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Case Report

Krackow technique in patellar tendon rupture with tibial tuberosity avulsion with anterolateral rim of tibial plateau fracture: A case report

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ABSTRACT

Background: Simultaneous occurrence of patellar tendon rupture and tibial tuberosity avulsion with anterolateral rim of tibial plateau fracture is an extremely rare condition that mainly occurs in adolescent population involved in sports activities. It is believed to be due to eccentric contraction of the extensors with the leg fixed to the ground.

Case History: The author present a case of 42 years old male patient who suffered an avulsion fracture of the tibial tuberosity with anterolateral rim of tibial plateau with rupture of patellar tendon in road-traffic accident which is rarely seen.

Method: It was treated with open reduction with cannulated cancellous screw insertion and tension band wiring and patellar tendon repair by krackow technique which showed excellent results post-operatively. The pathophysiology, mechanism of injury, diagnosis and management of this case is reviewed in this article.

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1. Introduction

Tibial tubercle avulsion fractures are rare, accounting for less than 1% of physeal injuries. Similarly, patellar tendon ruptures are uncommon, and their precise incidence is not clearly reported. Both conditions typically require careful diagnosis and appropriate management. Patellar tendon rupture with tibial tuberosity avulsion is a very rare injury that are seen in young adolescents/adult typically involved in sports activities.¹⁻⁴ It has not been reported much in road-traffic accident in adult. In this article, we present an extremely rare case where tibial tuberosity avulsion with patellar tendon rupture with anterolateral rim of tibial plateau fracture occurred in a middle-aged male patient in a road-traffic accident due to direct impact on the knee. It can present challenges in both diagnosis and management. A variety of surgical techniques to

address the tibial tubercle fracture include open reduction and internal fixation with Kirschner wires, Sherman or cancellous screws and cerclage wires,⁵ while techniques to repair the patellar tendon rupture use suture repair of tendon to periosteum or transosseous sutures through the tibia.^{1,5} In this kind of rare injury, the absence of a clearly favored operative fixation approach highlights the challenge in establishing standardized protocols. This case report aims to detail the diagnosis, operative management, and post-operative rehabilitation of a middle-aged individual having a combined patellar tendon rupture with tibial tuberosity avulsion, coupled with an anterolateral rim injury to the tibial plateau. This comprehensive documentation provides valuable insights into the treatment and recovery process for this specific injury pattern. We have obtained the patient's informed written consent for publication of the case report.

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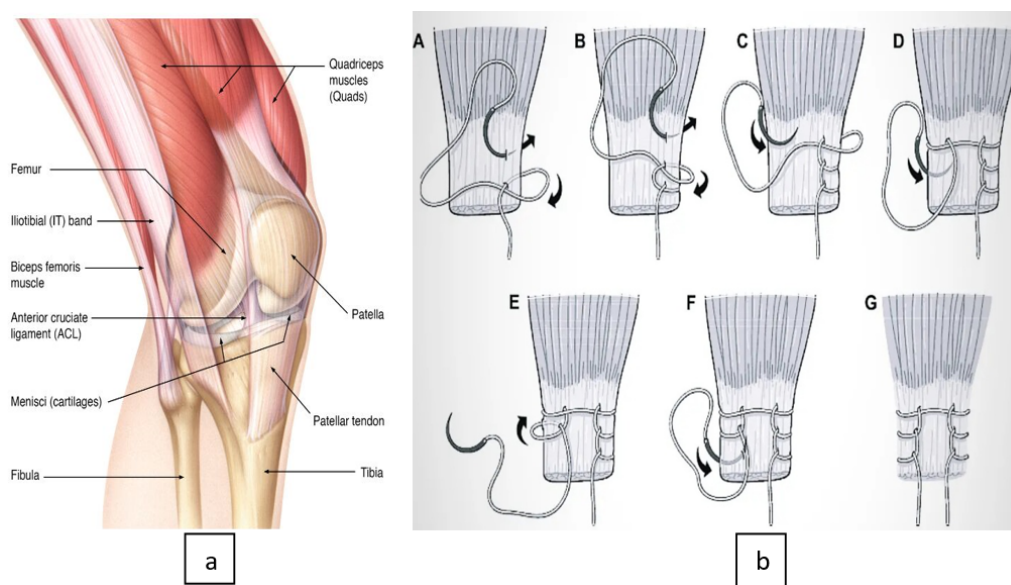


Figure 1: a): Normal anatomy of knee showing patellar tendon; b): Krackow technique for patellar tendon repair

2. Case Presentation

A 42-years old male working as labourer who had fall on knee presented to the hospital with chief complaints of right knee pain with swelling and inability to walk after fall down from bike. On physical examination of the right knee, the skin was intact with no abrasions or open wounds. There was diffuse soft tissue swelling around the knee as well as a moderate knee joint effusion. He had severe tenderness on palpation directly over the tibial tuberosity and patellar tendon, with an asymmetrically high-riding patella on palpation compared to the contralateral extremity. A defect at the inferior insertion of patellar tendon palpated. There was no neurovascular compromise. The extensor mechanism was compromised. Distally, he demonstrated full motor strength with ankle and great toe dorsi- and plantar flexion. Radiographs demonstrated tibial tuberosity avulsion with anterolateral rim of tibial plateau fracture extending upto proximal tibial physis with concomitant patella alta. MRI was advised but due to economical constraints, it was omitted and CT scan was done instead.

Patient was taken for surgery after 24 hours of presentation. An anterolateral approach to the knee was used. First overlying traumatic haematoma was evacuated and fracture site exposed. The radiographic findings of tibial tuberosity avulsion and patellar tendon rupture were confirmed intraoperatively. We started with open reduction and fixation which was achieved with tension band wiring with the help of kirschner wire. Transosseous suture with two continuous locking suture with ethibond 5 were taken. Tibial tubercle piece fixed with tension band wiring and cannulated cancellous screw. Patellar tendon sutured through krackow technique.

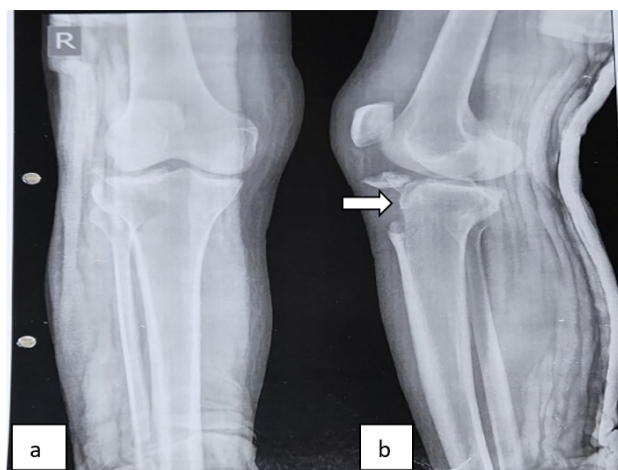


Figure 2: a): Anteroposterior and b): Lateral radiographs of right knee

3. Result

Our report suggests that cancellous screws, along with tension band wiring and K-wire is effective in fixing patellar tendon rupture with tibial tubercle avulsion. The positive outcome, allowing patient to return to routine activities without any complications, emphasizes the importance of preserving the bony avulsion of the tibial tubercle to enhance the overall holding strength of the construction.

4. Discussion

Tibial tuberosity avulsion is more common in adolescent population than any other because of an open physis.

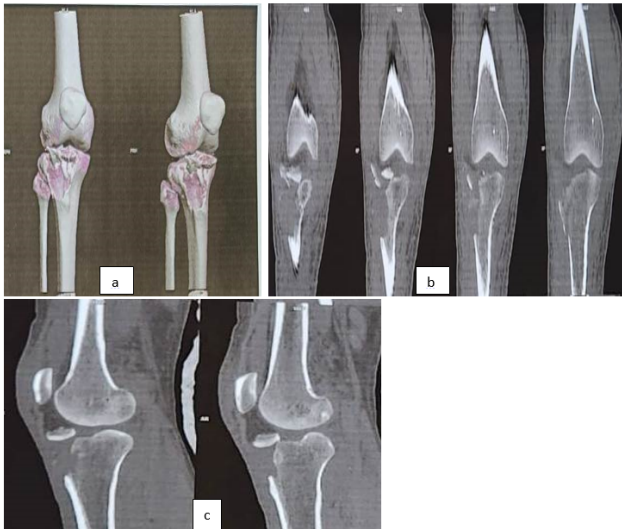


Figure 3: a): The computed tomography scan (b): Coronal section and c): Sagittal section) study demonstrates the tibial tubercle fracture

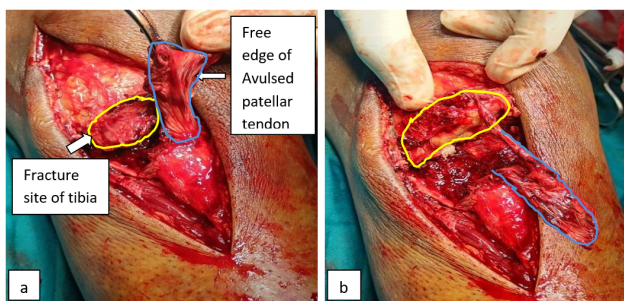


Figure 4: a,b): Intraoperative images showing tibia fracture site

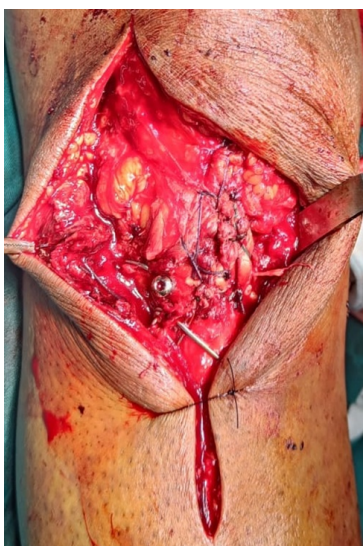


Figure 5: Showing final intraoperative appearance.

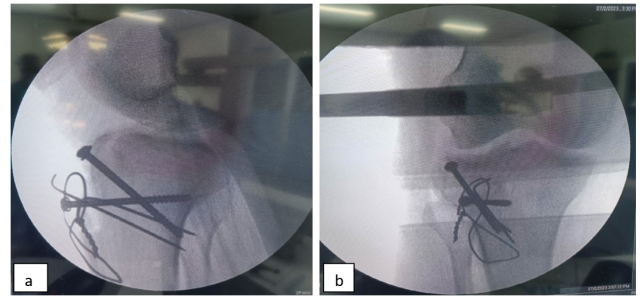


Figure 6: a,b): Showing review of final C-arm images

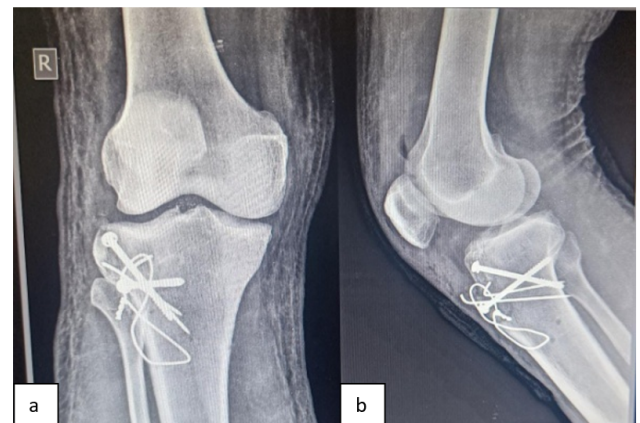


Figure 7: Showing follow-up radiographs of right knee. a): Anteroposterior; b): Lateral



Figure 8: Showing follow up at 1.5 months



Figure 9: Showing follow up at 6 months

Systemic illness like diabetes, chronic steroid use, quinolone treatment, chronic renal failure^{1,6} may increase risk of patellar tendon rupture because of tendon degeneration.⁷ This article describes the case of a simultaneous patellar tendon rupture with tibial tuberosity avulsion fracture in a middle-aged person in a road-traffic accident. We believe the mode of injury in our patient was direct impact on the knee due to accident causing tibial tubercle fracture with anterolateral rim of tibial plateau fracture with patellar tendon rupture. This has been reported seldomly. Zernicke et al. reported that a load of 17.5 times the body weight is required to rupture the human patellar tendon.⁷ In tibial tuberosity avulsion fractures, the initial avulsion may be followed by rotation, causing tension in the surrounding soft tissues. The presence of rotation is often evident on radiographs. This mechanism is plausible in our case. Desai and parikh reported that a high-riding patella, palpable gap at the site of patellar tendon and an inability to perform active extension are important findings suggestive of patellar tendon injuries.¹ Though physical examination is important, it is difficult to perform because of pain and swelling. In our case, fractured fragment was large enough for screw fixation and tension band wiring was required in our patient. Tension band wiring has been done to provide additional stability to the tibial tubercle fracture and institute early mobilization of the knee joint. In patients with radiographic evidence of tibial tubercle fracture, lateral flexion extension radiographs, ultrasonography, computed tomography and/or magnetic resonance imaging are important to rule out concomitant patellar tendon avulsion.^{8,9} Previously, isolated distal patellar tendon avulsions have been treated with transosseous sutures or suture anchors.^{1,10,11} In adolescents, combined lesions have been treated using a variety of methods, including staples, wires or suture tape, tension banding, lag screws, suture anchors, and/or transosseous sutures.^{1,12} The preferred suture technique for patellar tendon repair is the krackow technique for most of cases and bunell technique is also used in some cases. While there may not be specific clinical studies comparing treatment methods for this particular scenario, achieving stable fixation of the bone fragment and ensuring proper repair and reinsertion of the patellar tendon are generally considered crucial for satisfactory clinical outcomes.

5. Conclusion

Patellar tendon rupture with tibial tuberosity avulsion with anterolateral rim of tibial plateau fracture is very rare and challenging condition and its incidence is very less. The combination of open reduction with insertion of cancellous screw and tension band wiring with K-wire and patellar tendon suturing via krackow technique gives excellent and satisfactory clinical outcome.

6. Source of Funding

None.

7. Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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