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Extensor Tendon Lacerations From Arthroscopic Excision of Dorsal Wrist Ganglion: Case Report

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Abstract

Arthroscopy is an accepted technique for the resection of wrist ganglions. The reported complication rate is comparable with open resection at 2%; however, this rate may be underestimated. Most reported complications are relatively benign and self-limited. In this case report, we detail lacerations of multiple digital extensor tendons from arthroscopic resection of a dorsal ganglion and describe our management of this complication.

Keywords

Arthroscopy; extensor tendon; wrist ganglion

A RTHROSCOPIC GANGLION RESECTION has become common practice in hand surgery owing to the ease of the technique and the relatively low complication rate. The theoretical advantages of arthroscopic resection include faster recovery, less scarring and stiffness, the ability to look for concomitant pathology, and lower complication and recurrence rates.¹ The complication rate of wrist arthroscopy is often quoted as 2% based on the study by Warhold and Ruth in 1995.² They reported on 205 wrist arthroscopies and described 4 complications (1 suture abscess, 1 inclusion cyst, and 2 cases of self-limited sympathetic dystrophy).² Recent reviews of the literature, however, suggest this incidence is an underestimate, citing studies with complication rates up to 20%.³ Late extensor tendon injury has been reported after wrist arthroscopy.⁴ A cadaveric study examining the risk to the extensor tendons in inexperienced arthroscopists' hands revealed 2 injuries to extensor digiti minimi out of 35 portals for 3 different case-types.⁵ We report a case of injury to several extensor tendons following arthroscopic resection of a dorsal ganglion.

CASE REPORT

A 39-year-old, left-handed woman presented to a hand surgeon with bilateral wrist pain associated with occupational typing. Diagnosed with tendinitis, she participated in hand therapy intermittently for 7 months. Although the wrist pain improved, she developed a painful mass on the dorsum of her right wrist, was diagnosed with a dorsal wrist ganglion,

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and was offered arthroscopic resection. From the operative report, the surgeon used standard 3 to 4 and 6R portals and found a dorsal wrist ganglion connected to the scapholunate ligament. The ganglion and its stalk were removed along with a piece of capsule, exposing the extensor carpi radial longus tendon. A nontraumatic central perforation of the triangular fibrocartilage complex was noted but left unaltered owing to a lack of preoperative associated symptoms. A chondral defect on the lunate created during the initial inspection was smoothed before closure. The tourniquet time was 25 minutes.

Immediately after surgery, she was unable to fully extend her right index finger and had difficulty with pain control. She had the sense of tethering of her wrist with limited wrist flexion when her orthosis was removed at the first postoperative visit. A magnetic resonance imaging (MRI) study was initially interpreted to reveal an intact extensor indicis (EI) tendon with signal changes in the fourth compartment tendons, but later interpretations of this study differed. Electrodiagnostic studies 4 weeks after surgery indicated right radial and median nerve motor neuropathy. She had decreased motor recruitment in the EI (most affected), extensor digitorum communis (EDC), flexor pollicis longus, and pronator teres. These findings were attributed to be consistent with a demyelinating process; she continued her postoperative course with therapy.

Owing to persistent index finger motion limitation and recurrence of her preoperative wrist pain, she consulted 3 surgeons for additional opinions. Another MRI study obtained 8 months after surgery showed focal thickening and intratendinous signal changes in the EI and the EDC to index tendons, a small dorsal ganglion, and perforation of the radial aspect of the triangular fibrocartilage.

At presentation to our clinic 12 months after arthroscopy, her physical examination was remarkable for the inability to actively extend her right index finger at the metacarpophalangeal (MCP) or interphalangeal joints. Her wrist motion was 10° of active flexion and 50° of active extension. Passively, she reached 60° of flexion; this discrepancy did not appear to be limited by pain. When her wrist was flexed to demonstrate extensor tenodesis, her index finger seemed to extend and maintain a reasonable cascade. Her extensor tendons appeared abnormal as seen through the skin on the hand and wrist and appeared to be tethered and perhaps scarred at the transversely oriented 3 to 4 portal site. Passive flexion of her MCP joints revealed a tender subcutaneous cord from the wrist level to the small and ring finger MCP joints. This cord was put under tension with wrist flexion, and yet tenodesis was normal for the ring and small digits. Active pronation and supination were intact. Mild atrophy of the thenar muscles was present.

This evaluation suggested ruptures of her EI and EDC to index tendons with index finger extension through intact juncturae tendineae. At this time, her Quick Disabilities of the Arm, Shoulder, and Hand (DASH) scores were 91 for disability/symptoms, 94 for the work module, and 100 for sports. Repeat nerve conduction and muscle electrophysiology studies were normal.

Fifteen months after her initial surgery, she elected to undergo surgical exploration and repair of extensor tendons. Using an open approach over the third dorsal extensor

compartment at the level of proximal carpus, the third and fourth compartments were exposed. The distal portions of the EI and EDC tendons to the index finger were found as stumps, scarred to the dorsal wrist capsule, and were not continuous with their proximal portions. The EDC tendons to the middle and ring fingers were intact. The EDC to the small finger was scarred over the other tendons such that it formed a cord that could be tensed by wrist flexion but was not in continuity with any tendon proximally. Proximally, the EDC and EIP to the index finger were found as stumps, scarred to the floor of the fourth compartment. The proximal stump of the EDC to the small finger was found scarred to the proximal portion of the retinaculum. Dissection proximal to the retinaculum in the ulnar border revealed an intact extensor digiti minimi tendon. Once the ruptured tendons were freed, the scar was carefully excised. The distal EI tendon was transferred to the EDC of the middle finger with a Pulvertaft weave. A similar reconstruction was performed for EDC to small finger to the EDC to the ring finger. The EI muscle was healthy in color, and its tendon was woven into the EDC to the middle finger proximally to bolster strength. The EDC to the index finger proximal stump was also incorporated into this weave. The retinaculum was closed without abutting any portion of the repaired tendons through full range of finger and wrist motion.

After surgery, the patient was maintained in an orthosis with 10° of wrist extension and the MCP joints at neutral. She was instructed to actively flex her proximal interphalangeal joints and passively extend her fingers within the constraints of the orthosis. At her first postoperative visit, her motion was 10° of wrist flexion and 30° of wrist extension with full extension of all digits and no active flexion at her MCP joints. She participated in hand therapy weekly with multiple treatment modalities (i.e., massage, moist heat, phonophoresis, continuous passive motion, and manual exercises). By 6 months after her revision surgery, she had regained active extension of all digits at the MCP joints off a table. By 9 months after surgery, she was working full-time as a massage therapist, and her DASH score was 86, work module was 88, and sports score was 81. One year from her reconstructive surgery, her index range of motion was 20° extension and 30° flexion at the MCP joint, 0° extension and 120° flexion of the proximal interphalangeal joint, and 0° extension and 90° flexion of the distal interphalangeal joint. All other finger joints were limited to 0° of active extension.

DISCUSSION

Universally quoted complications of wrist arthroscopy include infection, chondral damage, and equipment failure. Poor positioning of portals and forceful use of instruments can theoretically damage articular cartilage, ligaments, tendons, cutaneous nerves, and vascular structures.⁶ Complications have largely been reported in small case series or case reports. Several such reports detail damage to the transverse radioulnar branch of the dorsal sensory branch of the ulnar nerve, which is particularly vulnerable owing to its variable arborization near the 6R portal.^{2,3} One case details an extensor tendon sheath fistula formation with the radiocarpal joint at the 3 to 4 portal site,⁷ and another case report highlights delayed extensor pollicis longus tendon injury.⁴ Injury to the extensor digiti minimi tendon was reported in a cadaveric study involving novice arthroscopists.⁵ Our case report describes injury to the EI and EDC from arthroscopic resection of a ganglion.

The reported complication rates of wrist arthroscopy vary between 1% and 20%, the low end of which is similar to that of open procedures.^{8,9} In our case report, open ganglion excision may have resulted in a larger initial scar but allowed the direct inspection of tendons and avoided the injury to the EDC on the ulnar side of the fourth compartment. It remains unclear how this complication occurred. Forceful insertion of instruments through the 3 to 4 portal in the vicinity of the affected tendons may have been the cause. To potentially avoid this complication, we recommend careful placement of arthroscopic portals with methodical and gentle introduction of instruments. Use of the shaver at a level superficial to the capsule could also cause damage. In the standard arthroscopy setup, perhaps some laxity on the extensor tendons contributes to their predilection to be easily damaged once the capsule is removed because they may translate volarly. That said, tensioning the tendons with axial traction might result in damage to a longer segment.

This case also highlights the use of postoperative electrodiagnostic and imaging studies. The electrical studies suggested EI injury but were not diagnostic. The EI tendon on the initial MRI was interpreted as intact—an opinion that may have been incorrect because indeed it was indicated by second opinion interpretation of the same MRI. This raises the issue of false negatives on MRI or ultrasound. With experienced technologists, ultrasound is another modality with decent testing characteristics¹⁰ to evaluate for tendon pathology and might have been useful in this case. In this case, multiple studies were performed at the request of separate consultants. With hindsight, immediate exploration would have obviated the need to interpret, reinterpret, and repeat MRI studies, which did not ever prove to be diagnostic.

Many of the reported complications of wrist arthroscopy are relatively benign and self-limited; however, as this case illustrates, there are potential major complications that require extensive reconstructive surgery. This is an important consideration in preoperative planning and patient education.

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