

# Bilateral Post-Traumatic Avulsion Of Patellar Apexes: A Case Report

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## ABSTRACT

Patellar tendon rupture and patellar apex rupture are established complications in patients with end stage kidney disease, however, little to no literature describes bilateral patellar avulsion. This is a case presentation of bilateral knee avulsion due to bilateral patellar tendon rupture at the level of the apexes in a patient with end stage kidney disease on dialysis. A 52-year-old female presented to the emergency department for low energy traumatic event. On physical exam patient had bilateral patella alta with limited range of motion. On imaging, bilateral knee MRI was diagnostic of bilateral avulsion of patellar apexes. Considering the clinical and radiological findings, patient was admitted for surgical repair, in which a free tendon graft was placed. Post-operative radiography showed good patellar placement and fixation. Upon discharge, patient was allowed partial weightbearing for the first 6 weeks, followed by full weightbearing. One year post-surgery, the patient was pain free and able to ambulate comfortably. We conclude that, patellar apex avulsion should be suspected in patients with renal dysfunction presenting for unilateral or bilateral chronic knee pain even if no severe mechanism of injury was present.

**Key words:** patellar apexes, renal dysfunction, bilateral

## INTRODUCTION

Bilateral post-traumatic avulsion of both patellar apexes is rare. A relationship between renal dysfunction and patellar tendon rupture might exist according to the literature.<sup>1</sup> However, only few reported cases describe bilateral patellar avulsion in patients suffering from end-stage kidney disease.<sup>1,7</sup> This is a case presentation of an elderly patient with end-stage kidney disease coming with avulsion of both patellar apexes after a low energy traumatic event.

## CASE REPORT

A 52 year-old woman with end stage kidney disease, secondary to diabetes mellitus type 2, presented to the emergency department for

unremitting bilateral knee pain after a low energy knee trauma. On physical examination, evident bilateral knee effusion, severe quadriceps amyotrophy, and bilateral patella alta (Figure 1) were noted. Bilateral disruption of the extensor mechanism was appreciated with absent active extension in both knees as well. Subsequently, Knee x-ray and MRI were ordered for diagnosis. Knee x-ray showed symmetrical bilateral patella alta due to patellar apexes avulsion (Figure 2a-d). MRI showed avulsion of bilateral apexes with normal patellar and quadriceps tendons, and no menisco-ligamentous injuries (Figure 3a-b). Severe articular cartilage damage of both femoral condyles and patella was noted as well (Figure 4). On blood tests, patient was found to have severe anemia (hemoglobin 7.2), elevated creatinine level (5.7 - normal range being 0.51 to 0.95), and elevated parathyroid hormone level (870 - normal range being 15 to 68). Consequently, she was admitted to the intensive care unit for two days where she required blood transfusions and electrolyte correction. Once patient stabilized, the operation was performed using a direct anterior approach. The

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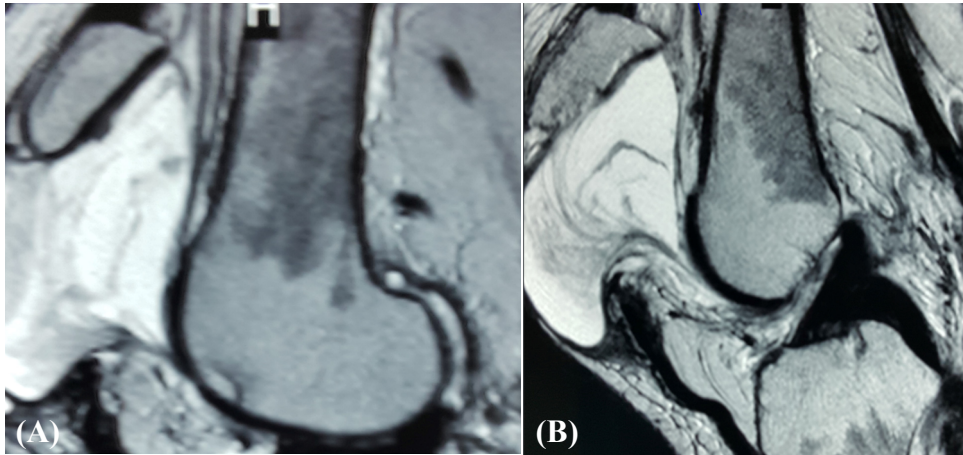
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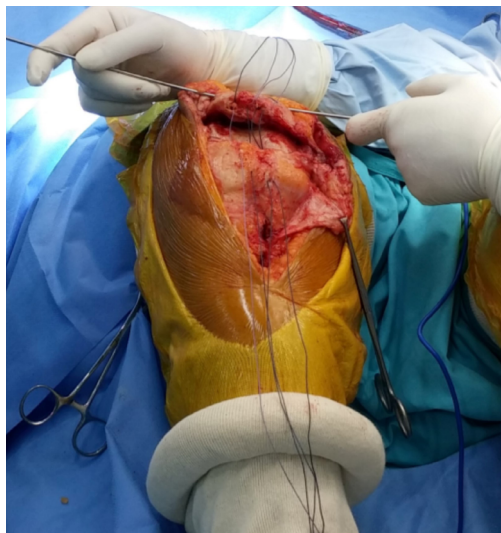
**Figure 1** Bilateral patella alta and quadriceps amyotrophy



**Figure 2** AP (A) and lateral (B) radiographs showing the apex avulsion injury of the right patella; AP (C) and lateral (D) radiographs showing the apex avulsion injury of the left side patella



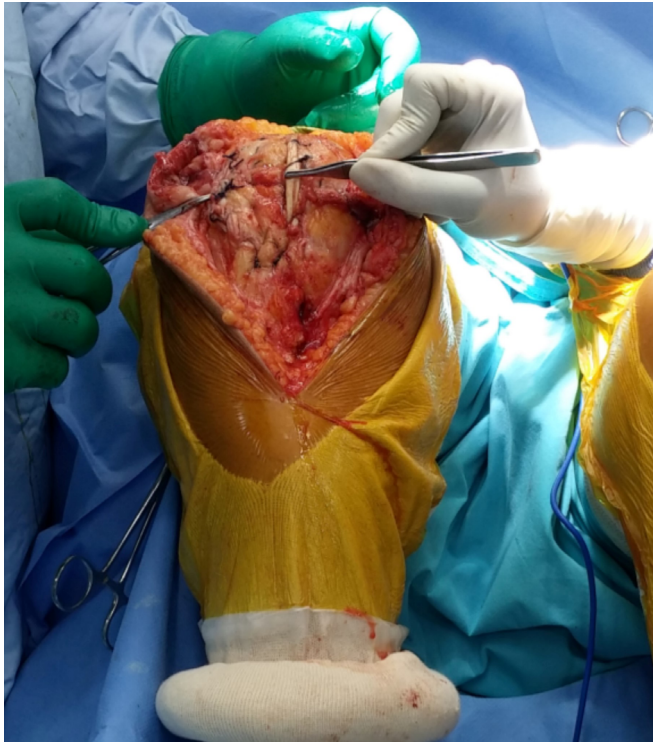
**Figure 3** MRI showing (A) patella apex rupture of the right side and (B) wing patella apex rupture of the right side, with patella tendon intact



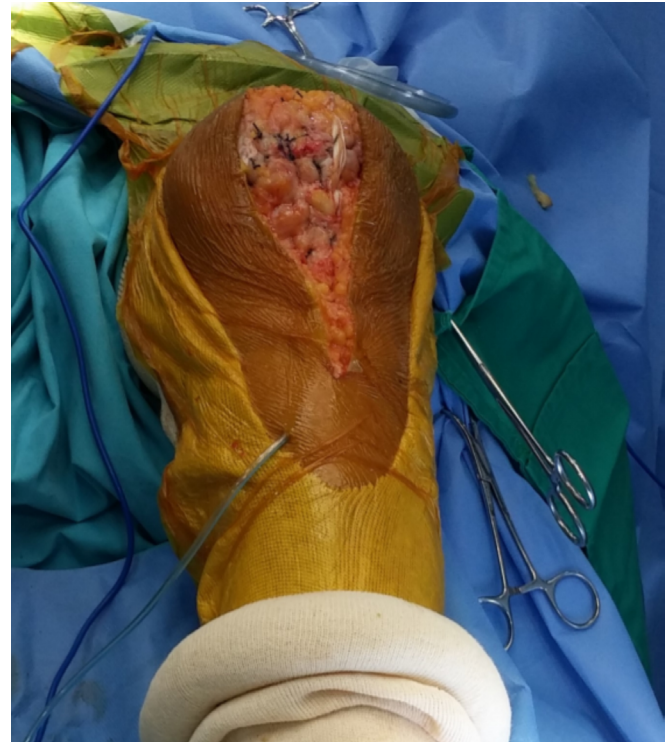
**Figure 4** Intra-operative photo showing extensive cartilage damage and the patellar apex avulsion



**Figure 5** Intra-operative photo showing horizontal mattress sutures



**Figure 6** Intra-operative photo showing post-anchors fixation with graft placement



**Figure 7** Intra-operative photo showing fixation with anchors and graft of the left side

continuity of the extensor mechanism complex was assured by using 2 non-absorbable suture anchors with horizontal mattress configuration extending from the insertion of the tendon on the patella and quadriceps tendon proximally to the torn tendon distally (Figure 5). A semi tendinous free tendon graft was then incorporated in the sutures after being passed through a tibial tunnel distally and was well-fixed proximally on the anterior patellar retinaculum and the quadriceps tendon (Figure 6 and 7). Post-operative plain radiograph showed adequate fixation with appropriate alignment and no significant fracture gap. Post-operative follow up was uneventful. During her hospital stay post-op, patient started passive and active aided exercises with the assistance of an articulated brace. Partial weight bearing was permitted using a walker for the first 6 weeks post-operation, and full weight bearing as tolerated after 6 weeks. Cultures were negative after 3 days of incubation. At the one-year benchmark clinic visit, patient was not complaining of any pain or gait abnormality. On physical exam, patient had full extension and flexion reaching 130 degrees.

## DISCUSSION

Around 50 reported cases of bilateral patellar tendon rupture are described in the literature, making it an extremely rare incident<sup>1</sup>. Spontaneous rupture of the tendons (including avulsion) is associated with renal failure<sup>1-7</sup>, diabetes mellitus<sup>8</sup>, hyperparathyroidism<sup>9</sup>, long term-micro trauma and corticosteroid use<sup>10,11</sup> or a combination of these diseases. However, renal failure is the most reported cause of spontaneous tendon rupture.

Furthermore, patellar tendon rupture is the third most common cause of extensor mechanism dysfunction, after patellar fracture and quadriceps tendon rupture<sup>12</sup>. Zernicke, et al.<sup>13</sup> reported that a force of 17.5 times the body weight is required to rupture this tendon. To put this into perspective, climbing stairs is reported to create a force of 3.3 times body weight. Clinically, bilateral avulsion of patellar tendon or apexes is sometimes difficult to be found, and may be diagnosed radiographically via the presence of bilateral patella alta. The best way to make this diagnosis is through a lateral view radiography of the knee in slight flexion to

exert tension on the patellar tendon. On this view, an Insall Salvati ratio can be calculated.<sup>14</sup> Patellar tendon tears are classified according to a three-part system: Type 1 at the origin of the tendon at the inferior pole of the patella, Type 2 a midsubstance tear through the tendon, or Type 3 at the insertion of the patellar tendon to the tibial tubercle.<sup>15,16</sup>

The pathogenesis of such spontaneous or post traumatic ruptures remains controversial.<sup>17</sup> Weakness of the tendo-osseous junction due to secondary hyperparathyroidism and additional chronic inflammatory changes due to repeated micro-trauma is one of the possible etiologies of the rupture.

With regards to treatment, the necessity for early repair cannot be overemphasized. Tendon retraction and scarring occur shortly after injury and can greatly complicate repair.<sup>18</sup> If repair is delayed, scar tissue release, patellar traction, and adjunct allograft or gracilis-semitendinosus autograft insertion may be used to facilitate repair.

Munakata et al. in 1995, was the first to describe a case of acute post traumatic bilateral avulsion of patellar apices in a young woman with renal failure.<sup>19</sup> Our patient, who is known to have end-stage kidney disease, had chronic bilateral avulsion of both patellar apices sustained after a fall, a low energy trauma. Concerning the operative technique used, we consider that the use of anchor screws and mattress suturing with the adjunction of a semitendinosus autograft will ensure a solid stability. However, more trials with bigger sample size are needed to further prove the efficacy of this technique in similar patients.

## CONCLUSION

Bilateral patellar avulsion with the absence of high energy traumatic episode is very rare. kidney disease, uremia, hyperparathyroidism are all patellar rupture risk factors described in the literature. Ruptures usually happen simultaneously and are not necessarily preceded by high energy trauma.

At last, high index of suspicion is needed in patients with end stage kidney disease presenting with chronic knee pain and a clinical picture of bilateral patellar apex avulsion. A prompt surgical

intervention is needed to assure satisfactory treatment outcome and subsequently good quality of life after injury.

## Conflicts of Interest

The author declare no conflicts of interest or sources of funding.

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