



## Simultaneous Bilateral Tibial Tubercle Avulsion Fracture in a case of Pre-Existing Osgood-Schlatter Disease (OSD)

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### ABSTRACT

#### Introduction:

Osgood-Schlatter disease (OSD) is a well known condition, characterized by pain over the tibial tubercle with subsequent tubercle prominence. Avulsion fracture following OSD is a rare complication. We report an unusual case of simultaneous bilateral tibial tubercle avulsion fracture in a 16 year old boy who was a known case of OSD.

#### Case presentation:

A 16 year old boy a known case of OSD presented to the outpatient department with history of jumping from the school compound wall (two feet height) while playing, followed by severe pain around anterior aspect of both knees and difficulty in walking. Radiographs showed bilateral tibial tubercle avulsion fracture. He was treated successfully with open reduction and internal fixation with tension band wiring. At the end of 22 months the patient was symptomatically relieved and both the tuberosities were united with the main bone.

#### Conclusion:

Even though bilateral Osgood-Schlatter disease (OSD) is a well known condition, one should always keep in mind the risk of tibial tubercle avulsion fractures while treating a case of OSD. Patient should be advised not to involve in strenuous activities till the disease subsides radiologically or till skeletal maturity.

**Keywords:** Osgood-Schlatter disease (OSD); avulsion of tibial tubercle; traction apophysitis; tibial tubercle fracture.

### INTRODUCTION

Osgood-Schlatter disease (OSD) is a well known clinical condition, characterized by painful tender disabling swelling over the tibial tubercle [1]. In 1903, Osgood in the United States and Schlatter in Germany reported this condition independently for the first time [1, 2].

Avulsion of the tibial tubercle in an adolescent is rare and is usually produced by sudden violent contraction of the quadriceps muscles. Bilateral tibial tubercle avulsion fractures are extremely rare [3-5]. We report a case of simultaneous bilateral tibial tubercle avulsion fracture in a 16 year old boy who was a diagnosed case of OSD.

### CASE REPORT

A 16 year old boy presented to the outpatient department in November 2009 with the history of painful swelling around the anterior aspect of both proximal tibia. On examination both the tibial tubercles were tender and prominent. Knee joints examination did not have any positive findings. He was diagnosed clinically to have bilateral OSD and treated conservatively with NSAIDS and compression bandage. Patient was symptomatically improved with the treatment.

He was brought to the outpatient department after 2 months in February 2010 with the history of jumping from the school compound wall (two feet height) while playing, followed by severe pain around anterior aspect of both knees and difficulty in walking. After few minutes the knees were swollen and he was unable to bear weight on both the legs and to flex and extend the knees. There was a palpable defect distal to the tibial tubercles with high riding patellae.

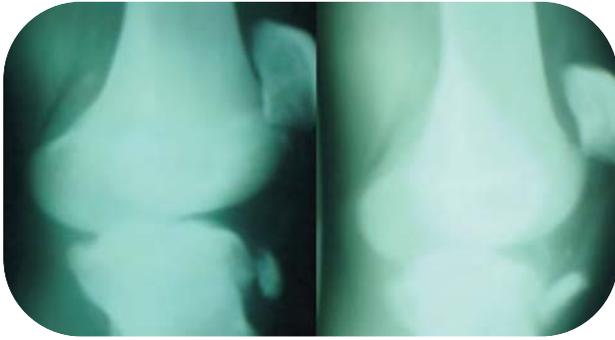
Radiographs of both knee joints AP and lateral views were taken which showed bilateral tibial tubercle avulsion fractures. (Fig.1) According to Ogden classification [6] right side was type IIa and left side

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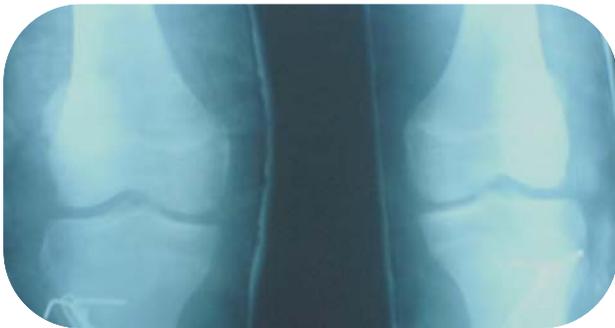
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**Figure 1:** Radiograph of Right and left knees respectively showing Ogden type IIa AND IIb avulsion fracture of the tibial tubercle.

was IIb tibial tubercle avulsion fracture. Both sides were treated with open reduction and internal fixation with Tension Band Wiring (TBW) (Fig. 2 and 3).



**Figure 2:** Postoperative radiographs of Right knee with TBW in situ

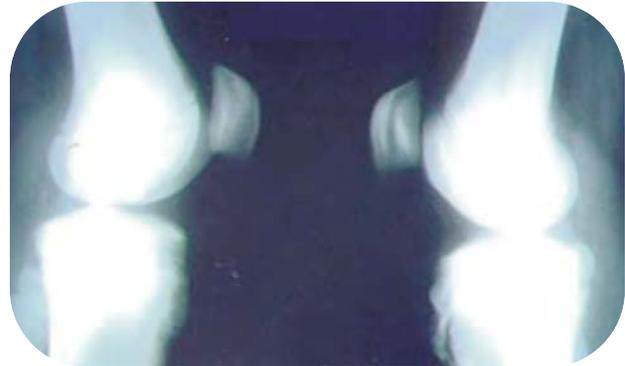


**Figure 3:** Postoperative radiographs of Right knee with TBW in situ

### SURGICAL PROCEDURE

Patient was positioned supine under tourniquet control. 7 cm medial parapatellar incision was taken to expose the fracture site. Fracture was reduced and confirmed clinically and radiologically under image intensifier and fixed with two 2 mm K wires and tension band wiring. The figure-of-eight wire was passed deep to the patellar ligament and through a transosseous tunnel 4cm distal to the fracture. Kirschner wires provided rotational stability, and were

inserted through the proximal part of the tubercle and engaged the posterior cortex of the tibia under direct guidance of image intensification. Patient was put on cylindrical slab for 2 weeks and gradual mobilization of knee was started. Patient was allowed to bear weight with the help of walking frame.



**Figure 4:** 22 months follow up radiograph of both knees showing well united tuberosities

Patient was followed up clinically and radiologically at 6 weeks, 12 weeks, 6 months and 12 months and 22 months (Fig. 4). Implants were removed at the end of 12 months. At final follow up the knee range was 0 to 120° and completely pain free with patient doing all his activities without any functional limitations

### DISCUSSION

A painful, tender disabling swelling about the tibial tubercle in adolescence is characteristic of OSD. The earliest record of traction epiphysitis is of a middle aged male, dated ninth to tenth century A.D. on the archaeological evidence found in the late saxon burial ground of St. Catherine, Thorpe, England [7].

The disease starts in the second decade of life and usually resolves spontaneously without any sequelae by the time of skeletal maturity. Boys in the early second decade of life are predominantly affected. Less than one-quarter of patients develop pain over the tibial tubercles [8]. Initially, the tibial tubercle is painful following physical activity, may be due to chronic micro trauma to the tibial tubercle secondary to overuse of the quadriceps muscle and gradually becomes prominent and constantly painful. Radiological examination demonstrates a round regular ossification over the tubercle. MRI will show the patellar tendon attachment more proximally and in a broader area to the tibia (Routine MRI was not done in our case as clinico - radiological findings were correlating with the diagnosis).

Clinical conditions like chondromalacia patellae, patellar tendinitis, osteomyelitis of proximal tibia, pes anserinus bursitis and Sinding – Larsen - Johanson



syndrome should be considered as differential diagnosis and should be ruled out before considering OSD.

Avulsion fractures of the tibial tuberosity are uncommon, comprising only 0.4 to 2.7% of all epiphyseal injuries [9]. The mechanism of avulsion injury usually consists of violent knee flexion against a tightly contracted quadriceps or a violent quadriceps contraction with a fixed foot like in bad landing from a jump [10]. In our patient the avulsion was caused after landing from a two feet high jump. Also our patient was already a diagnosed case of OSD on conservative management, but was not complying with our advice to refrain from sports activities. OSD has been reported to be a associated risk factor for tibial tuberosity avulsion [11-18] although scientific correlation is still inconclusive [14]. Ogden commented that structural modification in the physeal cartilage, probably change in the columnar cartilage to fibrocartilage may weaken the physis to tensile strain [6,12]. Our case supports the hypothesis that patients with OSD have a risk for developing tibial tuberosity avulsion and should be allowed for a adequate period of restricted activities, specially sports related activities. There have been 230 published cases with tibial tuberosity avulsion fractures, [19] but simultaneous bilateral tibial tubercle avulsions are uncommon, with only few cases reported [3-5,21-25] and reports in a case of pre-existing OSD are still rare [6,15, 16,17,18]. Thus our case is among rare bilateral presentations that strengthen the association between pre-existing OSD and tibial tubercle avulsion fracture. Accepting the association between OSD and avulsion fractures, such children should be advised a period of restricted activities to avoid this complication. We reviewed the literature with respect to duration between diagnosis of OSD and avulsion fractures. Ogden et al reported a single case with bilateral avulsion with preexisting OSD. However this case was asymptomatic and was not diagnosed previously [6]. Inoue et al too reported one case with pre exiting asymptomatic OSD but did not comment on the duration between diagnosis and avulsion [15]. Mosier and Stanitsk [16] reported another case that presented with avulsion fracture after three weeks of diagnosis of OSD. Chow et al reported one case of avulsion fracture with prior diagnosis of OSD 6 months back [17]. Levi et al reported one case in 13 year old boy who had history of OSD in left knee since one year [18]. Our case presented with avulsion fracture two months after diagnosis. Thus a time variation from 3 weeks to 1 year has been reported between diagnosis of OSD and avulsion fractures, however data is insufficient to make comment on the period after diagnosis of OSD, in which activities should be restricted to prevent tibial avulsion fracture. It would be probably safe to have

sports restrictions up till the physeal fusion or complete radiological healing of the primary OSD. The latter point was not commented on in the reviewed literature and probably a non healed OSD will have a higher propensity for avulsion fractures as seen in our case.

Classification of the tibial tubcle avulsion fractures is slightly confusing. The original classification system was provided by Sir Reginald Watson-Jones which defined three types. Type I was an avulsion of a small part of the tibial tubercle, distal to the proximal tibial physis. Type II extended across the physis but did not enter the knee joint. Type III was an avulsion which extended proximal to the physis into the knee [26]. This classification was modified by Ogden et al [6] to include displacement and comminution. Ryu and Debenham described a fracture of the tibial tuberosity that extends posteriorly along the proximal tibial physis creating an avulsion of the entire proximal epiphysis (type IV) [27]. In our case both knee had Ogden class II fractures and were treated with K wires and tension band wiring. Open reduction of type II injuries is essential [30] and many methods of fixation for avulsed tibial tubercle are available like tension band wiring, screw fixation with washer, suture anchor fixation, bone staples fixation etc [19,29-30]. In Ogden type III injuries where there is comminution and intraarticular extension the range of motion may be limited [3, 30], however as our case was extraarticular type II injury the recovery of range of motion was full as reported by other such studies [6, 15,21,30].

#### CONCLUSION:

We report a rare case of bilateral tibial tuberosity avulsion fracture in a case of pre-existing OSD. This case shows association between these factors and we can probably suggest to patients to restrict activities till complete radiological healing of the OSD to prevent risk of tibial tubercle avulsion. Our case was an extraarticular avulsion and open reduction internal fixation results in good clinical and functional results.

#### CLINICAL MESSAGE

*High strain and sports activities should be restricted till healing of diagnosed OSD to prevent risk of tibial tubercle avulsion fractures. In cases with avulsion fracture of tibial tuberosity in adolescent, K wire and tension band wiring give good clinical and functional result.*

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