

# Successful Treatment of de Quervain Tenosynovitis With Ultrasound-guided Percutaneous Needle Tenotomy and Platelet-Rich Plasma Injection: A Case Presentation

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De Quervain tenosynovitis is a disorder of the tendons of the first dorsal compartment of the wrist that causes pain and functional disability, which may be refractory to conservative treatments. We present a case of ultrasound-guided percutaneous needle tenotomy and platelet-rich plasma injection for the successful treatment of de Quervain tenosynovitis.

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## INTRODUCTION

De Quervain tenosynovitis is clinically characterized by the insidious onset of pain at the radial styloid process that is exacerbated by grasping, thumb abduction, and wrist ulnar deviation. Repetitive and sustained tension on the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) tendons of the first dorsal compartment of the wrist leads to a fibroblastic response. It is often characterized, at least initially, as a stenosing tenosynovitis, with thickening of the extensor retinaculum and tendons caused by repetitive tension. The progression to tendinosis is thought to cause pain due to resisted gliding of the APL and EPB tendons in the fibrous compartment [1].

Conservative therapy is the first line of treatment, including activity modifications, splinting, occupational or physical therapy, analgesic or nonsteroidal anti-inflammatory medications, and corticosteroid injection(s) [1]. Up to 83% of patients report relief with a single corticosteroid injection [2]. After failure of conservative efforts, surgical release of the first dorsal compartment and decompression of the stenosed APL and EPB tendons are often considered.

Platelet-rich plasma (PRP) is autologous blood centrifuged to produce a smaller volume of more concentrated platelets. Prior studies have shown success when using PRP to treat tendinopathies, including Achilles tendinopathy, elbow epicondylar tendinopathy, patellar tendinopathy, rotator cuff tendinopathy, and others [3-11]. However, there are only a few randomized controlled studies with the use of PRP, and its efficacy is still debated [12,13]. To our knowledge, PRP injection for the treatment of de Quervain tenosynovitis has not been reported in the literature. We present a case of de Quervain tenosynovitis refractory to conservative measures that was successfully treated with ultrasound (US)-guided percutaneous needle tenotomy (PNT) and PRP injection.

## CASE PRESENTATION

The patient is a 74-year-old woman who initially presented with 2 months of left thumb pain, clinically consistent with de Quervain tenosynovitis. She subsequently underwent 3 months of treatment with activity modifications, bracing, supervised occupational therapy, and an US-guided corticosteroid injection into the first dorsal compartment of the wrist, all of which failed to significantly relieve her pain. Of note, no septations were seen within the patient's first dorsal compartment during US-guided injection. Alternative diagnoses that may cause thumb pain were carefully considered. The patient did not have first carpometacarpal joint tenderness and did have normal plain radiographs of this joint. In addition, she

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**Figure 1.** Coronal T2-weighted magnetic resonance imaging of the patient's left wrist before the percutaneous needle tenotomy and platelet-rich plasma injection procedure, showing tendinosis and longitudinal intrasubstance tearing of both the abductor pollicis longus and extensor pollicis brevis tendons (arrows) within the first dorsal compartment of the wrist. Although a scapholunate ligament injury was also noted, this was not thought to be clinically relevant based on the patient's age, history, and physical examination. Left = ulnar; right = radial; top = distal; bottom = proximal.

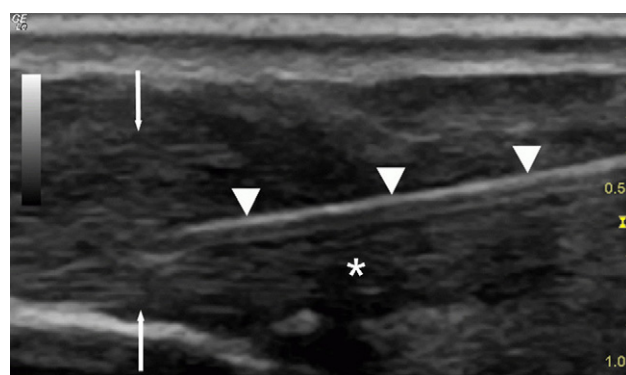
did not have neck pain, radicular pain, paresthesias, or weakness. Phalen and Tinel signs were each negative at the elbow, forearm, and both the radial and volar wrist.

Magnetic resonance imaging of the left wrist was performed, which showed tendinosis and longitudinal intrasubstance tearing of both the APL and EPB tendons (Figure 1). Adjacent radial-sided wrist structures were within normal limits. The patient did have a chronic scapholunate ligament injury on magnetic resonance imaging; however, this was not thought to be clinically relevant based on the patient's age, history, and physical examination. Further nonoperative and operative treatment options were discussed with the patient. The patient elected to proceed with US-guided PNT and PRP injection into the left APL and EPB tendons. The patient was instructed to avoid nonsteroidal anti-inflammatory drugs (NSAIDs) for the week before the procedure as well as 2 weeks after the procedure, to avoid any potential impairment of platelet and growth factor activity.

The patient voluntarily consented to participation in our institution's PRP injection registry, which was approved by

the institutional review board of Cleveland Clinic Florida. She completed a visual analog scale (VAS) at baseline, which she reported as 38 of 100. The senior author (E.P.), who is experienced in musculoskeletal US, performed the procedure. The patient's left wrist was examined while in a semisupinated position, in preparation for the procedure, by using a GE Logiq-e US system and a 5-13 MHz linear-array transducer (GE Healthcare, Waukesha, WI). The patient's wrist and hand were then prepared in a sterile fashion. A sterile US transducer cover kit was used (Civco Medical Solutions, Kalona, IA). Local anesthesia was achieved with 2 mL of 1% lidocaine without epinephrine by distributing this with a 1.5-inch, 25-gauge needle under direct US guidance at the skin insertion site, as well as into the APL and EPB tendons and the first dorsal compartment of the wrist. Then, a 1.5-inch, 22-gauge needle was used to perform a PNT procedure under direct US guidance on the APL and EPB tendons as well as the retinaculum (Figure 2). Previous PNT literature supports the use of an 18- to 20-gauge needle [4,14,15]. This prior literature, however, generally examined the use of PNT for tendons larger than the APL and EPB tendons. As such, E.P. believed that it was appropriate to use a slightly smaller-gauge needle for the PNT on these particular tendons, while still using a needle thickness sufficient to fenestrate the tendons; a 22-gauge needle was chosen.

The position of the patient's hand, US transducer, and needle during the procedure are demonstrated in Figure 3. Fenestrations were directed through the APL and EPB tendons as well as the retinaculum, under direct US guidance until the PNT was believed to be adequate. Approximately 30-35 total fenestrations were performed during the procedure. Particular attention was given to tendinopathic portions of the tendons, which were visualized by US as areas of hypoechoogenicity and thickening. During the PNT, 2 mL of



**Figure 2.** Long axis (longitudinal view) of the right abductor pollicis longus (APL) tendon during the percutaneous needle tenotomy procedure. Left = proximal; right = distal; top = superficial; bottom = deep; arrows = borders of the APL tendon; asterisk = area of hypoechoogenicity within the APL tendon; triangles = needle.



**Figure 3.** Position of the patient's hand, ultrasound transducer, and needle during the percutaneous needle tenotomy and platelet-rich plasma injection procedure. Note that during the actual procedure, a sterile ultrasound transducer cover kit was used, as outlined in the text.

additional 1% lidocaine without epinephrine was administered. Before the tenotomy procedure, 20 mL of the patient's whole blood was collected. By using a Harvest SmartPreP 2 APC+ PRP system (Harvest Technologies, Plymouth, MA), 3 mL of PRP was obtained. The manufacturer's instructions were followed without deviation. No exogenous activator was used. After the tenotomy procedure described above, the syringe was changed, and, under direct US guidance, 3 mL of PRP was administered into the APL and EPB tendons, with equal distribution between the 2 tendons.

The patient was given a wrist–thumb spica splint to use for 2 weeks after the procedure. During these 2 weeks, she was instructed to remove the splint 4 times daily for active range-of-motion exercises of the wrist and hand. At 2 weeks, the patient began supervised occupational therapy, with 2 visits per week for 10 weeks, according to the guidelines outlined by Finnoff et al [4]. At 3 months after the procedure, the patient reported a VAS of 10 of 100, which represented a 74% reduction in pain from her preprocedure level. At 6 months after the procedure, the patient reported a VAS of 14 of 100, which represented a 63% reduction in pain from her preprocedure level. There were no complications associated with the procedure or in the 6-month period after the procedure.

## DISCUSSION

PRP was first used clinically in maxillofacial and plastic surgery in the 1990s. Its use in orthopedics and sports medicine began in the early 2000s, initially in spinal fusion augmentation and fracture healing [16]. In recent years, its use has been expanded to the treatment of tendinopathies, with some favorable results reported in the literature for Achilles tendinopathy, elbow epicondylar tendinopathy, pa-

tellar tendinopathy, rotator cuff tendinopathy, and other tendons [3-12,17]. However, other studies have not shown a favorable result relative to control treatments or the injection of autologous blood, and further research is needed to confirm its efficacy [18-20]. Reported complications from PRP injections are related to the phlebotomy and injection, including hematoma, venous thrombosis, minor bleeding, injury to structures with the injection needle, and infection [12,17].

After activation, platelets release many growth factors, including platelet-derived growth factor, transforming growth factor  $\beta$ , and epidermal growth factor, which may aid in tissue regeneration [10]. The growth factors stimulate a cascade to recruit reparative cells while also inhibiting apoptosis and metalloproteinase activity. The restoration of tendon tissue may result in a decrease of pain and an improvement of function [3-11,21]. Based on the reported success of PRP injections for the treatment of certain tendinopathies, it may potentially be successful for the treatment of other tendinopathies, including de Quervain tenosynovitis.

The current patient did not respond to a 3-month period of standard conservative care but responded well to US-guided PNT and PRP injection, with pain relief lasting at least 6 months after the procedure. She experienced relief of pain in her left hand and was able to avoid surgical intervention. Specifically, the patient's VAS score dropped 63% from before the procedure to 6 months after the procedure. In addition, there were no complications associated with the procedure. Factors such as noncompliance with postprocedural instructions, the physical therapy program, or instructions to avoid NSAIDs during the preprocedure and postprocedure periods could potentially affect the clinical results of this procedure. We also acknowledge that it is unknown how this patient's condition may have fared if no further intervention had been performed.

For patients with de Quervain tenosynovitis refractory to conservative care, our findings suggest that US-guided PNT and PRP injection may be a reasonable option to consider before surgery. However, large, controlled, high-quality research studies are needed to better establish the effectiveness and safety of this procedure in refractory de Quervain tenosynovitis.

## CONCLUSION

We report a case of US-guided PNT and PRP injection for the successful treatment of de Quervain tenosynovitis. To our knowledge, this has not been previously reported in the literature. Further research is recommended to investigate the efficacy of PNT and PRP injection for refractory de Quervain tenosynovitis. For patients who have failed conservative treatment for de Quervain tenosynovitis, if the diagnosis is firm and the patient is either unable or unwilling to consider surgery, then we recommend that this treatment be considered.

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