CASE REPORT

Triggering of the abductor pollicis longus in association with deQuervain's tenosynovitis

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SUMMARY

DeQuervain's tenosynovitis is a common cause of radial-sided wrist pain. Symptoms result from a narrow first dorsal compartment and associated tendinosis of the enclosed extensor pollicis brevis and/or abductor pollicis longus (APL). Surgical intervention, offered when conservative measures fail to adequately relieve symptoms, requires a detailed understanding of potentially aberrant anatomy in order to avoid persistence or recurrence of symptoms. We describe a case whereby the patient presented with complaints of thumb triggering in extension and associated disabling first dorsal compartment tendinosis. Intraoperatively, after supernumerary tendons were identified and addressed, the APL was at risk for subluxation over a prominent fibroosseous ridge. Routine first dorsal compartment release alone may have failed to address all of this patient's pathology.

BACKGROUND

DeQuervain's tenosynovitis is a common cause of radial-sided wrist pain. Several reported series imply that this condition is most often in the dominant hand of middle-aged women who endure occupations or daily routines mandating repetitive deviation of their affected wrist and thumb.¹ Symptoms primarily include pain over the first dorsal compartment at the level of the wrist. Severity of pain can range from mild to disabling. Non-invasive treatment options include activity modification, splinting and anti-inflammatory medication. When these methods fail, a corticosteroid injection into the first dorsal compartment may be curative, with published success rates between 61% and 83%.² Patients with symptoms refractory to conservative management almost always achieve symptom relief after a properly performed surgical release of the dense fibrous tissue of the first dorsal compartment that is effectively stenosing the extensor pollicis brevis (EPB) and/or abductor pollicis longus (APL) tendon.

While DeQuervain's tenosynovitis is very common, triggering of one or more extensor tendons within the first dorsal compartment in association with DeQuervain's tenosynovitis is exceedingly rare and such a presentation can cause confusion during a general orthopaedic surgeon's development of a differential diagnosis. Volar tendon subluxation after routine release of the first dorsal compartment, as observed during this case, is also uncommon. This report serves as an important

reminder of both entities. In doing so, this report also highlights pertinent aberrant pathoanatomy within the first dorsal compartment that, if unrecognised during routine surgical release, can result in persistent symptoms.

CASE PRESENTATION

The patient is a 65-year-old right-handed woman, previously employed as a housekeeper, who was referred to our office with 7 months of persistent, severe and sometimes disabling radial-sided wrist pain. She denied any history of prior wrist surgery or trauma. She reported pain with ulnar wrist deviation and thumb flexion. She also reported that the thumb occasionally 'got stuck' in extension. Her pain and complaints of triggering in thumb extension persisted after a corticosteroid injection into her first dorsal compartment (performed by an orthopaedic surgeon 6 weeks prior to our initial consultation). Physical examination revealed tenderness localised to the first dorsal compartment adjacent to the radial styloid. Finkelstein's and Eichhoff's manoeuvres reproduced the patient's pain. There was observed symptomatic locking of the thumb with active thumb abduction and extension that was understandably confused during prior investigation as a trigger thumb. However, no volar thumb tenderness or triggering flexor nodules were palpated. The triggered, extended thumb was unlocked with manual tendon manipulation with passive thumb adduction and flexion.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis for DeQuervain's tenosynovitis as well as the thumb triggering in extension seen in this patient includes several nearby pathological entities to include trigger thumb, intersection syndrome, scaphoid fracture, carpal instability, superficial radial neuritis, degenerative conditions such as osteoarthritis of the radiocarpal or thumb carpometacarpal joint(s) or cervical radiculopathy. A detailed physical exam localising pain directly over the first dorsal compartment adjacent to the radial styloid can differentiate first dorsal compartment pathology from a flexor-based trigger thumb or an intersection syndrome (whereby pain is approximately 5 cm proximal to the wrist joint). A thorough neurological examination of the affected extremity should differentiate this patient's symptoms from an overlying neuropathy. Wrist radiographs, if necessary,

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Figure 1 Tendons exiting the first dorsal compartment prior to its release become kinked with passive thumb motion distal to the site of severe stenosis.

and a high index of suspicion for bony abnormalities will distinguish bony pathology.

TREATMENT

Our patient's symptoms were refractory to a corticosteroid injection into the first dorsal compartment as well as a 6-week period of immobilisation with a prefabricated thumb spica splint. Given her severe pain and persistent symptoms, the patient declined a repeat injection and elected for surgical intervention. On the day of surgery, after appropriate anaesthesia and application of a non-sterile tourniquet, a 3 cm linear incision was made centred over the first dorsal compartment through skin. Tenotomy scissors were used to spread the subcutaneous tissue and easily identify the dorsal sensory branch of the radial nerve, which was retracted and protected through the remainder of the case. The first dorsal compartment roof was identified. Prior to release, the tendons were visualised distal to the first dorsal compartment sheath. The first dorsal compartment was notably stenosed such that tendons kinked with manual examination prior to release (figure 1). Interestingly, triggering into the narrow sheath was not manually reproducible with passive motion while the patient was under anaesthesia.

The first dorsal compartment was then longitudinally incised in its centre. The EPB was in a separate subcompartment that was additionally released. The tendons within the compartment were identified and freed of all adhesions proximally and distally. The distal aspect of the APL contained a distinct nodule and an hour-glass curvature adjacent to a prominent volar fibroosseous ridge. We believe this nodule was primarily responsible for triggering. There was one additional flattened APL slip deep to the primary APL tendon which was excised because it may have assisted in both narrowing the available space within the compartment and also pushing the APL superficially over the volar ridge. Passive thumb motion caused volar subluxation of the thickened APL over the prominent fibroosseous ridge (figure 2). Given the observed subluxation of the APL after release, a 1 cm slip off the dorsal portion of the previously incised extensor sheath was created and sutured loosely over the tendons to the periosteum of the prominent ridge. Dynamic examination confirmed smooth gliding of involved tendons without recurrent stenosis, subluxation or triggering (figure 3).

Figure 2 Intraoperative assessment after first dorsal compartment release revealed a large hourglass-shaped nodule within the abductor pollicis longus tendon and volar subluxation over a prominent fibroosseous ridge during passive motion.

The tourniquet was deflated. Haemostasis was obtained. The wound was irrigated with normal saline solution. Skin was reapproximated with 4-0 monofilament non-absorbable suture. A sterile soft bulky thumb spica dressing was applied. The patient was instructed to leave the bandage on for 2 weeks until the first postoperative visit follow-up, at which point the skin sutures were removed and an unrestricted range of motion and strengthening protocol were initiated.

OUTCOME AND FOLLOW-UP

The patient had immediate relief noted during her first postoperative visit 2 weeks after surgery. At 6 months follow-up, the patient's symptoms remained completely resolved. She maintained full wrist and thumb strength and range of motion.

DISCUSSION

In addition to describing an exceedingly unusual presentation of DeQuervain's tenosynovitis, this report serves as an important reminder of several pathoanatomic variants a surgeon may observe within the first dorsal compartment during release. These observations may necessitate technical intraoperative modifications or additions to an otherwise very routine surgical procedure.

Aberrant anatomy within the first dorsal compartment is often blamed for recurrence or persistence of symptoms after corticosteroid injection or surgical release.³ Since the first description of this disease entity by Fritz de Quervain in 1895, anatomic studies have revealed the presence of multiple APL or EPB slips and septums within the first dorsal compartment.⁴⁻⁶ The most

Figure 3 First dorsal compartment tendons after release of the first dorsal compartment and secured under a loose retinacular slip.

Figure 4 Artistic representation of the retinacular slip creation to address tendon subluxation.

common anatomical configuration includes two APL tendons distally inserting onto the first metacarpal base and a separate compartment for the EPB.⁷ As many as six APL slips have been reported with insertions varying between the first metacarpal, trapezium, carpometacarpal joint and within the opponens pollicis.^{7,8} Failure to inject or completely release these anatomical additions can lead to treatment failure. In our case, the initial injection likely failed to relieve any symptoms due to both the altered anatomy and severe stenosis. Excision of the supernumerary APL, as we performed in this case, has been described and likely helped limit postoperative irritation to the nodular portion of the primary APL tendon.⁹

An uncommon complication described only after surgical release is postoperative subluxation of the tendons (volar or dorsal) after either too much volar release of the first dorsal compartment or complete retinacular excision.^{10,11} Subluxation occurs over a prominent fibroosseous ridge or the radial styloid. If symptomatic, surgical solutions include radial ridge excision, creation of a brachioradialis flap or tendinous routing within a retinacular sling.^{12–14} Our case was unique because we believe the intraoperative APL subluxation observed after release was due to the reactively enlarged APL from severe stenosis and triggering combined with the prominence of the volar fibroosseous ridge. We addressed this concern by creating a retinacular slip (figure 4).

Lastly, the differential diagnosis initially included a trigger thumb because the patient stated her thumb was ‘locking’. However, locking occurred in extension rather than flexion. Triggering of the thumb in extension has been reported to have a rare prevalence less than 1.3%.¹⁵ Among the few reported cases that exist, approximately half report the presence of a nodule in at least one of the first dorsal compartment tendons and only two cases trace symptoms directly to the APL in isolation.^{15–18} Interestingly, none of those cases report intraoperative reproduction of triggering, as was the case in our patient. We believe that triggering is due to dynamic proximal muscular pull that is unlikely to be recreated unless the patient is awake enough to adequately contract the EPB and/or APL muscle. Lastly, none of the reported cases of first dorsal compartment triggering described intraoperative subluxation after release, as such a complication is also exceedingly rare.

Despite the emphasis this manuscript places on surgical technique, the authors would like to stress that non-operative measures should always be considered and attempted prior to surgical intervention. Surprisingly, there are limited prospective studies available to strictly guide treatment algorithms

and non-operative options are numerous. Rest, non-steroidal anti-inflammatory medication (NSAIDs), brief periods of immobilisation and corticosteroid injections are the most common non-operative measures employed.¹⁹ In addition, an occupational therapist can enhance adaptive positioning, fabricate splints and modify work-related techniques associated with repetitive stress to the first dorsal compartment (ie, typing, lifting, vacuuming or fine motor tasks).²⁰ Commonly employed physiotherapy techniques have also been described and include iontophoresis to reduce the burden of excessive NSAID intake, therapeutic ultrasound, soft-tissue massage and tendon gliding exercises.^{21–24} These techniques have been described as useful for upper extremity tendinopathies, but their specific effects on DeQuervain’s tenosynovitis have not been studied in isolation. Lastly, Hadianfar *et al* conducted a small randomised trial and concluded that five sessions of acupuncture may yield better short-term functional outcomes than a single corticosteroid injection.²⁵

In general, concluding that non-surgical management has failed depends on: (1) a patient’s response to evidence-based conservative treatments (ie, immobilisation and corticosteroid injections), and (2) the potential risk versus benefit of continued conservative measures. Level V recommendations by experts in the field suggest that proceeding with surgical intervention after failure of one corticosteroid injection and a trial of immobilisation is appropriate in certain patients with moderate to severe symptoms.^{1,26} Most of the available evidence regarding treatment of DeQuervain’s tenosynovitis concludes that at least one steroid injection preferentially alters the natural history of DeQuervain’s tenosynovitis, with success rates between 62% and 93%.^{27,28} Splinting in combination with injection has a controversial (and possibly lower) success rate.^{29,30} The duration after which one should wait for a positive response has not been widely studied. Furthermore, there are no studies specifically describing the utility of a repeat injection. Lastly, patients with ‘moderate’ to ‘severe’ symptoms (as opposed to ‘mild’ symptoms) or an additional EPB compartment are significantly more likely to need surgery before reporting long-term symptom relief.^{28,31} With respect to our patient, we only considered early surgical intervention given this patient’s risk factors associated failure of conservative treatment (ie, poor response to injection, extension triggering and in hindsight an additional EPB compartment) and also the degree to which this pain was affecting the patient’s quality of life.

Learning points

- ▶ A detailed understanding of potentially aberrant pathoanatomy within the first dorsal compartment is required to diagnose and treat challenging atypical presentations of DeQuervain’s tenosynovitis.
- ▶ Locking or triggering of the thumb in extension is an exceedingly rare presentation associated with DeQuervain’s tenosynovitis that may lead to clinical confusion given that the differential diagnosis includes trigger thumb (which is an extremely common entity seen by most orthopaedic surgeons).
- ▶ Subluxation of tendons within the first dorsal compartment after surgical release of the first dorsal compartment can lead to persistent symptoms if not appropriately addressed during surgical assessment.

Contributors DAG and HA were equally involved in this patient's care. DAG, HA and JJT were collectively influential in the idea formulation for this manuscript. DAG drafted the manuscript. HA and JJT edited and approved the final manuscript (and revisions).

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