CASE REPORT

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A new surgical technique for traumatic dislocation of posterior tibial tendon with avulsion fracture of medial malleolus

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We introduce a case of traumatic dislocation of the posterior tibial tendon with avulsion fracture of the medial malleolus in a 52-year-old female patient who was treated surgically with periosteal flap and suture anchor fixation. Based in the posteromedial ridge of the distal tibia, a quadrilateral periosteal flap was created and folded over the tendon, followed by fixation on the lateral aspect of the groove by use of multiple suture anchors. Clinical and radiological findings 25 months postoperatively showed well-preserved function of the ankle joint with stable tendon gliding.

Keywords: Periosteal flap; suture anchor; posterior tibial tendon.

Although numerous surgical options have been introduced for traumatic dislocation of the posterior tibial tendon, there is no consensus regarding superiority of any method. Screw fixation has been recently reported for reduction of dislocated tendons in cases where an acute malleolar fracture is found.[1] However, in chronic situations with small fragments in which it is not possible to obtain stable fixation, another treatment option might be necessary.

We report the use of a periosteal flap with multiple suture anchors as a successful tendon stabilization technique for traumatic dislocation of the posterior tibial tendon with concomitant avulsion fracture of the medial malleolus.

Case report

A 52-year-old woman presented to our outpatient clinic with pain and swelling in her left ankle. The patient's right ankle had been injured in a traffic accident 6 weeks prior and diagnosed as comminuted fracture of the distal tibia; this injury was treated by open reduction and internal fixation, followed by weight-bearing with ankle-foot orthosis (AFO) at 6 weeks postoperatively. During the non-weight-bearing (NWB) period, however, the patient complained about intermittent painful swelling around the left medial malleolus, which was aggravated by ambulation. Follow-up radiographs showed a small avulsed fragment under the tip of the left medial malleolus (Figure 1a, b). Marrow edema in the medial malleolus, elevated flexor retinaculum from the periosteum of the distal tibia, and anterior subluxation of the posterior tibial tendon were found by magnetic resonance imaging (MRI) (Figure 1c, d). As the dislocation was traumatic in origin and the diagnosis was delayed, surgical stabilization of the tendon and vigorous rehabilitation of the contralateral side were necessary for restoration of normal ankle function.

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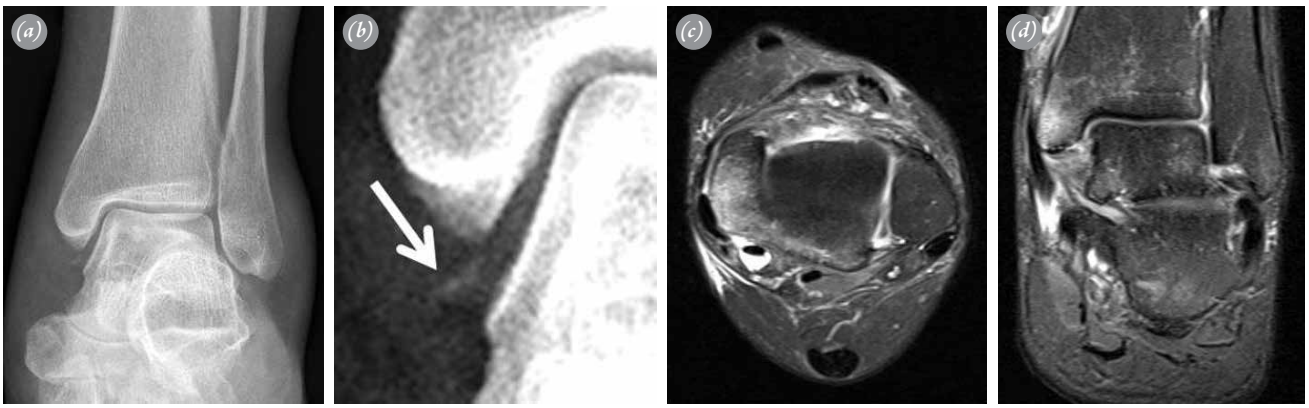

Fig. 1. Plain radiograph 6 weeks after initial injury showed a small avulsed fragment under the tip of **(a)** the left medial malleolus, which was highlighted on **(b)** the right inset. **(c)** T2 axial and **(d)** coronal MRI revealed anteriorly dislocated posterior tibial tendon with detached flexor retinaculum.

With the patient under spinal anesthesia and in the supine position, surgery was undertaken with the inflation of a tourniquet at the proximal thigh. A 6-cm curvilinear incision was made along the posteromedial border of the distal tibia, extending distally toward the tip of the medial malleolus. Intraoperatively, the flexor retinaculum did not appear torn, but it was completely detached from the tibia, making a false pouch over the periosteum (Figure 2a). Following division of the retinaculum parallel with the skin incision, synovial fluid was evacuated, and the anterior dislocated posterior tibial tendon was noted without fraying or rupture. The avulsed bone fragment found in the plain radiograph was corticocancellous bone peeled from the posteromedial aspect tibia, which was extended to the medial ridge of the groove for the posterior tibial tendon (Figure 2b). Due to its age, thin wafer shape, and small size, the fragment was removed. The retromalleolar groove for the posterior tibial tendon appeared intact.

Based in the posteromedial ridge of the distal tibia, a quadrilateral periosteal flap 2 cm in width and 2 cm in height was created (Figure 2c). While the dislocated tendon was relocated into the groove, the flipped periosteal flap was folded over the tendon and extended laterally, as free excursion without impingement was allowed by full range of motion (ROM) of the ankle. The flap was sutured on the tibia by use of 2 suture anchors (2.8 mm titanium, FASTakTM II, Arthrex, Naples, FL, USA). Another suture anchor was placed at the junction of the groove and the posterior edge of the posterior colliculus for additional coverage of the distal part of the tendon, which could not be enclosed by the periosteal flap. Instead, the inferior portion of the incised flexor retinaculum was sutured to the anchor. Before the incision was closed, stability of the reduced tendon was evaluated by ROM of the ankle and verified by smooth gliding inside the groove (Figure 2d). The flexor retinaculum was repaired securely with the vest-over-pants technique.

After 2 weeks of NWB postoperatively, a partial weight-bearing short leg cast was applied with slight ankle inversion and plantar flexion posture. At 6 weeks postoperatively, active ROM exercise was allowed with AFO. Full weight-bearing was possible from 3 months postoperatively. At follow-up 25 months postoperatively, radiographic and ultrasonographic findings showed well-positioned suture anchors as well as the posterior

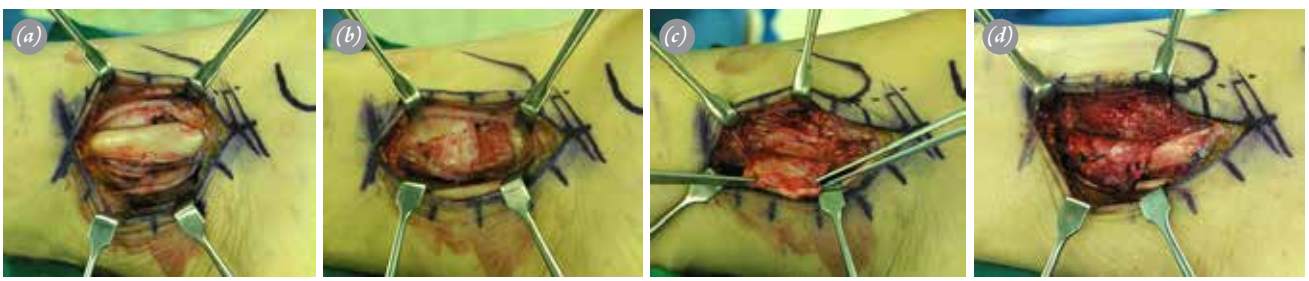

Fig. 2. Intraoperative findings showed anterior displacement of **(a)** posterior tibial tendon and **(b)** tibial bone defect after removal of the avulsed fragment. **(c)** A quadrilateral periosteal flap was developed from the distal tibia; **(d)** Following suture anchor fixation at the inner aspect of the groove, stable tendon relocation was verified before retinacular repair. [Color figures can be viewed in the online issue, which is available at www.aott.org.tr]

Fig. 3. **(a)** Radiographic and **(b)** ultrasonographic findings 25 months postoperatively showed position of anchors and stable tendon placement under the medial malleolus. Comparable motion of **(c)** left ankle joint with contralateral side as well as **(d)** favorable single heel rising was noted. [Color figures can be viewed in the online issue, which is available at www.aott.org.tr]

tibial tendon behind the malleolus (Figure 3a, b). The patient was able to perform almost full ROM of the ankle as well as normal single heel rise test without pain (Figure 3c, d).

Discussion

Traumatic dislocation of the posterior tibial tendon can be difficult to accurately diagnose due to its rarity and similar features with other differential diagnoses such as medial ankle sprain or contusion.[2–6] Pain and swelling around the medial malleolus prevent the surgeon from performing thorough physical examination. Moreover, if there are no abnormal bone findings in plain radiographs, dislocation of the tendon could be easily overlooked. According to a recent systemic review, 53.1% of cases were initially misdiagnosed, and 4.4 months passed before dislocation of the tendon was diagnosed.[7] In this report, it took 6 weeks to detect the tendon problem; we believe that the postoperative NWB period on the contralateral complex ankle fracture might have contributed to the delayed diagnosis.

Dislocated posterior tibial tendon can be treated both conservatively and surgically. To our knowledge, no previous report on the treatment of dislocation of the posterior tibial tendon using periosteal flap with suture anchor has been published to date. Although the use of periosteal flap for reconstruction of the flexor retinaculum has been reported,[8] the fixation method and material differed from our technique. Likewise, the suture anchor has been introduced for fixation of detached retinaculum.[9,10] However, these cases did not have combined medial malleolar fracture, and the anchors were fixed at the anterior ridge of the groove. In our case, anterior-based periosteal flap was employed for reconstruction instead of lax retinaculum, as we judged that the use of dislodged retinaculum could not guarantee stable relocation of the tendon for several reasons. First, the retinaculum had already been injured, and the elongated tissue structure was weakened by the chronic condition. Second, whatever method was used to fix the retinaculum at the anterior aspect of the groove would eventually result in scar healing at the repair site. We thought, however, that the anterior part of the groove would be the strongest barrier, considering the natural tendency of the tendon to subluxate anteriorly; accordingly, taut periosteal tissue based on the intact anterior attachment to the bone could be more suitable for reconstruction than the retinaculum. For these reasons, the suture anchors were placed at the inner aspect of the groove while wrapping the tendon from the anterior to posterior direction. A supplemental suture anchor was fixed at the distal level of the groove, which was estimated to be a very vulnerable area for the tendon to subluxate anteriorly, as we considered this area could make the groove shallower by the lack of bone barrier following the avulsion fracture.

Aside from the employment of an intact structure as the source of reconstruction, this report involves several conceivable limitations. Our technique was not compared with other previous reports using various flaps. In particular, effectiveness according to the harvest area, size, and fixation point of the flap should be investigated by further biomechanical comparative studies. Regarding surgical procedure, careful manipulation is required not to jeopardize the neurovascular structures inside the tarsal tunnel. In addition, though we did not experience this issue, mechanical irritation by the impingement between the knot of the suture anchor and deep flexor tendons might occur in the postoperative period.

In conclusion, by using a periosteal flap with suture anchor fixation for treatment of dislocation of the posterior tibial tendon, we achieved satisfactory clinical and radiological outcomes in a delayed diagnosis case. When the pathology includes both soft tissue and bone lesion, which may be unstable following simple retinacular re-

pair, our surgical procedure may serve as an alternative treatment method for traumatic dislocation of the posterior tibial tendon.

Conflicts of Interest: No conflicts declared.

References

1. Oakley J, Yewlett A, Makwana N. Avulsion fracture of the medial malleolus following posterior tibialis tendon dislocation: a case report. Foot Ankle Surg 2011;17:94–7.
2. Gambhir AK, Kay PR. Traumatic dislocation of tibialis posterior presenting late as a bony spur. Injury 1998;29:401–2.
3. Marcus RE, Goodfellow DB, Pfister ME. The difficult diagnosis of posterior tibialis tendon rupture in sports injuries. Orthopedics 1995;18:715–21.
4. Prato N, Abello E, Martinoli C, Derchi L, Bianchi S. Sonography of posterior tibialis tendon dislocation. J Ultrasound Med 2004;23:701–5.
5. Schweitzer ME, Karasick D. MR imaging of disorders of the posterior tibialis tendon. AJR Am J Roentgenol 2000;175:627–35.
6. Zwipp H, Dahlen C, Amlang M, Rammelt S. Injuries of the tibialis posterior tendon: diagnosis and therapy. [Article in German] Orthopade 2000;29:251–9. [Abstract]
7. Lohrer H, Nauck T. Posterior tibial tendon dislocation: a systematic review of the literature and presentation of a case. Br J Sports Med 2010;44:398–406.
8. Soler RR, Gallart Castany FJ, Riba Ferret J, Garcia Ramiro S. Traumatic dislocation of the tibialis posterior tendon at the ankle level. J Trauma 1986;26:1049–52.
9. Nuccion SL, Hunter DM, Difiori J. Dislocation of the posterior tibial tendon without disruption of the flexor retinaculum. A case report and review of the literature. Am J Sports Med 2001;29:656–9.
10. Wong YS. Recurrent dislocation of the posterior tibial tendon secondary to detachment of a retinacular-periosteal sleeve: a case report. Foot Ankle Int 2004;25:602–4.