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Case Report

Bilateral Quadriceps Tendon Rupture in a Chronic Hemodialysis Patient: A Case Report and Surgical Management

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Abstract

Simultaneous bilateral quadriceps tendon rupture is a rare injury, particularly in individuals with underlying medical conditions such as renal failure. This paper presents the case of a renal failure patient 51 old year with 10 years history of haemodialysis treatment suffering from bilateral quadriceps tendon rupture.

Keywords: Quadriceps tendon, Tunnel bone repair, Renal failure, Traumatic rupture.

INTRODUCTION

Steiner and Palmer were the first to report on a patient with simultaneous bilateral quadriceps tendon rupture in 1949 (Steiner C *et al*., 1949). Bilateral simultaneous quadriceps tendon rupture is a rare injury in an otherwise healthy person. However, certain systemic conditions, such as chronic renal failure, rheumatoid arthritis, systemic lupus erythematosus, and hyperparathyroidism, are known risk factors for tendon rupture. Additionally, the use of corticosteroids and fluoroquinolones has been associated with increased tendon fragility.

CASE PRESENTATION

We present the case of a 51-year-old woman with a history of chronic renal failure, undergoing chronic hemodialysis three times a week. She tripped on the stairs and landed on both knees. The patient was no longer able to walk and presented to the emergency department the same day. The clinical examination revealed that the patient could no longer actively extend both lower limbs, with bilateral suprapatellar gaps (Figure 1).

Figure 1: Physical examination showing palpable soft tissue depression above each patella

Standard radiographs taken as part of the trauma assessment showed no skeletal damage (Figure 2). The evaluation was completed with an MRI, which confirmed the ruptures and their extent (Figure 3).

Figure 2: AP X-ray of both knees with no evidence of fracture

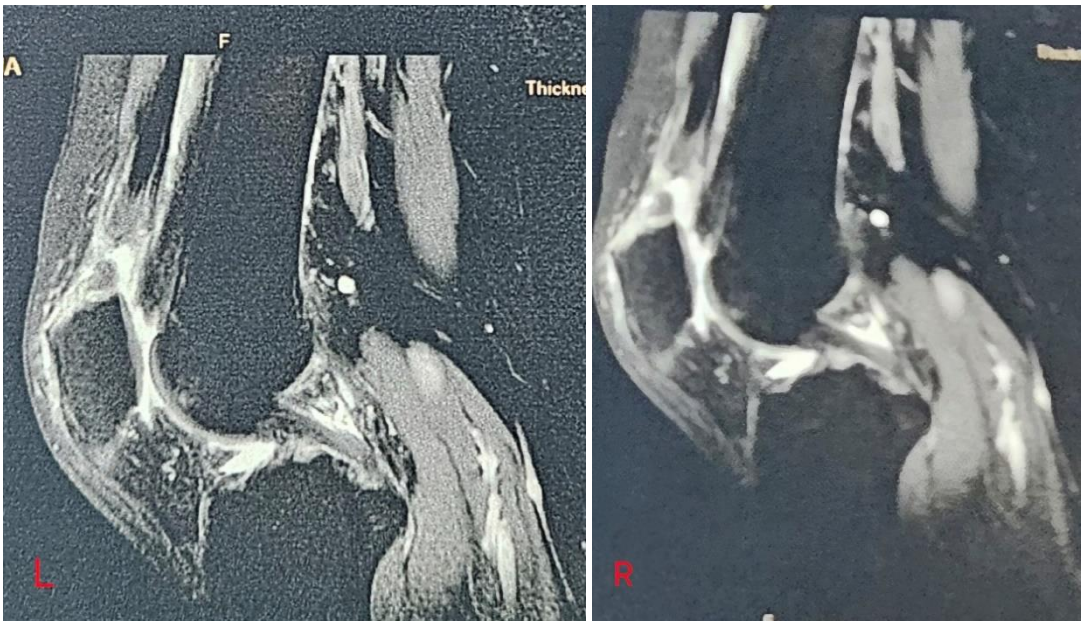

Figure 3: Lateral T2-weighted magnetic resonance images of the knees Images showed that the continuity of the quadriceps tendons was avulsed from the superior pole of both patellaes

The patient underwent surgery the day after her hemodialysis session. The procedure was performed under spinal anesthesia with pneumatic tourniquets placed at the base of both limbs. The same midline approach was used for both knees. The rupture was identified (figure 4), and the edges were freshened. The repair technique involved creating three longitudinal tunnels through the patella (Figure 5). Krackow sutures were used on the quadriceps tendon to ensure secure fixation. The sutures were passed through the tunnels and tied below the patella. Additional absorbable sutures were added to reinforce the repair and provide better

attachment (Figure 6). Postoperatively, both knees were immobilized in extension using brace splints for a period of six weeks. Histological evaluation of the tendon during a follow-up procedure revealed no significant pathological changes other than mild inflammatory cell infiltration.

By three months postoperatively, both knees achieved a range of motion from 0° to 100° without extension lag. However, 12 months after surgery, she achieved 130 of flexion.

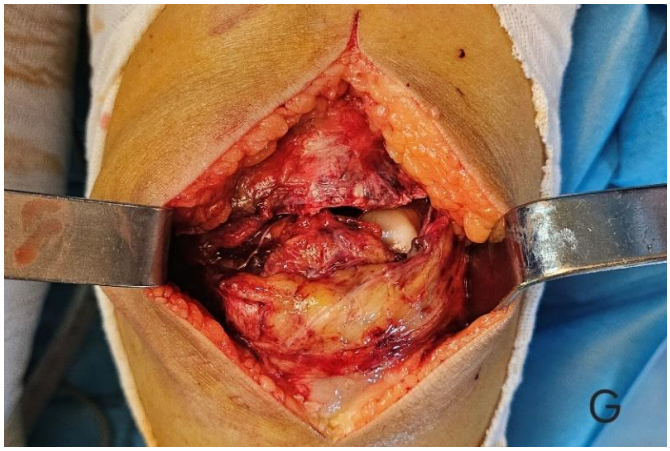

Figure 4: Peroperative image showing the complete rupture of the quadriceps tendon above the patella was observed following dissection of each knee

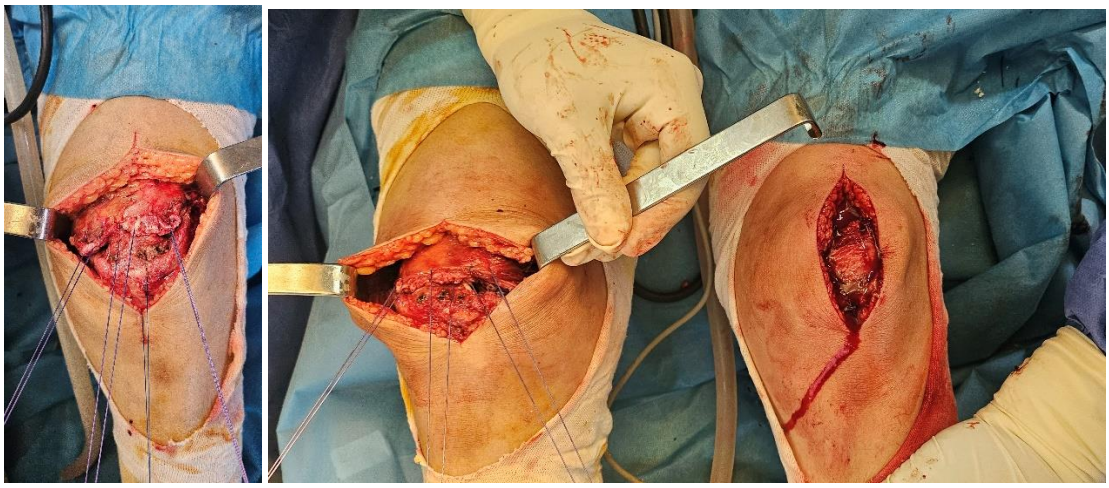

Figure 5: Peroperative images showing sutures passed through the tunnels

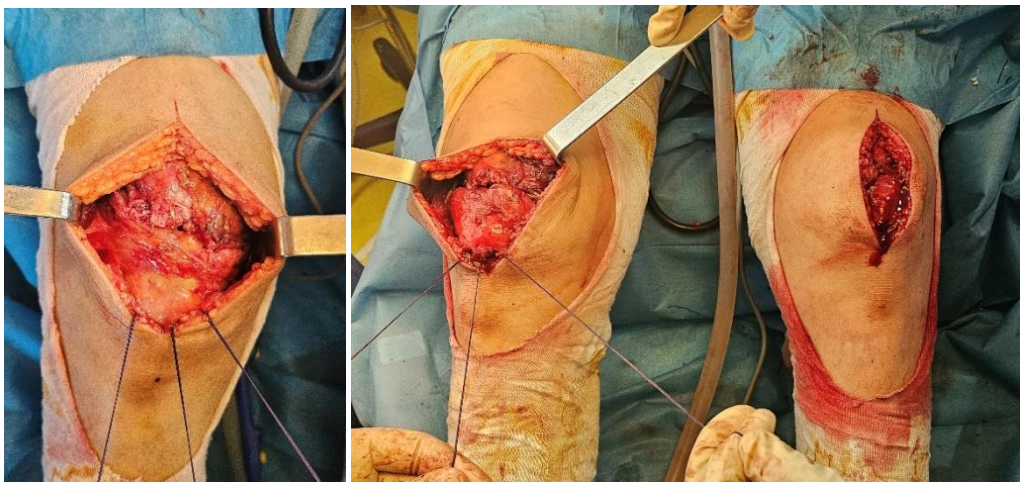

Figure 6: Peroperative images showing sutures passed through the tunnels and tied below the patella

DISCUSSION

In the typical patient with an acute and complete quadriceps tendon rupture, surgical repair is recommended to restore function. Studies suggest that early (within 2 weeks) surgical treatment and subsequent functional exercise can lead to satisfactory results (Gao MF *et al*., 2013). This case represents a rare occurrence of simultaneous bilateral quadriceps tendon rupture in a patient with chronic renal failure. Early surgical intervention, performed on the same day as the injury, was crucial in achieving full functional recovery as recommended by literature. The use of three bone tunnels, Krackow locking sutures, and reinforcement with absorbable sutures provided a strong and reliable fixation method, resulting in favorable postoperative outcomes.

When comparing this surgical technique with other methods described in the literature, several factors must be considered. The use of three bone tunnels enhances the stability of the repair by distributing the load across multiple fixation points, which is particularly advantageous in cases where the tendon quality is compromised due to systemic conditions like renal failure. Studies have shown that tunnel bone repair provides a low risk of re-rupture and allows for early mobilization, which is critical for restoring knee function (Sherman *et al*., 2016; Massey *et al*., 2020). However, the procedure can be technically demanding and may increase the risk of patellar fractures, especially in patients with osteoporosis (Scuderi, 1958). Also, the insertion of sutures through the quadriceps tendon (via drilled holes into the superior border of the patella) is the most common method used to repair quadriceps tendon rupture (KIM TW *et al*., 2011).

The Krackow locking suture technique is widely recognized for its ability to provide strong and secure fixation of tendons. This method ensures that the tendon is firmly anchored to the bone, reducing the risk of suture pull-out and improving the overall strength of the repair (Krackow *et al*., 1986; Lighthart *et al*., 2008). In this case, the combination of Krackow sutures and three bone tunnels provided excellent biomechanical stability, allowing for early rehabilitation and full restoration of knee function.

In contrast, suture anchor repair is a minimally invasive technique that allows for strong suturing of the tendon to the patella, particularly when the rupture site is near the patella. This method has been associated with favorable outcomes, including reduced postoperative pain and early mobilization (Sasaki *et al*., 2021; Wenzl *et al*., 2004). However, suture anchors may loosen over time, requiring additional surgery for removal, and may be less effective in cases of significant tendon degeneration or retraction (Neubauer *et al*., 2007).

Another commonly used technique is transosseous sutures with augmentation, which involves passing sutures through bone tunnels and augmenting the repair with artificial tendons, wires, or fascia. This method provides strong fixation and is often used in chronic or complex cases (Fujikawa *et al*., 1994; Larsen & Lund, 1986). However, it is more invasive and may require a longer recovery period, with potential complications such as infection or hardware irritation (Boudissa *et al*., 2014).

Finally, primary end-to-end repair is a simpler technique that involves direct suturing of the torn tendon ends. While this method is effective in acute cases with minimal tendon retraction, it may not provide the same level of strength as other techniques, particularly in patients with systemic conditions that weaken the tendon (Siwek & Rao, 1981; Kannus & Józsa, 1991).

After surgical repair, patients are immobilised in cylindrical casts for four to six weeks, and physiotherapy is used to regain full strength and range of motion. With this regimen, most patients return to full function without the need for an assistive device (Shah M *et al*., 2002).

CONCLUSIONS

In conclusion, bilateral quadriceps tendon ruptures are uncommon injuries that require early surgical treatment and subsequent functional exercise, in order to maximize functional outcomes for the patient.

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