Arthroscopic Resection in the Management of Dorsal Wrist Ganglions: Results With a Minimum 2-Year Follow-Up Period

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Purpose: The purpose of this report is to review the results of arthroscopic resection of dorsal wrist ganglions.

Methods: Forty-one patients with dorsal wrist ganglions had arthroscopic resection: 24 women and 17 men. The average patient age was 29.8 years. All of the patients had some or all of the following: pain, localized swelling, and limited range of motion. Along with clinical examination, 19 wrists had ultrasound or magnetic resonance imaging to confirm diagnosis. Twelve patients had previous injections with recurrence. The average follow-up time to date is 47.8 months (range, 28–97 months).

Results: Overall postoperative motion improved compared with preoperative values. No cases of scapholunate instability were noted. The average postoperative grip strength improved significantly. Only 2 ganglions recurred and required 2 attempts at open resection for successful eradication the ganglion. No major intraoperative or postoperative complications occurred.

Conclusion: Arthroscopic ganglionectomy is a safe and reliable alternative to open resection. (J Hand Surg 2004;29A:59–62. Copyright © 2004 by the American Society for Surgery of the Hand.)

Key words: Dorsal wrist ganglion, wrist arthroscopy, ganglionectomy.

Dorsal wrist ganglions arising from within the scapholunate joint are the most common type of ganglions of the hand and wrist.[1] The mainstay of surgical treatment remains open ganglionectomy.[1-6] Interest in arthroscopic ganglionectomy as an alternative technique, however, has been explored since its introduction by Osterman and Raphael in 1995.[7-9] The purpose of this article is to evaluate the results of arthroscopic excision in the management of dorsal wrist ganglions at the authors' institution.

Materials and Methods

Patient Demographics

During a period of 6 years and 6 months, 41 patients had arthroscopic excision for primary dorsal wrist ganglions: 24 women and 17 men. The patient ages ranged from 11 to 56 years with an average of 29.8

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Table 1. Patient Functional Data (Before and After Surgery)

	Before Surgery	After Surgery	p Value
Wrist ROM			
Flexion	50 (SD = 7)	59 (SD = 8)	NS
Extension	42 (SD = 8)	55 (SD = 8)	p = .03
Radial deviation	16 (SD = 4)	17 (SD = 4)	NS
Ulnar deviation	32 (SD = 6)	32 (SD = 6)	NS
Grip strength (kg)	15.3 (SD = 4)	22.3 (SD = 5)	p = .01
Pain	5.2 (SD = 1.3)	1.2 (SD = 0.4)	p = .001
SL instability (#)	0	0	NS
Ganglion size (cm)	1.2 (SD = 0.3)		
Duration of symptoms (mo)	4.6 (SD = 4)		

NS, not significant; ROM, range of motion; SL, scapholunate.

years. The overall average size for the ganglions was 1.1 cm in diameter. All of the patients had pain (especially with extension of the wrist), localized swelling, and limited range of motion. In every case, the mass transilluminated under pen-light visualization. All of the ganglions arose from the scapholunate interval. Every patient had plain x-rays, which showed no evidence of bony pathology or carpal instability. Ultrasound helped confirm diagnosis in 19 patients, magnetic resonance imaging was performed in 3, and the remaining 19 were treated on the basis of history and examination findings. No patient had undergone prior surgery; however, 12 patients had prior aspirations.

The average patient follow-up time to date is 47.8 months (range, 28–97 months). Preoperative data were collected from hand history and physical examination sheets at the time of initial evaluation. Postoperative data were similarly reviewed. Parameters measured included range–of motion, grip strength, pain rating, scapholunate instability, and recurrence. The integrity of the scapholunate ligament was assessed by clinical examination including performance of Watson's scaphoid shift test for all patients. Radiographic evaluation of the scapholunate joint (eg, gapping, measurement of scapholunate angle) was also used to determine the presence of scapholunate instability. Patients were evaluated and all of the measured parameters were assessed at their most recent clinical examination. Patients who were released from the clinic were contacted by telephone to determine the presence of recurrence and the pain rating.

Patient Functional Data

The data are summarized in Table 1. The average preoperative range of motion was flexion of 50°, extension of 42°, radial deviation of 16° and ulnar deviation of 32°. The average preoperative grip strength was 15.3 kg (range, 8–37 kg). The average pain rating (on a scale of 1–10) was 5.2 (range, 2–8). The average size of the ganglion measured 1.1 cm in diameter (range, 0.5–4 cm). There were no cases of scapholunate instability before surgery.

Statistical Analysis

Statistical data analysis was performed using the Student *t* test and significance was set at a p value less than or equal to .05.

Surgical Technique

The technique includes the standard wrist arthroscopy instrumentation and setup: the hand and wrist are placed in the distraction tower to approximately 5 kg of traction. The 3-4, 4-5, and 6R (or 6U) portals are identified and the tourniquet is inflated. A 2.7-mm arthroscope is inserted into the 3-4 or 4-5 portals for inspection of the joint and identification of the ganglion stalk. In this series, the ganglion stalk was clearly seen in 12 of 41 cases. A 2.9- or 2.0-mm shaver was then inserted into the 4-5 or 3-4 portal and the ganglion was excised. A 1-cm–diameter area of the dorsal capsule was excised in addition to the entire ganglion and stalk (when visible). Care was taken to avoid injury to the scapholunate interosseous ligament by working with the shaver facing away from the scapholunate joint. Similarly, caution was used to avoid injury to the extrinsic extensor tendons, mainly the extensor carpi radialis brevis and extensor digitorum communis, which lie superficial to the dorsal capsule and thus are at risk during capsulectomy. Other researchers have reportedly used the 1-2 portal to help with visualization and excision.[8,9] In this series, the 1-2 portal was not used. The midcar-

pal joint was inspected in 16 of 41 cases. No patients were noted to have scapholunate interosseous ligament instability or disruption under arthroscopic visualization. Overall, the average tourniquet time was 30 minutes (range, 18–56 minutes). No intraoperative complications were reported. Postoperative protocols varied slightly among surgeons. Overall, most patients were splinted for a brief period of time (3–7 days). They were then allowed activity as tolerated with avoidance of strenuous activity for approximately 4 to 6 weeks. The protocol has also changed over time; some patients early in this series were immobilized for a considerably longer period of time (2–3 weeks).

Results

No patients were lost to follow-up evaluation. The postoperative functional data are summarized in Table 1. Overall, the flexion and extension arcs improved to 59° and 62°, respectively. The radial and ulnar deviation arcs, 17° and 32°, respectively, did not differ significantly from preoperative values. The only statistically significant change was the wrist extension ($p = .031$). There was also a statistically significant increase in grip strength to 22.3 kg ($p = .016$). Pain ratings had improved to an average of 0.7 ($p = .001$), with 34 patients experiencing no pain and 7 experiencing only occasional mild pain. Two ganglions recurred after arthroscopic ganglionectomy: one 4 months and the other 6 months after surgery. Both of these cases went on to have open excision with repeat recurrence. The ganglions were finally eradicated with another open excision. Ten patients had initial stiffness after surgery. Eight of these patients had motion restored within 4 weeks of surgery. The remaining 2 required occupational therapy to help with motion and reached maximal ranges by 8 weeks after surgery. These were patients who underwent surgery early in the series and participated in a longer immediate postoperative regimen. No intraoperative complications occurred and there was no clinical evidence of scapholunate instability noted after surgery. One case of mild persistent swelling was noted. This resolved over time without sequelae.

Discussion

The recurrence rate in this series was only 5%—2 of 41 patients. It is unclear as to the reason these 2 cases recurred. There was nothing in the surgical notes stating that they were complicated or difficult excisions. Of note, the stalk was not seen in either case. As stated earlier, both ganglions recurred after attempted open excision and required a second open procedure. At most recent follow-up evaluation, these patients have had no further recurrence. Perhaps previous surgery made open excision difficult because of scarring.

Postoperative range of motion was improved from a flexion-extension arc of 94° to 114°. Although there was not a statistically significant difference in flexion improvement, there was a significant improvement in extension. Grip strength and pain levels also significantly improved after arthroscopic ganglionectomy. In addition, there was no evidence of postoperative scapholunate dissociation. These results compare favorably with previous studies examining similar outcome variables.[8,9]

In this series, there was a substantial rate of postoperative stiffness after arthroscopic ganglionectomy, with 10 of 41 patients affected. All of the patients eventually developed improved motion; however, in 2 patients formal occupational therapy was necessary and maximal motion was not achieved until nearly 8 weeks after surgery. These patients were treated early in the investigation of arthroscopic ganglionectomy. As such, they were immobilized for a longer period of time compared with current protocols. The authors found that excessive immobilization was not necessary. With the new regimen, no case of prolonged stiffness has occurred.

One case of persistent swelling after surgery was noted. This may have been secondary to excessive resection of the dorsal capsule. In reviewing the surgical notes, there was no mention of excessive capsulectomy, and a standard 1-cm–diameter area was excised. The swelling resolved and the patient had no postoperative pain. A theoretical concern regarding excessive capsule resection is the development of persistent swelling. Fortunately, this has not been a problem.

To date, 3 reports in the English peer-reviewed literature on arthroscopic ganglionectomy have been published, and they show recurrence rates ranging from 0% to 7%.[7-9] Overall, these rates compare favorably with open resection. Including this current series there has been no incidence of postoperative scapholunate instability. A potential advantage of arthroscopic resection is that it provides a more controlled excision of the ganglion while protecting the scapholunate interosseous ligament.

This study fares well compared with the previous reports on arthroscopic ganglionectomy in respect to other parameters. Osterman and Raphael[7] noted no complications in their series of 18 patients. Five

patients improved, 2 worsened, and 11 had no change in same range-of-motion and grip strength. Luchetti et al[9] reported no improvement in range-of-motion or grip strength after arthroscopic ganglion resection in 30 patients; these patients also had no complications associated with the procedure. Nishikawa et al[8] proposed a classification system based on arthroscopic appearance of the ganglions; however, the authors only examined recurrence (2 of 37) and return-to-work data. They had no complications and did not report range of motion and grip data. None of the previous articles commented on pain scores. In the current report, extension motion significantly improved, as did pain and grip scores.

The mainstay of surgical treatment is open ganglionectomy. It is a fairly safe and reliable technique. Angelides and Wallace[1] noted only 3 of 500 recurrences with open resection. They noted the importance of resecting the cyst and stalk down to the scapholunate joint. Although the specific number of patients was not elaborated, there were some cases that required second incisions to remove the cyst completely. Physical therapy was also initiated in patients slow to regain motion. Unfortunately, not all studies reporting on open resection of dorsal wrist ganglions are as optimistic. McEvedy[10] reported recurrence rates as high as 40% with open ganglionectomy. Similarly, Zachariae and Vibe-Hansen[11] noted a recurrence rate of 34% in a series of 347 cases.

A reported event after open ganglionectomy has been scapholunate instability.[6,12,13] Crawford and Taleisnik[13] suggest in their case report that, although unclear, surgical excision of the dorsal ganglion may have resulted in a predisposition to instability. After manipulation, the patient did go on to develop rotatory scapholunate instability. Clay and Clement[6] reported on 62 patients who underwent radical excisionof dorsal wrist ganglions and experienced 1 case of postoperative scapholunate instability. These researchers suggested that surgical excision of the ganglion weakened the scapholunate ligament, increasing the risk of instability. It is important to note that several researchers believe that the ganglion itself is a result of underlying scapholunate pathology or instability.[14,15] Regardless of which came first, the ganglion or the scapholunate pathology, there is an association between open ganglionectomy and scapholunate instability.

In examining the outcome parameters range of motion, pain, and grip strength, this current study compares favorably with open ganglionectomy. Angelides and Wallace[1] did not report improved range of motion in their study; instead they stated the 1.2% of their 500 cases had decreased range of motion after open ganglion resection. Razemon[4] reported a decrease in prehension strength in almost 17% of patients, and 5 of 36 patients complained of stiffness. Clay and Clement[6] reviewed 61 patients who underwent open ganglionectomy and noted that although 90% had no or slight pain, 5 patients (10%) had moderate to severe pain. In addition, 9 patients felt that they were weaker and 21% of patients felt that they were either worse or no better after surgery. Other reported complications unique to open ganglionectomy include infection, neuroma, unsightly scar, and keloid formation.[1,10,12]

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