Case report

A rare case of communicating infection in the hand: The horseshoe abscess

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1. Introduction

Hand infections are a common problem presenting to the emergency department and the on-call hand surgeon. Occasionally, conservative measures such as elevation, intravenous antibiotics and physiotherapy result in resolution. In the presence of penetrating trauma, significant contamination or when a collection is suspected, surgical exploration and drainage are essential. When bacteria gain access to the flexor tendon sheath, rapidly evolving infection can occur. Without prompt recognition and drainage, irreparable damage and long-term functional impairment can result. The sheaths of the thumb and little fingers extend more proximally than those of the index, middle and ring fingers and may communicate with the radial and ulnar bursa respectively. In a proportion of the population, the radial and ulnar bursa can communicate at the level of the wrist. Tendon sheath infections originating in the little finger or thumb can follow this communicating pathway resulting in the rare horseshoe abscess. A female patient who developed such an abscess is presented. By discussing the patho-anatomy behind this rare presentation, we highlight the importance of prompt diagnosis and surgical drainage.

2. Case report

A 50-year-old unemployed, right hand dominant woman was seen in the emergency department with worsening pain and swelling in the left thumb. Three days previously she sustained a small penetrating wound over the volar aspect of the interphalangeal joint whilst trying to remove the head of a mop with a kitchen knife. She suffered from hypertension but was otherwise fit and well. Apart from anti-hypertensives, she took no regular medication, had no known allergies and was up to date with tetanus immunisation. She smoked 20 cigarettes per day.

On examination all fingers and thumb were perfused. There was some paraesthesia at the tip of the thumb but all other fingers had normal sensation. A small 5 mm incised wound was situated over the interphalangeal crease. The thumb was diffusely swollen, erythematous and shiny (Fig. 1). Swelling and erythema extended proximally into the thenar eminence and towards the distal wrist crease. The little finger was also diffusely swollen, erythematous and shiny. There was no evidence of any penetrating injury over the little finger. Palpating down the flexor sheath of the thumb and little finger caused the patient great discomfort, as did any attempts at passive extension. The index, middle and ring fingers were unaffected. There was no evidence of any tenderness over the mid-palm or distal forearm. Palpable lymph nodes were identified in the left axilla. Systemic features of infection including sweats, shivers, nausea and vomiting were present. The patient was pyrexial at 38 °C and blood analysis confirmed elevated inflammatory markers. X-ray of the left hand confirmed no foreign body or bony injury. The patient was quickly admitted for arm elevation, empirical IV antibiotics and urgent surgical drainage.

The tendon sheaths of the thumb and little finger were exposed with Brunner-style incisions. These incisions were extended into the palm and were connected over the region of the superficial palmar arch before extending proximally into the distal forearm (Fig. 2). Pus was evident in both thumb and little finger sheaths. Necrotic fat was found adjacent to the sheaths. The neurovascular bundles were intact. Turbid fluid extended into the palm and wrist

Fig. 1. Pre-operative photograph of right hand. Note the puncture wound at the interphalangeal crease of the thumb and the swelling and erythema surrounding the thumb and little finger.
although no frank pus found at this level. Unfortunately all theatre visits occurred out-of-hours and therefore intra-operative medical photography was not available. Multiple samples of tissue and fluid were sent for microbiology. The soft tissues and tendon sheaths were thoroughly irrigated and the wounds were left open. The patient required 2 further visits to theatre before local signs of infection began to subside. Microbiology confirmed the presence of group B streptococcus and the patient completed 1 week of IV antibiotics. Regular physiotherapy was performed to optimise function and the patient was discharged after 10 days in hospital. At a recent hand clinic visit her hand is free from infection. Her function is improving although she is still unable to make a fist.

3. Discussion

The flexor tendon sheath of the finger is a synovial-lined fibrous tunnel composed of visceral and parietal elements and extends from the level of the metacarpal neck to the distal interphalangeal joint. Within the sheath the tendon is bathed in synovial fluid. This fluid provides an important source of nutrition and lubrication, allowing the tendons to glide through the sheath. The flexor tendon pulleys are a series of fibrous condensations found along the sheath and serve to optimise mechanical efficiency during tendon excursion. The proximal end of the thumb flexor sheath becomes confluent with the radial bursa in the vast majority of patients. The bursa extends proximally with the flexor pollicis longus tendon to a point 1–2 cm proximal to the proximal edge of the transverse carpal ligament. Likewise, the proximal end of the little finger sheath often communicates with the ulnar bursa although this is thought to occur less frequently than the communication in the thumb. Moving proximally, the ulnar bursa widens radially, enveloping the shaft of the fourth metacarpal and the base of the third metacarpal (Fig. 3). Paron's space is a potential space located at the level of the distal forearm lying between the flexor digitorum profundus tendons and the pronator quadratus fascia. It is at this point where the radial and ulnar bursa can communicate (Fig. 3). Anatomical studies have found the presence of this communication in 33–100% of patients. These studies have also shown that in a significant proportion of hands, communications can exist between the index, middle and ring finger flexor tendon sheaths and the ulnar bursa. It is apparent that there is considerable variation in the communicating pathways within the flexor tendon sheaths of the fingers.

These findings have important implications when diagnosing and treating a patient with a flexor sheath infection. Penetrating injury was the inciting event in this case and is the most common cause of flexor tendon sheath infection. Haematogenous seeding of organisms can occur in the absence of penetrating injury although this is much less common. The lag time between tissue inoculation and the declaration of symptoms varies depending on the structures involved. Although our patient presented three days following injury, infective symptoms in her right thumb were apparent less than 24 h following the incident and is consistent with infection in the tendon sheath.

Kanavel described four signs supporting the diagnosis of flexor sheath infection: affected finger held in flexion; pain palpat ing along the tendon sheath; pain on passive extension; a diffusely swollen finger. There has been debate over which of these signs most accurately predicts the presence of pus within the tendon sheath although many feel that pain on palpating down the sheath and pain on passive extension of the finger are the most reliable. All four Kanavel signs were obvious in this case as was the need for surgical drainage. However, in some patients, particularly those who are diabetic or immunocompromised, eliciting these signs and deciding if the patient needs to go to theatre can be more challenging.

Following inoculation of the tendon sheath with bacteria, the viscous, proteinaceous synovial fluid provides a suitable culture medium for their proliferation. Due to the poor vascularity of the sheath, the host immune system is unable to eradicate the infection. Rapidly multiplying bacteria and the associated swelling and oedema leads to an increase in pressure within the sheath. If the sheath is not decompressed, eventually a point is reached where the intra-sheath pressure exceeds perfusion pressure. This leads to ischaemia and ultimately necrosis of the tendon. In addition to compromised vascularity, proliferating bacteria produce noxious proteolytic enzymes that degrade the delicate structures of the finger. Without prompt surgical drainage, the synovial-lined tendon, synovial joints and phalanges are all at risk. In severe episodes, amputation is the only option.

This sequence of events is often different in the thumb and little fingers due to the communication between the tendon sheaths and the radial and ulnar bursa respectively. In addition, swelling extending into the thenar and hypothenar space and
the accumulation of pus is often absent as the bursae tend to auto-decompress into Paronos space. It is in these situations when the horseshoe abscess can occur. We found no evidence of frank pus in Paronos space although the presentation and clinical findings were highly suggestive of a communication between the radial and ulnar bursa. Although the horseshoe abscess is described in well-known hand surgery textbooks, there appears to be a lack of documented cases in the literature.\(^7\)

We have described a rare case of a horseshoe abscess in a female patient. By discussing the underlying anatomy of the flexor tendon sheaths, the radial and ulnar bursa and the potential communications that can exist between them, we hope to raise awareness of this presentation.

References