INTRA-ARTICULAR PHYSEAL FRACTURES OF THE DISTAL FEMUR: A FREQUENTLY MISSED DIAGNOSIS IN ADOLESCENT ATHLETES

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BACKGROUND
Intra-articular physeal fractures of the distal femur are an uncommon injury pattern with a high incidence of complications. Only a few small case series exist in the literature. The purpose of this study was to pool patients from three high-volume pediatric centers to better understand this injury pattern, to determine outcomes of surgical treatment, and to assess risk factors for complications.

METHODS
A retrospective review of all patients presenting to one of three level-one pediatric trauma centers with an intra-articular physeal fracture between 2006 and 2016 was performed. Demographic and injury data (age, gender, skeletal maturity, mechanism of injury, concomitant injuries, sports participation, if the fracture was missed upon initial evaluation), radiographic features (classification, location, displacement), surgical data (surgical approach, stabilization technique, and post-operative protocol), and patient outcomes (healing, time to union, return to sports, and complications) were documented. Factors significantly associated with complications were identified utilizing chi-square test and analysis of variance statistics.

RESULTS
A total of 49 patients were identified with a mean age of 13.5 years. The majority were male and had a Salter-Harris III fracture (84%) involving the medial femoral condyle (88%). 50% occurred while playing football. The initial diagnosis was missed in 36% of cases. Advanced imaging revealed more displacement than plain radiographs (6 mm vs. 3 mm, respectfully p=0.007). All patients underwent surgical fixation and at a mean follow up of 2 years, all patients had returned to sports and had “good to excellent” results. A leg length discrepancy was identified in 14% (mean 17 mm) and an angular deformity was identified in 8% (2 varus/2 valgus).

CONCLUSIONS
Clinicians evaluating skeletally immature adolescent athletes (particularly football players) with acute knee injuries need to keep a high index of suspicion for an intra-articular physeal fracture. These fractures are frequently missed and fracture displacement may be under-reported on plain radiographs. Patients with residual growth, fractures involving the lateral femoral condyle, and patients treated with a cast have a higher incidence of complications. When identified, surgical outcomes are good with high rates of return to sport.