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CASE REPORT

Release of the A1 Pulley for Trigger Finger Complicated by Flexor Tenosynovitis

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Introduction

Trigger finger is one of the most common conditions presenting to hand surgeons today. Believed to be caused by inflammation and subsequent narrowing of the A1 pulley, patients with trigger finger often present with pain associated with clicking, catching, and loss of motion of the affected finger [1]. The incidence of primary trigger finger has been reported at between 2 and 3 % [1–3]. Although it can occur in anyone, it is seen more frequently in the diabetic population and in women, typically between the ages of 50 and 60-years old [1, 4]. The diagnosis is usually made in a straightforward manner by history and physical, however, other pathological processes such as fracture, or tumor should be excluded first. The mainstays of treatment are surgical release and more recently, corticosteroid injection [1, 4, 5].

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Most authors have reported success rates of between 60 and 100 % for the surgical release of the A1 pulley [4, 6, 7]. Complications associated with the surgical treatment have also been well described. In the largest series to date of approximately 1600 patients, Ring and colleagues concluded an overall complication rate of 5 % (84 operated digits) [4]. The most common adverse events were slow recovery of motion, wound problems and persistent postoperative triggering [4]. Interestingly, infections were among the least common postoperative complications in this cohort (2 %) and no deep space infections, such as those extending into the flexor tendon sheath, were reported [4]. Other series have also demonstrated similar results. Will and colleagues reported only four instances of wound erythema or infection out of 78 trigger fingers released (5 %) [8]. All of these infections were superficial; not a single patient required drainage of the infection [8].

Flexor tenosynovitis is an infection of synovial sheath that surrounds the flexor tendon. It is often caused by penetrating trauma but can also result from the direct spread of continuous infections like a felon or septic joint [9, 10]. Gram positive organisms, like Staphylococcus, are the most the most commonly implicated infectious agent but infections caused by gram negative organisms are also known to occur in patients with a history of diabetes, IV drug abuse, or animal bites [9, 10]. In general, flexor tenosynovitis is a rare entity and to date has not been reported to be caused by release of a trigger finger. This manuscript presents the first case of a patient who developed flexor tenosynovitis, which required return to the operating room for drainage, as a complication of an A1 pulley release for trigger finger.

Case Report

The patient is a 58-year-old woman who presented to our institution with swelling pain and erythema of the middle finger of the right hand. Over the prior 48 h, she had noticed

progressive pain and erythema, on the volar aspect of her middle finger, starting at the base of the digit, extending proximally to the wrist as well as distally to the tip. She reported pain with extension of the middle finger and inability to flex the metacarpophalangeal (MCP), proximal interphalangeal (PIP) and distal interphalangeal (DIP) joints of her middle finger. On presentation, she denied any fevers but reported chills. Her medical history is remarkable for a release of the A1 pulley of the right middle finger 10 days prior for trigger finger. Of note, she had a local steroid injection into the finger at the time of her surgical release of the trigger finger. Her past medical history is otherwise significant for hypertension, uterine fibroids, mitral valve prolapse, and depression. She denied a history of smoking, diabetes, had no known allergies and was taking minimal medications: Simvastatin, Lisinopril, Sertraline and Bupropion.

She was initially evaluated at an outside hospital where IV Cefazolin was started before transfer. On examination in the emergency room, the patient was noted to be afebrile and hemodynamically stable. Her right hand exam was notable for an intact Flexor Digitorum Superficialis (FDS) and Flexor Digitorum Profundus (FDP) to all digits, as well as intact Flexor Pollicus Longus (FPL) and Extensor Pollicus Longus (EPL). Fusiform swelling was noted over the right middle finger starting at the base and extending to the tip (Fig. 1). She reported pain upon passive stretch of the right middle finger and grossly normal sensation, although somewhat diminished compared to the other fingers. Her previous incision was intact with some induration appreciated. She had normal range of motion of the wrist and no pain or tenderness on the volar flexor mass. Laboratory studies were unremarkable except for an elevated WBC count at $12\times10^3/\mu L$ and a CRP of 27 mg/L. X-rays of the hand in three views and were unremarkable (Fig. 2) Based on the clinical picture, a diagnosis of flexor tenosynovitis was established and the patient was taken urgently to the operating room for exploration and washout of the right middle finger.

An axillary block was performed and the original volar A1 pulley release incision was opened and immediately upon opening the skin copious purulent drainage was encountered (Fig. 3). Cultures were taken and dissection was carried through to the flexor sheath, where further purulence was encountered. The FDS and FDP tendons were identified and noted to be intact. Dissection of the sheath was performed proximally until no further purulence was encountered. A mid-lateral incision on the ulnar distal border of the finger was then made and dissection was carried down to the FDP tendon. Again purulence was encountered and an 18-gauge IV catheter was then inserted into the flexor sheath to irrigate its entire length (Fig. 4). A Penrose was placed in the proximal incision prior to closure.

Postoperatively, the patient remained in the hospital for 3 days for observation. Intraoperative cultures demonstrated Methicillin Sensitive Staphylococcus Aureus (MSSA). She did not have any purulent drainage from the incisions and had improvement in pain, erythema and swelling. Her drain was removed prior to discharge and she was sent home with a 10 day course of Trimethoprim/Sulfamethoxazole and Amoxicillin/Clavulanic acid. She has had no evidence of recurrence and no wound breakdown at 6 months postoperatively.

Discussion

Flexor tenosynovitis is most commonly seen after traumatic inoculation of the flexor tendon sheath with a pathogenic bacterium [9, 10]. The disease was popularized by Kanavel in 1944, when he popularized its hallmark four physical exam findings, now referred to as Kanavel's Signs: fusiform

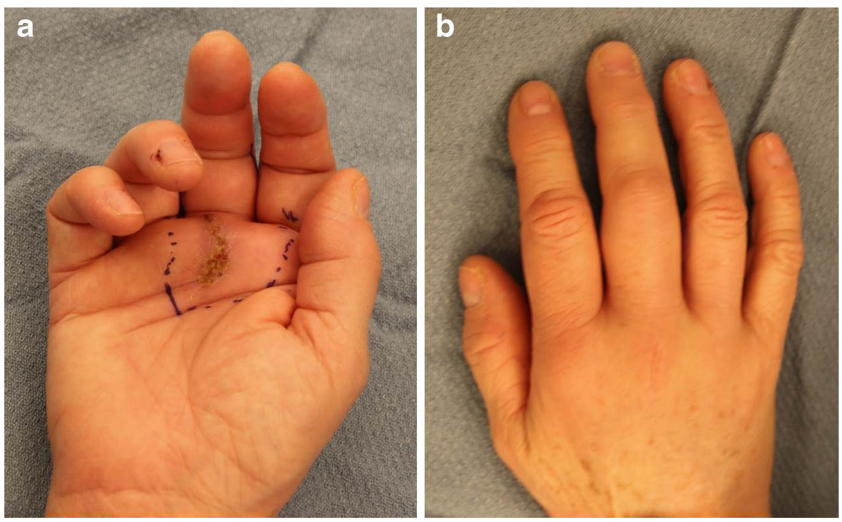

Fig. 1 **a** Volar and **b** dorsal appearance of the hand upon presentation

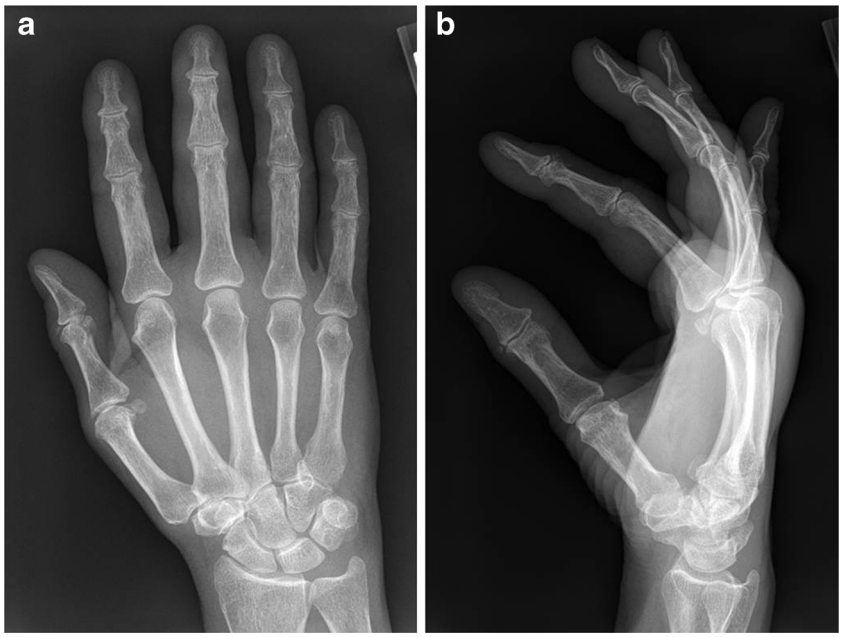

Fig. 2 **a** Anteroposterior and **b** lateral radiographs at the time of presentation

swelling of the digit, tenderness along the flexor tendon sheath, pain with passive extension of the finger and a digit with a semi-flexed posture [11]. The patient in this case presented with several Kanavel signs prompting the clinical diagnosis of flexor tenosynovitis, with the likely inoculation occurring at the time of her previous surgery. In this manuscript we present a previously unreported case of flexor tenosynovitis which resulted from an open release of the A1 pulley for trigger finger. Accordingly, all large series of patients undergoing trigger finger release have reported a low incidence of infection and none has reported any deep space infections, like flexor tenosynovitis [4, 8]. In these large series, the rates of superficial wound infections ranged from 2 to 5 % [4, 8].

Recently, many surgeons have adopted the practice of treating trigger finger with local steroid injections, with success rates ranging up to 80 % [5, 12]. Additionally, these studies have not reported significant complications such as infections, to be associated with these injections, even with diabetic patients [5, 12]. When used as a singular form of therapy, infections can occur as a result of a violation in sterile technique resulting in the inoculation of skin flora into the tendon sheath at the time of treatment. In this case, the patient underwent a simultaneous steroid injection at the time of her procedure. The local immunosuppressive effects of the steroids likely blunted the patient's immune response, allowing for the subclinical development of an infection tracking along the tendon sheath.

Additionally, the concurrent steroid injection at the time of surgery not only placed the patient at a higher risk to develop an infection but also was the likely cause for her delay ion presentation on postoperative day ten. Typically infectious flexor tenosynovitis will develop in several hours to days after a traumatic inoculum; contrasted to the one and a half weeks it took for this patient to develop symptoms.

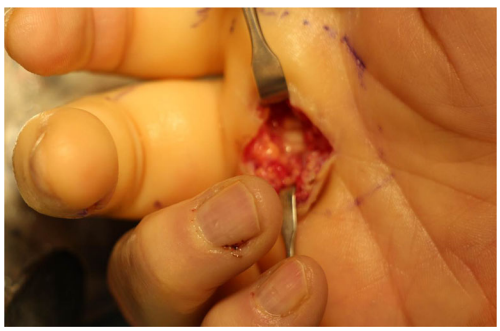

Fig. 3 Gross purulence encountered upon opening the original incision line and dissection to the flexor tendon sheath

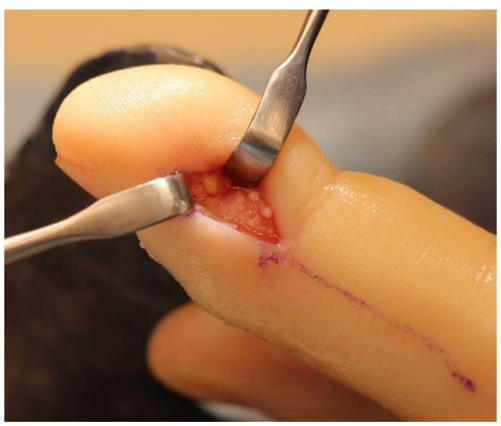

Fig. 4 Purulence encountered again more distally at the tip of the finger at the flexor tendon sheath

As illustrated by this case, the definitive management of flexor tenosynovitis is prompt operative exploration. The other key tenets of management include empiric broad-spectrum intravenous antibiotics, repeated debridement, if necessary, and delayed closure. The patient in this case demonstrated a classic presentation of flexor tenosynovitis, which was confirmed in the operating room on re-exploration, with an extremely unusual time course and source of inoculation. To our knowledge, despite numerous large studies evaluating the treatment and complications of trigger finger, there have been no reports of infectious flexor tenosynovitis caused by an open release of the A1 pulley. In this case, early debridement, combined with appropriate antibiotics, helped to eradicate her infection and the patient did well, not demonstrating any evidence of recurrent infection.

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