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CLINICAL VIGNETTE

Patellar Tendon Rupture Diagnosed on Ultrasound

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A 61-year-old male presented to the Emergency Department (ED) with right knee pain for 3 days. He had a past medical history notable for a right patellar tendon rupture status post repair five years prior. He reported he had been boating when he suddenly felt a popping sensation in the right knee. The pain was constant, dull and worse with movement. He reported weakness with no sensory changes and had some relief with Acetaminophen. He denied any fevers.

On physical exam patient had stable vital signs. His right knee was swollen and slightly erythematous. There were no skin breaks. A high riding patella was noted. On motor exam, the patient was unable to extend his knee. He experienced extreme discomfort with attempted passive extension of the knee. His dorsalis pedis and posterior tibial pulses were intact. Sensation was intact throughout the leg.

The differential for this patient was patellar tendon rupture, patellar subluxation, patellar fracture, dislocation of the knee, septic joint.

Radiographs of the right knee showed moderate soft tissue swelling anterior to the right knee joint and patella as well as along the course of the patellar tendon. There were multiple corticated bony fragments anterior and inferior to the patella consistent with old patellar fracture. Multiple smaller bony fragments were also seen along the course of the distal quadriceps and proximal patellar tendons consistent with avulsion injuries/tear and tendonitis.

A point of care ultrasound of the right knee revealed a hypoechoic area within the proximal patellar tendon. Dynamic ultrasound of the knee showed a complete patellar tendon rupture with anechoic fluid filling the gap between the proximal and distal parts of the patellar tendon. (Figure 1 Image C).

The clinical diagnosis of patellar tendon rupture was made and the patient was placed in a knee immobilizer and provided crutches. He was discharged home from the ED with a scheduled outpatient MRI of the right knee and orthopedic surgery follow up.

The outpatient MRI of the right knee revealed a comminuted fracture deformity at the inferior pole of the patella with bone marrow edema. There was a large full thickness tear in the proximal patellar tendon, a partial thickness intrasubstance tear in the distal quadriceps tendon and tears in medial and lateral retinaculum with a large suprapatellar joint effusion. The patient

was seen by orthopedics and scheduled for patellar tendon reconstruction with an Achilles allograft.

The patellar tendon originates from the inferior pole of the patella and inserts at the tibial tuberosity. In conjunction with the quadriceps, medial retinaculum, and lateral retinaculum, the primary motor function of the patellar tendon is knee extension. The patellar tendon is designed to handle loads up to 17.5 times the body weight of a healthy adult before rupturing.¹ The weakest point of the tendon is at its proximal insertion at the inferior pole of the patella. This is the most common site for patellar tendon ruptures.²

History and physical exam are frequently sufficient to make the diagnosis of patellar tendon rupture. The tendon ruptures in the setting of forced extension on a flexed knee. The patient will often report a popping sensation. Chronic medical conditions such as systemic lupus erythematosus, hyperparathyroidism, and medications such as steroids or fluoroquinolones have been associated with an increased risk of tendon rupture.³⁻⁶ On exam there will be evidence of a high riding patella, significant swelling of the knee, and loss of extension at the knee.² Of note extension of the knee can be preserved in partial tears where there are still some intact retinacular fibers.⁷

Imaging can further evaluate presence of a patellar tendon rupture. Radiographs may reveal a high-riding patella (patella alta) and can also assess for associated fractures. Radiographs are limited as images are unable to visualize the soft tissue or tendinous structures. MRI allows visualization of soft tissues for diagnosis of the ruptured tendon. MRI is rarely performed in the ED as it is expensive, time consuming, and is rarely readily available.

Ultrasound has been useful cost-effective imaging of the patellar tendon in the ED. In one study, ultrasound was more accurate than MRI in diagnosing patellar tendon pathology.⁸ The high frequency linear probe is used to visualize the tendon. Intact tendons will have fibrillar echotexture with multiple parallel layers of fine hyperechoic lines on the ultrasound. Echogenicity is partially dependent on the angle and axis used to visualize the tendon. This variability in echogenicity is known as anisotropy.⁹

After visualization of normal skin, soft tissue, and other musculoskeletal structures the probe is then moved toward the area of injury. When a patellar tendon rupture is present the ultrasound reveals a hypoechogenicity over the entire thickness

of the tendon. Dynamic Ultrasound allows for visualization of the two tendon ends with echo lucent fluid filling the space.¹⁰ In partial tendon rupture a wedge-shaped separation on dynamic ultrasound with knee flexion will be present.¹¹

The exam is done in both the sagittal and the transverse plane. Visualization in multiple planes will increase the sensitivity of the study. When possible comparison with the uninjured limb allows for easier identification of the injury. A disadvantage of ultrasound is that the accuracy of the exam is user dependent.

Surgical management is the gold standard for patellar tendon ruptures. In the ED the knee should be immobilized and urgent follow up with orthopedics arranged. Significant delays in surgical repair can lead to scar tissue formation with increased morbidity.¹²

Figure 1:



Figure 1: Image A and B are photographs of the patient's right knee. Image C is an ultrasound of the right knee. The Arrow is pointing to hypoechoic fluid and disruption of the patella tendon.

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