International Journal of Research in Orthopaedics
Jain MH et al. Int J Res Orthop. 2024 May;10(3):689-692
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20241124

Case Report

Tibial tuberosity fracture in adult as an unusual pattern of injury

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Received: 10 February 2024
Accepted: 14 March 2024

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ABSTRACT

Tibial tuberosity avulsion is an uncommon fracture in adults, such lesions typically seen in adolescent male with well-developed quadriceps, ligaments when they are stronger than growth plate. We described a case of 51-year-old gentlemen had direct trauma to left knee, no risk factors were identified, not able to walk, difficulty in straight leg raise test, radiograph of left knee showed tibial tuberosity avulsion fracture. The fracture was treated with open reduction and internal fixation, f/u with successful rehabilitation which results in good range of motion and excellent function at knee joint. The aim of study is present unusual and rare case of tibial tuberosity Avulsion fracture in adult, early diagnosis, surgical mode of treatment, post-surgery rehabilitation and possible complications.

Keywords: Tibial tuberosity, Patellar tendon, Modified Lyshlom's scoring system, Knee range of motion

INTRODUCTION

Tibial tuberosity avulsion is an uncommon fracture in adults. Constituting <3% of all epiphyseal injuries and 1% of all physeal injuries in skeletally immature population, such lesions typically seen in adolescent male with well-developed quadriceps, ligaments when they are stronger than growth plate.[1,2] There are two possible ways for this injury: strong quadriceps contraction during knee extension such as jumping or by violent flexion of the knee against a tightly contracting quadriceps.[3-6] The purpose of this study is to present a rare case of a fracture of the tibial anterior tubercle in an adult and the results of the operative treatment.

CASE REPORT

A 51 years man had direct trauma to left knee due to the fall of a wood cutter machine and was admitted to the emergency department of our hospital. He complained of pain and was unable to bear weight on the left knee or extend the knee. The patient graded the pain as 9/10 on a visual analogue scale for pain at the time of injury. He had a history of ischemic heart disease and diabetes currently on medication. He denied any history of head injury or loss of consciousness, any past history of chronic knee pain, difficulty walking. Examination revealed horizontal lacerated wound of 7x4 cm over anterior knee with tenderness at the tibial tuberosity and knee swelling. He was unable to straight leg raise on his left side. A radiographic examination showed avulsion fracture of tibial tuberosity.

Investigation

Hematological investigations were all within normal limits.

Treatment

The patient underwent surgical fixation. Previous wound was extended as an incision on both sides. Intraoperative

finding showed avulsed segment of tibial tuberosity and tears along the medial edges of patellar tendon in the extensor retinaculum. Krackow sutures were taken to repair the patellar tendon with ethibond (5-0) and tied over proximal tibial tunnel. Internal fixation of a tibial tuberosity with a 4 mm cannulated screw with washer to proximal tibia. Extensor retinaculum tears were repaired.

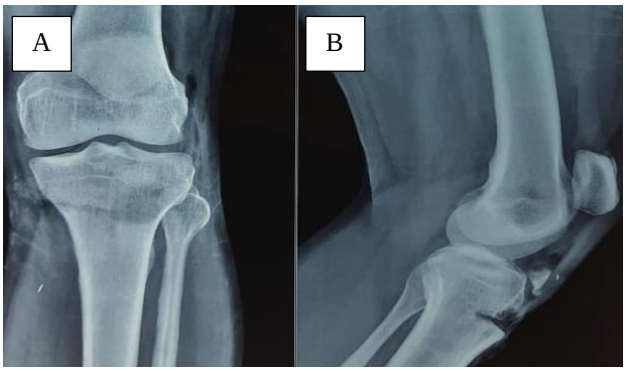

Figure 1: Pre operative A) anteroposterior and B) Lateral radiograph of left knee joint suggestive of tibial tuberosity avulsion.

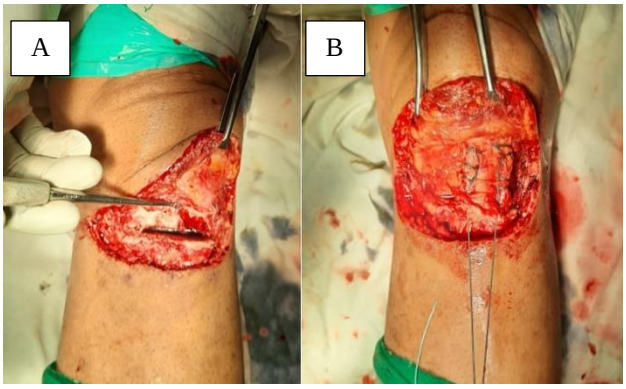

Figure 2: Images during the surgery showing A) Avulsion of tibial tuberosity with tear of medial edge of patellar tendon and B) repair with krackow technique.

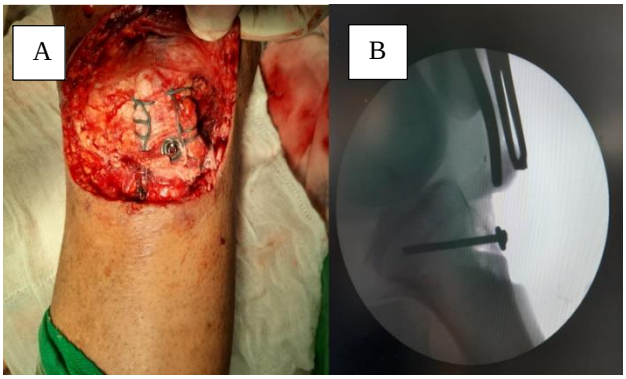

Figure 3: Images during surgery showing A) fixation of tibial tuberosity with 4 mm canulated screw and B) C arm picture showing reduction of bony fragment and fixation.

Postoperatively patient immobilized in long knee brace for 6-week, closed chain range of motion and nil weight bearing for 3 week and active exercises done after 3 weeks with progressive increase in range of motion to prevent quadriceps weakness, range of motion at 6 week was around 90 degree without any extension lag and 6 month full range of motion is obtained.

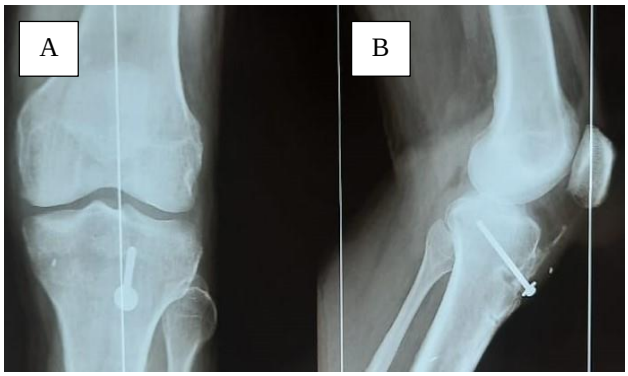

Figure 4: A) 1 year follow up anteroposterior and B) lateral X-ray of left knee joint suggestive of bony union of tibial tuberosity fragment.

Figure 5: Clinical picture suggestive of full range of motion without any extension loss.

Patient was evaluated on 3, 14, 30, 42 days and 2month and every monthly for six months, then once in three months for 1 year, patient followed up at 1 year with normal day to day activities with radiograph suggestive of bony union (Figure 4-5). Knee evaluation was done with modified Lysholm's score system.[7] We obtained an average 92 points, which is considered as excellent score according to above score system.

DISCUSSION

Tibial tuberosity avulsion fractures are extremely uncommon in adults. In the above case it's due to direct trauma. The mechanism of injury is usually due to strong quadriceps contraction with knee extension resulting from a jumping sports activity.[3-6] It most always occurs in males. Kang et al described another direct trauma to the knee resulting in a fracture of the tibial tubercle in 84-year-old man.[7,8] The injury inadvertently occurs due to eccentric

contraction of the quadriceps during pushing off or landing while jumping, resulting in severe traction on patellar tendon insertion and if force is greater than the strength of tibial tubercle, the result will be a fracture.[9] Some studies correlate avulsion of tibial tuberosity with associated injuries of the knee as meniscal tears, collateral ligaments ruptures, capsule avulsion and intra articular fracture but we could not find any on the clinical examination.[10]

The fracture of tibial tuberosity in adults is usually due to a complication of anterior cruciate ligament reconstruction with autologous patellar tendon graft. There are studies suggest that Osgood-Schlatter lesion, Osteogenesis imperfecta are predisposing factor for tibial tuberosity avulsion.[11,12] Some systemic disorder are associated with extensor mechanism injury includes chronic renal failure, chronic steroid use, lupus erythematous and arthritis. In this case patient was without any previous surgery or without predisposing factors to injury. In our set up whenever there is a trauma to knee always evaluated with X-ray as first and low-cost investigation. If fracture line extending to joint then evaluated with CT scan. In case of suspecting soft tissue, injury MRI will be needed. Most of the classification of fractures of the tibial tuberosity are related to the growth phase and the presence of the physis. Watson-Jones and Ogden described classification systems for immature skeletons.[13] For this reason we did not use any specific classification of fractures of the tibial tuberosity. Classification we used in this case based on disruption of extensor mechanism of knee, which is further subdivided into rupture of quadriceps tendon, patellar fracture, patellar ligament injury, tibial tuberosity avulsion fracture.[14] This type of fractures usually affects children and immature skeleton than adult where the risk of joint stiffness is low. So, we prefer use of long knee brace for 6 weeks with initial 3-week closed chain exercise and active exercises after 3 weeks with progressive increase in range of motion, gain an adequate strength in quadriceps. Although there is controversy in keeping knee immobilized or not and postoperative mobilization protocol.[15] The outcome of tibial tubercle fracture is generally good after surgical treatment but complications like joint stiffness and rerupture (loss of fixation), skin necrosis, genu recurvatum, deep vein thrombosis must be carefully handled postoperatively in adults.

Clinical massage

Careful physical examination is essential for diagnosis of uncommon lesions. Age of the patient and direct trauma are not directly related to tibial tuberosity fracture but it can happen. Identification of predisposing factor and associated knee injury are important for management protocol. Open reduction and internal fixation with preservation of extensor mechanism of knee joint is the key goal for treatment. While treating tibial tuberosity fracture joint stiffness must be taken care of along with gradual increase in range of motion, and prevent postoperative rupture.

CONCLUSION

In our opinion the goal of treatment is early diagnosis and anatomical reduction of displaced fragment, restoration of extensor mechanism alignment. Open reduction of displaced fragment and fixation with cancellous screw is effective. This method resulted in an excellent function according to modified Lysholm's score system with follow up period of 1 year.

ACKNOWLEDGEMENTS

Authors are thankful to the staff of hospital for their support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Jain MH, Kartik PN, Iyer N. Tibial tuberosity fracture in adult as an unusual pattern of injury. Int J Res Orthop 2024;10:689-92.