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Case Report

Atraumatic Avulsion of the Patellar Tendon to the Tibial Tuberosity in An Adult Without Predisposing Factors: A Case Report

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Abstract

Rupture of the extensor mechanism of the knee usually affects the patella. Patellar tendon injuries are less frequent and occur mainly in its insertion in the inferior pole of the patella and usually are associated with the presence of metabolic, inflammatory diseases or use of corticosteroids. The non-traumatic avulsion of the patellar tendon insertion into the tibia is a rare lesion of which there are few published cases. We present a very atypical case of a man of 40 years old without predisposing factors presented a complete avulsion of the patellar tendon insertion into the tibial tubercle. The patient was treated surgically with a good functional outcome at 5 months' follow-up.

Keywords: Patellar Tendon; Tibial Tuberosity; Rupture; Treatment; Predisposing Factors

Introduction

Ruptures of the knee extensor mechanism can occur in one of five locations: quadriceps muscles, quadriceps tendon, patella, patellar tendon or tibial tuberosity [1,2]. Patellar fracture is the most common among these injuries [2]. The affectation of the patellar tendon is the third in frequency after quadriceps tendon rupture [1]. Acute traumatic patellar tendon rupture in adults generally occurs in young patients (under 40 years old) during sports activities, as a result of the eccentric contraction of the quadriceps when the knee is flexed [3]. Certain metabolic and inflammatory diseases (lupus erythematosus, chronic renal failure, diabetes, rheumatoid arthritis, hyperparathyroidism) and the use of Corticosteroids predispose one to fracture [4], which in most cases is produced through the insertion of the tendon into the inferior pole of the patella [4,5]. There have been reports of partial ruptures of the distal insertion of the patellar tendon in athletes [6]. However, there are very few published about complete patellar tendon avulsions at the tibial tuberosity in adults. We present a very atypical case of complete distal avulsion of the patellar tendon in a healthy patient without predisposing factors [3,4].

Clinical Case

A male patient aged 40 presented at the emergency department with one day history of spontaneous pain and functional impairment of the right knee while walking. He did not remember any trauma or blow to that knee. The patient had a history of schizoid syndrome and depression and was being treated with ASENAPINE and LITHIUM. He had no history of taking medications such as Corticosteroids or Fluoroquinolones and did not remember having previously suffered pain on that knee. Physical examination revealed the presence of knee inflammation, where it was possible to palpate an infrapatellar defect, proximal displacement of the patella and an inability to extend the leg. Radiographs showed high riding patella without fractures and an Insall-Salvati index greater than 0.8 (Figure 1).

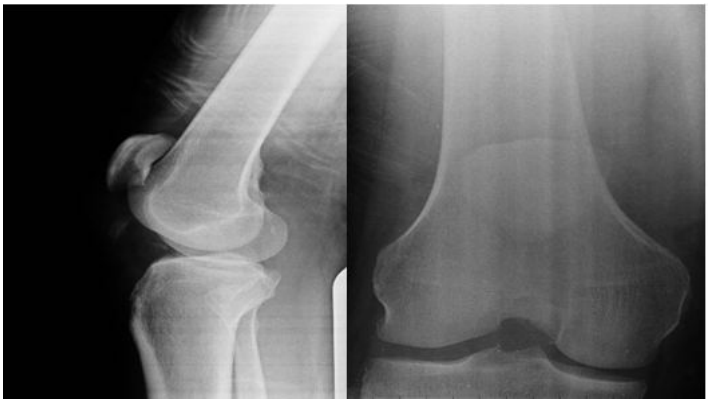

Figure 1: Preoperative AP and lateral X-rays showing a high riding patellae with a calcification into the thickness of the tendon as a result of previous trauma.

Ultrasound testing confirmed the diagnosis of distal avulsion of the patellar tendon with a 2-cm retraction along with the presence of calcification into the thickness of the tendon, possibly a result of previous trauma. The patient was brought to an operating theatre on the same day. After performing limb ischaemia, an anterior approach was done on the knee and the patellar tendon was exposed. The distal insertion thereof was completely avulsed from the tibial tuberosity (Figure 2).

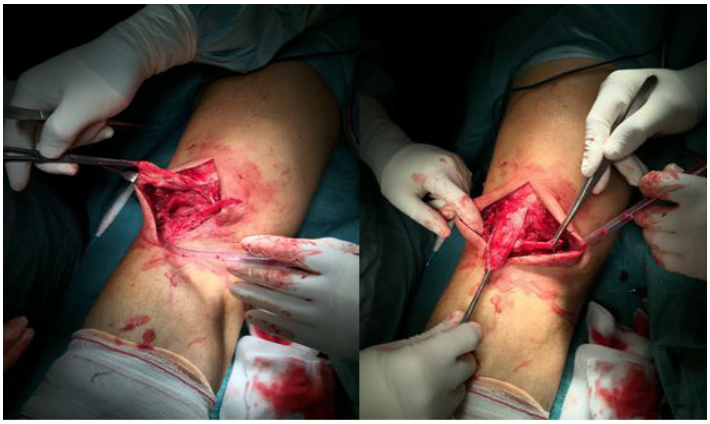

Figure 2: Intraoperatives images showing the complete avulsion of the patellar tendon to the tibial tuberosity.

The tendon stump was debrided and the tibial tuberosity bloody. Both the lateral and medial retinacula were torn. A quadruple Krackow suture was performed on the tendon with Ethibond and was reinserted into the tibial tuberosity after making two 2-mm transverse bone tunnels (one of which is more proximal and the other more distal). The most lateral sutures were passed through the more distal tunnel first and then the proximal. The central sutures, in contrast, were initially passed through the proximal tunnel and then the distal. All of the sutures were knotted above the tendon (Figure 3).

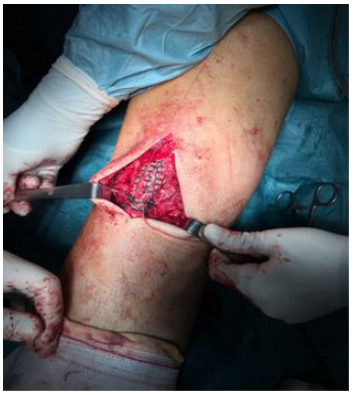

Figure 3: Intraoperative image showing the Krackow suture and the reinsertion of the patellar tendon into the tibial tuberosity.

The repair was reinforced with a 5.5-mm Twin Fix metallic suture anchor (Smith-Nephew) with four sutures. This anchor was placed at the ATT (anterior tibial tuberosity) between the two bone tunnels. Finally, it was protected with a figure-of-eight tension band wiring (Figure 4).

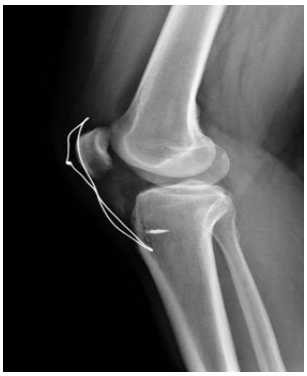

Figure 4: Postperative lateral X-rays showing the patellar in normal position, the metallic suture anchor and the tension band wire.

The patient was allowed to walk with full load of the limb in full extension for 4 weeks. He was insisted to perform isometric quadriceps exercises. He started with gradual flexion exercises four weeks after the operation, beginning with an angle of 45° and increasing 10° per week reaching 90° flexion on the ninth week. The quadriceps counter-resistance exercises were avoided until 12 weeks. From that moment, began a program of quadriceps potentiation and knee flexion farther than 90º. After 5 months, knee mobility was complete. During hospitalisation, a complete medical and endocrinological examination was conducted, finding no predisposing factors.

Discussion

Patellar tendon rupture is the third most common cause of injury to the knee extensor mechanism after patellar fracture and quadriceps tendon rupture. It occurs mostly in young male patients

under 40 years old and usually appears as a result of an eccentric overload on the tendon while doing sports activities, as it can be caused by a sharp contraction of the quadriceps muscle when the knee is partially flexed or due to direct trauma [3,7,8]. In adults, it generally involves the insertion of the patellar tendon into the inferior pole of the patella, less frequently breaking the middle part of the tendon, with distal tendon avulsion of the ATT extremely rare [5].

It is thought that there must be some structural changes in the tendon that could weaken it, thus favouring its rupture. These changes may appear as a result of three situations:

- There are many other illnesses that predispose the tendon to suffer a rupture with minimal trauma. Among them are systemic lupus erythematosus [7], chronic renal failure [9], diabetes [10], rheumatoid arthritis [11], treatment with Fluoroquinolone [12] and hyperparathyroidism [13]. In healthy people, a force of 17.5 times the body weight is needed in order to produce a ruptured tendon [14]. However, in the presence of these diseases, the rupture is produced with significantly less force and may occur bilaterally [7].
- The administration of Corticosteroid, whether local or systemic, has been associated with increased susceptibility of the tendon to rupture [7].
- Excessive chronic local pressure can trigger micro-tears leading to inflammatory and degenerative changes in the tendon. This mechanism has been called "Davidson's Theory" [15-17].

As in previously reported cases, after a thorough clinical and endocrinological examination, no local or systemic disease that predisposes one to tendon rupture was found. The patient led a sedentary lifestyle and did not do any sport. We found no cause to explain the tendon rupture with a trauma of such low energy. The possibility that the patient was suffering from some form of chronic tendinopathy was considered although no previous symptoms were manifested nor was it histologically confirmed. In many cases, the initial diagnosis of a rupture can go unnoticed and often discovered at a later time. In a study of 33 patients with injury to the patellar tendon, 28% of the cases (10) were not initially diagnosed, with a delay of more than one week in 7 of them, thereby delaying repair [18]. Patients usually have pain, swelling, inability to lift the leg straight up or maintain the passively extended knee against gravity. It is possible to identify the presence of a distal infrapatellar defect and to perform a proximal migration of the patella [5,8]. However, if the retinacula remain intact, the patella may be undisplaced, and a certain degree of extension can be performed [5,18]. The classic finding on plain radiography is the "patella alta". In addition, ultrasound, and especially MRI, can be used to differentiate partial from complete injuries and to identify the presence of chronic tendinopathy of the patellar tendon [6,19].

The treatment of these injuries may vary from primary surgical repair with cerclage augmentation, immobilisation of the extended leg for 6 weeks [20,21] to primary repair without augmentation, which allows, right from the beginning, a passive controlled range of motion without any restriction [22]. Reinforcement techniques with cerclage include the usage of the gracilis tendon or the semitendinosus tendon. This reinforcement is generally used in cases where the tendon structure has been reduced in substance or when surgical repair is delayed. With this technique, good results are obtained, but limited knee flexion, limb weakness, low riding patella/patella infera and the necessity for a second surgery to remove the cerclage can arise [20,22]. With primary repair without augmentation, the recovery is faster, less rehabilitation is needed and the individual's return to normal activity is shorter, but it requires highly compliant patients and as well as highly specialised rehabilitation staff [4,22].

Due to the few cases reported in the literature, the treatment of partial distal tendon injuries is discussed although several authors recommend surgical repair rather than conservative treatment, especially in athletes. When the rupture is complete, there is no doubt in the recommendation of surgical treatment. Performing an early diagnosis is fundamental because immediate repair produces better results than a delayed one [5-8].

We have found only two cases of complete patellar tendon avulsions at the tibial tuberosity in adults in the literature. Di Giacomo [4] chose to use FiberWire for tendon repair, immobilising the knee with an orthopaedic apparatus for 5 weeks. Chloros et al [3] used Ticron sutures and G2 Mitek anchor for tendon repair and kept the leg locked in full extension with an orthosis for 6 weeks after the surgery, with weight bearing according to the patient's tolerance. They began a progressive range of motion exercises from 6 weeks and showed good results with a follow-up of two and a half months. We performed a treatment which is more like Chloros' adding a cerclage wire that maintains immobilisation in full extension for two weeks less.

Sleeve fracture is characterised by the avulsion of a large area of periosteal patellar tendon attachment associated with small fragments of subchondral bone [23,24]. This injury may be associated with the use of steroids and generally occurs in adolescence. There are a few cases reported in the literature. In these patients, ruptures caused by the avulsion of the tibial tuberosity are more frequent than by pure patellar avulsion, which is equally rare. The frequency ranges from 0.4 to 2.7% of all epiphyseal injuries [25]. Yee et al. reported a case of simultaneous pure bilateral patellar tendon avulsion from the tibial tuberosity, without involvement of the physis, in an adolescent. Like our patient, he had no history of steroid usage, was completely healthy and denied any previous history of pain or knee inflammation. The patient complained of bilateral knee pain immediately after a jump during a football

match. He was successfully treated by fastening a screw, but transosseous Krackow sutures and tension band wiring were added to reinforce the attachment [26].

Conclusions

Distal patellar tendon avulsion is a very rare injury that requires early diagnosis, reliable fixation followed by a supervised rehabilitation process to obtain the best functional result possible. There are very few cases reported in the literature with very similar surgical treatments. We successfully treated this injury by reinserting the tendon using transosseus suture connecting the shoulder implant and a figure-of-eight tension band wiring with an excellent result in terms of knee mobility at 5 months' follow-up.

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