A 15-Year-Old Boy With a Basketball-Related Knee Injury

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A 15-year-old boy presented to the emergency department (ED) with acute onset of right knee pain. While playing basketball, the patient had attempted a layup and had felt a "popping" sensation in midair. He was unable to ambulate after the injury.

At presentation, the patient's vital signs were normal. His right knee had diffuse swelling, a defect palpable at the site of his tibial tuberosity, and a high-riding patella. Drawer tests and valgus and varus laxity were difficult to assess secondary to pain and swelling. The muscle compartments were soft. The patient was unable to extend his right leg. Popliteal pulses and distal pulses in the foot were normal.

A radiograph of the patient's knee was obtained (**Figure**).

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Based on the history, presentation, and imaging findings, what is your diagnosis?

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Answer: Acute Displaced Type II Salter-Harris Tibial Tuberosity Avulsion Fracture

The patient was diagnosed with an acute displaced type II Salter-Harris tibial tuberosity avulsion fracture. Closed reduction was attempted in the ED, and the patient was admitted overnight for monitoring of compartment pressures. He was taken to the operating room the following morning for internal fixation and was discharged later that day.

DISCUSSION

Avulsion fracture of the tibial tubercle is an uncommon injury, with an annual incidence of 0.25% to 2.7% and representing 0.4% to 2.9% of all proximal tibial fractures.[1-7] The injury is typically caused by either a sudden violent contraction of the quadriceps or passive flexion of the knee against the contracted quadriceps. It predominantly occurs in adolescents, with peak incidence from age 13 to 16 years.[1,8,9] This injury pattern has a male predominance. Apart from greater involvement in athletics, boys have a later age for fusion of the upper tibial epiphysis.[10] Additionally, there may be an association with preexisting Osgood-Schlatter disease; however, there is likely no causal relationship.[2,4,6,10,11]

Reported comorbid injuries include patellar tendon avulsion, meniscal injuries, and compartment syndrome.[2,3,12] The anatomy of the proximal tibia and the tibial tubercle with nearby branches of the anterior tibial recurrent artery suggest a predisposing factor for the development of compartment syndrome.[3] While reported complications are infrequent overall, in one case series 20% of patients had clinical symptoms of compartment syndrome preoperatively and underwent fasciotomy during fixation.[2] Lower-grade injuries have been successfully treated with external fixation and casting; however, internal fixation is not uncommon.[5-7] Compartment syndrome and popliteal artery compromise should be considered in every patient with this condition, and early evaluation by an orthopedic surgeon shoulder be prioritized.

Reported long-term complications include varus-valgus deformity and leg-length discrepancy, which appear more likely in younger children and those with a higher fracture classification.[7]

Following rehabilitation, our patient is expected to have complete recovery, with full painless range of motion, and he will be able to resume athletics in several months. ■

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