Point-of-Care Musculoskeletal Ultrasound in the Diagnosis of Medial Plica Syndrome: A Case Report

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ABSTRACT

Introduction: This report aims to illustrate the use of point-of-care ultrasound to aid in the diagnosis of medial plica syndrome.

Case Presentation: A 39-year-old male presented 3 weeks after the acute onset of right knee pain, clicking, a sense of increased pressure, and a sense of instability. Symptoms started after a lengthy electric scooter ride, during which he balanced on one leg while transporting a box.

Diagnosis: Point-of-care ultrasound showed tissue changes within the medial plica on side-to-side comparison. The right medial plica tissue was thickened with mixed echogenicity compared with the left knee. The diagnosis was supported by negative meniscal and positive plica orthopedic tests.

Conclusion: Point-of-care ultrasound can be used to support the diagnosis of medial plica syndrome.

Key Words: Medial plica, Knee pain, Point-of-care ultrasound, POCUS, MSK ultrasound

INTRODUCTION

A plica is a band of fibrillar tissue that extends from the joint capsule; knee plicae normally involute by a fetal age of 12 weeks.[1] The persistence of the medial plica may have a prevalence as high as 80%.[2] Based on arthroscopic studies, the prevalence of symptomatic plica syndrome is estimated to be about 10%.[3] Plica syndrome may be underdiagnosed because its symptoms mimic other pathologies, such as a medial meniscus tear.[1] A normal

plica can be damaged by direct trauma or a torsional mechanism, which can lead to inflammation and synovitis. A plica may also become pathologic due to cumulative microtrauma or secondary to another knee pathology.[4] The plica may become more fibrotic and less elastic over time as the pathology progresses.[5,6]

Figure 1 shows the location of the medial plica, although the exact location, width, and path can vary from patient to patient when it is present. The medial plica has been classified by various authors, but the classification system of Sakakibara[7] divides the medial plica into 4 types: a cordlike band running medial to the patella, a shelf partially under the medial patella, a wide synovial band covering the medial femoral condyle, and a "fenestrated" type that splits into 2 bands: one medial to the patella and one deep to it.[4,7-9]

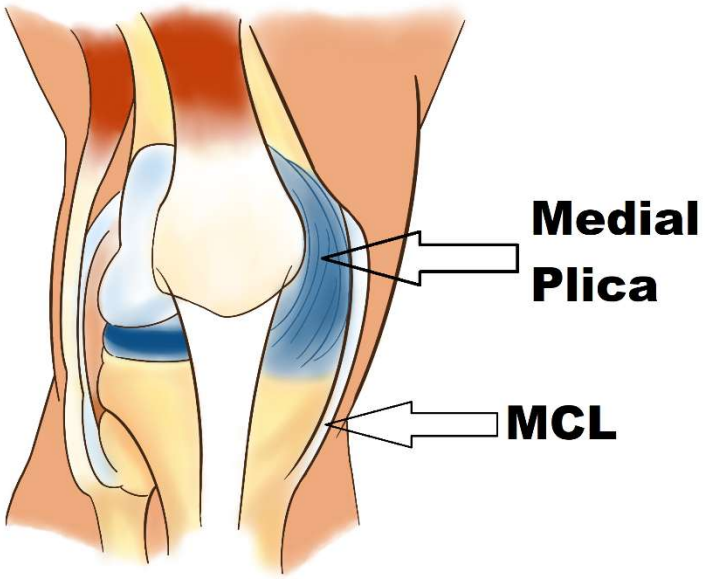


Figure 1. Location of the medial plica. MCL indicates medial collateral ligament.

Radiographs do not demonstrate soft tissue structures but may help rule out other pathologies. Magnetic resonance imaging (MRI) can visualize the plica, but its effectiveness is less than ideal, and ultrasound appears to have the best accuracy.[4] According to a meta-analysis, MRI had a sensitivity of 0.77 and specificity of 0.58, compared with 0.90 and 0.83, respectively, for diagnostic ultrasound.[4,10,11]

Musculoskeletal ultrasound requires a high-frequency linear probe (ideally ≥12 MHz with 196 or more elements).[12] Handheld ultrasound devices have improved greatly in recent years with multiple models that meet these criteria and can be purchased for approximately US $3000 to $6000, which makes them an affordable imaging modality that requires no special installation, dedicated space, or special considerations due to ionizing radiation.[13-17]

Clinical diagnostic tests may be more effective than imaging; for example, the mediopatellar plica test (MPP test) has a sensitivity of 0.90 and a specificity of 0.89.[11] Other common provocative plica tests include the Hughston fold test and the stutter test, which have

variable reported sensitivity and specificity.[4,18]

Typical clinical examination findings may include[18]:
• Anterior knee pain (parapatellar)
• Snapping sensation along the inside of the knee as the knee is bent
• Clicking, catching, clunking, grinding, popping
• Tenderness to touch
• A tender band (the plica) palpable beneath the skin
• Knee effusion, swelling
• Pain on squatting
• Locking, stiffness, and giving way

CASE PRESENTATION

The patient, a 39-year-old man, had to move a heavy box a long distance (>10 km [>6 miles]). His sole mode of transportation was an electric scooter. He kept his right leg slightly flexed to absorb bumps in the road while using his other leg to steady the box on the standing platform. He felt increased pressure afterward, but it was not until the next day that his knee began locking consistently when attempting stairs, squats, or even rising from a seated position.

This was not the first such episode, although it was the most symptomatic. He reported a sense of pressure and occasional clicking in the right knee since adolescence, when he would always cycle standing up because the normal cycling range of motion was uncomfortable. He went through a period of 4 years after a car accident during which his knee would always lock on stairs; the locking ultimately resolved when he did rehabilitation exercises involving the vastus medialis. A previous MRI (taken when he was 29, roughly a year after the car accident) showed a small tear of the posterior horn of the medial meniscus. He expressed frustration that previous clinicians had consistently asked about pain, particularly joint line pain, which he has never experienced. He described pressure as his most significant symptom. Before this most recent incident, he had no daily symptoms other than mild pressure at the medial knee. If he cycled too much, the pressure would worsen, but a week of rest was usually enough to settle it. He reported seeing no fewer than 5 physicians (including 2 orthopedic specialists), 3 physiotherapists, and 1 chiropractor without receiving a medial plica syndrome diagnosis.

He presented 3 weeks after the acute onset of right knee pain, clicking, a sense of increased pressure, and a sense of instability. On physical examination, a tender band was palpated over the medial condyle of the right knee. This band was present on both knees but larger on the symptomatic side. The Thessaly test was negative, and there was no joint line tenderness. The MPP test and the stutter test were both positive.

Ultrasound imaging was performed with a Suresult D3Ultra (Suresult Industrial Co Ltd, Dongguan City, Guangdong Province, China). Images of both knees were obtained for comparison (**Figures 2-6**). There was slightly more fluid in the right suprapatellar recess (**Figure 2**). There was thinning of the cartilage on the medial side of the right knee (**Figure 3**). The medial meniscus protruded slightly more in the right knee, and the joint space

appeared slightly reduced, both indirect signs of joint degeneration (**Figure 4**).[19] On a transverse view superomedial to the patella, there was a marked difference in the appearance of the soft tissue on the right side (**Figure 5**). The tissue resembled the honeycomb-like appearance of a nerve in cross-section: hypoechoic circles, separated by hyperechoic tissue. To differentiate this tissue from the tendon fibers of the vastus medialis muscle, images were obtained with the tendon fibers in long axis (**Figure 6**). The tendon fibers appeared relatively normal, and the unusual appearance of the tissue deep to the tendon, the medial plica, was clearly seen.

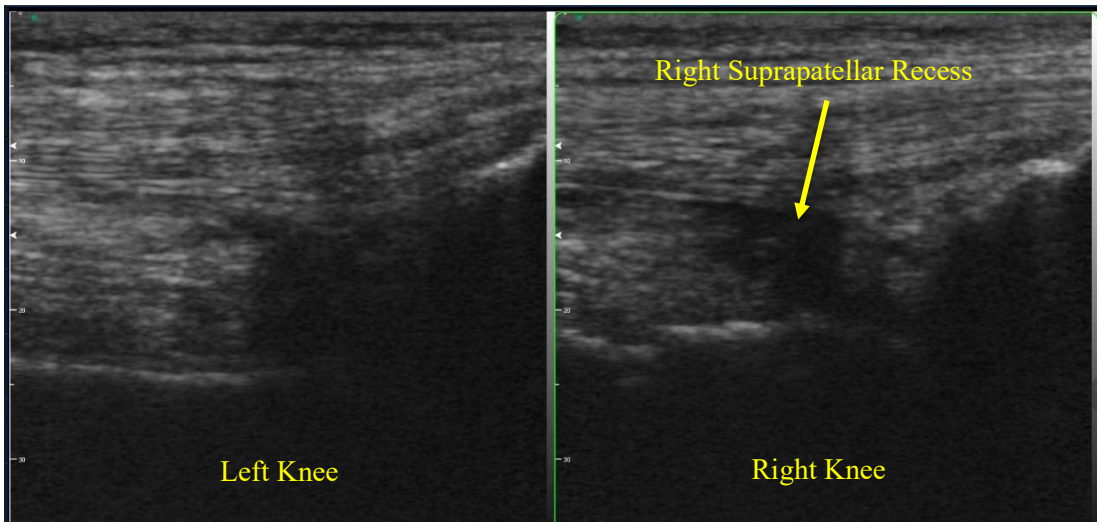


Figure 2. Suprapatellar region in the sagittal plane. Left side of the image is superior. The suprapatellar recess of the right knee contains slightly more fluid than the left side.

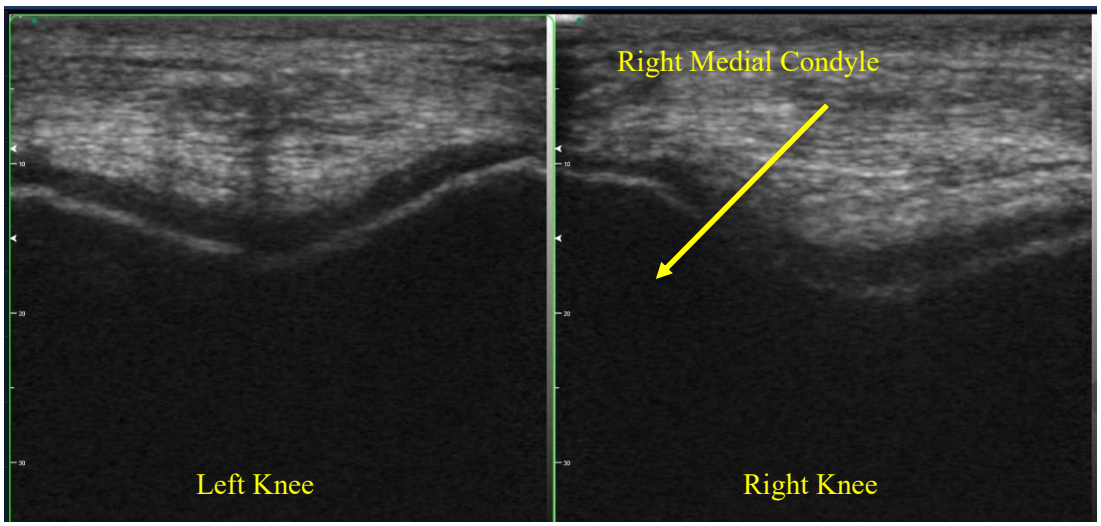


Figure 3. Transverse view of the knee condyles. Left side of the image is the patient's left. The medial condyle of the right knee has less cartilage than the medial condyle of the left knee.

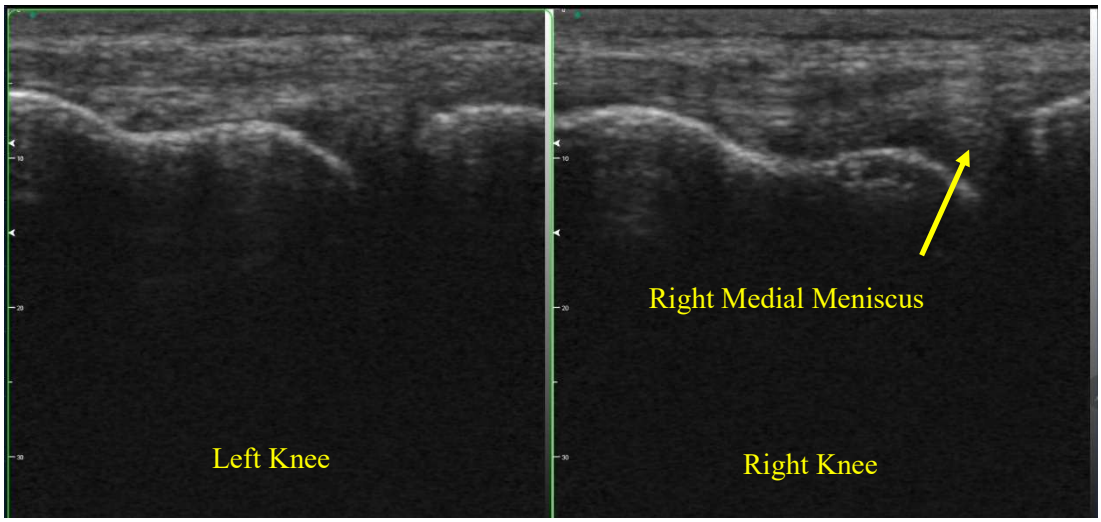


Figure 4. Coronal image of the medial knees. Left side of the image is superior. Note that the meniscus is pushed slightly outward and that there is slightly less joint space for the right knee compared with the left.

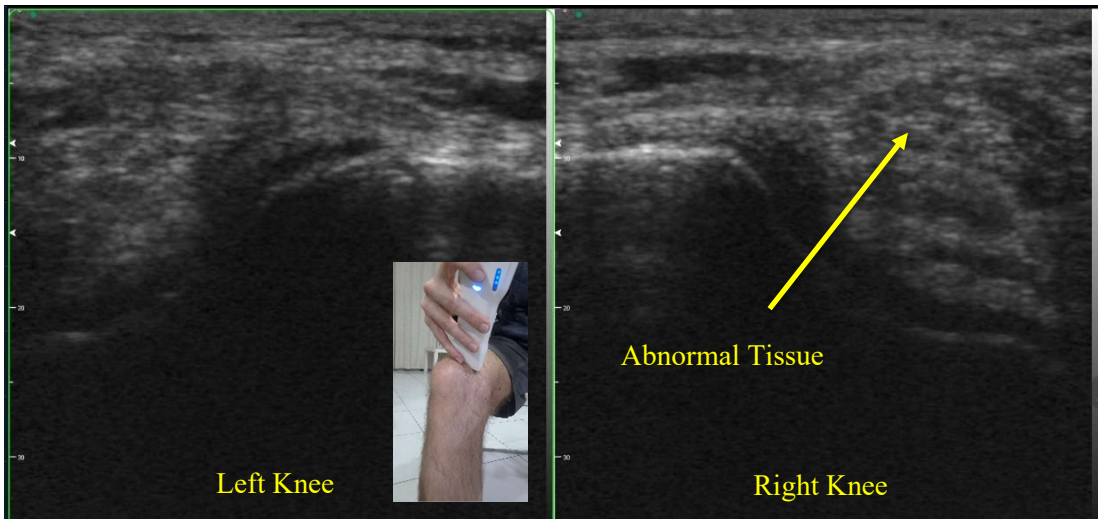


Figure 5. Transverse image of the medial suprapatellar region. Left side of the image is the patient's left. Note the abnormal soft tissue appearance in the right knee, which is the irritated medial plica. The probe position is inset in the left panel.

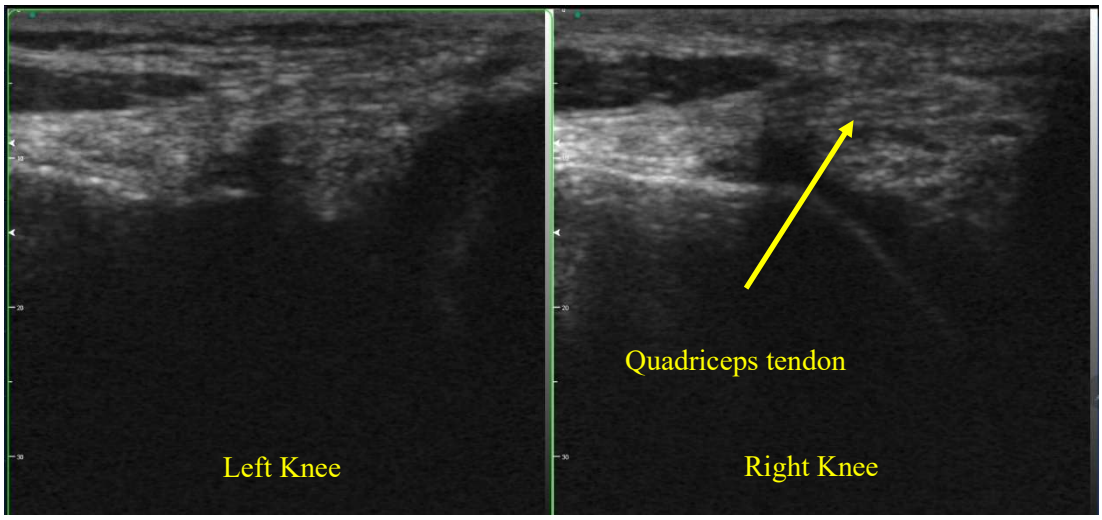


Figure 6. Long-axis view of the quadriceps tendon from the vastus medialis to the patella. The left side of the image is superior. Note the irregular tissue running underneath the tendon fibers of the right knee, which is the irritated medial plica.

DISCUSSION

In this case, the diagnosis could have been made from the patient history and physical examination alone. The abnormal ultrasound appearance on the symptomatic side further supported the diagnosis. Ultrasound can also be used to evaluate other structures for concurrent pathology or to rule out competing differential diagnoses. MRI is considered the best imaging modality for most knee pathology, and in this case, previous clinicians may have relied on the small meniscus tear to explain the patient's symptoms without checking for medial plica syndrome in the physical examination. This case shows the importance of keeping medial plica syndrome in the differential diagnosis and of recognizing that MRI is unreliable for its evaluation.

The scan took longer than usual because the clinician was not accustomed to diagnosing medial plica syndrome at the time, so additional care and time were spent, including scanning the asymptomatic side, but the total time was still likely less than 10 minutes. Since this case, the clinician has confirmed 3 additional cases with ultrasound, and scanning time has decreased to about 5 minutes from start to finish.

Of these 4 cases of medial plica syndrome, 2 patients described pressure as a predominant symptom, more so than pain. Although anecdotal at this point, pressure may be a useful symptom to ask about when differentiating medial plica syndrome from most other knee pathologies. Further investigation of this observation is beyond the scope of this case report.

Historically, the patient's symptoms were much more intense and prolonged until he performed rehabilitation exercises involving the vastus medialis. An imbalance between the vastus medialis and vastus lateralis can affect the medial and lateral forces on the patella during use. This suggests that evaluating for muscle imbalances may be important for managing medial plica syndrome. The right knee also showed more signs of degeneration

(less joint space and cartilage). This raises the question of whether the degeneration was caused by the symptomatic plica, or whether both the more symptomatic plica and the greater degeneration on the right knee resulted from muscle imbalance and poor biomechanics. I hypothesize that both factors contributed and reinforced each other: discomfort may have caused asymmetric muscle use, which may have increased irritation of the medial plica and medial condyle wear.

CONCLUSION

Medial plica syndrome may be misdiagnosed and can be challenging to diagnose, especially given the poor sensitivity and specificity of MRI compared with the physical examination and diagnostic ultrasound. When combined with the physical examination, point-of-care musculoskeletal ultrasound can help increase confidence in the diagnosis. In this case, a handheld unit was sufficient to clearly identify an irritated medial plica.

LIMITATIONS

A single-case design is inherently limited and does not demonstrate the reliability of identifying a symptomatic medial plica. There is also variability in the quality of ultrasound units, in patients, and in clinician skill and experience that could affect the usefulness of ultrasound in diagnosis. Because the medial plica is not present in all individuals and varies anatomically, the location and type of symptoms might differ between patients, and, in some patients, there may be no plica to identify.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

COMPETING INTERESTS

The author offers an online musculoskeletal ultrasound educational course and has partnered in the past with ultrasound manufacturers to produce educational content (including for Suresult Industrial Co Ltd).

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