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## Case report

### TIBIAL TUBEROSITY AVULSION FRACTURE IN AN ADULT- A RARE CASE REPORT

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## ABSTRACT

Tibial tuberosity avulsion fracture in an adult a rare case report. Avulsion of the tibial tuberosity is not an uncommon entity seen in adolescents. This injury is a very rare event in adults, with only a few cases reported in literature. Here we present a very rare case of an adult having tibial tuberosity avulsion with fracture femur. We performed an open reduction and internal fixation of the tibial tubercle using a cortical screw and tension-band wire. Patient had a good functional recovery after Six weeks of follow up.

**Keywords:** Tibial Tubercle, Avulsion, Extensor Mechanism, Tension Band Wiring.

## INTRODUCTION

Tibial tuberosity avulsion fracture in an adult- a rare case report. Avulsion of the tibial tuberosity is not an uncommon entity seen in adolescents<sup>1</sup>. This injury is a very rare event in adults, with only a few cases reported in literature<sup>2,3</sup>. Avulsions distally at the tibial tubercle are rarer in adults, but have been reported in combination with acute tibial tubercle avulsions fractures in adolescent athletes<sup>4</sup>. These are very uncommon injuries, with only 170 cases reported since 1853<sup>5,6</sup>.

Osgood- schlatter disease (an osteochondritis of the tuberosity of the tibia) and associated tibial tubercle avulsion fractures are common in children with an open physis due to a relatively weak bone at the bone tendon interface near the epiphysis. They account for less than 3% of all physical injuries in children<sup>7</sup>.

The above mentioned factors do not play a role in causing such injuries in the adults. Hence, these injuries are extremely rare in adults, with only case reports in the literature.

**Table1: Classification of tibial tuberosity fracture<sup>8,10</sup>:**

Ogden Classification (modification of Watson-Jones)	
Type I	Fracture of the secondary ossification center near the insertion of the patellar tendon
Type II	fracture propagates to proximal to the junction with the primary ossification center
Type III	Fracture extends posteriorly to cross the primary ossification center
Type IV	Fracture through the entire proximal tibial physis
Type V	periosteal avulsion of the extensor mechanism from the secondary ossification center

Here we report an exceptional case of a middle aged man who sustained a Tibial tubercle avulsion fracture, its natural history in adults, a possible explanation of the mode of trauma and portrayal of the surgical practice and a successful post-operative rehabilitation regime.

## CASE REPORT

A 34-year-old male had a history of a road traffic accident due to hit and run by a car, while the patient was on a motorbike. He presented to us with right thigh pain and right knee pain with swelling and on examination she had swelling of right thigh and the limb being in complete external rotation was suggestive of a shaft femur fracture. He also had swelling and ecchymosis anteriorly along the proximal tibia, particularly over the tibial tuberosity area. Active extension of his knee was not possible.



**Fig 1- x-ray lateral view of left knee and proximal leg**

Plain roentgenogram of the femur and knee revealed a mid third shaft femur fracture and an avulsion fracture of the tibial tuberosity.

He was immobilized with an above knee posterior splint and skin traction.

Open reduction and internal fixation via an incision centering directly over the tibial tuberosity was taken. Our aim to do this was to have an accurate anatomical reduction of the tuberosity fragment and restoration of extensor mechanism configuration and function.<sup>8</sup>

On sharp dissection of the area a small 2x1 cm tuberosity fragment was found avulsed from the base, but was attached to the patellar tendon. With the knee in extension the fragment was reduced back to its crater and two 1.5 mm k-wires passed through it, and engaged in the posterior cortex of tibia under direct guidance of image intensification. A tension band construct was carried out, thus maintaining the stability and reduction.

The torn edges of parapatellar retinaculum were sutured meticulously to the side running periosteum of tibia to get a watertight closure. The Intramedullary interlocking nail was done for the shaft femur fracture.

Patient was immobilized in a long knee brace for four weeks, after which passive knee exercise and active

assisted exercise were started. Six weeks follow up x-ray showed satisfactory union of the tubercle fragment after which active extension was commenced.



**Fig 2: Postoperative x-ray lateral view of left knee and proximal leg**



**Fig 3: Postoperative x-ray AP view of left knee and proximal leg**

## DISCUSSION

Avulsion fractures of the tibial tuberosity are uncommon injuries.<sup>9</sup> In adolescents this type of fracture accounts for less than 3% of all epiphyseal plate injuries.<sup>10</sup> Usually such an injury in an adult would produce a patellar tendon tear. Complications of tibial tuberosity avulsion: Recurvatum deformity, Compartment syndrome, Loss of range of motion and bursitis<sup>12, 13</sup>

The stresses generated by the active contractions of the quadriceps muscle are borne by the patellar tendon attachment at the tibial tuberosity. Failure of the bone usually occurs at the site of muscle insertion. Tensile forces also create ligament avulsions. A ligament avulsion, or an avulsion fracture, occurs more frequently in children than in adults. Avulsion fractures occur when tensile strength of the bone is not sufficient to prevent fractures.

The open physis in adolescence is incapable of resisting the extreme tensile forces and results in an

avulsion, but these factors are precluded in adults sustaining a similar trauma. Such injuries can occur on landing after a fall or a jump which produces a rapid contraction of the quadriceps mechanism against a partially flexed knee with the foot planted or a direct trauma to the knee. But due to associated shaft femur fracture and ecchymosis over the knee we conclude, in our case it may be due to direct trauma to the knee.

The scenario in adults is somewhat different in adults where repeated stresses in the same enormity and direction may cause inflammation of the tendon. Different modalities of treatment include: Nonoperative long leg cast in extension for 4-6 weeks. Operative modalities: 1) Closed reduction and percutaneous fixation (using a screw) 2) Open reduction and internal fixation (using cannulated screw) 3) Open reduction with arthrotomy and internal fixation 4) Open reduction and soft tissue repair.<sup>14</sup> **Postoperative care:** 1) Immobilization with long leg cast for 4-6 weeks and strict non-weight bearing. 2) Rehabilitation with a progressive extensor mechanism strengthening and return to mobilization no sooner than 3 months.

Here, owing to a very small fragment it was difficult to pass a cannulated screw through the fragment to fix it. Hence, two small k-wires of size 1.5 mm have been passed through the fragment to fix it. These wires are made bicortical in the posterior cortex of the tibia. A cortical screw with washer is passed in an antero-posterior direction. A tension band construct was made with one loop passing under the patellar tendon and other through the screw and washer.

The prospective advantage of using a tension-band wire fixation is early rehabilitation and weight-bearing. Cast immobilization for extended periods of time cause inhibition, deconditioning and quadriceps muscles wasting. This leads to problems in rehabilitation at a later stage.

## CONCLUSION

Thus, on a concluding note some interesting points worth mentioning about this case are: The age of the patient who is middle aged, secondly mode of trauma is direct fall, associated injury in the form of shaft femur fracture and our decision to surgically intervene to give the patient early rehabilitation.

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## Conflict of interest: Nil

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