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CASE REPORT

Extrusion of bone anchor suture following flexor digitorum profundus tendon avulsion injury repair

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KEYWORDS

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Summary Flexor digitorum profundus (FDP) zone I tendon avulsion injury is traditionally repaired with a pullout suture technique. More recently, bone anchor sutures have been used as a viable alternative and have largely replaced areas in hand surgery where pullout suture technique was once required. To date, there have been very few complications reported related to bone anchor suture use in FDP tendon reattachment to the bone. We report a very unusual case of extrusion of bone anchor through the nailbed, 6 years after zone I FDP tendon avulsion injury repair and a brief review of literature.

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Introduction

Flexor digitorum profundus (FDP) zone I tendon avulsion is a common injury, traditionally repaired using a pullout suture technique to reattach and secure the tendon substance to the bone.¹ However, this technique has fallen out of favour due to high level of complications associated with it.^{2–4} More recently, bone anchor sutures have been used as a viable alternative for reattachment of tendon to bone and have largely replaced areas in hand surgery where pullout suture technique was once required.^{5,6} To date, there have been very few complications reported in the literature of the use of bone anchor suture in zone I FDP

tendon avulsion injury repair. We report a very unusual case of extrusion of bone anchor through the nailbed 6 years after zone I FDP avulsion injury repair.

Case

A 26 year old, right-handed construction worker presented to our service with a one-year history of intermittent pain in the left index finger. The pain was worse in cold weather with the nailbed the most severely affected. He had a split nail for 2 months. His background history revealed that he had insertion of Statak[®] bone anchor suture into his distal phalanx of his left index finger following zone I FDP tendon avulsion injury 6 years previously.

On examination, a split nail with increased transverse curvature was noted (Figure 1a). The bone anchor was just visible underneath the split nail. There was a cutaneous

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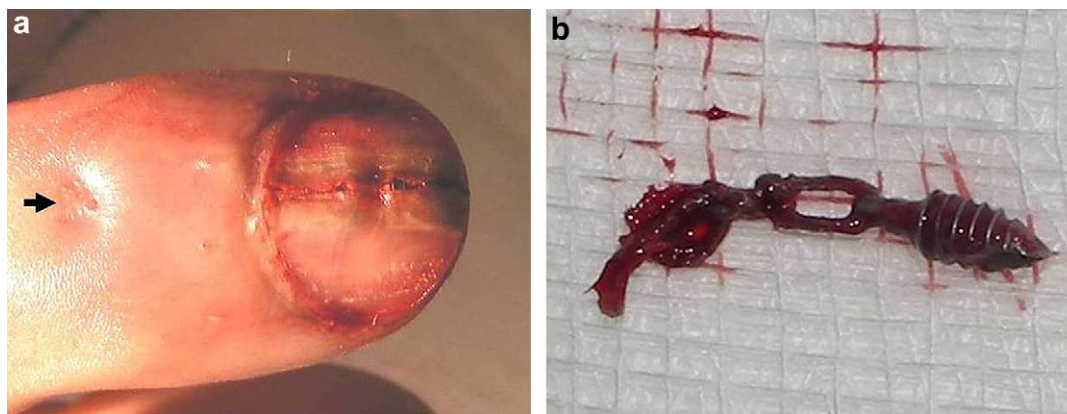


Figure 1 (a) Splitting of the nail as a result of the extruded bone anchor. Note the cutaneous pitting as illustrated by the black arrow. (b) Statak[®] bone anchor with screw configuration after removal from the nailbed.

pitting over the skin crease on the dorsal aspect of his distal interphalangeal joint (DIPJ), just proximal to the nailfold. He had a functional FDP tendon with range of movement of DIPJ at 5–55°.

At surgery, the Statak[®] bone anchor was noted to protrude through the nailbed beneath the nail. The screw bone anchor was removed uneventfully (Figure 1b). Figure 2a showed the defect through which the bone anchor suture was extruded. The patient retained pre-operative FDP function post-operatively. At 6 months follow up, his nail appearance has improved significantly (Figure 2b).

Discussion

There have been many techniques proposed to repair zone I avulsion injury of FDP tendon.² The most widely used technique has been the pullout suture technique to reattach and secure the tendon substance to the bone.¹ This technique involves the creation of fibroosseous tunnels in the distal phalanx in the direction of volar proximal to dorsal distal direction, and the passage of sutures through

these tunnels which are tied over the nail plate on a 'button'. However, this technique is declining in popularity due to complications associated with it including local wound irritation, nail deformities and skin necrosis, pain from the button, tracking infection, snagging of the button and rupture of repair, inconvenience to the patient, difficulty with hygiene, and obstructive during mobilisation exercises.^{2–4}

Bone anchor suture technique has been widely advocated for hand surgery where there is a need to anchor soft tissue to the bone.¹ The use of bone anchor suture for FDP avulsion injury repair involves less traumatic surgery and allows secure tendon-to-bone reattachment with early mobilisation and earlier patient return to work.⁶ Studies have shown the use of bone anchor sutures result in an equal or superior tendon to bone repair compared to the pullout suture technique.^{5,6}

The design of the anchor can be broadly divided into screw or non-screw configurations. The non-screw anchor typically has a titanium cylinder which deploys two barbs upon penetration of bony cortex. In situations where the

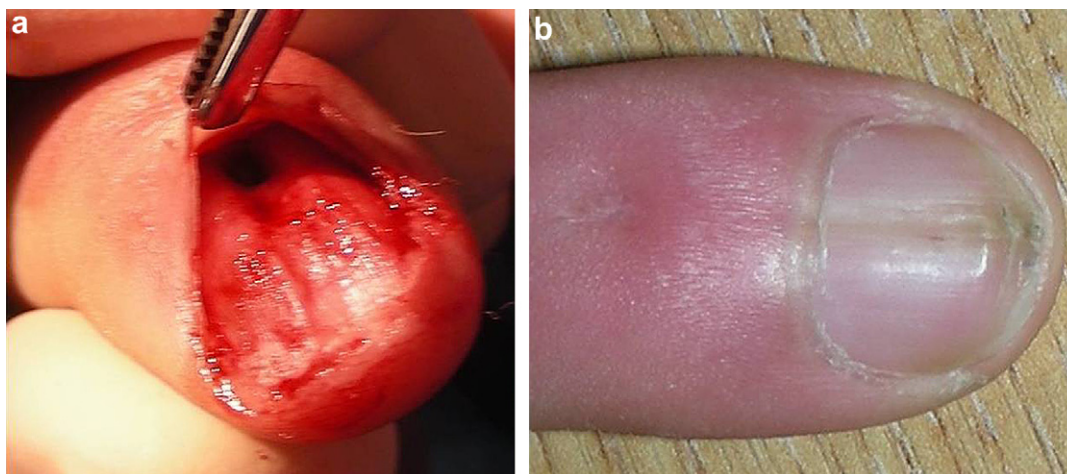


Figure 2 (a) Defect over the proximal nailbed underneath the nailfold. (b) Normal nail growth 6 months after removal of bone anchor suture.

intramedullary cavity is not suitable for the barbed bone anchor, the screw anchor design allows solid fixation in cortical bone. Barber et al showed comparable strength and failure for either type of anchor designs.⁷ However, unlike button pullout suture technique, bone anchors can only be used in Leddy and Packer Type I and II FDP avulsion injury due to the inadequacy of bony purchase when there is a sizeable bone fragment avulsed.^{1,3}

There have been few complications reported with the use of bone anchor for zone I FDP tendon avulsion injury apart from occasional infection from the implantation of a foreign body using this technique, malalignment of anchor, and anchor/bone size mismatches.³ Recently, Giannikas et al reported problem with a recurrent ulcer on the palmar side of the distal phalanx of the index finger, 12 months after Mitek[®] mini bone anchor was used to repair zone I FDP injury.⁴ Their X-ray showed dorsal migration of the Mitek[®] anchor and osteolysis of the surrounding bone. The authors attributed this to a foreign body reaction to the non-absorbable Mitek[®] anchor suture causing granulomatosis and surrounding osteolysis. Although no radiograph was taken on our patient because of lack of clinical suspicion of osteomyelitis, on hindsight, such possibility should be born in ones mind and a radiograph to examine the state of the bone will be advantages.

As a long-term complication of Statak[®] bone anchor suture, we described a case of spontaneous extrusion of bone anchor through the nailbed 6 years after the initial uneventful insertion for repair of zone I FDP tendon avulsion injury. The insertion of either screw or non-screw bone anchor devices are usually simple if carried out according to the manufacturer's guidelines. However, care needs to be taken to avoid unnecessary complications. In our case, during the initial surgery, it is likely that the distal cortex of the distal phalanx was breached. This is supported by the observation of cutaneous pitting over the dorsal skin creases overlying the DIPJ. The protrusion of the tip of Statak[®] anchor irritated the subcutaneous tissue resulting in subcutaneous tissue scarring and pitting. Over the course of 6 years, this allowed the migration of the bone anchor through the distal cortex of the distal phalanx, which extruded out over the nailbed.

Particular care should be taken during insertion of bone anchor suture to avoid penetration of nail matrix, distal cortex or DIPJ surface.^{5,8} Complications are more likely in the little finger, especially in small hands, due to its smaller distal phalanx.⁸ Schreuder et al showed that regardless of the angle of bone anchor insertion, the load of failure was the same among antegrade, perpendicular or retrograde anchor orientations.¹ It is therefore legitimate to orientate the angle of insertion of bone anchor suture to avoid

encroaching into unwanted spaces. It is also critical to select an anchor of the appropriate size, which may be done pre-operatively, by using an accurately sized radiograph. The Statak[®] bone anchor suture that was used in our case was not intended for such purpose by the manufacturer, and was likely too large for tendon re-insertion on this location.⁹

In conclusion, bone anchor sutures have been widely used for zone I FDP tendon avulsion injury repair but the proper type and size bone anchors should be used to lessen the possibility of long-term unwanted effects.

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Conflict of interest

None.

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