Letter to the Editor

Partial Patella Tendon Tear in a Middle-Aged Man with No Previous Knee Injuries: A Non-Surgical Approach

Dear Editor,

Patella tendon (PT) rupture is an uncommon cause of anterior knee pain[1] and is reportedly 6 times less frequent than patellar fracture, making it a rare injury.[2] Although most PT ruptures are unilateral, case studies that described simultaneous bilateral tendon ruptures have been reported.[3-5] PT tears can be classified as partial or complete and typically occur in active individuals <40 years old. We describe an unusual case of unilateral PT injury in a 39-year-old Chinese man.

Case Presentation

The patient presented to the specialist outpatient clinic after he sustained a fall when he was commuting on public transport. He reported that he was standing in a bus when it braked suddenly, causing him to lose his balance and fall. Due to the sudden impact, his lateral right knee struck the edge of a step. Although he could ambulate initially, he developed considerable swelling and bruising around the joint which worsened progressively. Prior to this incident, he had no history of trauma or symptoms and had no pre-existing medical conditions. He was not on any long-term medications such as steroids that would compromise his tendon.

On clinical examination, there was limitation to right hip flexion and knee extension. Pain was localised to the anterior-lateral border of the right PT. Ultrasound examination revealed near full thickness tear to the lateral half of the right PT that began one-third from the distal insertion. There were hypoechogenic changes that were suggestive of fluid within the substance of the tendon and areas of neovascularity (Fig. 1).

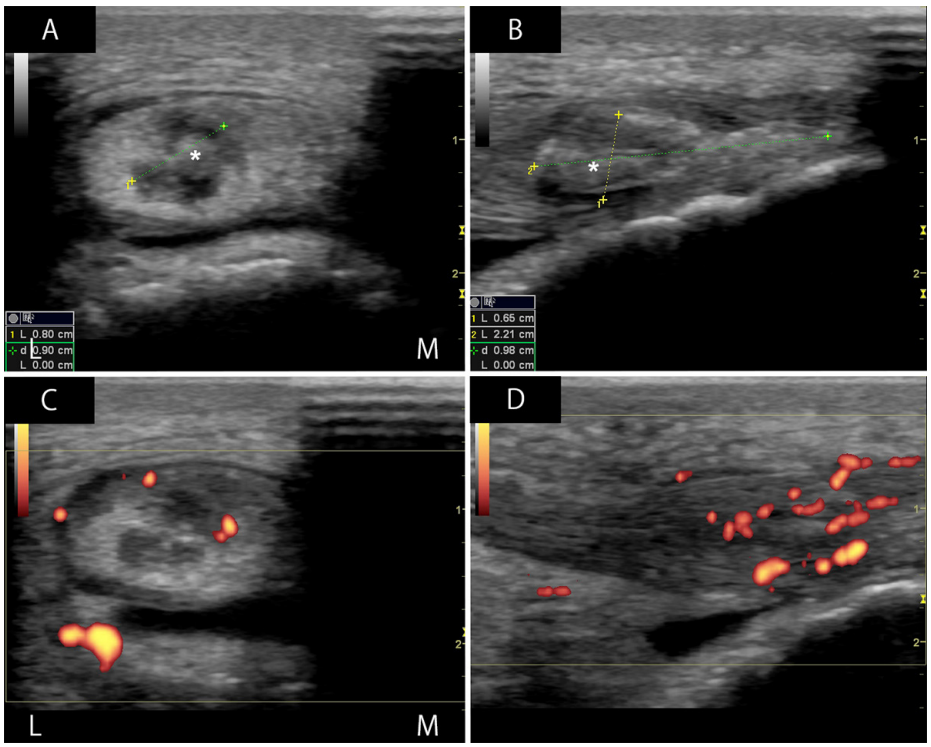

Fig. 1. Lateral and short axis ultrasonography of the right patella tendon. A and B: An 8 × 6.5 × 22 mm tear (∗) is seen in the lateral segment with a thickened but still intact tendon medially. C: Hypoechogenic areas indicate fluid within the substance of the tendon that represent a near full thickness tear. D: Considerable neovascularity seen in the region of interest does not tract proximally and is suggestive of acute injury as opposed to underlying tendinopathy.

Operative repair was discussed with the patient but he opted for conservative management. The right knee was immobilised in full extension for 2 weeks with a cast and he was allowed to weight bear. Upon removal of the cast after the acute phase of injury, he used a hinge brace as it was more comfortable and it was easier to monitor his recovery. The same position was maintained after the hinge brace was locked into full extension. Repeat ultrasound examinations at 2 (Fig. 2), 4 (Fig. 3) and 12 (Fig. 4) weeks demonstrated good healing within the substance of the tendon.

At the second consultation, platelet-rich plasma (PRP) therapy was discussed and offered as part of conservative management but in view of the healing, it was not adopted. Knee movement increased to 45 and 90 degrees flexion at 4 and 12 weeks, respectively. Upon complete healing, physiotherapy was commenced to restore full range of movement and quadriceps and hamstring strength. Over the next 3 months, he gradually returned to normal activities and eventually resumed his chosen sport of distance running.

Discussion

PT rupture is usually caused by direct or indirect trauma to the knee. The latter is more common[4] and involves a sudden contraction of the quadriceps with the knee in slight flexion caused by, for example, sudden movement, sprint and avoidance of a fall.[2] Biomechanical analysis has shown that a force equivalent to 17.5 times that of normal body weight can easily rupture the PT in healthy young individuals.[6] Traumatic ruptures are usually preceded by structural abnormalities in the tendon and 3 primary causes were identified:[7-9] 1) systemic disorders such as chronic renal insufficiency, diabetes mellitus, hyperparathyroidism, lupus erythematosus and rheumatological diseases; 2) chronic local stress to both knees leading to repeated microtraumas and inflammatory and degenerative changes; and 3) local or systemic administration of steroids.

Our patient did not have a history of systemic disorders, steroid use or symptoms in the tendon that would suggest microtrauma prior to his injury. Nevertheless, this case was still unusual after a partial width and near full thickness tear—normally caused by longstanding tendinopathy and subsequent intra-substance tearing—that was sustained upon direct impact to the tendon.

Complete PT ruptures typically present with patella alta and inability to initiate active knee extension due to disruption of the knee extensor mechanism. On the other

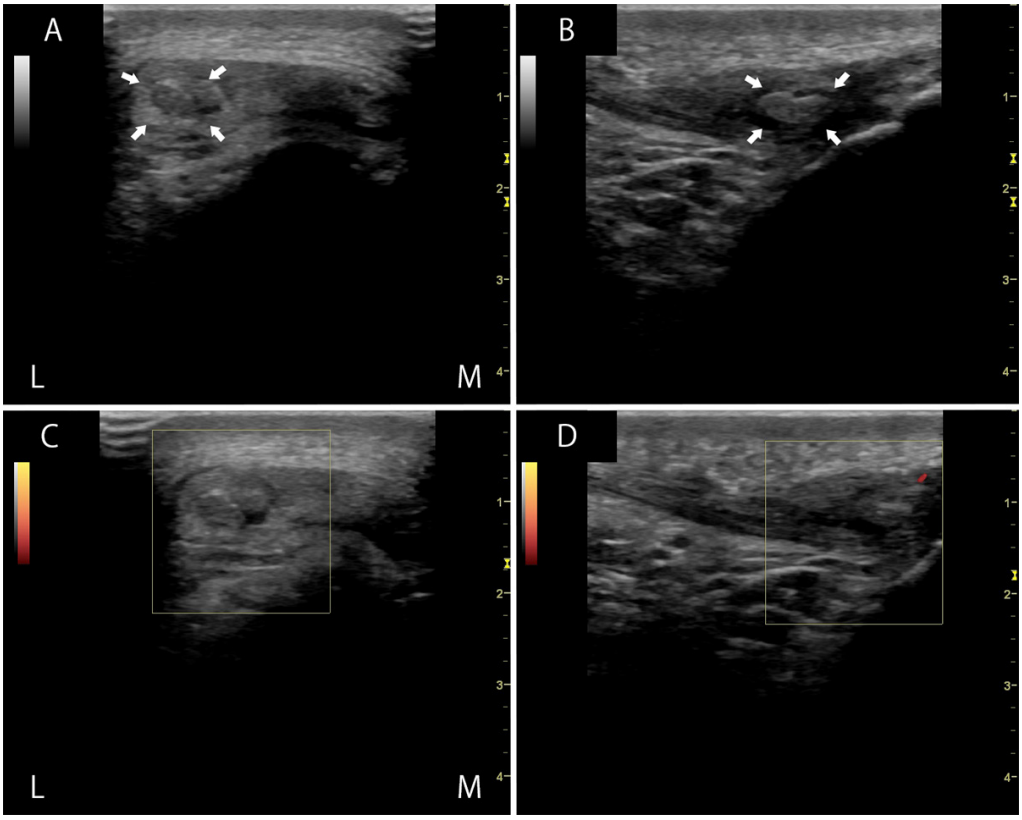

Fig. 2. Lateral and short axis ultrasonography of the right patella tendon at 2 weeks. A and B: Hypoechogenic areas seen in the initial images have lessened in both short and long axes. The hyperechogenic areas (white arrows) represent organisation of a haematoma. C and D: Initial hypervascularity has also settled following a period of mobilisation.

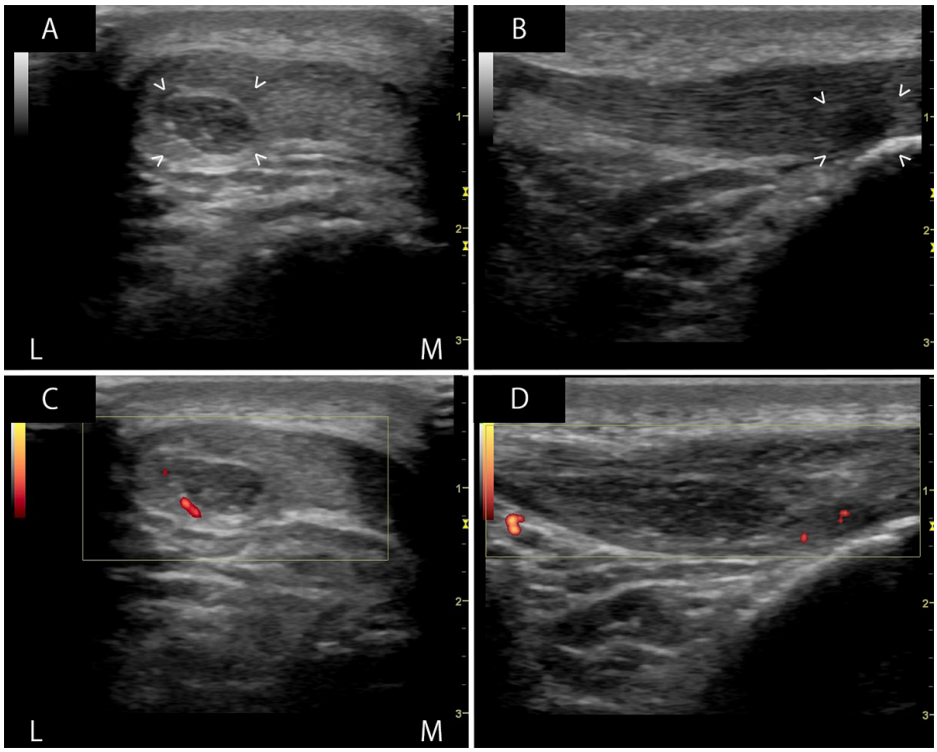

Fig. 3. Lateral and short axis ultrasonography of the right patella tendon at 4 weeks. A and B: The area of injury is almost fully filled and is well defined (^) compared to the normal tendon architecture. This is most evident on the short axis. C and D: Compared to the ultrasound images taken at 2 weeks, there is a slight increase in vascularity and it was attributed to the commencement of physiotherapy.

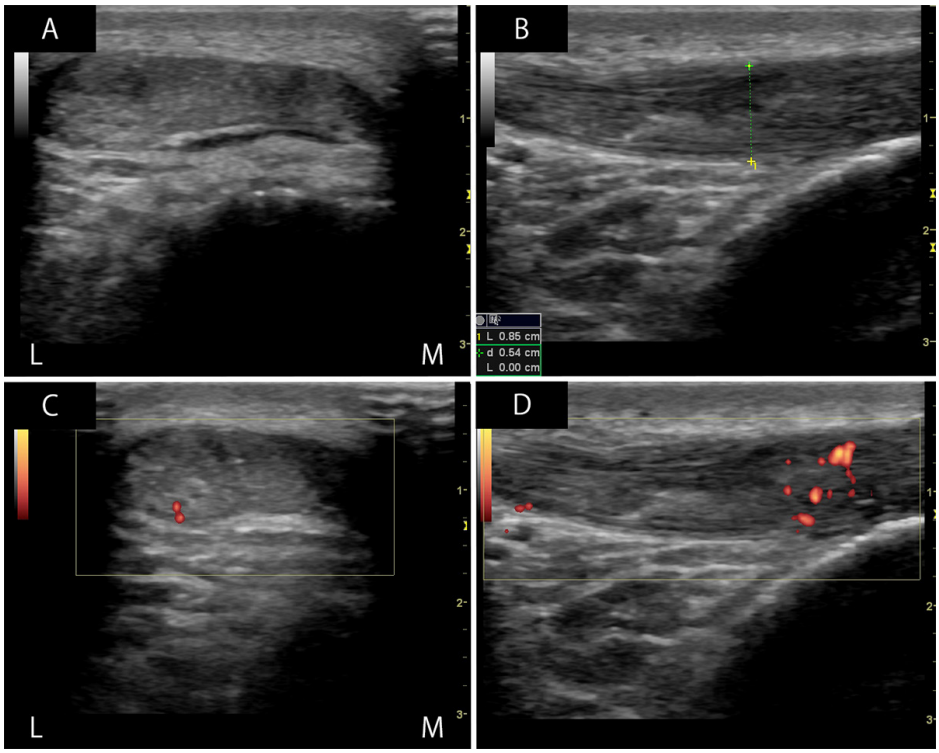

Fig. 4. Lateral and short axis ultrasonography of the right patella tendon at 12 weeks. A and B: The injury has healed well and shows similar echotexture as the uninjured portion of the tendon. This is evident on the short and long axes. The distal region remains thickened at 8.4 mm. C and D: Residual vascularity was attributed to ongoing physiotherapy and was not associated with pain symptoms.

hand, a partial tear has clinical features that resemble patellar tendinosis: preservation of active initiation of knee extension and aggravation of symptoms by movements such as jumping or navigating stairs.[10] Despite these features, the likelihood of a wrong diagnosis being made based only on clinical signs can be high.[11] This is because the presence of intact retinacular fibres in haemarthrosis or preserved active knee extension can limit the findings of a physical examination.

Imaging Patella Tendon Injuries

A plain radiograph is an appropriate first-line imaging modality for PT injuries since it can identify tibial tuberosity fractures, patellar avulsions or patella alta. These bony injuries are suggestive of a rupture.[12] Other findings that can be identified include joint effusion, poorly defined suprapatellar masses and calcific densities but they are frequently missed.[11] A diagnosis can be confirmed with either an ultrasound or magnetic resonance image (MRI) for cases that present with equivocal clinical and radiograph findings. Both are non-invasive and do not utilise ionising radiation. Over the past 2 decades, improvements in MRI have greatly reduced the need for invasive arthroscopies to examine the ligaments and menisci of the knee.[13-5] It is considered the gold standard in imaging PT injuries and reconstructing 3-dimensional images to facilitate preoperative planning.

Significant improvements in ultrasound technology and training have led to its widespread use in musculoskeletal medicine. Although it is difficult to visualise articular or particularly deep structures, ultrasound is still an excellent modality to diagnose superficial pathologies such as tendinopathies, ligament tears, joint degeneration and impingement. It is used to visualise any disruption in the tendon's fascicular pattern, which is indicative of a tear, and other pathological changes such as increased space between echogenic fibres and decreased echogenicity. In particular, power Doppler sonography is used to image neovascularisation. Given its low cost, healing can be monitored with regular imaging at follow-up examinations and changes such as the organisation of anechoic fluid following an acute injury can be observed.

Ultrasound imaging can also identify changes that are indicative of pre-existing pathologies such as thickening and calcification in tendinopathy, fusiform thickening and loss of normal fibrillar echotexture in inflammatory enthesitis.[16] Another unique feature of ultrasound is the ability to perform dynamic assessments and to guide interventions. According to Girish et al,[17] it is the investigation of choice in the examination of the extensor mechanism of the knee.

The literature on the accuracy of ultrasound imaging in diagnosing PT tears is mixed. In their retrospective review of clinical, MRI and ultrasound findings in patients who had undergone surgical repair of quadriceps and PT ruptures, Swamy et al[11] concluded that ultrasound was unreliable in the identification of acute injuries to the extensor mechanism of the knee in obese and muscular patients. They suggested that an MRI could be done when there is clinical ambiguity and before any surgical treatment is undertaken. Conversely, Warden et al[18] reported greater accuracy in the use of ultrasound than MRI to diagnose PT pathologies. Other studies have also advocated the use of ultrasound in early assessment and management of PT injuries.[19-21]

In their report on the intraoperative findings in 7 patients, La et al[20] concluded that ultrasound, including the use of dynamic evaluation, was helpful in the diagnosis of partial thickness tears of the quadriceps tendon and may aid in the differentiation of such cases from complete quadriceps tendon tears, particularly in acute cases. However, scar tissue in chronic injury may represent a potential pitfall in the assessment of partial versus full quadriceps tears. Lee et al[21] have suggested high-frequency ultrasound as an effective method to detect and localise disruption of the quadriceps and PT. However, its efficacy is dependent on the skill of the user.

Due to its high cost and long wait time, many patients are reluctant to undergo MRI. As such, the use of ultrasound imaging in outpatient clinics can assist clinicians to reach an earlier diagnosis and expedite treatment. When there is clinical suspicion of a significant rupture based on ultrasound findings and surgical intervention is deemed necessary, the findings can be discussed with the radiologist or surgeon and further imaging studies can be requested.

Clinical Management and Platelet-Rich Plasma

Our case highlights the propensity of PT to heal through immobilisation without any need for further intervention. Treatment for a partial PT tear overlaps with that for tendinopathy, which is conservative management that comprises rest, stretching and eccentric quadriceps strengthening exercises. However, this treatment is prescribed according to the experience of physicians and is not based on clinical data and findings. As such, its efficacy remains undetermined.[22] Traditionally, surgical intervention is considered for partial tears that do not respond to conservative treatment.[23,24] However, the emergence of PRP therapy has been hailed as an alternative, but less invasive, treatment option.

The increasing popularity of PRP therapy is attributed to the fact that it is a simple procedure and is one of the few established treatments that can hasten healing in musculoskeletal injuries. It involves the administration of concentrated PRP—which contain growth factors that are derived from the patient's own blood—into the injury site to promote healing. It is manufactured from the centrifugation

of blood. There are a myriad of PRP samples that contain varying amounts of platelets and leukocytes, and the platelet levels can be as high as 9 times that of whole blood.[25] Due to its autologous nature, PRP therapy has minimal side effects and can be classified into 4 groups: acute ligament injury, chronic tendinosis, intraoperative tissue repair augmentation and muscle injury.[26]

Contraindications to PRP therapy include allergies to any manufacturing components (such as dimethyl sulfoxide), concurrent illnesses, local infection around the site of injection and recent malignancy due to the hypothetical risk of injecting malignant cells back into the body. It is not recommended in patients with thrombocytopaenia or in those who are on regular nonsteroidal anti-inflammatory drugs due to altered platelet numbers and function.[27]

Although the results from in vitro and in vivo studies are promising and there are anecdotal cases of tendon recovery following PRP therapy,[10,28-31] multiple systemic reviews of the use of PRP therapy paint a controversial picture. Collectively, PRP therapy is beneficial in the treatment of patellar tendinosis and lateral epicondylitis but not for Achilles tendinosis.[29,32,33] There is also a lack of consensus on the use of PRP therapy in the treatment of muscle injuries. Reurink et al[34] did not find a significant difference in healing between patients with acute hamstring injuries on PRP therapy and those who were on placebo. Although some researchers have reported on the risk of fibrosis and scar tissue development,[32] others reported faster recovery and a return to normal sporting activities in patients who were treated with PRP therapy,[35] especially after it was combined with rehabilitative therapy.[36]

In surgical augmentation such as anterior cruciate ligament reconstructions and rotator cuff repairs, PRP therapy has shown mixed results and is therefore not recommended in routine clinical practice.[29,32] This could be due to 2 factors. First, there is a lack of a standard protocol on how PRP is obtained and used. As such, there are variations in platelet-to-leukocyte ratios, PRP volumes and usage techniques.[29,30,33] Second, patient factors such as age and activity levels can influence potential healing. The disease stage can also impact treatment timing.[29]

PRP therapy was discussed with our patient as a potential treatment modality but due to improvement in the tendon architecture seen on serial ultrasound findings, it was abandoned. It could be considered if the findings had demonstrated poor recovery.

Surgical repair of an acute, partially torn PT is rarely indicated, especially when active knee extension is still intact. When direct repair cannot be achieved, it may be augmented with tendon grafts but the method and procedure can vary depending on factors such as the location of the injury and chronicity of the lesion.[2,12,37-40] Early surgery is indicated after a complete rupture is identified and the outcome is generally positive.[40]

Conclusion

Our case demonstrates an unusual injury to the PT following direct trauma and the propensity for partial tendon injuries to heal without any clinical intervention. Although our patient did not require further intervention beyond immobilisation and rehabilitative therapy, PRP therapy or surgical intervention must be discussed early with patients on a case-by-case basis using tissue healing and functional recovery as a treatment guide. Additionally, it is important to conduct dynamic musculoskeletal ultrasound imaging studies in a high-volume orthopaedic or sports clinic in order to expedite treatment. They are preferred to MRI which is more costly and requires a longer wait time.

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