

# Ultrasound Imaging for a Male with Anterior Knee Pain: Prepatellar Bursitis

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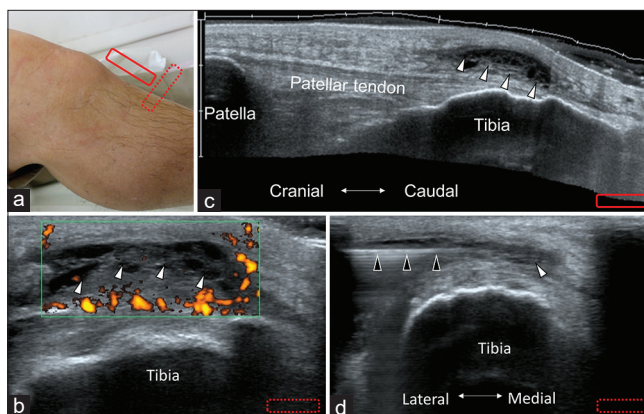
## SECTION 2 – ANSWER

### Case

A 63-year-old male had right anterior knee pain and swelling after a contusion 1 week ago. The range of motion of his right knee was normal. He did not receive any surgery on the affected knee. During the physical examination, we found redness and swelling over the skin of his right infrapatellar region [Figure 1a]. He later underwent an ultrasound examination. Figure 1b was obtained by placing the transducer over the tibial plateau in the horizontal plane. Figure 1c was a panoramic image obtained by moving the transducer from the inferior patellar pole to the tibial plateau in the sagittal plane. The structure indicated by the white arrow heads was the lesion. What is your impression?

### INTERPRETATION

Figure 1b was the power Doppler image over the tibial plateau in the horizontal plane. There was the focal accumulation of anechoic fluid at the subcutaneous layer. Hypertrophic synovium with increased vascularity was seen in the lobulated fluid. The transducer was later shifted to the sagittal plane to obtain the panoramic view [Figure 1c], which showed that the lesion was located on top of the distal patellar tendon. The thickness and echogenicity of the underlying patellar tendon appeared normal. The surface of the proximal tibia was smooth, without osteophytes or bony irregularity. The diagnosis of prepatellar bursitis was thus made. Using the in-plane approach through the horizontal plane over the tibial plateau [Figure 1d], 20 mg triamcinolone plus 2 ml 1% lidocaine were injected under ultrasound guidance. His symptom improved significantly thereafter.



**Figure 1:** (a) During the physical examination, we found redness and swelling over the skin of his right infrapatellar region; (b) the power Doppler image was obtained by placing the transducer over the tibial plateau in the horizontal plane. (c) The panoramic image was obtained by moving the transducer from the inferior patellar pole to the tibial plateau in the sagittal plane. The structure indicated by white arrow heads was the lesion. (d) Using the in-plane lateral-to-medial approach, 20 mg triamcinolone plus 2 ml 1% lidocaine were injected under ultrasound guidance. The black arrows indicated the needle

### DISCUSSION

The etiologies of anterior inferior knee pain include patellar tendinitis, patellofemoral pain syndrome (PFPS), knee osteoarthritis, Osgood-Schlatter disease, patellar fracture, deep infra-patellar bursitis, prepatellar bursitis, and so on. Patellar tendinitis, also known as jumper's knee, mostly occurs in athletes who participate in jumping sports such

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as basketball and volleyball.<sup>[1]</sup> The patients may report pain during resisted knee extension, and the symptom worsens after running or jumping. The ultrasound images reveal thickening, hypoechoic change and increased vascularity of the patellar tendon. PFPS usually results from overuse, patellofemoral malalignment, or trauma. It often occurs during descending stairs, squatting, running, cycling or prolonged knee flexion, and the pain may be relieved by rest. PFPS is usually diagnosed by clinical evaluation; ultrasound imaging is limited used in the PFPS diagnosis. The ultrasound imaging may show quadriceps muscle atrophy<sup>[2]</sup> and a thickened lateral patellar femoral retinaculum with increased vascularity.<sup>[3]</sup> However, there is only limited evidence to support the use of ultrasound in diagnosing PFPS. Knee osteoarthritis, which is prevalent in the older population, is characterized by osteophyte formation, joint space narrowing, and cartilage loss. The ultrasound images show synovial hypertrophy, joint effusion, juxta-articular osteophytes, decreased cartilage thickness, meniscal extrusion, and displacement of the medial collateral ligament. Osgood-Schlatter disease is a common traction apophysitis in adolescents, which can be diagnosed by ultrasound through the findings of thickened distal patellar tendons and irregularity of the apophyseal surface of the proximal tibia.<sup>[4]</sup> The patellar fracture can be confirmed by plain radiographs which show fracture displacement, patella Alta, or patella Baja. However, ultrasound is more sensitive than plain radiographs for detection of linear fractures. Deep infrapatellar bursitis usually results from overuse of the knee extensor mechanism. The bursa is located posterior to the patellar tendon and anterior to the tibial tuberosity, with Hoffa's fat pads beside.<sup>[5]</sup> The ultrasound image reveals fluid accumulation between the deep surface of the patellar tendon and tibia plateau.

During the ultrasound examination of the anterior knee, the patient is in the supine position, with slight knee flexion (20°–30°) and a small pillow can be placed underneath the popliteal fossa. Under this position, the quadriceps and the patellar tendons are tightened. Normally, the prepatellar bursa is a potential trilaminar space located anterior to the patella. It is composed of three layers: The prepatellar subcutaneous bursa, the prepatellar subfascial bursa, and the prepatellar subaponeurotic bursa.<sup>[6]</sup> Overuse, trauma and crystals deposition can cause bursitis. Accumulation of fluid further distends the prepatellar skin and elicits pain, especially during knee flexion. The ultrasound diagnosis of prepatellar bursitis can be simply based on the collection of hypoechoic fluid, sometimes with synovial debris in the subcutaneous layer anterior to the patella or patellar tendon.

Aspiration of fluid under sonographic guidance is recommended for patients with prepatellar bursitis. The bursal fluid can be used to distinguish septic from aseptic bursitis, leading to different management strategies. According to previous studies,<sup>[7,8]</sup> aspiration from the anterior aspect of the knee may

increase the risk of iatrogenic sinus tract formation. Therefore, approaching from the lateral aspect would be preferable. Inflamed bursae should be treated with antibiotics, and repeated bursal aspiration may be required. Aseptic bursae can be treated with aspiration, compression, and corticosteroid injections.<sup>[9]</sup> Corticosteroid injections led to a more rapid and sustained decrease in swelling with less frequent recurrence.<sup>[10]</sup> However, the adverse effect after corticosteroid injections should be firmly kept in mind, including infection and skin atrophy.<sup>[11]</sup> Surgical treatment, such as drainage or bursectomy, is indicated in refractory or recurrent cases.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

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