

Management of Simultaneous Bilateral Quadriceps Tendon Ruptures with Ipsilateral Achilles Tendon Rupture: A Case Report

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Abstract

Introduction: Concurrent ruptures of several major tendons of the lower limbs are exceptional. They can be post-traumatic or related to metabolic or drug-induced factors. Their management is complex and requires optimal functional rehabilitation. **Clinical Case:** We report the case of a 40-year-old hypertensive patient treated with amlodipine, who, following indirect trauma in a road accident, presented with complete functional impairment of the lower limbs. Examination revealed a triple tendon rupture: a complete bilateral rupture of the quadriceps tendon at the level of the patella (Caton-Deschamps index of 0.40 on the right and 0.45 on the left) and a rupture of the right Achilles tendon 1 cm from its insertion. On postoperative day 16, the patient underwent a single-stage surgery. The Achilles tendon was sutured with axial transosseous sutures in the prone position. The two quadriceps tendons were reinserted in the supine position using vertical patellar transosseous tunnels. Strict plaster cast immobilization was maintained for 45 days. At 34-month follow-up, the patient is walking independently with a slight right-sided limp. Extension is complete and symmetrical. Flexion is 130° on the left and limited to 100° on the right. The right ankle is mobile. Ultrasound reveals microcalcifications of scar tissue on the three operated tendons and the contralateral healthy Achilles tendon. **Conclusion:** Reinsertion using transosseous tunnels combined with 6 weeks of immobilization is a reliable strategy for securing these injuries.

Keywords

Tendon Rupture, Transosseous Reinsertion, Immobilization, Case Report

1. Introduction

Concurrent ruptures of the knee extensor mechanism and the Achilles tendon remain uncommon [1]. The involvement of metabolic or drug-induced risk factors has been cited by several authors [2] [3]. Management of these complex injuries requires extensive surgical intervention, often performed in a single procedure. Functional rehabilitation plays a crucial role in achieving optimal functional outcomes [4]-[6]. We report here the case of a young patient who presented with a triple post-traumatic tendon rupture.

2. Clinical Case

Mr. AA, a 40-year-old shopkeeper of slender build with a known history of hypertension treated with amlodipine, was admitted to the surgical emergency department. No renal, endocrine, metabolic, or inflammatory factors were identified, other than amlodipine use. He was admitted for pain and a complete inability to use both lower limbs. He had been involved in a road traffic. While attempting to cross the road as a pedestrian, he was destabilized by a car approaching from the side. This caused him to fall, landing first on his knees and then on his right elbow (without direct physical contact with the vehicle). The initial pain was severe and localized to both knees and the right ankle. He initially sought care that same day at a local health facility, where he was treated with analgesics and both limbs were immobilized using a long-leg plaster splint (extending from the thigh to the foot). Tetanus prophylaxis was also administered. The patient was admitted to the Orthopedic Surgery and Traumatology Department of National Referral University Hospital eight days later.

Upon admission, the clinical examination revealed the following:

- Right knee: Significant local swelling with no visible skin impact site; a transverse anterior groove (indicating a disruption of the quadriceps tendon) located just above the proximal border of the patella. Active knee extension was impossible.
- Right ankle: Moderate posterior swelling at the level of the distal Achilles tendon, which showed a discontinuity. Active ankle flexion and extension were impossible, and the Thompson test was positive.
- Left knee: Two anterior skin abrasions, roughly disc-shaped and approximately 1 cm in diameter each. The remainder of the left knee examination was identical to that of the opposite side.

There were no neurovascular deficits, and the examination of the right elbow was normal.

Standard anteroposterior and lateral knee radiographs taken upon admission revealed bilateral patella baja, with a Caton-Deschamps index of 0.40 on the right and 0.45 on the left. No bone lesions were observed. Anteroposterior and lateral ankle views showed no bone lesions. Laboratory test results were normal.

Following local wound care, temporary immobilization was reapplied using long-leg casts (extending from the upper thigh to the foot), with the knees in full

extension and the right ankle in equinus. Medical management consisted of analgesics, anticoagulant, and the placement of an intravenous access line. Preoperative blood glucose, glycated hemoglobin, and urea levels, as well as the lipid profile, were normal.

Mr. AA underwent surgery in a single session, 16 days after the injury. The time elapsed between the trauma and the surgery was 16 days. This long delay was due to the late admission to the specialized center and the fact that the patient's family had to secure the necessary funds for treatment in the absence of health insurance coverage. The procedure was performed under spinal anesthesia (pneumatic tourniquet was not used). Both limbs were prepped according to operating room protocols with the patient in the prone position; the feet extending beyond the edge of the operating table.

The first stage of the procedure addressed the right Achilles tendon rupture. An incision approximately 8 cm long slightly offset medially, and extending upwards from the Achilles tendon insertion was made. This revealed a complete tendon rupture approximately 1 cm from its calcaneal insertion (**Figure 1(A)**). After evacuating the hematoma and irrigating with saline, the tendon edges were excised and debrided, followed by further irrigation. A trial approximation of the tendon ends, with the ankle positioned in slight equinus, yielded satisfactory results. Tendon repair was then performed using size 2 slowly absorbable suture material, incorporating transosseous sutures passed axially through the distal tendon stump (**Figure 1(B)**). This was reinforced with a circumferential over-and-over suture, with the ankle held in equinus. We performed a saline lavage followed by a two-layer closure over a suction drain. Haemostasis being satisfactory, closure was performed and dry dressing using a sterile bandage was applied.

Next, the patient was returned in the supine position, followed by re-prepping and draping. The second stage began with the left knee. A midline anterior knee incision approximately 18 cm long was made, with its distal limit at the apex of the patella. After evacuation of the hematoma, haemostasis and performing a lavage, exploration revealed a complete rupture of the quadriceps tendon at its insertion on the patella (**Figure 1(C)**). The edges of the rupture were debrided, and frayed tendon fibers were excised. Apposition of the edges was satisfactory. Prior to tendon reinsertion, all soft tissue was removed from the proximal pole of the patella to ensure adequate contact. An inverted "U" stitch was placed through the proximal part of the quadriceps tendon using doubled, slowly absorbable suture material. Two parallel axial tunnels were then drilled through the patella to accommodate the two ends of the "U" suture. The sutures were tied distal to the patella with the knee in extension, allowing for compression apposition of the tendon. "X" stitches using the same suture material were used to reinforce the repair (**Figure 1(D)**). The site was then irrigated with saline, followed by three-layer closure over a suction drain. A sterile dressing was applied after haemostasis.

The third stage involved the right knee. A fresh application of Betadine was performed before inflating the tourniquet. We used the same approach as for the left knee, allowing exposure of the lesion. Exploration also revealed a complete

rupture of the quadriceps tendon at the level of the patella, identical to the opposite side. The remainder of the surgical technique was identical to that described for the opposite lesion.

In the fourth surgical stage, a bilateral posterior femoropedal plaster splint was applied, with the knees in full extension. The right ankle was immobilized in 30 degrees of equinus. Postoperatively, parenteral antibiotic prophylaxis was administered for 48 hours, along with parenteral analgesics, followed by oral analgesics as needed for pain management. Thromboembolic prophylaxis with low molecular weight heparin was initiated (until full weight-bearing was achieved). Drains could be removed after 48 hours, and the patient could be transferred to a wheelchair. Dressings were changed every 5 days, and the sutures were completely removed on day 18. Self-rehabilitation with isometric contractions began immediately postoperatively. The right femoropedal splint was changed on day 21 to restore the ankle to 90 degrees of flexion. The postoperative course was uneventful, and the plaster casts were removed on postoperative day 45. Physical therapy began immediately (walking assistance, muscle strengthening, proprioception, and verticalization using a walker). Knee flexion was 30 degrees, and extension was full. The range of motion of the right ankle was 5 degrees of flexion and 35 degrees of extension. Weight-bearing was complete on the left but partial on the right. Bilateral full weight-bearing with two crutches was possible on day 60 post-surgery; the right crutch was discontinued on day 75 and the left after 90 days. There was a moderate limp when walking, requiring the use of a forearm crutch for long distances (starting at 1 kilometer) up to 12 months post-operatively.

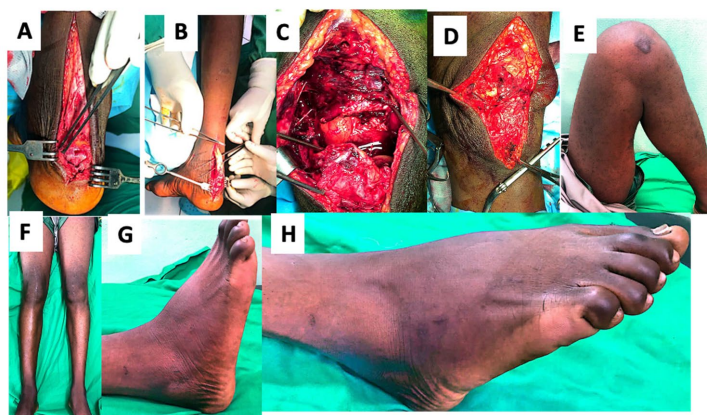


Figure 1. (A) Intraoperative image showing the quadriceps rupture; (B) Intraoperative image after tendon repair; (C) Intraoperative image showing the site of Achilles tendon rupture; (D) Intraoperative image after tendon repair; (E) & (F) Postoperative images at 34-month follow-up showing left knee flexion of approximately 130 degrees and maximum extension of both knees; (G) & (H) Images at the same follow-up showing the ankle at 90 degrees and in maximum plantar flexion.

The 34-month post-surgery evaluation revealed: good healing of the surgical wounds and a slight right-sided limp. There was no pain associated with walking. Clinical examination of the right lower limb showed: good quadriceps muscle tone

and stiffness in flexion of the right knee at approximately 100 degrees. On the left, knee flexion was 130 degrees, and full extension was achieved in both knees (**Figure 1(E)** & **Figure 1(F)**). Flexion/extension was normal at the right ankle (**Figure 1(G)** & **Figure 1(H)**). The ultrasound performed revealed microcalcifications at the level of the 3 affected tendons as well as at the level of the left calcaneal tendon.

3. Discussion

The occurrence of a bilateral rupture of the quadriceps tendon, either in isolation or associated with a unilateral rupture of the Achilles tendon in the same patient, is a uniquely encountered clinical entity [1] [7]. A triple combination of injuries, as in our case, is poorly documented in the literature [1].

Quadriceps tendon ruptures are usually seen in individuals over the age of fifty in the context of associated comorbidities. These comorbidities are often related to microvascular or collagen disorders [2] [3] [8]-[10].

In our patient, significant metabolic disorders were ruled out due to normal standard laboratory results. However, the presence of an asymptomatic anterior chronic degenerative tendinopathy is suggested by the patient's slender build, combined with the presence of microcalcifications on the unruptured opposite Achilles tendon on ultrasound (at 34 months). Amlodipine has been described as a factor capable of acting in two different ways. On the one hand, it acts by blocking type I calcium channels, alternating collagen production and microvascularization within the tendon prior to rupture [8]. On the other hand, it accelerates postoperative tendon regeneration through its vasodilatory effect [11].

The injury mechanism found in this case was indirect, as confirmed by other authors [12]. This bilateral rupture of the quadriceps tendons could result from a sudden and uncontrolled eccentric quadriceps contraction with the knee flexed during the fall. The braking forces exceeded the tensile strength of an already weakened tendon, causing the rupture. Simultaneously, the rupture of the Achilles tendon would result from a forced and sudden dorsiflexion of the ankle upon impact with the ground. This explains the proximity of the ruptures to the bony insertion. The diagnosis of quadriceps and/or Achilles tendon ruptures remains primarily clinical. The risk of diagnostic error in this case stems from the fact that the patient is admitted to the eighth ward with a bilateral knee injury and no comparable healthy side. The presence of cardinal clinical signs allowed for easy diagnosis. Radiography provides only indirect diagnostic information when the rupture involves the quadriceps. In our case, it revealed bilateral patella baja (Caton-Deschamps index of 0.40 and 0.45). Ultrasound and MRI, which we did not use, could have helped confirm the diagnosis [1] [2] [13]. The choice of a single-stage surgical procedure on postoperative day 16, under spinal anesthesia, allowed for the treatment of all lesions while avoiding the risks associated with repeated anesthesia. This choice aligns with the views of some authors who have mentioned the absolute necessity of surgical treatment in cases of Achilles tendon rupture [14]. Delayed treatment itself increases intraoperative difficulties due to tendon retrac-

tion [15]. This leaves no time for a two-stage program that would delay functional rehabilitation, crucial for optimal functional recovery.

Analysis of the results at 34 months' follow-up reveals a difference in functional recovery between the two limbs. The dilemma lies between mechanically protecting the tendon sutures and preventing joint stiffness. The 6-week immobilization period was motivated by the need to protect the tendon sutures. Some authors have mentioned the need for early progressive mobilization or the use of articulated splints, which would optimize the gain in joint range of motion [4].

At 34-month follow-up, the right knee still exhibited residual stiffness in flexion limited to 100°, associated with a slight limp. The presence of two tendon ruptures in the right lower limb impacted the local functional prognosis and the gait score [16]. However, this overall result remained satisfactory.

4. Conclusion

Diagnosing bilateral traumatic ruptures of the quadriceps tendon, simultaneously associated with rupture of the Achilles tendon, is straightforward clinically, but complex to treat. The surgery and functional rehabilitation employed in this case yielded an overall satisfactory functional outcome, despite stiffness in the right knee.

Ethical Considerations

Patient consent was obtained for the publication of this article. The ethical principles of the Declaration of Helsinki regarding medical research involving human subjects were adhered to, and approval was obtained from the National Referral University Hospital.

Author Contributions

Conceptualization, Daniel Mossalbaye Adendjingue, Magloire Dingamnodje and Valentin Andjeffa; methodology, Daniel Mossalbaye Adendjingue; software Daniel Mossalbaye Adendjingue; validation, Rimtebaye Kimassoum, Valentin Andjeffa, and Daniel Mossalbaye Adendjingue; formal analysis, Allamine Hassan Adoum; investigation, Adoumbaye Djimtolnan, Service Minguemadji; resources, Daniel Mossalbaye Adendjingue; data curation, Magloire Dingamnodje Magloire Dingamnodje; writing—original draft preparation, Daniel Mossalbaye Adendjingue; writing—review and editing, Daniel Mossalbaye Adendjingue; visualization, Oswald Goukodadja; supervision, Rimtebaye Kimassoum; project administration, Valentin Andjeffa; funding acquisition, Adoumbaye Djimtolnan. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest related to this article.

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