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# Magnetic Resonance Imaging of Cysts, Cystlike Lesions, and Their Mimickers Around the Knee Joint

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## Abstract

While interpreting routine magnetic resonance imaging (MRI) of the knee joint, a radiologist may encounter various cystic lesions such as ganglion, synovial, and meniscal cysts, among others. In some cases, MRI may demonstrate cystlike lesions around the knee due to fluid distention of normal bursa and recesses, the diagnosis of which should not be difficult if a radiologist is familiar with their characteristic location and MRI appearance. In addition, there are cyst mimickers such as hematomas, abscesses, vascular lesions, and neoplasms around knee joint that may pose a diagnostic challenge on routine MRI. Due to their atypical location and variable morphology, contrast administration is helpful as the enhancement pattern aids to differentiate them from cysts and cystlike lesions. This pictorial essay aims to classify cysts, cystlike lesions, and cyst mimickers in and around the knee joint based on their anatomic location and highlight their characteristic MRI features.

## Résumé

Lorsqu'il interprète un examen d'imagerie par résonance magnétique (IRM) de routine de l'articulation du genou, le radiologiste peut détecter diverses lésions kystiques, comme des ganglions, des kystes synoviaux et des kystes méniscaux, entre autres. Dans certains cas, l'examen d'IRM montre des lésions kystiques autour du genou causées par la distension des fluides normalement contenus dans les bourses et les niches, une affection facile à diagnostiquer si le radiologiste est au fait de son siège caractéristique et de son apparence sur un examen d'IRM. De plus, il peut y avoir des lésions qui ressemblent à des kystes — comme des hématomes, des abcès, des lésions vasculaires et des néoplasmes — près de l'articulation du genou, ce qui rend difficile le diagnostic au moyen d'un examen d'IRM de routine. En raison de l'emplacement atypique et de la morphologie variable de ces lésions, l'administration d'un agent de contraste peut s'avérer utile, car le profil de rehaussement aide à distinguer les kystes des lésions kystiques. Cet essai illustré vise à classer les kystes, les lésions kystiques et les lésions ayant l'apparence de kystes dans l'articulation du genou et autour de celle-ci en fonction de leur siège anatomique, ainsi qu'à faire ressortir leurs caractéristiques d'imagerie.

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With the increasing use of magnetic resonance imaging (MRI) for evaluating the knee joint, incidentally found cysts and cyst mimickers in and around the knee are now diagnosed more frequently. The majority of these lesions are

benign cysts but cystic-appearing lesions may lead to potential misdiagnosis. Radiologists need to be aware of these entities, their specific anatomic locations, and potential pitfalls to avoid misdiagnosis and unwarranted intervention. Due to superior soft tissue contrast, MRI is the modality of choice for localizing and characterising cystic lesions around the knee. Furthermore, contrast-enhanced MRI helps to distinguish cystic from solid lesions [1]. We present a pictorial review of cysts, cystlike lesions, and their

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Table 1  
Classification of cyst and cystlike lesions in and around the knee joint

Intra-articular	Extra-articular (superficial to deep locations)	Intraosseous
Ganglion cyst	Ganglion cyst <sup>a</sup>	Ganglion cyst
- Anterior cruciate ligament	- In relation to tendons, ligaments, muscles, the joint capsule, bursa, and nerves	Periosteal ganglion cyst
- Posterior cruciate ligament		
- Hoffa fat pad		
Synovial cysts	Anterior	Subarticular cyst
	- Prepatellar bursitis	
	- Superficial infrapatellar bursitis	
	- Suprapatellar bursitis	
	- Deep infrapatellar bursitis	
	- Supra- and infrahoffatic recess	
	- Central synovial recess	
Meniscal cyst	Posterior	
	- Posterior femoral recess	
	- Posterior capsular recess	
	Medial	
	- Pes anserine bursitis	
	- Tibial collateral ligament bursitis	
	- Semimembranosus-tibial collateral ligament bursitis	
	Lateral	
	- Lateral parameniscal recess	
	- Iliotibial bursitis	
	- Lateral/fibular collateral ligament-biceps femoris bursitis	

<sup>a</sup> Can be seen anywhere around the knee joint.

mimickers in and around the knee joint on MRI. We have classified cysts and cystlike lesions as either intra-articular, extra-articular, or intraosseous, based on their location in and around the knee joint. Extra-articular lesions are further subclassified from the superficial to the deep based on their location within anterior, posterior, medial, and lateral compartments (Table 1). The cyst mimickers are categorized separately under pitfalls (Table 2).

## Intra-articular

### Ganglion Cyst

Ganglion cysts are benign lesions bound by dense connective tissue and filled with gelatinous fluid rich in hyaluronic acid and mucopolysaccharides. They are not lined by synovium, may be unilocular or multilocular, and often have internal septa [2]. On routine MRI, they appear cystic, with low signal intensity on T1-weighted imaging (T1WI) and high signal intensity on T2-weighted imaging (T2WI) [3–5]. Ganglion cysts may appear heterogeneous if complicated by hemorrhage or infection, whereupon follow-up contrast administration will usually reveal thin rim enhancement with no enhancing soft tissue component [6]. They can be intra-articular, extra-articular, intraosseous, or periosteal and may be seen anywhere around the knee joint.

Intra-articular ganglion cysts are located within or adjacent to the anterior cruciate ligament (ACL) or posterior cruciate ligament (PCL), usually the former [3]. They are

quite uncommon but the diagnosis tends to be quite obvious when they occur. The incidence rate of intra-articular ganglion cyst on MRI is approximately 1% [6]. On MRI, an ACL ganglion cyst characteristically has a fusiform appearance, interspersed within the ACL fibers (Figure 1) and may extend anteriorly or posteriorly towards the Hoffa fat pad or the femoral intercondylar fossa, respectively [2,3]. The PCL ganglion cyst is typically a well-defined unilocular, or multilocular, cystic structure located along the dorsal surface of the PCL [7] (Figure 2). Both are best demonstrated in the sagittal plane. Other less common, intra-articular locations are the Hoffa fat pad (Figure 3) and suprapatellar bursae. A ganglion cyst in these locations is usually multilocular [2]. Contrast-enhanced MRI is sometimes required to differentiate a ganglion cyst within Hoffa fat pad and suprapatellar recess from other synovial lesions such as a hemangioma or synovial sarcoma [2], as former typically shows peripheral wall enhancement in contrast to synovial lesions, which usually have an enhancing solid component within.

### Synovial Cysts

Synovial cysts communicate with the joint space and are lined by synovial cells [3]. Histologically, the presence of a synovial lining distinguishes them from other juxta-articular fluid collections [3]. It may sometimes be difficult to distinguish synovial cysts from bursae or ganglion cyst on imaging, with the latter conditions usually lacking true communication with the joint space [2]. Synovial cysts may

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