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## ***An Infrapatellar Fat Pad Tear in a High School Football Player: A Case Report***

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**Objective:** To present a clinical case exploring the occurrence and management of a tear to the infrapatellar fat pad IFP of a high school football player. **Background:** Acute tears to the IFP are rare. Typically, the (IFP) becomes impinged (i.e., Hoffa's disease) through a fall, direct knee trauma, or surgical complications, and require conservative treatment. **Treatment:** A 15-year-old high school football player reported to the athletic training clinic complaining of right knee discomfort and the inability to fully flex the knee. The patient stated that during a field goal attempt he missed the ball and hyperextended his right knee. Hoffa's disease and impingement of the IFP have been well documented, but these injuries have a different mechanism of injury. **Uniqueness:** More common injuries to the IFP occur because of microtraumas (i.e., Hoffa's disease or direct trauma to the knee (i.e., IFP impingement) in older populations. For this patient, the mechanism of injury was non-contact with minimal swelling, and no visual deformity or dislocation were present to suggest an injury. Additionally, the patient was able to complete functional movements with complaining only of "weird tightness" in the knee during extension. **Conclusion:** Due to the similarity of multiple knee pathologies, unknown mechanisms of injury need to be considered when evaluating the knee structure. Further examination is needed to determine demographic data and the probability of non-contact injury to the IFP, especially in pediatric patients. **Key Words:** *knee, anterior knee pain, infrapatellar fat pad, pediatric*

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### ***INTRODUCTION***

Impingement of the infrapatellar fat pad (IFP) (i.e., Hoffa's disease) is a rare condition.<sup>1</sup> Patients suffering from IFP impingement have been noted to experience persistent anterior knee pain after trauma (e.g., landing on the anterior knee in a flexed position) or micro-trauma (e.g., repetitive running or jumping).<sup>2</sup> Although the IFP is a common site of anterior knee pain, the occurrence of an isolated tear within the IFP is relatively rare.<sup>3,4</sup> In most cases, IFP tears present like most other knee injuries. The clinical presentation includes swelling, knee pain (e.g., sharp and stabbing) below the patella, limited range of motion, antalgic gait, and decreased quadriceps muscle strength.<sup>4,5,6</sup> One study reported a series of 2,623 patients undergoing knee arthroscopy and found the presence of an isolated (primary) lesion in the IFP in only 34 patients (1.3%).<sup>1</sup> While there is limited data available for this condition, reports indicate that a tear of the IFP usually coexists with other pathologies (e.g., meniscal tears and ligamentous injuries).<sup>1,7</sup> Presently, successful

treatments are aimed at managing the injury and decreasing symptoms.<sup>8</sup> There is no consensus on best practices for evaluation and treatment of an IFP tear when it does not follow an acute trauma or without any other concomitant pathology, but it is expected that after arthroscopic resection patients achieve improvement in symptoms and function.<sup>1,3,9</sup>

### ***OBJECTIVE***

The purpose of this case report is to examine the available evidence concerning a rare occurrence of an isolated IFP tear. In addition, the assessment and management of an adolescent male football player that suffered an acute IFP tear is described. Upon confirmed diagnosis with diagnostic testing, the patient was conservatively managed to decrease pain, increase range of motion, and prevent further joint effusion. This case includes background information on IFP injuries, descriptions of the assessment and management process, and the process for return to participation.

## ***HISTORY/BACKGROUND***

The patient was a 15-year-old male high school football kicker with a medical history of insulin-dependent diabetes and cold urticaria. One year prior to the injury, the patient suffered a Grade I sprain of his lateral collateral ligament of the right knee. On the day of the injury, when attempting to kick a field goal, the patient missed the ball causing his right knee to hyperextend. Immediately following the injury, the patient reported to the athletic trainer complaining of right knee pain over the lateral aspect and inferior patella. In addition, the patient complained of a “weird” and “tight” feeling in his right knee which was exacerbated with fully flexing his knee.

At the time of initial examination, there was minimal swelling inferior to the patella. Upon palpation, the patient complained of point tenderness over the lateral collateral ligament and the lateral border of the patella. Since the patient was able to fully ambulate without alterations, range of motion and strength were not tested. Therefore, special tests were completed to assess ligament and cartilage integrity of the knee, including anterior drawer, posterior drawer, Lachman’s, valgus stress, varus stress, Apley’s compression/distraction, patellar apprehension, and stroke. The only positive test was the varus stress test at neutral (0 degrees) that displayed a small amount of joint laxity but had a firm end point. In addition, the patella was found to be hypermobile, and when manipulated medially and laterally caused discomfort. Post examination, a compression wrap was applied to the knee and the patient was instructed to rest, ice, and elevate the knee. After the initial examination, the patient was instructed to return to the clinic the following day.

## ***DIFFERENTIAL DIAGNOSIS***

At this time, the athlete was suspected to have a subluxated patella and a lateral collateral ligament sprain. The differential

diagnoses consisted of IFP impingement, fat pad syndrome, infrapatellar bursitis, plica, knee capsule sprain, and injury to the medial patellofemoral ligament.

## ***INTERVENTION***

Upon reexamination the following day, there was increased tissue temperature around the patella and lateral joint space, gross hemarthrosis, and altered gait. Range of motion and strength testing showed decreased knee flexion and quadriceps strength when compared bilaterally. The same special tests were completed again and did not indicate ligament or cartilage tears. The patient was referred to his primary care physician who elected to aspirate the knee. Fifty-four cubic centimeters of frank blood were aspirated from the patient’s lateral knee joint space. The primary care physician also instructed the patient to take non-steroidal anti-inflammatory medication, as needed. At this time, the patient was not allowed to return to participation until symptoms resolved.

Two days after the initial injury, there was no reduction in the patient’s symptoms. As a result, the physician ordered a radiograph and MRI to further evaluate for injury. The MRI revealed a small contusion on the posterolateral tibial plateau, a 1 cm tear in the IFP, and significant joint effusion (see Figure 1). The physician concluded that the patient’s signs and symptoms were due to an isolated tear of the IFP. Based off this diagnosis, the patient continued to be withheld from participation to allow any resultant effusion and pain to subside.

Five days after initial injury, the patient returned for a follow-up with his physician. Based on the physician’s follow-up examination, an additional 12 cubic centimeters of blood-tinted fluid was aspirated from the right knee. The patient was permitted to return to participation as soon as he was comfortable. Seven days after the

initial injury, the patient returned to participation without restrictions and had little discomfort while kicking. While returning to participation, the patient was instructed to continue to use ice, compression, and over the counter non-steroidal anti-inflammatory medication, as needed.



### **DISCUSSION**

Overall, injuries to the IFP are uncommon and often considered a diagnosis of exclusion or misdiagnosed for other causes of anterior knee pain.<sup>1,11</sup> While an isolated tear of the IFP has been observed, the prevalence is not widely investigated. Kumar et al. reported only 1.3% of adult patients (34 out of a sample of 2,623 patients) and Ogilvie-Harris and Giddens reported 1% of adult patients (12 out of a sample of 1,200 patients) had an isolated (i.e., primary) lesion when undergoing knee arthroscopy.<sup>1,12</sup> Therefore, the resultant diagnosis of an isolated tear in the IFP for an active, adolescent patient is truly rare and unexpected. Reports have indicated that many tears in the IFP coexist with other pathologies or biomechanical deficits (e.g., hypermobile patella).<sup>1,10</sup> When evaluating and managing a patient with anterior knee pain, initiation of treatment should be contingent on the presence of symptoms affecting the ability to participate in activity and diagnostic testing. Should a patient become symptomatic, biomechanical deficits and the possibility of

coexisting or previous medical conditions should be considered.<sup>10,11</sup>

### **RELEVANCE TO PRACTICE**

This case describes the diagnosis and subsequent treatment of a healthy, adolescent patient that suffered an isolated IFP tear with no coexisting injury. This case presents two factors that should be considered when managing future patients. First, biomechanical deficits. During the initial examination the patient presented with a hypermobile patella. This should be considered during the examination process since patellar maltracking has been associated with injury to the IFP.<sup>10,13</sup> In addition, the patient was a “straight-toe” style kicker which may predispose him to knee hyperextension compared to “soccer style” kicking in which the kicker approaches the ball from the side. Second, the patient was diabetic. Diabetes is one of the common causes for delayed/impaired healing and can also decrease muscle function and strength.<sup>14,15</sup> Although the patient was able to return to participation approximately one week after injury, diabetes may have caused the start of the healing process to be delayed. In addition, patients with diabetes have decreased circulation which makes it more difficult to deliver blood and nutrients to injuries for healing. As a result, injuries heal more slowly or may not heal completely which may cause additional complications and decreased function in the future.<sup>13,16</sup> Therefore, patellar taping to tilt the inferior pole of the patella to unload the fat pad and strengthening of the vastus medialis oblique and vastus lateralis muscles of the quadriceps should be considered to prevent reinjury for this patient.<sup>4</sup> In addition, strengthening of the hip musculature may be needed, specifically the gluteus medius, to improve limb alignment and reduce stress on the knee.

At the conclusion of this case, the patient was able to return to full participation within one week without the recurrence of symptoms

following the irrigation of 66 cubic centimeters of blood tinted synovial fluid and general treatment for inflammation. The absence of an impact event (i.e., traumatic fall on the anterior knee) or repeated micro-trauma made it difficult to conclusively diagnose the injury without further diagnostic testing. It is also noteworthy that the patient was able to regain functionality and return to participation within one week of the initial injury without additional joint effusion or injury recurrence which is contrary to the 6-week physical therapy regimen suggested by Crossley et al.<sup>8</sup>

### **CONCLUSION**

According to the literature, the likelihood of sustaining an isolated acute tear of the IFP is extremely low.<sup>4</sup> Sustaining an isolated tear without the presence of a coexisting condition or the presence of repetitive microtraumas in a healthy, adolescent athlete is even more uncommon.<sup>4,9</sup> It is critical that clinicians complete a thorough examination to determine the source of a patient's pain and pathology. A patient's previous medical history as well as anatomical and biomechanical deviations offer the clinician an opportunity to explore differential diagnoses for a structure that is often overlooked with other knee pathologies. Without knowledge of this pathology, it could be difficult to complete an accurate examination and correctly diagnose an IFP tear to formulate an effective treatment plan. In this case, a proper examination and use of diagnostic testing led to a definitive diagnosis that resulted in a successful patient outcome.

While the patient in this case was able to return to participation with a tear in the IFP within one week of injury, most patients require arthroscopic resection to see improvement in symptoms of pain and function.<sup>4</sup> Until further prospective, controlled trials are conducted regarding the prevalence and underlying factors of IFP tears in adolescent patients, clinicians must rely on

patient reported information (e.g., mechanism of injury and chief complaint), diagnostic testing and individual expertise when conducting examinations and developing treatment plans because of the similar presentation of IFP tears to other knee injuries. When evaluating and treating conditions with limited research such as an IFP tear, initial and follow-up evaluations of the patient's condition are critical for optimal patient outcomes. Further research is needed to determine what biomechanical factors and coexisting pathologies contribute to the probability of sustaining an isolated IFP tear. In addition, research is needed to establish the most effective treatment and care plan in the adolescent population.

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