CASE REPORT/KAZUISTIKA

Simultaneous Ruptures of All Four Extensor Mechanism Tendons in Both Knees: a Rare and Challenging Case in a Chronic Kidney Disease Patient

Současné ruptury všech čtyř šlach extenzorového aparátu u obou kolen: vzácný a náročný případ u pacienta s chronickým onemocněním ledvina Rare and Challenging Case in a Chronic Kidney Disease Patient

ALI CAN KOLUMAN[1], SULEYMAN EMRE SALMANOGLU[1], CEMAL KURAL[1]

[1]Bakirkoy Dr. Sadi Konuk Training and Research Hospital, Bakirkoy/Istanbul, Turkey

Corresponding author:

Ali Can Koluman
Bakirkoy Dr. Sadi Konuk Training and Research Hospital
Zuhuratbaba, Dr. Tevfik Sağlam Cd No:11
34147 Bakırköy/Istanbul, Turkey

md.alicankoluman@gmail.com

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SUMMARY

We report a rare and remarkable case of simultaneous bilateral injuries to all four extensor mechanism tendons in a 39-year-old male with a history of diabetes and chronic kidney disease. Physical examination revealed pronounced swelling, palpable gaps above and below both patellae, and complete loss of active knee extension. Imaging confirmed complete ruptures of the right quadriceps and left patellar tendons, alongside partial ruptures of the left quadriceps and right patellar tendons.

Surgical repair was performed using suture anchors to ensure secure tendon reattachment. Postoperatively, both knees were immobilized with hinged braces for six weeks, followed by a structured rehabilitation program. At the 12-month follow-up, the patient demonstrated full recovery, with complete restoration of knee range of motion and muscle strength.

Key words: knee, extensor tendons rupture, chronic kidney disease.

INTRODUCTION

We report a rare and remarkable case of simultaneous bilateral injuries to all four extensor mechanism tendons in a 39-year-old male with a history of diabetes and chronic kidney disease (CKD). The patient, who had adapted to chronic left knee pain over time, presented with sudden, severe right knee pain and an inability to walk or extend his legs after descending stairs, despite no history of high-energy trauma. Due to his frailty and ongoing dialysis treatment, the chronic nature of the left-sided injury had gone undiagnosed until the acute right-sided rupture prompted further evaluation.

Physical examination revealed pronounced swelling, palpable gaps above and below both patellae, and complete loss of active knee extension. Imaging confirmed complete ruptures of the right quadriceps and left patellar tendons, alongside partial ruptures of the left quadriceps and right patellar tendons. These findings emphasized the coexistence of both chronic and acute extensor mechanism injuries, which might otherwise have been overlooked. Surgical repair was performed using suture anchors to ensure secure tendon reattachment. Postoperatively, both knees were immobilized with hinged braces for six weeks, followed by a structured rehabilitation program.

At the 12-month follow-up, the patient demonstrated full recovery, with complete restoration of knee range of motion and muscle strength. This case underscores the importance of thorough clinical assessment and imaging in CKD patients, as spontaneous tendon ruptures can occur insidiously. Given the risk of chronic, unrecognized partial tears progressing to complete ruptures, clinicians should maintain a high index of suspicion and routinely examine all four extremities in similar

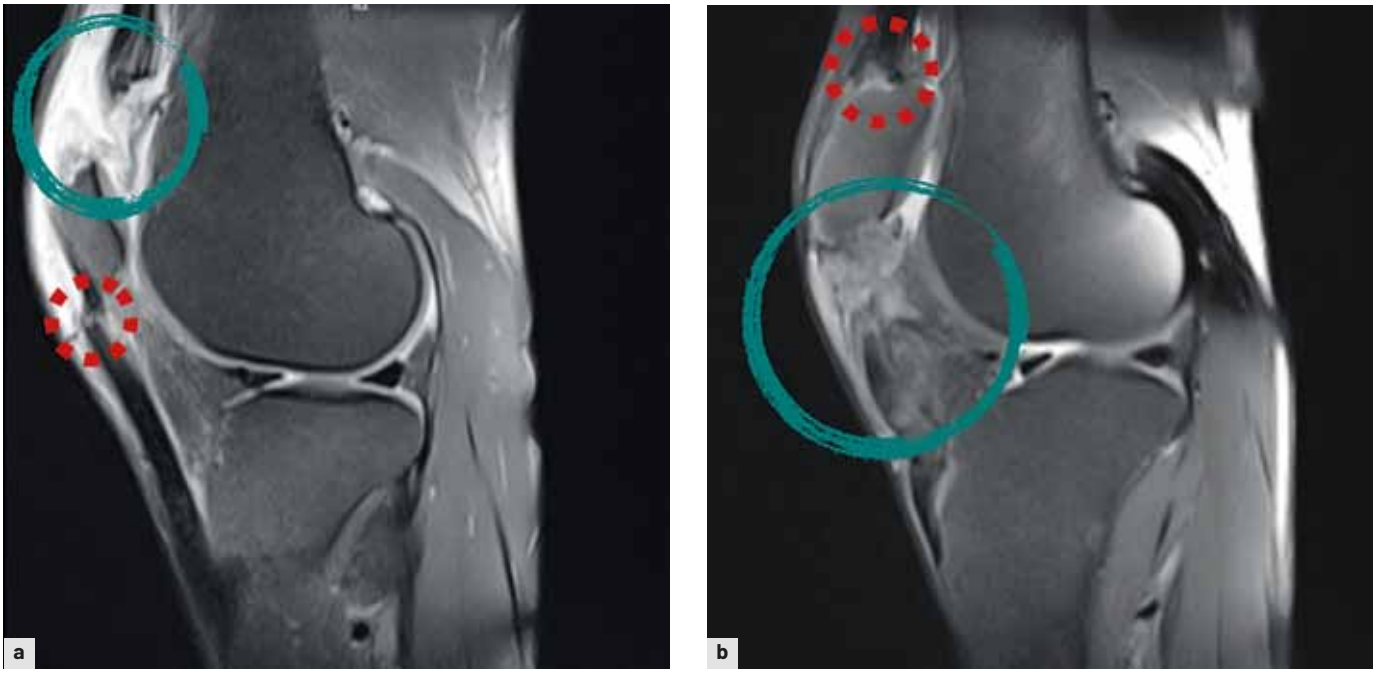

Fig. 1. **Right knee: quadriceps tendon full-thickness tear (green) and patellar tendon partial rupture (red). Left knee: patellar tendon full-thickness tear (green) and quadriceps tendon partial rupture (red).**

high-risk patients. Early diagnosis, timely surgical intervention, and individualized rehabilitation strategies are crucial for optimal outcomes in complex extensor mechanism injuries. Additionally, preventative measures such as exercise supervision and supportive bracing should be considered in CKD patients to mitigate the risk of spontaneous tendon injuries.

CASE PRESENTATION

A 39-year-old male patient presented to our hospital with sudden-onset right knee pain while descending stairs, followed by an inability to walk or lift his leg, despite no history of high-energy trauma. He reported a history of left knee pain that he had been trying to tolerate without seeking medical attention. The patient had a known history of diabetes and chronic kidney disease.

On physical examination, there was significant swelling and palpable gaps above and below both patellae. A defect was detected in the continuity of the right quadriceps and left patellar tendons, while partial defects were palpable in the left quadriceps and right patellar tendons. Active knee extension was completely lost in both knees.

Radiographs showed minimal calcifications in the bilateral quadriceps and patellar tendons. MRI revealed a complete rupture of the right quadriceps and left patellar tendons, as well as partial ruptures of the left quadriceps and right patellar tendons (Fig. 1). There were no open wounds.

The patient was placed in a supine position under combined anesthesia. After sterile preparation and draping of both lower extremities, anterior longitudinal incisions were made sequentially on both knees. Following the incision through the skin and subcutaneous tissue, complete ruptures of the right quadriceps and left patellar tendons were identified. No remaining tendon tissue was found at the rupture sites on the patella (Fig. 2).

The degenerated ends of the completely ruptured tendons were debrided to expose viable tissue. The bony attachment sites were decorticated using a burr to enhance tendon healing. For the repair, two knotted suture anchors were placed at the superior pole of the patella for the right quadriceps tendon and at the inferior pole of the patella for the left patellar tendon. The tendons were reattached using the Krakow suture technique. Additionally, one knotted suture anchor was applied to repair the partial ruptures of the right patellar tendon and left quadriceps tendon. Following the repair, the continuity of the extensor mechanism was confirmed.

Both knees were immobilized in extension using hinged knee braces for six weeks, with weight-bearing allowed using an orthosis. Passive range of motion exercises were initiated after the sixth week, with a goal of achieving 60 degrees of knee flexion by the eighth week.

Simultaneously, physiotherapy was started to restore muscle strength. By the tenth week, 90 degrees of flexion was targeted, with full knee flexion aimed for by the twelfth week. MRI

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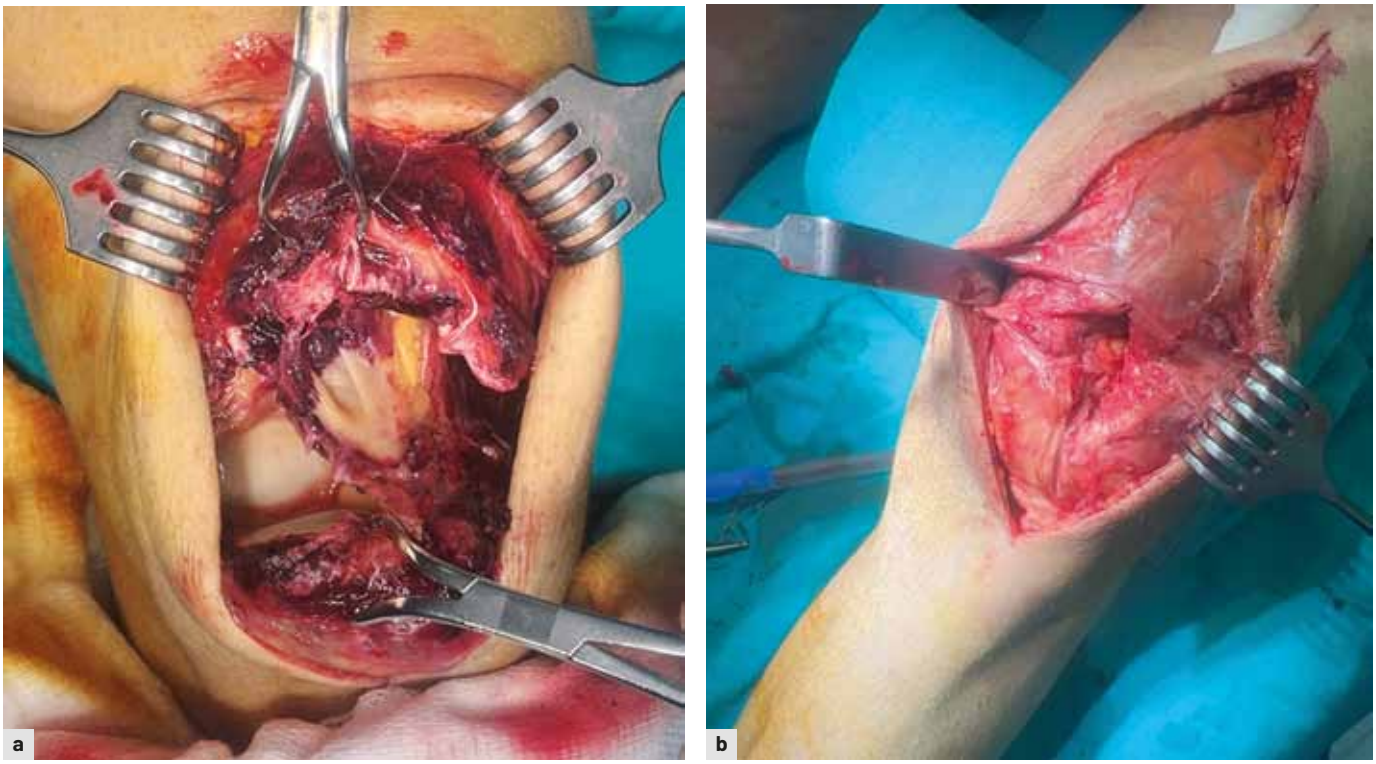

Fig. 2. **Right knee: acute quadriceps full-thickness tear (on the right), left knee: chronic patellar tendon full-thickness tear (on the left).**

scans at the 6-month follow-up demonstrated tendon healing (Fig. 3). At the 12-month follow-up, the patient demonstrated full muscle strength and complete range of motion.

DISCUSSION

The patella, patellar tendon, and quadriceps tendon are essential components of the knee extensor mechanism (17). In

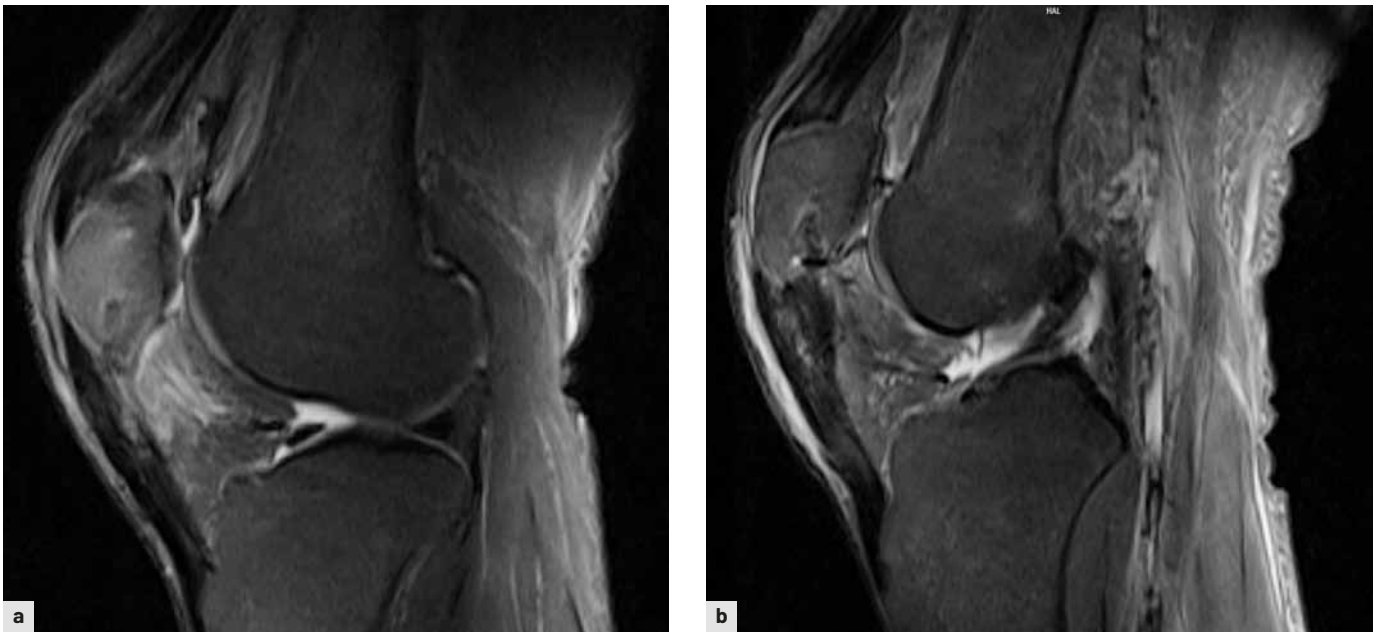

Fig. 3. **The healed state of both extensor mechanism.**

the event of pathology affecting any part of this biomechanically efficient system, the extensor mechanism is disrupted, leading to the inability of the knee to lock during the gait cycle, difficulty in walking, and challenges in performing a straight leg raise (21, 24). Patellar tendon ruptures are more commonly observed in younger individuals, whereas quadriceps tendon ruptures are typically seen in older patients (5). While chronic tendinopathy, obesity, rheumatoid arthritis, and corticosteroid use are risk factors for extensor mechanism tendon ruptures, systemic comorbidities such as chronic kidney disease are specifically known risk factors for bilateral tendon ruptures (2, 4, 12, 13, 18).

Although the first bilateral quadriceps tendon rupture was described in a patient with chronic kidney disease (20), literature has documented simultaneous, spontaneous, atraumatic bilateral quadriceps or bilateral patellar tendon ruptures, as well as quadriceps and patellar tendon ruptures occurring in different knees, due to systemic diseases, particularly chronic kidney disease (3, 9, 18, 19, 22, 23). However, the literature does not describe cases of simultaneous bilateral quadriceps and patellar tendon full-thickness ruptures accompanied by contralateral partial quadriceps and patellar tendon ruptures. In patients with spontaneous extensor mechanism injuries, physical examination through palpation and imaging methods such as ultrasound and MRI are crucial to avoid missing additional pathologies. While the exact mechanism of tendon rupture pathogenesis is not well understood, it is believed that hormonal changes, such as secondary hyperparathyroidism in chronic kidney disease patients, may lead to alterations in tendon structure (3, 14). However, there is uncertainty in the literature regarding the prevention of this condition.

Although many surgical techniques are available (5, 10, 15), regardless of the method, early surgical treatment is necessary for restoring physiology and achieving the best functional outcomes in patients with extensor mechanism injuries (8, 16, 22). Although we prefer the anchor technique due to its ease of use, shorter surgical time, and applicability in the repair of partial tears, the transosseous technique remains a valid option in the literature (7). Biomechanically, no significant difference has been found between the transosseous technique and the anchor technique, and uncertainty remains regarding which surgical technique provides the best solution (1, 5, 11). After the repair of the extensor mechanism, it is recommended to immobilize the knee in extension with an orthosis for at least 4–6 weeks, followed by the initiation of a physiotherapy program once the orthosis is removed (5, 22). However, the appropriate physiotherapy approach in cases involving simultaneous rupture of all four tendons is not well established. Due to the changes in tendon morphology in chronic kidney disease and the involvement of all four tendons, we prioritized tendon healing and planned a controlled physiotherapy program for our patient.

CONCLUSIONS

This case demonstrates that extensor mechanism injuries in systemic diseases, such as chronic kidney disease, may be overlooked, and patients can tolerate symptoms for an extended period. Spontaneous tendon ruptures, particularly in dialysis patients, can follow a progressive course, and partial ruptures may progress to full-thickness tears if not detected. Therefore, in patients with extensor mechanism injuries, merely performing symptomatic screening is insufficient; a thorough examination of all knee extensor tendons and evaluation with advanced imaging are essential.

Preventive approaches are of great importance in such patients. Measures such as exercise monitoring, supportive braces, and avoiding overloading can contribute to the prevention of tendon ruptures. During the treatment process, aggressive physiotherapy programs should be avoided, and an individualized rehabilitation plan supporting tendon healing should be implemented. With the appropriate surgical technique and careful rehabilitation, achieving full range of motion and functional recovery may be possible. ■

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