

Endoscopic Ganglionectomy and Release of the Sixth Extensor Compartment



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Abstract: Stenosing tenosynovitis of the extensor carpi ulnaris is one of the causes of dorsoulnar wrist pain. Conservative treatment is usually effective to alleviate the pain. Surgical release of the retinaculum of the sixth extensor compartment is indicated if conservative treatment cannot alleviate the pain. The purpose of this Technical Note is to describe the technical details of endoscopic release of the sixth extensor compartment via a 2-portal approach. Endoscopic resection of a ganglion over the sixth compartment can also be performed via the same approach.

Stenosing tenosynovitis of the extensor tendons within the extensor retinaculum most commonly involves the abductor pollicis longus and extensor pollicis brevis in the first extensor compartment of the wrist.¹ The other extensor compartments can also be involved. Stenosing tenosynovitis of the extensor carpi ulnaris (ECU) was first reported by Stein² in 1927. Patient can usually recall a fall or twisting insult to the wrist, although sometimes, injury history cannot be recalled.¹ Despite the paucity of reports in the literature, it is not an uncommon cause of dorsoulnar wrist pain.^{1,3} Differential diagnosis includes tear of the triangular fibrocartilage complex, disruptions of the lunotriquetral ligament, and abnormalities of the distal radioulnar joint.¹

The sixth extensor compartment has its own fibro-osseous tunnel, which is not connected either to the extensor retinaculum or the ulnar head.⁴ This allows

unrestricted pronation and supination of the forearm by letting the ECU tendon to shift freely over the ulnar head.⁴ The retinaculum of the sixth extensor compartment, however, tightly attached proximally to the ulnar groove and distally to the triquetrum, providing a direct approach to the carpus to maximize the extension vector, regardless of whether the forearm is in pronation or supination.⁴ Repetitive forearm rotation motion will cause the ECU tendon to rub against the ulnar styloid. It may subtly injure the synovium and lead to tenosynovitis of the sixth compartment.¹ However, a displaced fracture of the ulnar styloid, an osteophyte, an oversized ulnar styloid, or a dislocation of the ulnar head can irritate the ECU tendon within the sixth compartment and may precipitate inflammation in the synovial sheath of the tendon.^{1,5}

Conservative treatment includes activity modification, splintage, steroid injection, and nonsteroidal anti-inflammatory drugs and is usually effective to alleviate the pain.¹ Open release of the retinaculum of

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Table 1. Indications and Contraindications of Endoscopic Ganglionectomy and Release of the Sixth Extensor Compartment

Indications	Contraindications
1. Symptomatic stenosing tenosynovitis of the ECU resistant to conservative treatment	1. Bony impingement on the ECU tendon
	2. Other causes of dorsoulnar wrist pain
	3. Presence of complex tear of the ECU tendon

ECU, extensor carpi ulnaris.

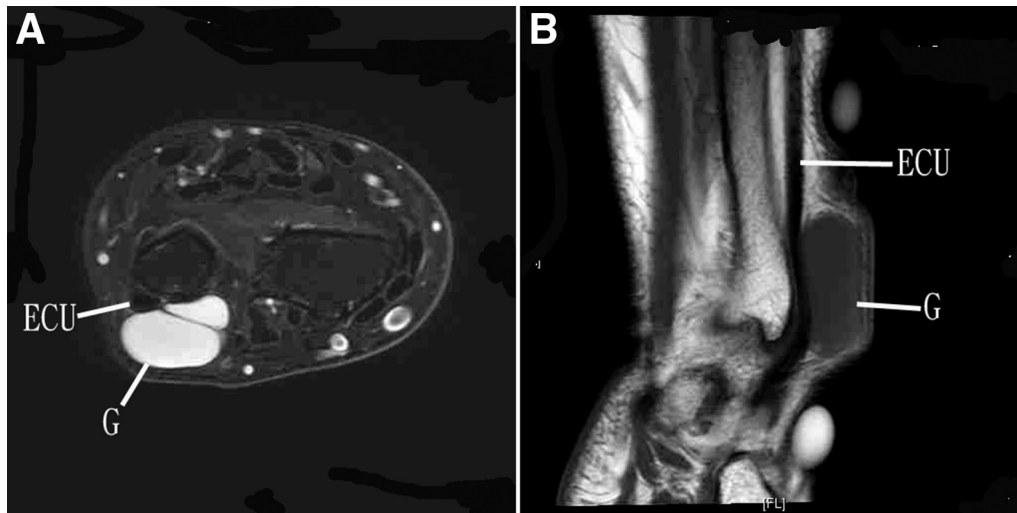


Fig 1. Preoperative magnetic resonance imaging of the illustrated case. (A) T2-weighted transverse image shows a multi-septate ganglion. (B) T1-weighted sagittal view shows the ganglion abuts on the ECU tendon. (ECU, extensor carpi ulnaris; G, ganglion.)

the sixth compartment is indicated if conservative treatment cannot control the symptoms.¹ Simple release is adequate provided that there is no bony impingement on the ECU tendon or attritional tendon degeneration.^{1,6-9} Recently, techniques of extensor tendoscopy of the wrist and endoscopic ganglionectomy of the wrist and hand have been reported.¹⁰⁻¹² The purpose of this Technical Note is to describe the technical details of endoscopic release of the sixth extensor compartment via a 2-portal

approach. Endoscopic resection of a ganglion over the sixth compartment can also be performed via the same approach. It is indicated for symptomatic stenosing tenosynovitis of the ECU resistant to conservative treatment. It is contraindicated if there is bony impingement on the ECU tendon, other causes of dorsoulnar wrist pain, or the presence of complex tear of the ECU tendon (Table 1).

Technique

Preoperative Planning and Patient Positioning

The diagnosis of ganglion can be confirmed by transillumination test. Because of the presence of a ganglion in the illustrated case, the point tenderness at the sixth extensor compartment¹ cannot be elicited. Preoperative clinical examination can exclude other causes of dorsoulnar wrist pain such as triangular fibrocartilage tear. Preoperative radiograph is useful in demonstrating erosive changes at the ulnar styloid, a sign that the tenosynovitis is severe and potentially damaging to the tendon.¹ Radiograph of the wrist can also detect other pathologies of the ulnar head that can impinge on the ECU tendon, such as ulnar head dislocation. Magnetic resonance imaging can confirm the diagnosis of the ganglion and study its characteristics (eg, multiseptate ganglion) and relation with the adjacent structures (eg, the ECU tendon, wrist joint) (Fig 1). Ultrasonographic study can demonstrate the thickened retinaculum that constricts the osseofibrous tunnel of the sixth extensor compartment and reduces movement of the ECU tendon during dynamic maneuvers.¹³

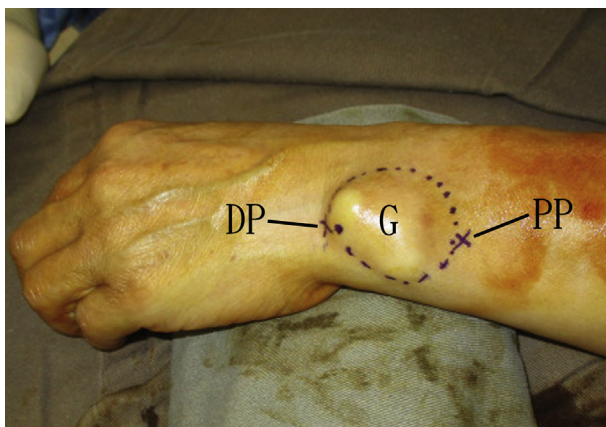
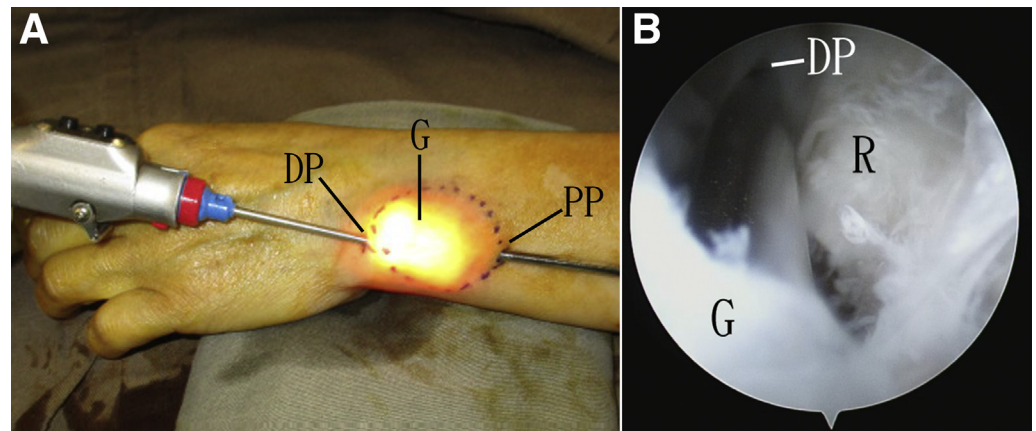


Fig 2. Endoscopic ganglionectomy and release of the sixth extensor compartment of the left wrist. The patient is in supine position with the hand on the side table. The proximal portal is placed 3 cm proximal to the ulnar styloid and along the extensor carpi ulnaris tendon. The distal portal is distal to the distal end of the ganglion and at the level of the triquetrum hamate joint. (DP, distal portal; G, ganglion; PP, proximal portal.)

Fig 3. Endoscopic ganglionectomy and release of the sixth extensor compartment of the left wrist. The patient is in supine position with the hand on the side table. (A) The proximal portal is the viewing portal and the distal portal is the working portal. (B) The ganglion sac is resected with the shaver. (DP, distal portal; G, ganglion; PP, proximal portal; R, retinaculum of the sixth extensor compartment.)



The patient is in supine position with the hand on the side table. An arm tourniquet is applied to provide a bloodless surgical field. Fluid inflow is by gravity and no arthro-pump is used. A 2.7-mm 30° arthroscope (Henke Sass Wolf, Tuttlingen, Germany) is used for this procedure.

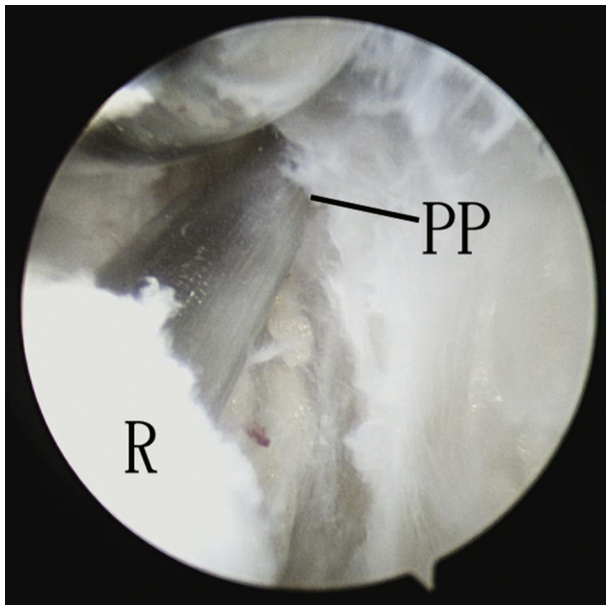


Fig 4. Endoscopic ganglionectomy and release of the sixth extensor compartment of the left wrist. The patient is in supine position with the hand on the side table. The distal portal is the viewing portal and the proximal portal is the working portal. The arthroscope-trocar is introduced via the proximal portal and attempted to be inserted into the sixth compartment. Stenosis of the sixth compartment can be confirmed if the trocar cannot be inserted into the compartment. (DP, distal portal; PP, proximal portal; R, retinaculum of the sixth extensor compartment.)

Portal Placement

Two portals are used for this procedure. The proximal portal is placed 3 cm proximal to the ulnar styloid and along the ECU tendon. The distal portal is distal to the distal end of the ganglion and at the level of the triquetrum hamate joint (Fig 2).

Endoscopic Ganglionectomy

Three-millimeter longitudinal skin incisions are made at the portal sites. The subcutaneous tissue is bluntly dissected towards the ganglion with a hemostat. The ganglion is perforated by the hemostat. The proximal portal is the viewing portal, and the distal portal is the working portal. The arthroscope and arthroscopic shaver (Dyonics; Smith & Nephew, Andover, MA) are inserted into the ganglion sac. The ganglion sac is resected with the shaver (Fig 3). The proximal and distal portals can be interchanged as the viewing and working portals to ensure complete resection of the ganglion.

Confirmation of Stenosis of the Sixth Extensor Compartment

The distal portal is the viewing portal. The proximal end of the retinaculum of the sixth extensor compartment and the ECU tendon proximal to the retinaculum is visualized. The arthroscope-trocar is introduced via the proximal portal and attempted to be inserted into the sixth compartment. Stenosis of the sixth compartment can be confirmed if the trocar cannot be inserted into the compartment (Fig 4).

Endoscopic Release of the Sixth Extensor Compartment

The proximal portal is the viewing portal, and the distal portal is the working portal. The retinaculum of the sixth extensor compartment is released with the

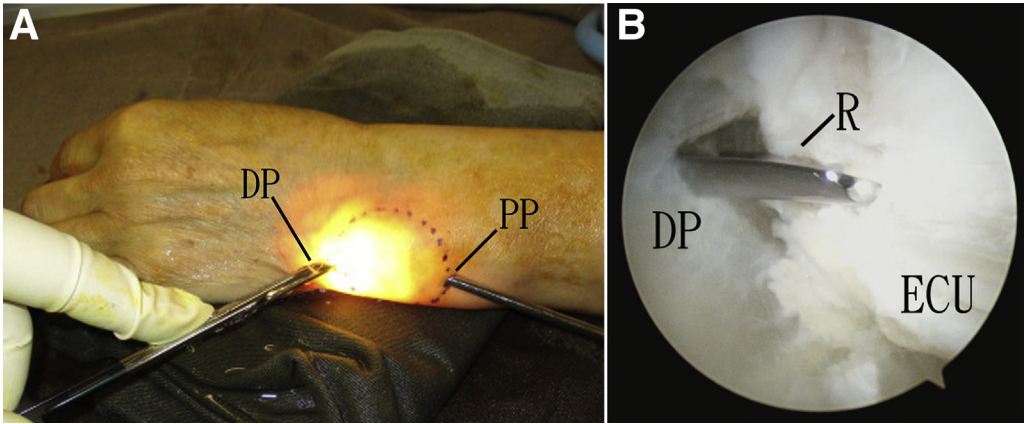


Fig 5. Endoscopic ganglionectomy and release of the sixth extensor compartment of the left wrist. The patient is in supine position with the hand on the side table. (A) The proximal portal is the viewing portal and the distal portal is the working portal. (B) The retinaculum of the sixth extensor compartment is released with the Supercut scissors. (DP, distal portal; ECU, extensor carpi ulnaris; PP, proximal portal; R, retinaculum of the sixth extensor compartment.)

arthroscopic shaver and a Supercut scissors (Stille, Lombard, IL) (Fig 5, Video 1, Table 2). The ECU tendon can then be examined for any attritional degeneration or tear. Inflamed synovium if present can be resected after release of the retinaculum.

Discussion

Theoretically, release of the retinaculum of the sixth extensor compartment has the potential risk of destabilization and volar subluxation of the ECU tendon. However, this was not observed after simple release.^{1,7} Endoscopic release of the retinaculum of the sixth extensor compartment is not technically difficult, but the surgeon should ensure complete release of the retinaculum for alleviation of pain. The key to its success is preoperative assessment to confirm that stenosing tenosynovitis of ECU is the

source of pain and there is no bony cause of ECU tenosynovitis.

Endoscopic management of ganglion can be either endoscopic resection of the ganglion sac or internal drainage of the ganglion to the adjacent joint.¹⁴ In this illustrated case, the ganglion is multiseptate and abuts onto the ECU tendon. Endoscopic resection is more appropriate than internal drainage.¹⁴

The advantages of this arthroscopic technique include better cosmesis, less soft tissue dissection, and less postoperative pain. The condition of the ECU tendon can be thoroughly assessed after release. The potential risks of this procedure include injury to the ECU tendon, injury to the dorsal cutaneous branch of the ulnar nerve, incomplete release of the retinaculum, and destabilization and volar subluxation of the tendon (Table 3). This is not a technically demanding procedure and can be attempted by average hand and wrist arthroscopists.

Table 2. Pearls and Pitfalls of Endoscopic Ganglionectomy and Release of the Sixth Extensor Compartment

Pearls	Pitfalls
1. The portals should be placed at the ends of the retinaculum of the sixth extensor compartment.	1. Incomplete release of the retinaculum can lead to persistent pain.
2. The attempted passage of trocar into the sixth compartment should be gentle to avoid iatrogenic tendon injury.	2. Complex tear of the ECU tendon requires open repair.
3. Synovectomy should be performed after release of the retinaculum.	3. Bony impingement on the ECU tendon cannot be managed by simple release of the retinaculum of the sixth compartment.

ECU, extensor carpi ulnaris.

Table 3. Advantages and Risks of Endoscopic Ganglionectomy and Release of the Sixth Extensor Compartment

Advantages	Risks
1. Better cosmesis	1. Injury to the ECU tendon
2. Less soft tissue dissection	2. Injury to the dorsal cutaneous branch of the ulnar nerve
3. Less postoperative pain	3. Incomplete release of the retinaculum of the sixth extensor compartment with persistent pain
4. Possible to endoscopically examine the condition of the ECU tendon	4. Destabilization and volar subluxation of the ECU tendon

ECU, extensor carpi ulnaris.

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