CASE REPORT

Rupture of the extensor hood of the fifth toe: a rare injury

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SUMMARY

Closed injuries of the extensor hood of the lesser toes are rare and seldom reported in the literature. We present the case of a woman aged 25 years who presented to the orthopaedic fracture clinic with a 2-week history of pain in the left fifth toe and inability to extend following a ballet dancing session. Investigations showed no fracture on plain radiographs, but an ultrasound scan demonstrated rupture to the extensor hood of the little toe. Successful surgical repair of the extensor hood was performed, and the patient made a good recovery with return to dancing activities.

BACKGROUND

Extensor hood rupture in the foot is a rare injury; most reported cases involve lacerations of the extensor hallucis longus tendon,^{1–4} whereas lesser toes injuries are seldom mentioned. Extensor hood rupture in the hand is much more common and a lot is known about this injury. We report the case of a professional dancer with rupture of the extensor hood of the little toe, which was successfully treated by surgical repair.

The extensor apparatus of the lesser toes is complex, and its function is crucial to obtaining a balance between extension and flexion mechanisms, as imbalances lead to deformities that can have severe impact on toe function. This has implication, particularly for patients whose profession requires them to have fine control of foot movements, such as in dancers.

We discuss the importance of correct diagnosis, appropriate investigation and management of injuries to the extensor apparatus to avoid loss of function, deformity and to enable patients to maintain their quality of life.

CASE PRESENTATION

A woman aged 25 years presented with a 2-week history of pain in the left little toe and inability to actively extend the toe after a ballet dancing session. The patient reported that after the ballet session, swelling and bruising were present, difficulty with movement, pain worse when standing and generalised discomfort in her left little toe. Prior to this event, there were no symptoms or injuries related to the little toe. No other associated or systemic symptoms were present. The patient was otherwise unwell with unremarkable medical history.

On physical examination, an old graze was seen on the dorsum of the left little toe; however, there was no swelling or obvious deformity around the left little toe and foot. On palpation, mild

tenderness was present over the metatarsophalangeal joint (MTPJ). The loss of active extension of the little toe MCPJ was observed; little toe flexion and extension at the other toes' MCPJs were maintained, and other active foot joint movements were normal. These clinical findings suggested damage to the extensor tendon mechanism of the fifth toe.

INVESTIGATIONS

Plain radiographs of the left foot showed no fracture or deformation of the toe. The injury was investigated further with an ultrasound scan, which showed hypoechogenicity around medial aspect of the extensor expansion at the fifth MTPJ, suggesting extensor hood injury (figure 1). The extensor digitorum tendon slip to the fifth distal phalanx was intact (figure 2). Following discussion with the patient regarding surgical and non-surgical management options, a decision was made to proceed with surgical exploration and repair of the extensor mechanism.

Figure 1 Axial image at the fifth metatarsophalangeal joint shows tendon in cross-section with surrounding hypoechoic area on the medial aspect of the extensor hood in keeping with its injury. The arrows demonstrate the extensor tendon in the axial plane.

Figure 2 Sagittal image at the fifth metatarsophalangeal joint (MTPJ) demonstrates linear intact extensor tendon superficial to the MTPJ.

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TREATMENT

At operation, the left fifth toe's extensor tendon was exposed and found to be intact; however, a 1.5 cm defect in the medial aspect of the extensor hood was observed. A mini Mitek anchor was placed on the proximal phalanx through the defect, and it was ligated to the proximal portion of the extensor hood. The extensor tendon was also shortened using Z-plasty, and satisfactory alignment of the little toe was achieved. Postoperatively, dressing was applied and steri-strips were used to keep the toe in an extended position.

OUTCOME AND FOLLOW-UP

At 3 weeks postoperatively, the scar was healing well, the pain was settling and the alignment of the toe was satisfactory at rest; sutures were cut and the patient was encouraged to start mobilising the toe freely but to avoid sports and tiptoeing.

At 6 weeks postoperatively, there was evidence of little toe extension, although a partial lag was still present.

At 10 weeks postoperatively, the patient was able to lift her left little toe off the ground, which allowed her to start dancing again.

A final review at 5 months postoperatively confirmed a positive outcome; although there was persisting partial extensor lag in the fifth toe this caused no symptoms to the patient, she was able to dance again professionally without the little toe getting caught and impacting on her performance.

DISCUSSION

Lacerations of the extensor tendon mechanism of the toes can be devastating for professional dancer. Stability and strength of the forefoot musculature is necessary to maintain balance, go on tiptoes, land from jumps and perform turns. Although integrity of the hallux musculature is often considered the most important mechanism, the other toes are also crucial components affecting balance when walking and stability of the foot.⁵

First, it is important to highlight the complexity of the extensor mechanism of the lesser toes, which was first described by Sarrafian and Topouzian.⁶ Extension is achieved by the coordinated action of muscles and tendons extrinsic, namely the extensor digitorum longus (EDL), and intrinsic, extensor digitorum brevis (EDB), lumbricals and interossei. Additionally, stability is conferred by the extensor sling, extensor wing and triangular lamina; together, they form the fibroaponeurosis called extensor hood, which covers the dorsal and lateral aspects of the MTPJ and proximal interphalangeal joint (PIPJ). The EDL tendon crosses the MTPJ and PIPJ, then branches into three slings, one central and two collaterals, over the dorsum of the proximal phalanx of the lesser toes. The central slip inserts into the dorsum of the middle phalanx, whereas the collateral slips insert into the distal phalanges.

It is important to note that EDB is absent in the fifth toe, leaving EDL predominantly responsible for extension.⁷ This is particularly relevant to our case as the injury affected the extensor hood of the fifth toe; damage of EDL tendon in the second, third and fourth lesser toes is often compensated by the action of EDB tendon and therefore does not lead to significant loss of function; however, this compensation is not possible for the little toe.

As previously mentioned, the literature on rupture of the extensor hood rupture of the lesser toes is scarce, and no case has been reported about fifth toe extensor hood injury; leaving uncertainty regarding the line of treatment. Surgical repair or reconstruction is the first-line treatment for injuries involving major tendons;

however, studies showed that even seemingly minor tendons and associated structures can be repaired. The literature looking at the management of extensor hood rupture in the hand showed that surgical repair offers a favourable outcome compared with non-operative treatment,^{8–12} and early mobilisation is recommended to avoid scarring and adhesion formation.¹³ A case report by Nicklas *et al*¹⁴ highlighted the importance of extensor hood integrity to maintain extension of the hallux.

When choosing a treatment approach, it is important to assess risks and benefits relevant to the patient. Where there is no established first-line treatment, like in this case, conservative treatment options as well as surgical repair are valid. Conservative treatments often carry fewer risks, and may be preferred by patients if residual function is adequate. This is particularly relevant to dancers and athletes, for whom complications of surgery can have severe implications for their career. However, surgical management can also be considered; this aims to improve function and return to preinjury levels of activity, especially in young, active and comorbidity-free individuals.

In this instance, injury to the extensor hood caused a functional impairment that interfered with the patient's daily and professional activities, and the patient chose the surgical treatment option.

This case highlights the appropriate line of investigation and presents one potential management for extensor hood rupture of the little toe, as this enabled the patient to regain sufficient levels of function to engage in professional dancing activities without experiencing any symptoms due to the injury.

Learning points

- ▶ Extensor hood rupture of the little toe is a rare injury; however, it should be considered as a possible diagnosis in patients presenting with fifth toe pain and where plain radiographs do not show fractures.
- ▶ If suspected as an injury, an ultrasound scan should be performed to confirm or exclude the diagnosis.
- ▶ In this case, active surgical management for extensor hood rupture of the little toe enabled the patient to regain sufficient level of function.
- ▶ There is no established first-line treatment, and conservative and surgical treatments need to be taken into consideration, assessing their risks and benefits as well as patient choice.
- ▶ Surgical intervention carries risks but can be considered as an option in this type of injury, especially where symptoms due to the injury interfere with lifestyle activities.

Contributors All authors contributed to the creation of the manuscript. Specifically, these were the roles: SV is responsible for literature review and gathering evidence, manuscript writing and editing. SG is responsible for interpretation of relevant imaging, manuscript editing. JM is responsible for consultant surgeon who diagnosed and operated on the patient, and identified the case as a rare presentation, manuscript editing.

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