

# **USING PLATELET-RICH PLASMA TO TREAT DEQUERVAIN'S TENOSYNOVITIS AND CORTISONE-INDUCED SKIN DISCOLORATION AND ATROPHY: A CASE STUDY**

Shirley Chen, BA<sup>1,2</sup>, Nazly Suarez, BSc<sup>1,2</sup>, Tonima Islam, BA<sup>1,2</sup>, Tenzin Trinley, BA<sup>2,3</sup>, Ilana Urman, BA<sup>2,4</sup>, and Devi E. Nampiaparampil, MD<sup>2,5</sup>

**Background:** Patients with DeQuervain's tenosynovitis are often treated with a combination of cortisone injections and wrist braces with thumb spica splints. This combination is effective for most patients. For some patients, the pain remains refractory.

**Case Report:** We present the case of a 38-year-old woman with recurrent episodes of DeQuervain's tenosynovitis who had experienced periods of relief from a combination of cortisone injections and nighttime splinting. However, she also had adverse effects from these injections including skin bleaching and fat atrophy. The patient underwent a leukocyte-poor platelet-rich plasma (PRP) injection and experienced > 6 months of pain relief. In addition, the skin discoloration and fat atrophy that had been present for approximately 15 months completely resolved.

**Conclusions:** PRP may be a viable nonsurgical treatment option for recalcitrant DeQuervain's tenosynovitis. It may also be an option for patients with cortisone-induced negative cosmetic effects. To our knowledge, this is the first report addressing the effects of PRP on either DeQuervain's tenosynovitis or cortisone-induced skin discoloration and atrophy.

**Key words:** Platelet rich plasma, regenerative medicine, DeQuervain's, tenosynovitis, radial tenosynovitis, cortisone, discoloration, bleaching, fat atrophy, Finkelstein

## **BACKGROUND**

DeQuervain's tenosynovitis is characterized by inflammation and degeneration of 2 tendons in the first dorsal compartment: the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) (1). Patients with the condition experience pain at the dorsal radial aspect of the wrist that is worse with repetitive motions of the thumb (1) (Fig. 1). Women between the ages of 30 and 50 are at greater risk to develop it. It is commonly diagnosed in women who are either pregnant, postpartum, or lactating, so there may be a hormonal component (1).

Diagnostically, patients often have a positive Finkelstein's test. If a patient tucks her symptomatic thumb into a clenched fist and then deviates her wrist to the ulnar side, she often has worse pain, indicating a positive Finkelstein's test (2) (Fig. 2).

Therapeutically, the conservative options include thumb spica splinting, nonsteroidal anti-inflammatory drugs (NSAIDs), occupational therapy and physical therapy including activity modification, modalities, manual therapy, and therapeutic exercise (3). The condition

From: <sup>1</sup>City University of New York, Hunter College, New York, NY; <sup>2</sup>Metropolis Pain Medicine, New York, NY; <sup>3</sup>CUNY Graduate School of Public Health and Health Policy, New York, NY; <sup>4</sup>School of Medicine and Health Sciences, Physician Assistant Program, The George Washington University, New York, NY; <sup>5</sup>Department of Rehabilitation Medicine, NYU Grossman School of Medicine, New York, NY

Corresponding Author: Devi E. Nampiaparampil, MD, E-mail: devichechi@gmail.com

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Fig. 1. Relevant anatomy.

responds well to cortisone injections, so often patients will combine these injections with thumb spica splints at night (4,5). One study suggested that the condition resolved in 73.4% of cases with 1 to 2 cortisone injections (5). In refractory cases, a surgical release of the first dorsal compartment can also be considered (6,7).

Localized cortisone injections for DeQuervain's tenosynovitis are generally well-tolerated. Localized skin hypopigmentation and fat atrophy are potential adverse reactions. Typically, the reactions occur weeks to months after the injection. In most cases, hypopigmentation improves months to years after it first appears (8,9). However, there are cases of permanent hypopigmentation and fat atrophy (10,11). These adverse reactions are more often seen in people with darker skin. The exact mechanism is still unknown. One theory is that the cortisone affects melanocyte function. Melanocytes create skin pigment. Steroids such as triamcinolone, which is larger in size, higher density, and more likely to aggregate, may be more likely to cause depigmentation (12).

Skin atrophy, another common side effect of localized cortisone injection, is characterized by increased skin transparency, tearing, fragility, and bruising (13). The skin atrophy can usually be seen in the epidermis and dermis within 14 days after the cortisone injection. It is caused by cortisone's inhibition of fibroblast and keratinocyte cell proliferation and collagen synthesis (10,13). It may lead to thinning of the epidermis and changes in the connective tissues. The skin and fat atrophy may resolve after several months (12). Normal saline infiltrations may improve the contouring of the area, but they do not treat the skin and fat atrophy (14).

Platelets and growth factors are integral to the normal



Fig. 2. Finkelstein's test.

wound healing process. Studies suggest that a concentrated mixture of platelets and growth factors, called platelet-rich plasma (PRP), can be used to treat chronic injuries (15). Platelets' main function is to come together at sites of tissue damage to seal small breaks in blood vessels. They form platelet clots by releasing granules with chemical messengers that signal even more platelets to become activated. When they are activated, platelets flatten out to cover more surface area at the site of the damaged tissue. The increased surface area exposes sites on the platelet which other platelets can attach to. This process is called platelet aggregation (16).

Platelets also attract various growth factors to the site of injury. Growth factors such as vascular endothelial growth factor, PDGF (platelet-derived growth factor), transforming growth factor (TGF)-alpha and TGF-beta encourage and facilitate the growth of new blood vessels, the transport of fibroblasts, the creation of an extracellular matrix, and the deposition of collagen, processes that are integral to wound healing (17).

For these reasons, PRP is thought to improve healing in chronic degenerative tendon injuries. As wound healing improves, pain and function can improve. PRP has shown greater efficacy in managing recurrent tendonitis and tendinosis than in managing other conditions (18). Perhaps it can improve skin and fat healing through the same mechanism of action.

To our knowledge, PRP has not been studied either in the evaluation of DeQuervain's tenosynovitis or in the management of cortisone-induced cosmetic side effects.

## CASE PRESENTATION

### Patient Description

This is the case of a 38-year-old female patient who

first developed DeQuervain's tenosynovitis in the left wrist after increasing the frequency of her hatha yoga sessions. She had pain with abduction and extension of the thumb that affected her ability to grasp items and lift her backpack. She also had pain with the yoga poses "downward facing dog" and "chaturanga" as well as with the plank position.

### Physical Examination Results

Diagnostically, the patient had pain and tenderness over the radial sheath, pain and weakness with abduction and extension of the right thumb, and a positive Finkelstein's test.

### Test Results

X-rays of the hand and wrist were normal.

### Case History

Therapeutically, the patient received a cortisone injection and the symptoms almost completely resolved 3 days afterward. The injection was followed with wrist and thumb spica splinting.

A few months later, the patient developed similar symptoms in her right wrist and thumb. The symptoms abated 3 days after she received a cortisone injection over the right abductor pollicis longus and extensor pollicis brevis tendons. The effect lasted for approximately 3 months, at which time the patient became pregnant. She had a cortisone injection with good results that lasted until the third trimester. The patient held off on repeating the injection in the hopes that the symptoms would resolve after the delivery. However, the symptoms worsened. The patient found it difficult to lift her newborn, to carry the baby's car seat and supplies, and to open child-proof locks. She had a third cortisone injection that provided relief within 3 days.

Within one month of the injection, the patient noted a bleaching of the skin around the injection site. The

area measured approximately one cm x one cm although the margins were not clearly delineated. This sudden change occurred overnight, per the patient's recall. Over the course of the next month, she also developed skin and fat atrophy at that site. There was a noticeable disfiguration of the patient's soft tissues. The skin had also become translucent such that the underlying cutaneous veins were both visible and palpable (Fig. 3).

The pain remained well-controlled for about 3 months. Again, the patient found it difficult to care for her child as well. The thumb pain also decreased her productivity at work. Therefore, despite the cosmetic effects of the prior injection, she had a fourth cortisone injection for DeQuervain's tenosynovitis. At this point, the patient's hand surgeon counseled her about the risks, benefits, and alternatives to surgical intervention.

The cortisone injection was effective in controlling the symptoms for a 3-month period. Although the pain returned, the patient had found she could make ergonomic and lifestyle changes that would allow her to function more effectively. However, to control the pain, she expressed an interest in trying PRP injections.

### Treatment

After written and verbal consent were obtained, approximately 10 mL of blood were drawn from the patient and transferred to a specially prepared PRP tube containing anticoagulants. The tube was vertically rotated back and forth 5 times. The tube was placed in a centrifuge with an opposing counterweight. After 5 minutes, the tube was removed and inspected for a visible gel, buffy coat, and golden liquid layer of PRP. The tube was vertically rotated back and forth 5 times. Afterwards, the PRP and buffy coat were gently extracted and transferred to a 10-mL syringe. The syringe was attached to a 25-gauge needle. Meanwhile, the patient's right hand and wrist were prepped and draped in the usual sterile fashion. Using a high-frequency ultrasound probe, the



Fig. 3. Various views of an approximately 1 cm x 1 cm hypopigmented atrophied area over the snuff box of the wrist; 14 months after a localized cortisone injection.

needle was directed into the snuff box at a 30-degree angle. No resistance was felt. The patient experienced no change in her baseline paresthesias during the injection. After negative aspiration for blood, the PRP was injected directly into the APB and EPL. There were no complications. The patient tolerated the procedure well. There was minimal bleeding. The patient was instructed to avoid any excessive strains over the next week.

### Expected Outcome

We expected the patient to experience partial pain relief and moderate functional improvement from the injection in the short-term. We did not expect her to experience any significant short- or long-term side effects from the procedure. We did not expect any change in the cosmetic appearance of her wrist.

### Actual Outcome

The patient experienced pain relief within 2 weeks of

the injection. By 4 weeks, the wrist and thumb pain had completely resolved. By 6 weeks, the skin discoloration and atrophy that had been present for over 15 months had completely resolved. The patient has not experienced any recurrence of pain or weakness symptoms over the past 6 months. There has been no return of the discoloration or atrophy. Other than a slight increase in pain the day after the procedure, the patient has not had any adverse effects from the PRP injection (Fig. 4).

### CONCLUSIONS

1. PRP may be a viable nonsurgical treatment option for patients with recurrent DeQuervain's tenosynovitis that only responds to cortisone injections for short-term intervals.
2. PRP may be an effective strategy for treating cortisone-induced skin discoloration and atrophy.

More research is needed on both fronts.



Fig. 4. The snuff box of the wrist in the same patient 6 months after the PRP injection: no skin discoloration and no fat atrophy.

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