Bedside Injections for Wrist Pain

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Essential Concepts

- De Quervain's disease first extensor compartment injections are increasingly a first line and superior treatment compared with conservative medical management
- Radiocarpal joint injections are an effective therapeutic tool in treating a variety of painful etiologies including inflammatory arthritis, osteoarthritis, posttraumatic arthritis, and overuse
- Goals of injections for De Quervain's Disease and the radiocarpal joint include long-term relief and to prevent pain recurrence and additional management
- Ganglion cyst aspirations are indicated in the management of pain and for decompression of a vessel or nerve
- Pain relief is often rapid, and the duration of therapeutic benefit may last days to months.

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D. Souza et al. (eds.), *Bedside Pain Management Interventions*,
https://doi.org/10.1007/978-3-031-11188-4_59

1 Bedside Injections for De Quervain's Disease

Overview

De Quervain's Disease (DQD) is a mechanical irritation of the tendons within the first dorsal extensor compartment on the radial side of the wrist [1]. The two tendons within this compartment are of the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) (Fig. 1).

It is characterized by pain, swelling, and tenderness with an incidence of 0.5% in men and 1.3% in women [2]. Treatment modalities can be grouped into conservative medical management (CMM), including medications, splints, & injections; and surgical interventions, including surgical release. Ultrasound-guided corticosteroid injection of the first extensor compartment are increasingly being recognized as a superior of CMM [3].

Indications and Contraindications

De Quervain's Disease may appear with repetitive thumb extension and abduction causing ulnar deviation occurring in activities such as hammering and skiing. It may also appear under hormonal influence such as in post-partum patients. DQD

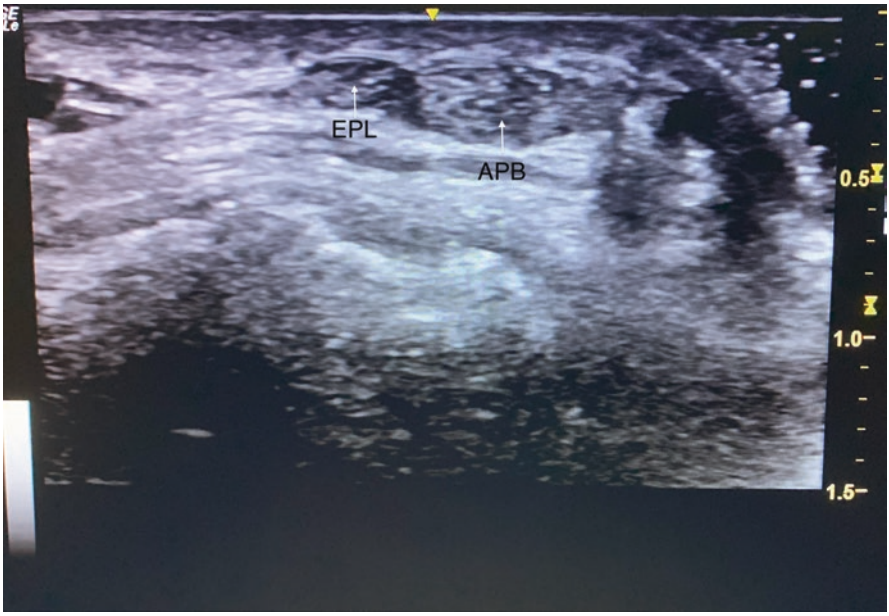

Fig. 1 Abductor pollicis longus and the extensor pollicis brevis tendons within the first extensor compartment. Ultrasonogram. *APL* abductor pollicis longus, *EPB* extensor pollicis brevis

arises when degenerative changes occur within the first extensor compartment causing tenosynovitis of the APL and EPB. It is a clinical diagnosis based on history and physical exam findings that include local tenderness and swelling of the radial wrist, as well as positive Finkelstein's test. The Finkelstein test is performed by holding the distal tip of the patient's thumb and adducting and pronating it over the palm to elicit their pain. The diagnosis is easily confirmed by ultrasound having a sensitivity of 100% and a specificity of 96% [2]. Ultrasound imaging of the tendons within the extensor compartment will show thickening of the synovium (Fig. 2a).

Common contraindications include infection at the injection site, intolerance or allergy to injectate, including steroids, and patient refusal. Anticoagulation, including iatrogenic, and platelet dysfunction, including iatrogenic, are not considered to be a contraindication for these injections.

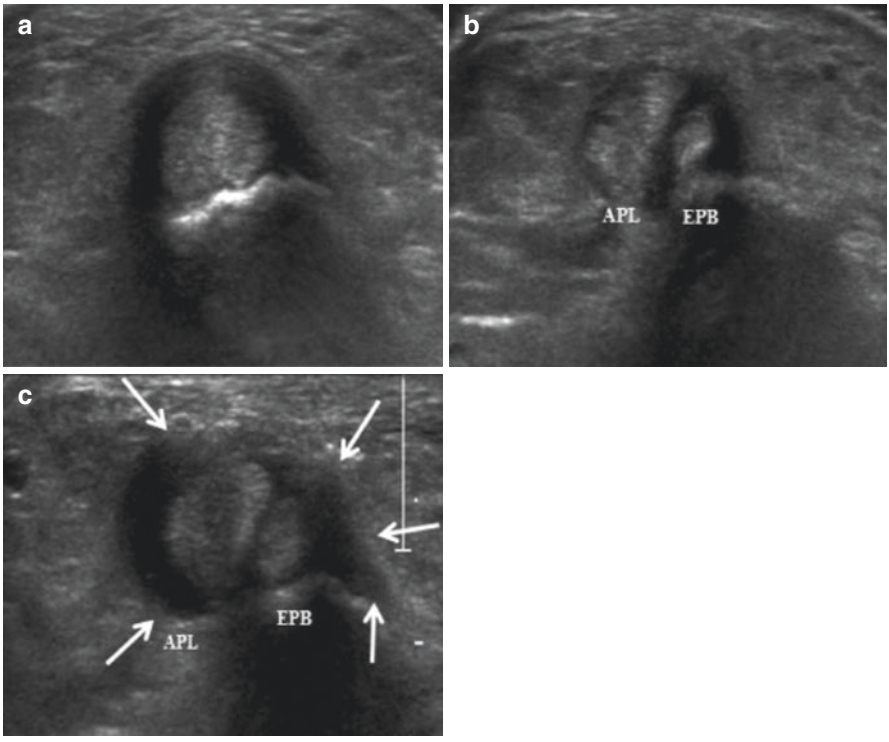

Fig. 2 (**a**) Thickening of the synovium within the first extensor compartment. Ultrasonogram. Hypoechoic area represents thickened synovium. (**b**) "Complete" compartmentalization of the abductor pollicis longus and extensor pollicis brevis in distinct compartments ultrasonogram. *APL* abductor pollicis longus, *EPB* extensor pollicis brevis. (**c**) Hypoechoic appearance of a septum between the adductor pollicis longus and extensor pollicis brevis tendons ultrasonogram. Arrows indicate hypoechoic appearance of the septum between the APL and EPB. *APL* abductor pollicis longus, *EPB* extensor pollicis brevis

Clinical Anatomy

The first dorsal extensor compartment is the most laterally located tendon compartment of the wrist. The compartment is lateral to the metacarpal bones and distal radial bone. Two tendons course through this compartment: abductor pollicis longus (APL) and the extensor pollicis brevis (EPB). There are three anatomical variations practitioners should be aware of due to their suspected influence on failure rates associated with corticosteroid injection to this compartment [3]. These variations relate to compartmentalization of the APL and EPB tendons. With "complete" compartmentalization we find the APL and EPB in distinct compartments. "Incomplete" compartmentalization has the APL and EPB in a shared compartment at the distal radius but in separate compartments more distally. Finally, there may be no compartmentalization when the tendons share a compartment. As described below, it is recommended that practitioners identify these compartments on ultrasound to guide technique (Fig. 2b).

Equipment and Supplies

This procedure can be performed at the bedside and in an office setting. It is recommended that practitioners use ultrasound (US) to confirm correct needle placement and adjust technique based on anatomical variation (Table 1).

Landmark Technique

Landmark-based technique can be used for these injections. However, as mentioned above, we do not recommend it because the ultrasonography allows confirming needle placement, adjusting the injection technique to anatomical variations, potentially decreasing the chance of unintentional vascular or neural injury, and possibly improving patient satisfaction. The same concerns about a blind injection are relevant to the other procedures described in this chapter. Therefore, we proceeded with describing only the ultrasound-guided technique.

Table 1 Equipment and supplies

Syringe	3 or 5 ml
Needle	25, 27, 30 gauge 1/2 to 1 in.
Anesthetic	0.5 mL 1–2% lidocaine 0.5 mL 0.25–0.5% bupivacaine 0.5 mL lidocaine/bupivacaine combination
Corticosteroid	Triamcinolone 20–40 mg (t1/2 life: 18–36 h) Methylprednisolone 40–80 mg (t1/2 life: 18–36 h)

Ultrasound-Guided Technique

In a clean fashion, begin by placing US probe on wrist to obtain a transverse view of the first extensor compartment, visualizing the two tendons (Fig. 3).

Scan the probe proximally and distally to identify whether the tendons have complete, distal incomplete, or no sub-compartmentalization. If there is no sub-compartmentalization, then the medication is injected in their common compartment. If incomplete compartmentalization is seen, then it is recommended to inject the medication within the proximally located shared compartment; to allow medication to diffuse distally within the separate compartments. Finally, if complete compartmentalization is seen then inject half of the prepared medication into each distinct compartment [4]. Figure 2c demonstrates the hypoechoic appearance of a septum between the tendons.

Potential Complications and Adverse Effects

The complication rate is extremely low and nearly all complications are self-limiting; requiring no medical intervention [5]. In addition to common complications such as bleeding or infection, patients may report mild paresthesia in the distribution of the radial nerve. Mild local depigmentation may occur as a result of superficially located steroid. Additionally, practitioners should be vigilant of allergic reactions to both steroid or local anesthetic.

Fig. 3 Probe orientation and US image for first extensor compartment injection

2 Bedside Radiocarpal Joint Injection

Overview

Radiocarpal (RC) joint injection serves as a useful therapeutic tool in the management of painful conditions of the RC joint.

Indications and Contraindications

In patients that fail conservative management, RC joint injection is indicated for painful conditions due to inflammatory arthritis, osteoarthritis, posttraumatic arthritis, and overuse [6, 7]. Analysis of aspired effusion may be part of the diagnostic workup for inflammatory arthropathies. Pain at the RC joint can be predisposed from prior scaphoid fractures. Aging, genetics, gender, BMI, and daily use can all be factors in the development of RC joint pain. Pain usually manifests in the wrist with restrictions of wrist flexion and extension, and can also be accompanied by mild swelling and weakness [8, 9].

Common contraindications include infection at the injection site, intolerance of allergy to injectate, including steroids, and patient refusal. Anticoagulation, including iatrogenic, and platelet dysfunction, including iatrogenic, are not considered to be a contraindication for these injections.

Clinical Anatomy

The radiocarpal joint is composed of the distal radius and the proximal row of three carpal bones: scaphoid, lunate, and triquetrum. The triangular fibrocartilage complex separates the radioulnar joint, and the scapholunate and lunotriquetral ligaments separate the midcarpal joints. The wrist joint is not one compartment due to various divisions, but there is a communicating synovial cavity. The radiocarpal joint communicates with the pisiform-triquetral joint in approximately 75% of cases [10, 11].

Equipment and Supplies

This procedure can be performed at the bedside and in an office setting. The patient is placed in a seated position with a fully pronated forearm. Lister's Tubercle is palpated. The skin at the dorsum of the wrist is prepped with antiseptic solution. After localization of the RC joint, a 25-gauge 1-in. needle is inserted at the level of the radioscaphoid joint and advanced to the periosteum of the underlying distal radius. The needle is guided into the joint cavity until fluid flows freely. Steroid and local anesthetic are injected; please refer to Table 1 for

specific volumes. After negative aspiration is confirmed, the solution is injected [12].

Ultrasound-Guided Technique

After prepping the skin with antiseptic, a high-frequency linear-array transducer is situated using a dorsal approach and longitudinal planes. The transducer should be translated with Lister's Tubercle in the center. The transducer should be rotated 90° into the anatomic sagittal plane for a long-axis view. In this position, it should be possible to visualize the distal radius, lunate, and capitate. The transducer can be rotated to ensure that the needle is placed between the second and third extensor compartments (separated by Lister's Tubercle). The needle is inserted in-lane distal-to-proximal trajectory at 45° to the transducer (Fig. 4).

A few millimeters distal to the joint is the optimum placement to avoid the dorsal lip of the radius [13]. Joint effusions, thickening of the synovium, articular space narrowing, osteophyte formation, and cortical irregularities are all common ultrasound findings.

Potential Complications and Adverse Effects

The complication rate is extremely low. The region of the scapholunate ligament should be avoided due to potential ligamentous damage. In addition to common complications such as bleeding or infection, patients may report mild paresthesia in the distribution of the radial nerve. In addition, mild depigmentation and allergic reactions as described in the initial section are potential complications. Two weeks of relative rest may be advised with splinting to protect the joint [13] (Fig. 5).

Fig. 4 Probe orientation and US image for radiocarpal joint injection

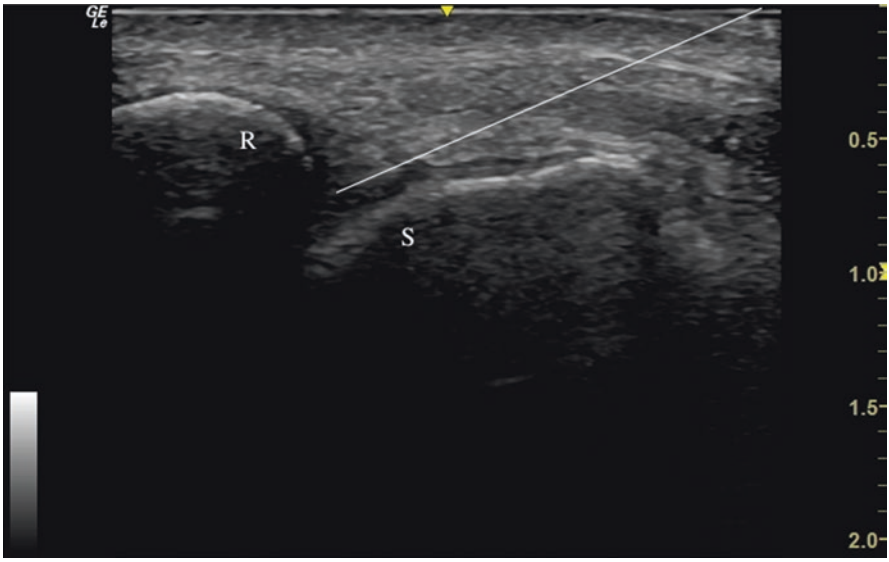

Fig. 5 Ultrasound image for radiocarpal injection. Ultrasonogram. *R* radius, *S* scaphoid

3 Bedside Ganglion Cyst Aspirations

Overview

Ganglion cyst aspiration serves as a useful therapeutic tool at the bedside and in an office setting.

Indications and Contraindications

Ganglion cyst aspiration is indicated in the management of pain and less frequently in decompression of a vessel or nerve. The cyst is typically a swelling in conjunction with a joint capsule or tendon sheath. The cystic lesions are filled with fluid from the degeneration of periarticular or peritendinous soft tissues [6, 7]. They typically occur on the dorsal aspect of the wrist. Recurrence after aspiration is common, and surgery has a lower rate of recurrence in comparison to aspiration. Common contraindications include infection at the injection site, intolerance of allergy to the injectate, including steroids, and patient refusal. Anticoagulation, including iatrogenic, and platelet dysfunction, including iatrogenic, are not considered to be a contraindication for these injections.

Clinical Anatomy

Surrounding anatomical structures should be considered with respect to the cyst location. The majority of ganglia are at the dorsum of the wrist superficial to the

scapholunate ligament. Volar ganglia originate from the scaphotrapezium joint; they are located on the radial side and may displace the radial artery or the superficial sensory branch of the radial nerve. Vascular structures should be located with doppler imaging.

Equipment and Supplies

It is recommended that practitioners use ultrasound to confirm correct needle placement and adjust technique based on anatomical variation. For dorsal ganglia, the patient is placed in a seated position with a fully pronated forearm. The skin surrounding the cyst is prepped with antiseptic solution. After localization of the cyst with transducer, a 16-gauge 1-in. needle is inserted at an approximately 45° to the transducer. A 16-gauge needle is often necessary due to the high viscosity of aspirated material, but the needle size will also depend on the size and location of the cyst. Adequate time should be given between anesthetic injection and aspiration due to the high pain with wrist injections. Local anesthetic, and less frequently steroids, may be injected if there is wrist pain and/or synovitis near the cyst; please refer to Table 1 for specific volumes.

Ultrasound-Guided Technique

After prepping the skin with antiseptic, a high-frequency linear-array transducer is situated typically using a dorsal approach and longitudinal planes. Hockey-stick transducers are ideal for aspiration to have adequate space for placement of the needle. The transducer should be translated to place the cyst in the center of the transducer. The needle is inserted at 45° to the transducer to enter the body of the cyst (Fig. 6) [6].

Fig. 6 Probe orientation and US image for the wrist ganglion cyst aspiration

Potential Complications and Adverse Effects

The complication rate is low and nearly all complications are self-limiting. In addition to common complications such as bleeding or infection, mild local depigmentation and allergic reactions are less common complications. Well-defined lesions may present as anechoic or hypoechoic with posterior enhancement close to a joint or tendon sheath, which should be avoided when possible. US guidance is advantageous for aspiration of multiloculated ganglia [6].

Clinical and Technical Pearls

- For optimal positioning during RC joint injections, a pillow or rolled towel should be placed under the forearm to obtain slight wrist flexion.
- The needle is guided into the ganglion cyst until fluid flows freely. If fluid does not flow freely, the contents can be liquefied with injection of normal saline.
- Patient should be informed with the possibility of developing of lipodystrophy with use of steroids or punctate scars especially with repeated blocks.
- Meticulous attention should be paid to an immunocompromised patient to prevent development of infections. Although it is rare, early detection is imperative to prevent deleterious fatal consequences.
- Extra caution must be taken in patients on anticoagulation. Patients should be observed for at least 15 min after the injection.

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Further Reading

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