Case Report

Snapping Pes Anserinus and the Diagnostic Utility of Dynamic Ultrasound

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Received : 29-06-2017
Accepted : 18-08-2017
Published : 17-10-2017

Abstract

Snapping pes anserinus syndrome is an often encountered cause of medial knee snapping. It results from impingement and translation of the gracilis tendon or semitendinosus tendon over the osseous structures of the knee during active flexion and extension. Ultrasonography is often the diagnostic imaging test of choice in cases of mechanical snapping. We report 2 cases of painful snapping pes anserinus and highlight the value of dynamic ultrasound in making an accurate diagnosis so as to direct care.

Keywords: *Dynamic ultrasound, gracilis tendon, pes anserinus, snapping pes anserinus syndrome, snapping pes syndrome*

Introduction

Soft tissue snapping is a result of normal or abnormal anatomic structures shifting over or traversing adjacent structures associated with movement of a neighboring joint. Identifying the true source of snapping and the soft tissue structures involved can often be a challenge depending on the depth of the anatomy and the rarity of the clinical condition. Although symptoms can be variable, snapping conditions are often misdiagnosed as more common pathology, and may lead to incorrect treatment or, quite possibly, unnecessary surgical intervention. Musculoskeletal ultrasound and dynamic ultrasound, in particular, provides additional value compared to more conventional static imaging in making a correct diagnosis. At the medial knee, snapping pes anserinus tendons are the main cause of extra-articular knee snapping.[1] We report 2 cases of painful snapping gracilis tendons and highlight the utility of dynamic ultrasound to help make the correct diagnosis and guide clinical treatment.

Case Report

Case 1

A 31-year-old male presented for evaluation of right knee pain, muscle spasms, and mechanical snapping. The symptoms had been present for 2 years with no antecedent trauma or injury. The knee pain was associated with a snapping sensation with extension of the right knee joint notably in the posteromedial region. Initial work up at the onset of symptoms included magnetic resonance imaging at an outside facility that revealed mild chondromalacia of the lateral facet of the patella, bone contusions of the femoral condyles, as well medial and lateral tibial plateau consistent with hyperextension injury. An electromyogram was normal. He ultimately underwent arthroscopic lateral retinaculum release, which did not improve his symptoms.

Physical examination revealed an antalgic gait with mild atrophy of the right quadriceps and calf musculature compared to the left. The pain was noted with palpation of the medial thigh and pes anserine region. With repetitive flexion and extension, there was visible and audible snapping of the medial, distal hamstring region, reproducing his discomfort. Manipulation of the patella

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Quick Response Code:

Website: www.clinicalimagingscience.org

DOI: 10.4103/jcis.JCIS_45_17

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How to cite this article: Shapiro SA, Hernandez LO, Montero DP. Snapping Pes Anserinus and the Diagnostic Utility of Dynamic Ultrasound. J Clin Imaging Sci 2017;7:39.
Available FREE in open access from: http://www.clinicalimagingscience.org/text.asp?2017/7/1/39/216811

did not cause pain, and there was no joint line tenderness. Hyperextension was not noticeable on examination at full extension. McMurray test was negative. There was no obvious effusion.

An updated magnetic resonance imaging revealed mild edema-like signal along the confluence of the pes anserine tendons and a small tear of the medial meniscus. Dynamic ultrasound over the posterior and medial thigh and knee was performed with the patient lying lateral recumbent on the right side. Static sonographic examination revealed no abnormal character or quality to the hamstring muscles and tendons, no osseous abnormality, no meniscal pathology, and no abnormal fluid collections. However, with repetitive flexion and extension of the knee, dramatic snapping of the gracilis tendon between the sartorius muscle and the medial femoral condyle was encountered [Figures 1, 2 and Supplemental Video 1]. Sonopalpation with the pressure of the ultrasound probe over this region reproduced the patient's pain, and the patient was diagnosed with snapping pes anserinus syndrome. A corresponding magnetic resonance imaging of the region where the snapping occurred is shown in Figure 3 for correlation, and an ultrasound of the normal contralateral knee is shown in Figure 4. Supplemental Video 2 shows the normal knee with a fixed gracilis tendon without snapping. A subsequent ultrasound-guided triamcinolone and lidocaine injection of the gracilis tendon at the level of the medial femoral condyle performed to assist with diagnosis provided immediate pain relief despite the persistence of tendon snapping.

Due to long standing pain and dysfunction, the patient subsequently elected for resection of the gracilis and semitendinosus tendons along with arthroscopic partial medial meniscectomy followed by physical therapy. The soft tissue snapping resolved postoperatively [Figure 5] as did his knee pain. A follow-up diagnostic ultrasound revealed resolution of tendon snapping on dynamic examination [Supplemental Video 3].

Case 2

A 72-year-old female had previously undergone left total knee arthroplasty for painful, severe knee osteoarthritis. She struggled with continued pain postoperatively despite successful rehabilitation and no apparent abnormalities on radiographic examination. She complained of painful popping and snapping in the medial knee despite the absence of new injury. Her physical examination revealed palpable snapping and pain in the pes anserinus region with well healed surgical arthrotomy scars, and no evidence of infection. An ultrasound over the painful pes region showed the normal sonographic appearance of the prosthesis along with persistence of cortical irregularity from osteophytes involving the non-prosthetic portions of the medial aspect of the femoral condyle. Dynamic ultrasound confirmed snapping of the gracilis tendon deep to the sartorius muscle from posterior to anterior of the medial femoral condyle during repeated flexion and extension [Figures 6, 7 and Supplemental Video 4]. Hypoechoic tissue deep to the sartorius and adjacent to the gracilis tendon may be contributing to the snapping tendon as the tendon appears to translocate with this tissue during flexion and extension as the muscle bellies contract and relax. Again, ultrasound guided lidocaine and corticosteroid injection circumferentially surrounding the gracilis tendon completely relieved the patient's preprocedural pain [Supplemental Figure 1]. In this patient's case, no surgery was required, and the patient remained pain-free thereafter.

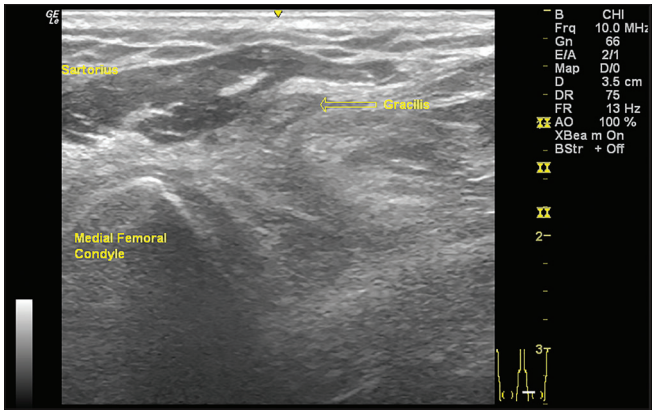

Figure 1: Transverse ultrasound of gracilis tendon posterior to medial condyle – Case 1. A 31-year-old male with right knee pain. Transverse sonogram showing the gracilis tendon in flexion before snapping over the medial femoral condyle of the right knee. The top of the picture is medial, bottom is lateral, left side is anterior knee, and right is posterior knee. The dynamic ultrasound of this image is demonstrated in Supplemental Video 1.

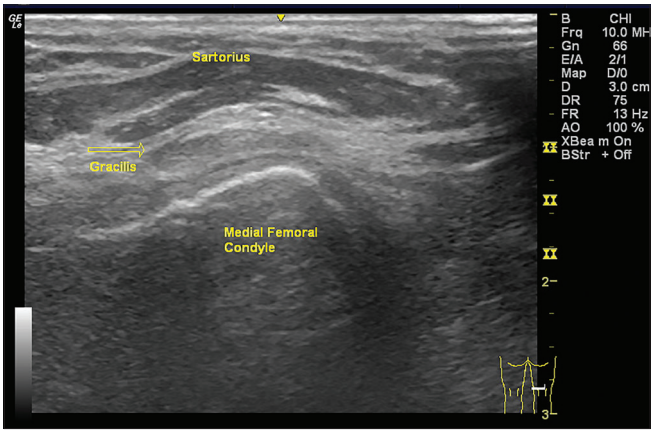

Figure 2: Transverse ultrasound of gracilis tendon anterior to medial condyle – Case 1. A 31-year-old male with right knee pain. Transverse sonogram showing the gracilis tendon in knee extension after snapping over the medial femoral condyle. The dynamic ultrasound of this image is demonstrated in Supplemental Video 1.

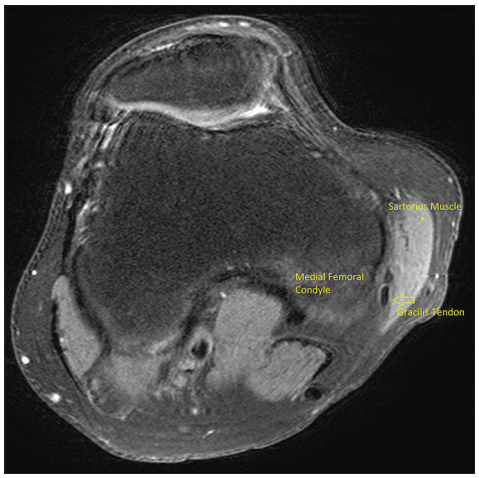

Figure 3: Medial right knee MRI correlation – Case 1. A 31-year-old male with right knee pain. The region of interest corresponding to ultrasound in Figure 1 showing the sartorius muscle belly (asterisk), gracilis tendon (arrow), and approximating hamstring musculature.

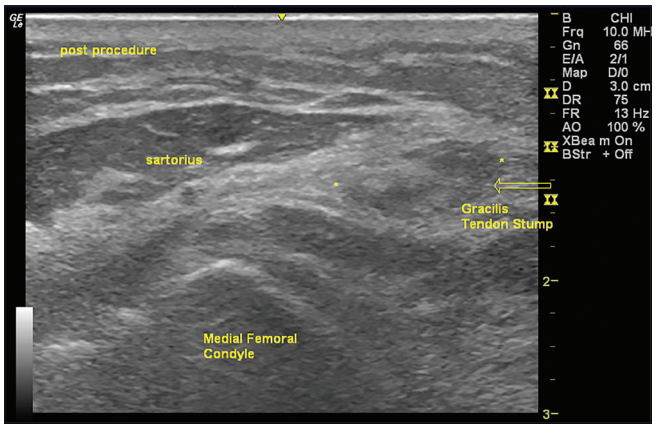

Figure 5: Postoperative ultrasound – Case 1. A 31-year-old male with right knee pain. Postoperative ultrasound appearance of the right medial knee after sartorius and gracilis hamstring harvest. The gracilis tendon is now absent deep to the sartorius muscle and instead seen as a large hypoechoic retracted stump positioned more posteriorly (asterisks and arrow).

Discussion

Snapping pes anserinus syndrome is felt to be the most frequently encountered cause of extra-articular medial knee snapping.[1] It is a result of translation of the pes tendons, usually gracilis or semitendinosus, across the posteromedial aspect of the medial femoral condyle and tibia during active movement of the knee from flexion to extension.[1,2] It has been reported in athletes, trauma, overuse, tumors, and as the result of anatomical variants and postoperative changes.[2-10] We report two cases of snapping pes anserinus and highlight the value of dynamic ultrasound in making a correct diagnosis to direct appropriate care. The supplemental videos provided with this report demonstrate the abrupt nature of the snapping tendons involved which may also involve alterations in the shape of the contracting musculature and surrounding soft tissues. Ultrasound has been shown

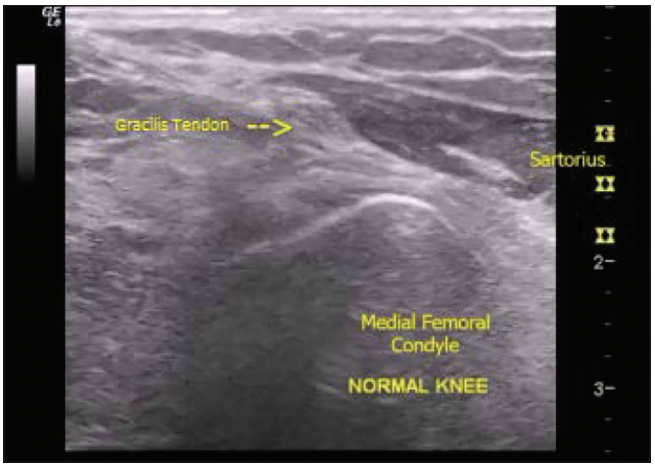

Figure 4: Normal left knee ultrasound – Case 1. A 31-year-old male with right knee pain. Contralateral normal left knee ultrasound showing the fixed gracilis tendon posterior and deep to the sartorius muscle belly. The top of the picture is medial, the bottom is lateral, left side is posterior knee, and right is anterior knee. Dynamic flexion and extension ultrasound of the normal knee is shown in Supplemental Video 2.

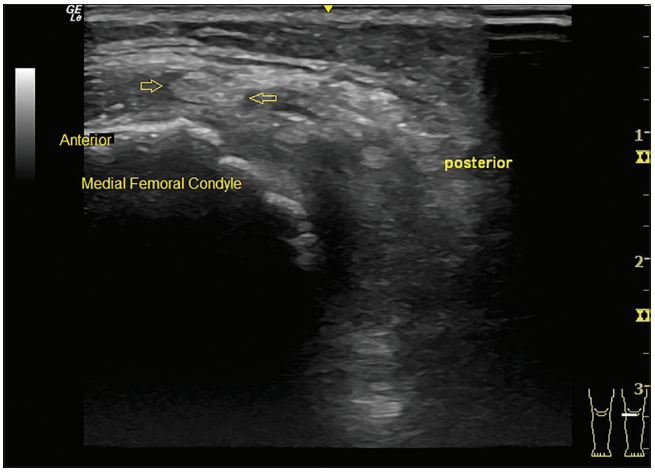

Figure 6: Transverse ultrasound of the left gracilis tendon at the medial condyle – Case 2, a 72-year-old female with prior left total knee arthroplasty and painful snapping of the medial knee. The gracilis tendon in knee flexion before snapping over the medial femoral condyle seen as a hyperechoic oval structure. Left side of the picture is anterior; right side is posterior. Arrows denote the gracilis tendon.

to have sensitivity and specificity comparable to magnetic resonance imaging for imaging soft tissue disorders of the knee.[11-13] Dynamic ultrasound has the advantage of allowing patients to recreate their snapping symptoms during real-time visualization of the tissues involved.

In cases of medial knee snapping, the sonographic evaluation of the medial knee begins with long and short axis views of each structure about the medial knee joint (femoral and tibial cortices, medial meniscus, medial collateral ligament, pes anserinus tendons, presence or absence of hypertrophic osteophytes, fluid, masses, etc.). To specifically survey for snapping tendons at the medial knee, we then start the transducer in the transverse orientation, posterior and proximal to the knee

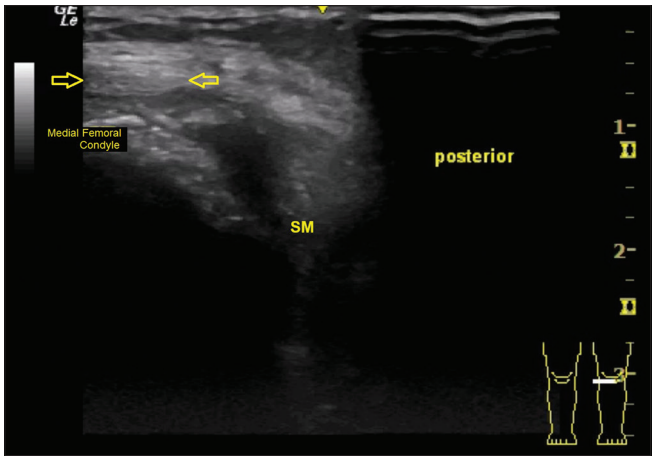

Figure 7: Transverse ultrasound of the left gracilis tendon anterior to medial condyle – Case 2, a 72-year-old female with prior left total knee arthroplasty and painful snapping of the medial knee. The gracilis tendon is imaged in short axis knee extension after snapping over the medial femoral condyle. The gracilis is still seen as hyperechoic, but now more flattened after snapping. Arrows denote the gracilis tendon, SM – semimembranosus tendon. The dynamic ultrasound is demonstrated in Supplemental Video 4.

joint where the semitendinosus tendon sits superficial to the semimembranosus tendon and muscle belly. This is incidentally where one might encounter a Baker's Cyst in communication with the knee joint located in the bursa between the medial head of the gastrocnemius and the semimembranosus tendon. While remaining in a transverse orientation we then translate the probe distally and anteromedially, tracing the semitendinosus tendon to where it begins to approximate the gracilis tendon and the sartorius muscle belly. It is in this location that the sonographer can begin to survey for snapping of the pes anserinus tendons while either passively flexing and extending the knee, or asking the patient to perform the inciting maneuver actively. The sonographer must take care to keep the transducer anchored on the anatomical structures in question during such dynamic maneuvers. Once the source of snapping is identified, an additional repetitive sweep distally and proximally should confirm the source as well as survey for any other possible pain generators and/or additional snapping structures.

In the absence of such real time imaging, the correct diagnosis may be delayed, or missed altogether. As is the case with many snapping tendon conditions, treatment of snapping pes anserinus syndrome is initially conservative with symptom management medically along with physical therapy. Surgical options including pes anserine tendon resection (open or arthroscopic) are available if patients fail conservative measures.[1,14]

Declaration of patient consent

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

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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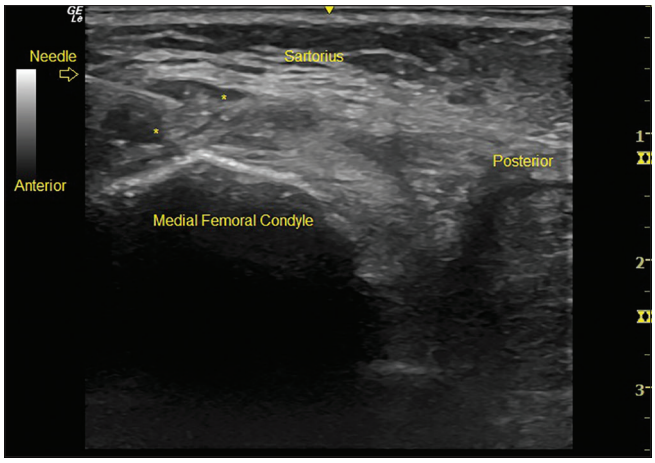

Supplemental Figure 1: Ultrasound guided lidocaine and corticosteroid injection in Case 2, a 72-year-old female with prior left total knee arthroplasty and painful snapping of the medial knee. The procedure was performed with a linear probe at a Frequency of 12 mHz. Left side of picture is anterior; right side is posterior. Needle is imaged in-plane from anterior to posterior injecting circumferentially around the gracilis tendon imaged in transverse orientation superficial to the medial aspect of the femoral condyle and deep to the sartorius muscle belly.

Supplemental Video 2: Dynamic ultrasound of the normal left knee – Case 1, A 31-year-old male with right knee pain. With repetitive flexion and extension, the contralateral gracilis tendon is seen posterior to the medial femoral condyle and deep to the sartorius muscle belly. The top of the picture is medial, bottom is lateral, left side is posterior knee, and the right is anterior knee.

Supplemental Video 4: Dynamic ultrasound of the medial left knee – Case 2 a 72-year-old female with prior left total knee arthroplasty and painful snapping of the medial knee. Left side is anterior, right side is posterior and top is medial. The gracilis tendon is seen in transverse orientation as an oval fibrillary echoic structure moving and snapping from posterior to anterior over the medial aspect of the femoral condyle with flexion and extension.

Supplemental Video 1: Dynamic ultrasound of the medial knee – Case 1, A 31-year-old male with right knee pain. With repetitive flexion and extension, the gracilis tendon is seen snapping posterior to anterior over the medial femoral condyle just deep to the sartorius muscle belly. The top of the video is medial, bottom is lateral, right is posterior knee, and left is anterior knee.

Supplemental Video 3: Postoperative dynamic ultrasound – Case 1, A 31-year-old-male with right knee pain. Postoperative right medial knee ultrasound after sartorius and gracilis hamstring harvest. During dynamic knee flexion and extension, the gracilis tendon no longer snaps, and instead is seen as a static structure, appearing as a large hypoechoic retracted stump more posteriorly positioned.