

# Bilateral Tibial Tubercle Avulsion Fractures Associated With Osgood-Schlatter's Disease

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**A**vulsions of the tibial tubercle are rare injuries with a reported incidence of lower than 3%.<sup>1,2</sup> Although anecdotal evidence in case reports supports a relationship between Osgood-Schlatter's disease (OSD) and the risk for tibial tubercle avulsion fractures, no studies have established a definite connection.

This report represents a case of an individual with pre-existing OSD who sustained sequential bilateral tibial tubercle avulsion fractures.

## CASE REPORT

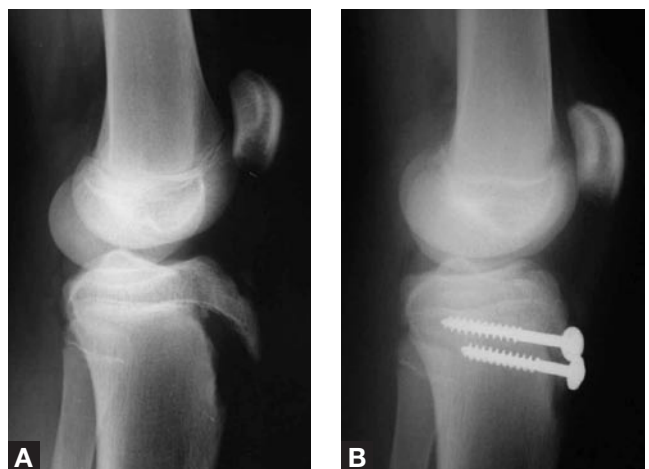
A 16-year-old male with a documented history of bilateral OSD presented after he felt a pop in his left knee while playing basketball and subsequently could not bear weight on his left lower extremity. On presentation, the patient had diffuse swelling over his left knee and proximal patellar migration, and he was unable to actively extend his knee. The knee was otherwise stable, with no evidence of ligamentous injury. A lateral roentgenogram showed a type III tibial tubercle avulsion fracture that extended into the articular surface (Figure 1A). The patient was treated with open reduction and internal fixation under general anesthesia. An anterior midline incision was used, the periosteal flap was elevated to expose the fracture, and the fracture fragment was stabilized and reduced with a 0.062-inch Kirschner wire. An anatomic reduction was confirmed using fluoroscopy, and two 6.5-mm cancellous screws were used to fix the fracture (Figure 1B). The large periosteal flap was resutured to its anatomical position using absorbable suture.

Postoperatively, the patient was treated with a knee immobilizer with no weightbearing for 6 weeks. He did well, and his fracture healed without any further problems. About 2 months later, the patient presented with the same

history of playing basketball and feeling a pop on the contralateral side. Examination of the knee revealed the same findings as for the previous injury, but the lateral roentgenogram showed a type II tibial avulsion fracture (Figure 2A). The patient was treated in the same manner as described above with open reduction and internal fixation (Figure 2B).

## DISCUSSION

Case reports have shown that these injuries most commonly occur in males aged 13 to 17, when physal closure has not yet occurred. The mechanism of injury has been described as passive knee flexion against a strongly contracted quadriceps or as a strong quadriceps contraction with a fixed foot and the knee in flexion. This injury was initially reported and classified by Watson-Jones<sup>3</sup> with a description of the fracture pattern. In a type I injury, the tubercle is hinged upward without displacement at the proximal base. In type II, the tubercle is avulsed and retracted proximally, and in type III, a larger portion of the epiphysis is involved and the fracture extends across the physis and through the articular surface.<sup>3</sup> Ogden and colleagues<sup>2</sup> modified the classification by describing the fracture pattern in association with the ossification centers. Activities that commonly cause this type of injury include jumping or landing sports such as basketball and gymnastics.<sup>4</sup> Ogden and colleagues<sup>2</sup> differentiated OSD from tibial tubercle avulsion fractures by indicating that



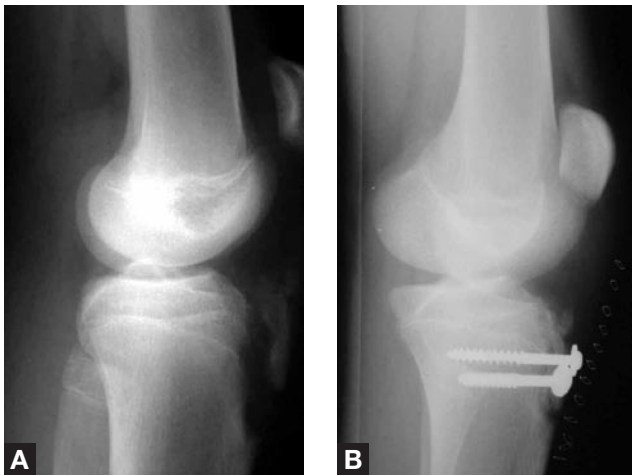
**Figure 1.** (A) Lateral radiograph of the initial injury showing a type III tibial tubercle avulsion fracture. (B) Postoperative lateral radiograph of the fracture reduced and two 6.5-mm cancellous screws used for fixation.

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**Figure 2.** (A) Lateral radiograph of the second injury occurring 2 months later showing a type II tibial tubercle avulsion fracture. (B) Postoperative lateral radiograph of the fracture reduced and two 6.5-mm cancellous screws used for fixation.

the former is a chronic and often asymptomatic injury, whereas the latter is acute and symptomatic.

Patients with OSD typically describe symptoms of swelling, warmth, and tenderness over the promi-

10% in teenage girls, and adolescent athletes show a 20% predilection as compared with 5% in non-athletes. Although there is a relatively high incidence of OSD in adolescent athletes, the occurrence of tibial tubercle avulsion fractures in adolescent athletes with OSD has not been reported in the literature because of low incidence.

One of the difficulties in establishing a quantitative value for risk in the relationship between OSD and tibial tubercle avulsion fractures is that the incidence of tibial avulsion fractures is low or that incidence hasn't been reported and thus isn't known. Ogden and coauthors<sup>2</sup> reported 3 cases of tibial tubercle avulsion fractures with pre-existing OSD in a group of 14 cases. Hand and coauthors<sup>7</sup> noted 1 out of 7 cases, and Levi and Coleman<sup>8</sup> reported 4 out of 15 cases of preexisting OSD with the fractures. A case report was also provided by Bowers of OSD with fracture.<sup>5</sup>

The current case is the first to describe bilateral tibial tubercle avulsion fractures with bilateral pre-existing OSD. The case supports the anecdotal evidence of tubercle avulsion fracture risk in adolescent athletes with OSD.

**“Patients with OSD typically describe symptoms of swelling, warmth, and tenderness over the prominence of the tibial tubercle.”**

nence of the tibial tubercle. The pain can be exacerbated when the knee is extended against resistance. It has been proposed that OSD is a consequence of micro-avulsions of the tibial tubercle from the anterior traction caused by the extensor mechanism.<sup>5</sup> The apophysis of the tibial tubercle is formed via membranous ossification anterior to the tibial metaphysis. Ossification begins in early adolescence, and it is believed that OSD occurs during this period. As reported by Kujala and colleagues,<sup>6</sup> the incidence of OSD is approximately 15% in teenage boys and

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*This paper will be judged for the Resident Writer's Award.*