to the 3-4 portal. Arthroscopic instruments that will be needed to perform the proximal row carpectomy include: a hook probe, a 2.9 shaver or radiofrequency device, a 4.0 bur, small sharp osteotomes, pituitary rongeurs, and an image intensifier.

The first step in performing the proximal row carpectomy, after one is satisfied with the cartilage status of the proximal pole of the capitate and the lunate fossa, is to remove the scapholunate and lunatotriquetral ligaments with a shaver or radiofrequency device. This is performed through the 4-5 and/or 6-R portals. Next, the core of the lunate is removed with a bur; care is taken to avoid damaging the lunate fossa and proximal capitate by leaving an “eggshell” rim of lunate, which is morcellized with a pituitary rongeur under direct vision and/or with image intensification. Next, using the 3-5 or 4-5 portal as a working portal, the scaphoid and triquetrum are fragmented with an osteotome and bur under image intensification and removed by piecemeal with a pituitary rongeur. Coring out and fragmenting the carpal bones allows for easy removal, as well as protection of the articular cartilage. Great care is taken to avoid damaging the articular cartilage. Great care is taken to avoid damaging the volar extrinsic ligaments, especially the radioscapophocapitate, which will be responsible for maintaining the stability of the capitate in the lunate fossa.

After the entire proximal row is removed, the wrist is examined under radiographic image intensification. Care is taken to ensure that there is no impingement of the trapezium against the radial styloid. Some authors advocate a modest styloectomy; while we rarely perform this procedure, it can be done arthroscopically with the aid of image intensification, if needed.

Posterior interosseous neurectomy may be performed through a separate 1.5-cm longitudinal incision just ulnar to Lister’s tubercle. The fourth compartment is partially opened on the radial side. One centimeter of the nerve is resected with bipolar electrocautery. The fourth compartment is then repaired with absorbable suture. All wounds are closed with 4-0 nylon monofilament suture.

Patients are placed in a short-arm plaster splint for approximately 3.5 to 4 weeks. Sutures from the portals are removed at 10 days. Gentle range of motion exercises are begun after splint removal at 4 weeks, and strengthening is begun at approximately 8 weeks postoperatively.

**COMPlications**

There are several potential complications associated with proximal row carpectomy. When the procedure is done arthroscopically, the cartilaginous surfaces of the proximal capitate and lunate fossa must be protected from instrument damage. Also, care must be taken not to disrupt the volar extrinsic carpal ligaments, as they are later necessary for long-term radiocarpal stability [Figure 21.1]. Visualization is often greater arthroscopically than open; we sometimes leave behind a shell of cortical bone attached to the ligaments to avoid ligamentous injury. There is also the potential complication of irritation of the nerves, especially the dorsal ulnar sensory branch, and po-

Potential for damage to the median and ulnar nerves, especially the ulnar nerve, while using the osteotomes. The dorsal capsule-ligamentous structures are not significantly disrupted when the arthroscopic technique is utilized. Thus, there is less dorsal scar formation, and dorsal instability may occur, though we have not seen this clinically. While we have not had to do this, should dorsal capsular laxity present as a problem, concurrent or later electrothermal capsulorrhaphy may be performed.

ADVANTAGES

As with any arthroscopic procedure, the surgery is less invasive than an open procedure. Also, there is little damage to the dorsal ligaments, which are left essentially intact, in contrast to standard open proximal row carpectomy. Better visualization of the volar extrinsic ligaments increases the likelihood of preservation. Finally, there is a more acceptable scar and less stiffness, secondary to minimal capsular dissection.

CONCLUSION

Overall patient satisfaction with this procedure has been excellent. Immediate postoperative pain seems to be less than that experienced by those who have undergone open proximal row carpectomy. In our experience, all patients reported satisfactory pain relief, functional wrist motion, and effective grip strength.

References