

Paralabral Cysts of the Hip

Sonographic Evaluation With Magnetic Resonance Arthrographic Correlation

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This retrospective study demonstrates the sonographic appearance paralabral cysts of the hip with magnetic resonance (MR) arthrography as the reference standard. Consensus review by 2 musculoskeletal radiologists was used to assess the paralabral cysts and determine their characteristics. The 3 paralabral cysts seen on sonography and confirmed with MR arthrography in this study were anechoic or hypoechoic, lobulated, and filled with contrast on MR imaging. A labral tear was also noted in all cases on both sonography and MR arthrography. Sonographic assessment for an anterior hip paralabral cyst and labral tear may be of diagnostic benefit.

Key Words—cyst; hip; labrum; paralabral; sonography

Tears of the acetabular labrum have been reported as the most common forms of intra-articular hip disorders.¹ Typical etiologies for labral tears include femoroacetabular impingement, hip dysplasia, trauma, capsular laxity, and joint degeneration.¹ A paralabral cyst is a benign soft tissue cyst usually seen in association with a tear of the fibrocartilagenous labrum of the shoulder or hip.²⁻⁶ Although most labral tears do not have an associated paralabral cyst, the high association of paralabral cysts and labral tears indicates that when a paralabral cyst is seen, a labral tear can usually be inferred, even if not discretely visualized.^{2,4-6}

Paralabral cysts and associated labral tears can be assessed with several imaging methods. Radiography is not useful because of its low soft tissue resolution. Computed tomography has a higher soft tissue resolution compared to radiography but is also limited for the assessment of paralabral cysts unless the cysts are very large. Magnetic resonance imaging (MRI) can often reveal a paralabral cyst but can be limited in the evaluation of labral tears unless intra-articular contrast (MR arthrography) is used. Sonography is infrequently used to assess the integrity of the acetabular labrum because of its low reported sensitivity but is often used in evaluation of the hip to assess for joint or bursal fluid, snapping tendons, and inguinal hernias or to guide injection or aspiration.^{7,8}

Because sonography is an effective modality for evaluation of cystic lesions, it may be useful to evaluate paralabral cysts. In some cases, a labral tear may also be visualized with sonography, although the sensitivity of this test for visualizing a tear may be low.⁷⁻⁹ The presence of a paralabral cyst, however, strongly implies a labral tear and increases the investigator's confidence when a suspected labral tear is noted on sonography. The purpose of this study is to retro-

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Abbreviations

MRI, magnetic resonance imaging

spectively characterize the sonographic appearance of paralabral cysts proven by MR arthrography and assess the frequency of associated labral tears.

Materials and Methods

This study was granted an exemption by our Institutional Review Board for approval and patient consent. A retrospective database search of the radiology archive from January 1, 2006, to September 1, 2010 was performed to identify patients who had sonographic evaluations of the hip that described a cystic structure. Only those cases with an MR arthrogram on the same hip were included in this study. All MR arthrographic examinations were performed within 37 days of the hip sonographic examinations. Retrospective review of the sonograms and MR arthrograms was performed by consensus review of 2 fellowship-trained musculoskeletal radiologists, each with greater than 10 years of experience in musculoskeletal imaging, including sonography, to confirm the presence of a paralabral cyst. Three cases were thus included and 1 case excluded because the retrospective review determined that the “cyst” was not a paralabral cyst but rather iliopsoas bursitis.

Sonographic evaluation of the hip was performed by 1 fellowship-trained musculoskeletal radiologist with musculoskeletal sonography experience (7 years of experience) as part of routine patient care using a commercially available scanner (LOGIQ 9; GE Healthcare, Milwaukee WI; iU22 or HDI 5000; Philips Healthcare, Bothell, WA) and using linear array and curvilinear transducers ranging from 3 to 14 MHz. Structures imaged by hip sonography include but are not limited to the hip joint, capsule, labrum, and surrounding muscles and tendons, including the iliopsoas. Contralateral sonography of the asymptomatic hip was, in some cases, also completed.

Magnetic resonance imaging was performed as part of routine patient care on several clinical scanners (3T; Siemens Medical Solutions, Mountain View, CA; GE 1.5T; and Philips Achieva 3) with routine clinical imaging parameters after injection of a mixture of diluted gadolinium into the hip joint. Joint injections were performed using fluoroscopic guidance.

Retrospective review of the sonograms and MR arthrograms was then completed to characterize the paralabral cyst and labrum by the same 2 fellowship-trained musculoskeletal radiologists in consensus. The location (anterior, posterior, inferior, or superior), size (millimeters), and shape (round or oval) of the paralabral cyst was recorded. The echogenicity on sonography (anechoic, hypoechoic, isoechoic, or hyperechoic) and the signal inten-

sity on MR arthrography (equal to or less than the intra-articular contrast signal intensity) were also recorded. Any associated labral tear was noted on sonography (anechoic or hypoechoic cleft) and MR arthrography (contrast-filled cleft or absence of the labrum). Medical records were reviewed to record the sex, patient age at sonography, and specific history. The time interval between sonography and MR arthrography was recorded, as was any surgical follow-up on the hip.

Results

Three cases were identified in which sonography revealed a paralabral cyst of the hip. In all 3 cases, the paralabral cyst was confirmed by MR arthrography. The patients were all female, ranging from 14 to 50 years of age at the time of sonography. The sonographic studies were ordered to assess the cause of hip pain, including a suspected femoral hernia and snapping hip, and to guide injection of the iliopsoas tendon sheath. All patients underwent MR arthrography within 37 days of sonography.

On sonography and MR arthrography, all paralabral cysts were lobular and were located at the anterior aspect of the acetabulum, adjacent to the anterior labrum. Two of the cysts were noted to be predominately hypoechoic on sonography; the third cyst had regions that were hypoechoic and anechoic. On both sonography and MR arthrography, the cysts ranged from 8 to 15 mm in greatest dimension. A labral tear was noted in all 3 patients on both sonography and MR arthrography (Figures 1 and 2). One of the 3 patients went to surgery, and a labral tear was confirmed by arthroscopy.

Discussion

Labral disorders are common causes of hip pain. This study demonstrates that paralabral cysts of the hip can be visualized with sonography in association with labral tears. When evaluating the hip with sonography, assessment for a paralabral cyst and labral tear can be of benefit.

The diagnosis of a labral tear can be a clinical dilemma because there are several nonfocal and nonspecific signs and symptoms.¹⁰ There are frequently numerous referrals and a long time interval before the diagnosis is eventually made.¹¹ Maneuvers on physical examination may be helpful when found to be positive. In a study of 18 patients with periacetabular osteotomy, Troelsen et al⁹ found that the impingement test (hip flexion to 90°, internal rotation, and abduction) had sensitivity of 59%, specificity of 100%, a positive predictive value of 100%, and a negative predic-

tive value of 13% for the diagnosis of acetabular labral tears. The flexion, abduction, and external rotation (FABER) test (placement of the legs in a figure 4 position and application of pressure laterally at the knee) is reported to have sensitivity of 41%, specificity of 100%, a positive predictive value of 100%, and a negative predictive value of 9% for the diagnosis of acetabular labral tears.

Although the reference standard for diagnosis of acetabular labral disorders is arthroscopy, MR arthrography plays an important role in the preoperative diagnosis and decision to perform arthroscopic surgery. Magnetic resonance arthrography of the hip has sensitivity of 90% to 100%, specificity of 71% to 100%, and accuracy of 88% to 94% in the diagnosis of acetabular labral tears.^{12–15} However, MR arthrography is not without drawbacks related to percutaneous injection of the contrast agent into the hip joint, which increases the risk for an allergic reaction and infection and causes the diagnostic process to be potentially painful, time-consuming, and expensive.⁷ The intra-articular contrast agent injection may also involve radiation exposure if fluoroscopy is used to guide the injection.

Sonography, in contrast, has no risk of an allergic reaction or infection, is generally painless, and is much less expensive than MRI.¹⁶ It also has the advantage of assessment during joint motion, which can be of benefit for many musculoskeletal applications, including diagnosis of a snapping iliopsoas tendon.¹⁷ There have been a small number of published reports regarding the usefulness of sonography in the assessment for labral disorders in the hip. A 2003 study by Mitchell et al⁸ found that in 25 patients with hip disorders as diagnosed by arthroscopy, the sensitivity of sonography in the detection of labral tears was 13%, and the specificity was 100%. A 2007 study by Troelsen et al⁷ found the sensitivity of sonography for labral tears in 20 patients with dysplastic hips to be 44% and the specificity to be 75%. A clinical study 2 years later by the same group assessed 18 patients with previous acetabular osteotomy and reported sensitivity and a positive predictive value of 94% for the detection of labral tears. The higher sensitivity and positive predictive value of this subsequent study may be due to the interval experience gained with this examination.⁹ The authors caution that the diagnostic role of sonography for labral disorders in an unselected group of patients remains unclear. One point of agreement between these studies is the high positive predictive value of sonography when evaluating labral disorders. In these studies, sonography was found to have positive predictive values of 88% and 94%.^{7,9} This finding indicates that positive sonographic findings can potentially lead directly to intervention or treatment, without any further diagnostic evaluation.⁷

There is a strong association between labral tears and paralabral cysts seen on MRI. This finding has been reported in both the hip as well as the shoulder joint (Figures 1 and 2).^{2–6} A 1996 study by Schnarkowski et al⁴ described 7 para-acetabular cystlike masses in the hip, with all 7 having a torn, deformed, or absent labrum on MRI. A second study in 2000 by Magee and Hinson² found that of 13 patients with acetabular labral cysts seen on MRI,

Figure 1. Paralabral cyst and labral tear in a 50-year-old woman. **A**, Sagittal sonogram of the anterior hip showing a predominately hypoechoic lobular paralabral cyst (arrowheads) and hypoechoic labral tear (arrow). **B**, Oblique T1-weighted magnetic resonance image after intra-articular administration of diluted gadolinium showing contrast filling the labral tear (arrow) and adjacent contrast-filled paralabral cyst (arrowhead).

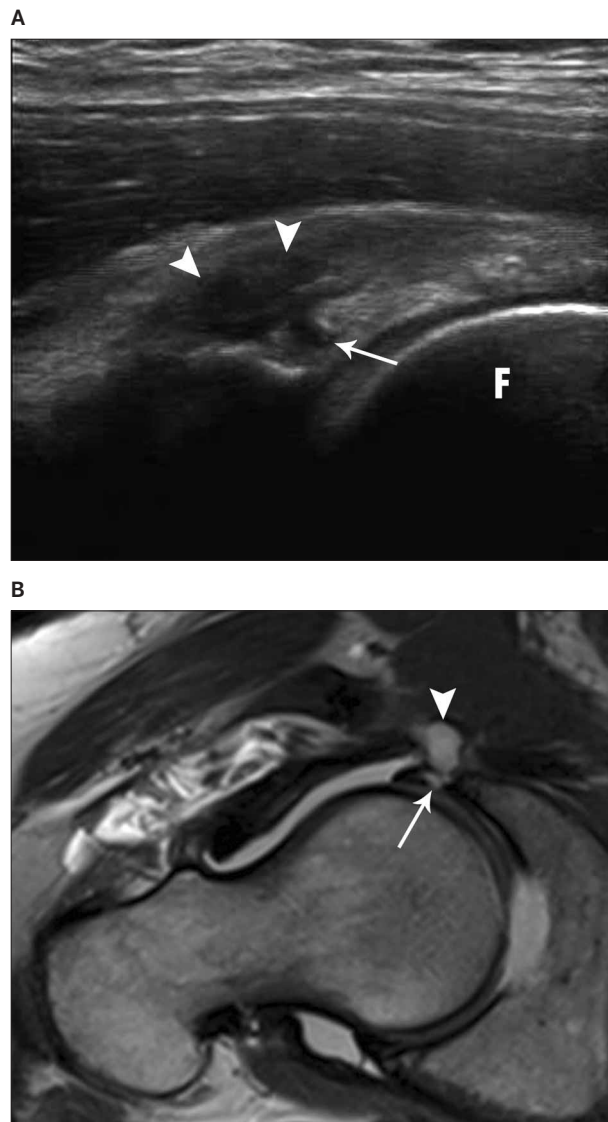


Figure 2. Paralabral cyst and labral tear in a 14-year-old girl. **A**, Sagittal sonogram of the anterior hip showing a labral tear as a hypoechoic cleft (arrow) at the junction of the labrum and acetabulum with an adjacent hypoechoic paralabral cyst (arrowheads). **B**, Oblique T1-weighted magnetic resonance (MR) image after intra-articular administration of diluted gadolinium showing contrast filling the labral tear (arrow) and adjacent contrast-filled paralabral cyst (arrowhead). **C**, Transverse sonogram of the anterior hip showing the hypoechoic paralabral cyst (arrowheads) adjacent to the anterior cortex of the acetabulum. **D**, Axial T1-weighted MR image after intra-articular administration of diluted gadolinium showing the contrast-filled paralabral cyst (arrowhead). **E**, Oblique T1-weighted MR image after intra-articular administration of diluted gadolinium showing contrast filling the labral tear (arrow) and adjacent contrast-filled paralabral cyst (arrowhead). **F**, Sagittal T1-weighted MR image after intra-articular administration of diluted gadolinium showing contrast filling the labral tear (arrow) and adjacent contrast-filled paralabral cyst (arrowhead).



10 (77%) had an associated labral tear by arthroscopy or arthrotomy.² To our knowledge, ours is the first study to characterize a series of paralabral cysts by sonography.

Sonography is an effective modality for evaluation of cystic lesions, and a hip sonographic examination completed for any diagnostic or therapeutic reason may easily be modified to include an assessment of the labrum and paralabral soft tissues. The normal labrum appears triangular in shape and echogenic on sonography.¹⁸ If a paralabral cyst is noted, a diligent evaluation of the labrum is warranted because a labral tear is usually present, even if not well visualized (Figures 1 and 2).

In cases in which sonography is used to guide injection of the hip, assessing the labrum and paralabral soft tissues immediately after injection may improve the detection of labral disorders by outlining the labrum and filling the labral tear and paralabral cyst with fluid.¹⁹ Similarly, if a hip joint effusion is present, it may improve visualization of the labrum and labral disorders. Thus, if sonography of the hip is performed for assessment of hip pain and joint fluid is noted, an assessment for labral disorders and paralabral cysts can be helpful and in some cases may be diagnostic.

Limitations of this study include the retrospective design and the small number of cases. The number of cases will likely increase with future studies because the labrum is now routinely assessed during hip sonography in our practice. Surgical correlation of the labral disorder was present in only 1 of the 3 cases; however, MR arthrography was used in this study and is known to have high accuracy for the detection of labral tears and is the modality of choice for such assessment.^{12–15} Further evaluation with a larger study group would be of benefit to determine the sensitivity and specificity for the sonographic detection of paralabral cysts. All cysts were noted at the anterior aspect of the hip, at the junction of the labrum and acetabulum. Cysts may occur elsewhere, such as at the posterior acetabulum, and would not have been detected during evaluation of the anterior hip. However, labral tears most commonly occur at the anterior labrum, and most paralabral cysts would be expected to occur at this site.^{11,20–22} If patient symptoms warrant, assessment of the lateral and posterior paralabral tissues with sonography can also be performed.

On the basis of the results of this study, we have modified our hip sonographic protocol to always include assessment of the anterior labrum and paralabral tissues. Likewise, if a hip injection is to be performed, sonographic assessment during or immediately after the injection may be of benefit because the addition of joint fluid can aid vi-

ualization of labral tears and paralabral cysts. Detection of a labral cyst can provide a high level of confidence regarding a concomitant labral tear. Finally, if a labral tear is seen, because of the high positive predictive value of sonography, the patient may, in some cases, be able to proceed directly to intervention or treatment without the additional time, potential risks, and expense of MR arthrography.

In conclusion, sonographic assessment for an anterior hip paralabral cyst and labral tear may be of diagnostic benefit. Our hip sonographic protocol now routinely includes assessment of the anterior labrum and paralabral tissues.

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