

Endoscopic Ganglionectomy of the Volar Radial Wrist Ganglion



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Abstract: Volar ganglion cyst of the wrist is a common hand problem faced by orthopaedic surgeons. Excision is indicated if it is painful. Arthroscopic ganglionectomy of the wrist ganglion has been reported with the advantage of minimally invasive surgery. Most of them involve elimination of the valvular mechanism and internal drainage of the ganglion fluid to the wrist joint. The access of the ganglion sac is limited especially for a multiloculated cyst. The purpose of this Technical Note is to report the technique of endoscopic resection of the volar radial wrist ganglion. This can ensure complete resection of the ganglion sac especially for the multiloculated one.

Volar ganglion cysts commonly occur near the radial artery in the wrist. They may occur after trauma to the wrist causing a small tear in the volar joint capsule.¹ Because of the tear, the joint fluid escapes and the body builds a small shell around the fluid, forming the ganglion cyst.¹ For painful volar ganglion, aspiration or surgical techniques may be used. A total of 74% of patients have no recurrence after one treatment with needle aspiration.¹ However, aspiration can cause injury to the blood vessels, nerves, or tendons. With surgery, the volar ganglion cyst is completely excised along with part of the joint capsule.¹ Recurrence rate is lower if part of the joint capsule is excised, as there may be smaller developing ganglia located there.¹ Arthroscopic ganglionectomy of the wrist ganglion has been reported, and most of them involve elimination of the valvular mechanism and internal drainage of the ganglion fluid to the wrist joint.²⁻⁴ The access of the ganglion sac is limited especially for a multiloculated

cyst. The purpose of this Technical Note is to report the technique of endoscopic resection of the volar radial wrist ganglion. It is indicated for volar radial wrist ganglion, especially the multiloculated one. It is contraindicated for ganglion associated with significant intra-articular pathology of the wrist joint. It is also contraindicated for those ganglia located deep in the carpal tunnel (Table 1).

Technique

Preoperative Planning and Patient Positioning

Preoperative magnetic resonance imaging is important for the study of the relationship of the ganglion to the radial artery, median nerve, flexor carpi radialis (FCR) tendon, and flexor pollicis longus (FPL) tendon (Fig 1). Any intra-articular pathology of the wrist joint and communication between the ganglion and the wrist joint should be noted.

The patient is placed in a supine position with the hand on the side table. An arm tourniquet is applied and inflated if needed. A 2.7-mm 30° arthroscope (Henke Sass Wolf, Tuttlingen, Germany) is used for this procedure. Fluid inflow is by gravity and no arthropump is used.

Portal Placement

The endoscopic procedure is performed via the proximal and distal portals that are just ulnar to the flexor carpi radialis tendon. The distal portal is at the level of the volar joint line of the radiocarpal joint. The proximal portal is 2 to 3 cm proximal to the distal portal (Fig 2). The arthroscope and the arthroscopic instrument are

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Table 1. Indications and Contraindications of Endoscopic Ganglionectomy of the Volar Radial Wrist Ganglion

Indications	Contraindications
1. Volar radial wrist ganglion, especially the multiloculated one	1. Ganglion associated with significant intra-articular pathology of the wrist joint 2. Those ganglia located deep in the carpal tunnel

inserted between the flexor carpi radialis and flexor pollicis longus tendons.

Dissection of the Ganglion Sac From the Radial Artery

The tourniquet should not be inflated during this step. Pulsation of the radial artery allows easier identification of this structure. The proximal portal is the viewing portal. The adipose tissue deep to the FCR tendon is carefully resected with an arthroscopic shaver via the distal portal. The shaver blade should face ulnarly and dorsally to avoid damage to the FCR tendon, ganglion, or the radial artery. The ganglion sac is then exposed. The interface between the ganglion and the radial artery is carefully dissected with a hemostat (Fig 3). If the ganglion is large and obscures the radial artery, the sac can be collapsed by making a small hole at

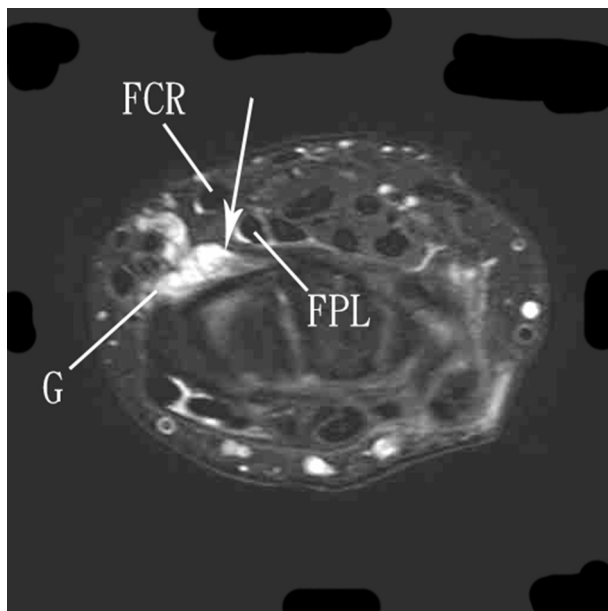


Fig 1. Endoscopic ganglionectomy of the ganglion at the volar radial side of the wrist. The patient is in a supine position with the hand at the side table. Magnetic resonance imaging of the wrist of the illustrated case shows the multiloculated radial volar ganglion (G). Arrow: the direction of insertion of an arthroscope and arthroscopic instrument through the interval between the flexor carpi radialis tendon (FCR) and the flexor pollicis longus tendon (FPL).

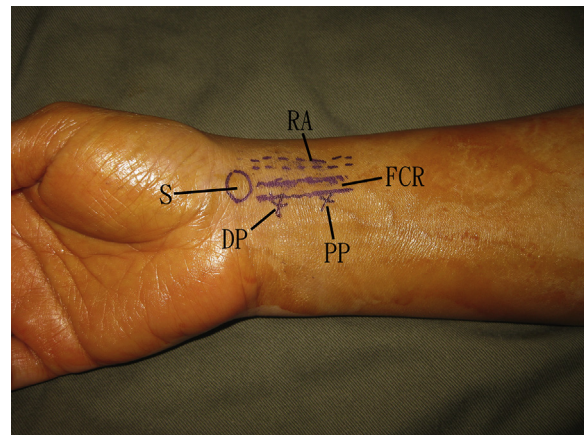


Fig 2. Endoscopic ganglionectomy of the ganglion at the volar radial side of the wrist. The patient is in a supine position with the hand at the side table. The distal scaphoid tubercle (S), radial artery (RA), and flexor carpi radialis tendon (FCR) are outlined. The distal portal (DP) is at the level of the volar joint line of the radiocarpal joint. The proximal portal (PP) is 2 to 3 cm proximal to the distal portal. Both portals are just ulnar to the flexor carpi radialis tendon.

the base of the sac. This can expose the radial artery, and the interface between the artery and the sac is dissected out.

Endoscopic Ganglionectomy

The proximal portal is the viewing portal. The arthroscopic shaver (Dyonics, Smith & Nephew, Andover, MA) is inserted to the interface between the

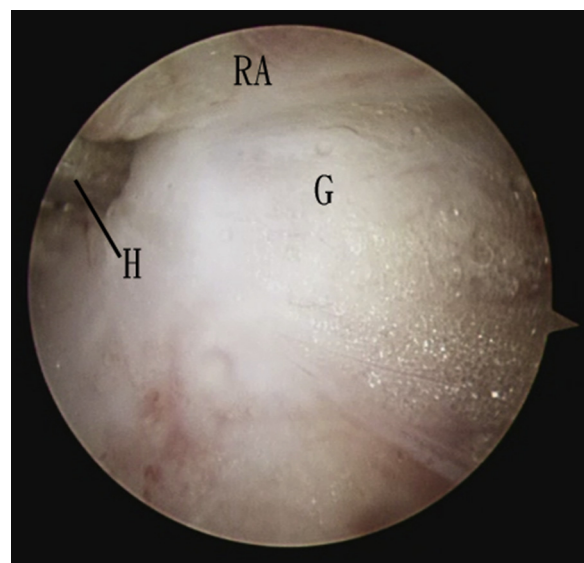


Fig 3. Endoscopic ganglionectomy of the ganglion at the volar radial side of the wrist. The patient is in a supine position with the hand at the side table. The proximal portal is the viewing portal and the distal portal is the working portal. The interface between the ganglion (G) and the radial artery (RA) is carefully dissected with a hemostat (H).

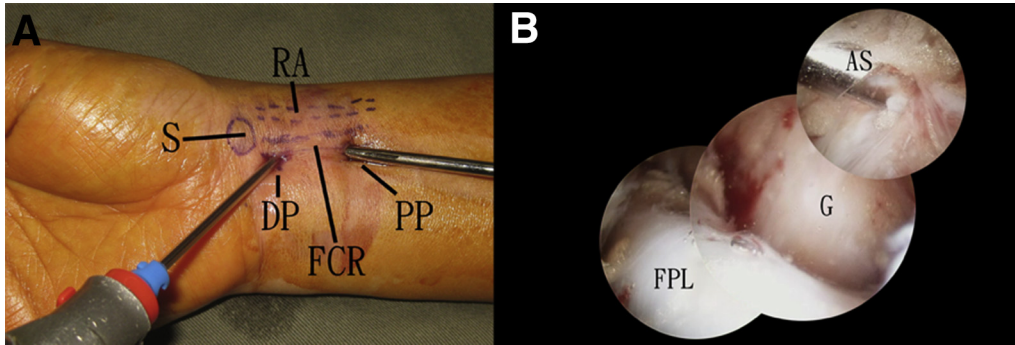


Fig 4. Endoscopic ganglionectomy of the ganglion at the volar radial side of the wrist. The patient is in a supine position with the hand at the side table. (A) The proximal portal (PP) is the viewing portal and the distal portal (DP) is the working portal. (B) Endoscopic resection of the ganglion (G) by the arthroscopic shaver (AS). (FCR, flexor carpi radialis tendon; FPL, flexor pollicis longus tendon; RA, radial artery; S, distal scaphoid tubercle.)

ganglion and the radial artery via the distal portal. The shaver blade faces ulnarly and dorsally and the ganglion is resected from the palmar to dorsal direction (Fig 4). The resection is progressed radially. All along the resection is deep to the radial artery and the FCR tendon. The FCR tendon can avoid accidental tilt of the shaver blade palmarly toward the radial artery. The resection is then progressed ulnarly. The FPL tendon is pushed ulnarly by the shaver to expose the ulnar portion of the ganglion. The shaver blade should face radially during resection of the ulnar portion of the

ganglion. This avoids damage to the FPL tendon. Dissection and debridement ulnar and palmar to the FPL tendon should be abandoned to avoid damage to the median nerve.⁵ After ganglionectomy, the pronator quadratus muscle and the volar wrist capsule are exposed.

Millicapsulectomy of the Volar Wrist Capsule

The volar capsule is carefully probed by the blunt end of the shaver to look for any capsular defect. Millicapsulectomy can be performed among the volar wrist ligaments (Fig 5).

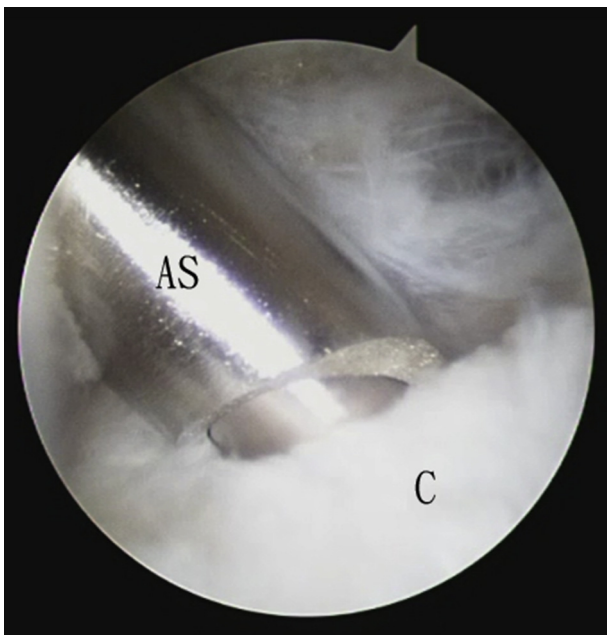


Fig 5. Endoscopic ganglionectomy of the ganglion at the volar radial side of the wrist. The patient is in a supine position with the hand at the side table. The proximal portal is the viewing portal and the distal portal is the working portal. Millicapsulectomy is performed between the volar wrist ligaments by an arthroscopic shaver (AS). (C, volar wrist capsule.)

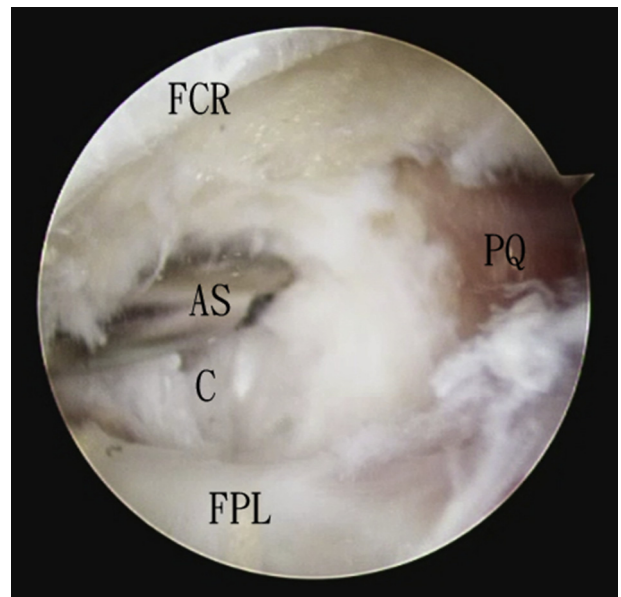


Fig 6. Endoscopic ganglionectomy of the ganglion at the volar radial side of the wrist. The patient is in a supine position with the hand at the side table. The proximal portal is the viewing portal. After endoscopic ganglionectomy, the operative field is carefully examined for any residual lesion. The wrist capsule (C), pronator quadrates muscle (PQ), flexor pollicis longus tendon (FPL), flexor carpi radialis tendon (FCR), and radial artery are exposed and examined for any damage. (AS, arthroscopic shaver.)

Table 2. Pearls and Pitfalls of Endoscopic Ganglionectomy of the Volar Radial Wrist Ganglion

Pearls	Pitfalls
1. The introduction of the arthroscope and arthroscopic instruments should be between the FCR and FPL tendons	1. The intra-articular pathology of the wrist joint cannot be tackled through this endoscopic approach and wrist arthroscopy should also be performed if indicated
2. Dissection of the ganglion from the radial artery is better performed without inflation of the tourniquet	2. The median nerve should not be mistaken as the flexor pollicis longus tendon. They can be differentiated by passive extension of the thumb. The flexor pollicis longus tendon will move with thumb motion, whereas the median nerve will not
3. The shaver should be kept between the FCR and FPL tendons throughout the ganglionectomy	

FCR, flexor carpi radialis tendon; FPL, flexor pollicis longus tendon.

Confirmation of Completeness of Ganglionectomy

After endoscopic ganglionectomy, the operative field is carefully examined for any residual lesion. The wrist capsule, pronator quadratus muscle, FPL tendon, FCR tendon, and radial artery are exposed and examined for any damage (Fig 6, Video 1, Table 2). The wounds are closed by simple sutures and a bulky dressing is applied for 2 to 4 weeks.

Discussion

Endoscopic ganglionectomy can have 2 approaches: endoscopic resection of the ganglion and the internal drainage of the ganglion.⁶ Endoscopic resection of the ganglion is particularly suitable for a multiloculated cyst. Complete resection rather than internal drainage of the cyst is expected to have lower recurrence rate. The major structures at risk during this procedure is the radial artery and the median nerve. The flexor carpi radialis tendon and the flexor pollicis longus tendon are good landmarks for the radial artery and the median nerve, respectively. The insertion of the arthroscope and arthroscopic instruments through the interval between the 2 tendons can reduce the risk of injury to the median nerve and radial artery during the introduction of the instruments. The working space is deep to the radial artery and is more spacious than arthroscopic ganglionectomy. The radial artery does not need to be retracted during ganglionectomy. During resection of the radial portion of the

Table 3. Advantages and Risks of Endoscopic Ganglionectomy of the Volar Radial Wrist Ganglion

Advantages	Risks
1. Less wound complication	1. Injury to the median nerve
2. Less soft tissue trauma	2. Injury to the radial artery
3. Better cosmesis	3. Injury to the volar wrist ligaments
4. Complete resection of the ganglion especially for multiloculated ones	4. Incomplete resection
	5. Recurrence of ganglion
	6. Intra-articular pathology cannot be dealt with

ganglion, the FCR tendon prevents accidental volar tilt of the shaver blade toward the radial artery. During resection of the ulnar portion of the ganglion, the flexor pollicis longus tendon prevents excessive ulnar placement of the shaver toward the median nerve. Instead of partial capsulectomy during open ganglion resection, millcapsulectomy is performed so as to preserve the important volar wrist ligaments.

The advantages of this minimally invasive approach include better cosmesis, less soft tissue dissection, no wound retraction needed, low risk of skin necrosis, and complete resection of the ganglion especially for multiloculated ones. The potential risks of this technique include injury to the median nerve, radial artery, and volar wrist ligaments; incomplete resection; recurrence of ganglion; and intra-articular pathology cannot be dealt with (Table 3).

References

1. Finsen V, Haberg O, Borchgrevink GE. Surgery for wrist ganglia: One-hundred and twenty-two patients reviewed 8 years after operation. *Orthop Rev (Pavia)* 2014;6:5162.
2. Osterman AL, Raphael JS. Arthroscopic resection of dorsal ganglion of the wrist. *Hand Clin* 1995;11:7-12.
3. Gallego S, Mathoulin C. Arthroscopic resection of dorsal wrist ganglia: 114 cases with minimum follow-up of 2 years. *Arthroscopy* 2010;26:1675-1682.
4. Ho PC, Lo WN, Hung LK. Arthroscopic resection of volar ganglion of the wrist: A new technique. *Arthroscopy* 2003;19:218-221.
5. Lui TH. Flexor pollicis tendoscopy. *Arthrosc Tech* 2017;6:e249-e254.
6. Lui TH. Arthroscopic ganglionectomy of the foot and ankle. *Knee Surg Sports Traumatol Arthrosc* 2014;22:1693-1700.