

## Bursae, Cysts and Cyst-like Lesions About the Knee

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One of the more common imaging findings when evaluating the knee, whether by ultrasound or MRI, is the “cystic lesion.” These “cystic lesions” may be related to bursae, cysts, or other cyst-like lesions and could be soft tissue or intraosseous in origin. They are mostly benign lesions; however, not all hypoechoic or T2 hyperintense lesions are cysts, and neoplastic lesions may be missed if close attention is not paid to the typical imaging findings. Therefore, knowledge of the normal bursae, common cysts, and cyst-like lesions which can occur about the knee is essential for the appropriate diagnosis and management in these cases.

### BURSAE

In general, a bursa functions to reduce friction between two structures, at least one of which is moving relative to the other. Bursae can be divided into two types, anatomic and adventitial. Anatomic bursae are true synovial lined sacs which may be fluid-filled and located in expected positions near the joint. In contrast, adventitial bursae are not synovial lined and may occur away from the joint.

### Normal Bursae

There are various bursae which are encountered during routine imaging of the knee. The bursae about the knee can be divided by location into anterior, medial and lateral (**Table 1**). These bursae can become distended from direct or repetitive trauma or secondary to local or systemic inflammatory changes. Bursitis can be further complicated by hemorrhage, rupture, synovial proliferation, chondromatosis, or infection.

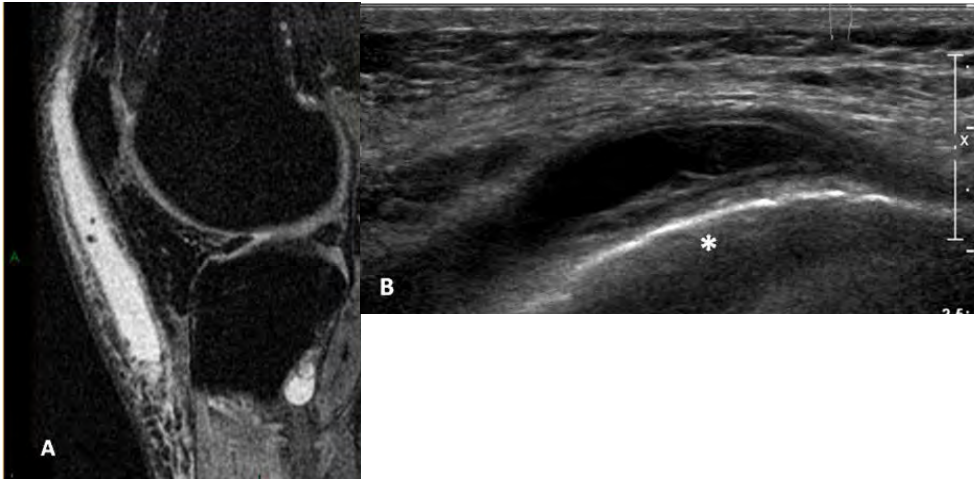
#### Anterior Bursae.

The prepatellar bursa is located within the anterior subcutaneous soft tissues superficial to the patella (**Fig. 1**).<sup>1,2</sup> Prepatellar bursitis, sometimes referred to

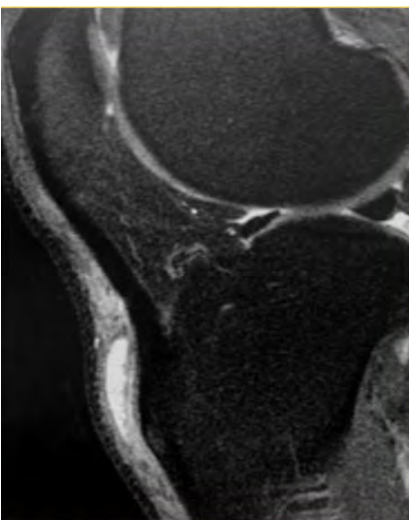
<b>ANTERIOR</b>
Prepatellar
Superficial Infrapatellar (Pretibial)
Deep Infrapatellar (Retropatellar)
Suprapatellar
<b>MEDIAL</b>
Medial Gastrocnemius (MG)
Pes Anserine
Semimembranosus-Tibial Collateral Ligament (SMTCL)
Medial Collateral Ligament (MCL)
<b>LATERAL</b>
Iliotibial
Fibular
Fibulopopliteal
Popliteal
Lateral Gastrocnemius (LG)

**Table 1.** Normal bursae of the knee by location.

as carpet-layer or housemaids knee, results from the bursa undergoing repetitive compressive and shear forces between the skin and the patella owing to the positioning the individual’s weight on to the anterior knee over the patella.<sup>2</sup> The superficial infrapatellar bursa, or pretibial bursa, resides within the subcutaneous fat superficial to the tibial tuberosity at the level of the distal patellar tendon (**Figs. 2 and 3**).<sup>1,2</sup> The deep infrapatellar bursa, or retropatellar bursa, is a small bursa located directly posterior to the distal third of the patellar tendon, just proximal to its insertion on the tibial tubercle (**Fig. 3 and 4**).<sup>1,2,3</sup> Trace fluid is normal in the deep infrapatellar bursa; bursitis is referred to when the fluid outpouches the recess inferior to the Hoffa’s fat pad. The suprapatellar bursa is a superior recess of the knee joint deep to the quadriceps femoris tendon anterior to the intracondylar fossa (**Fig. 5**). During embryologic development, the septum separating the suprapatellar bursa from the remainder of the joint will perforate and involute, leaving only a small transverse residuum of the septum.<sup>4</sup>



**Figure 1.** Prepatellar Bursa. Sagittal fat suppressed T2WI (A) shows a fluid distended prepatellar bursa with surrounding subcutaneous edema in this patient with prepatellar bursitis. Transverse ultrasound of the anterior knee (B) demonstrates an ovoid hypoechoic collection anterior and superficial to the patella (\*) in a different patient with prepatellar bursitis.



**Figure 2.** Superficial Infrapatellar Bursa. Sagittal fat suppressed T2WI shows a fluid distended superficial infrapatellar bursa.



**Figure 3.** Superficial and Deep Infrapatellar Bursae. Sagittal ultrasound of the anterior knee at the level of the distal patellar tendon (o) attachment to the tibial tubercle (\*) demonstrating a subcutaneous hypoechoic fluid collection representing the inflamed pretibial or superficial infrapatellar bursa (solid arrow) in this patient with pretibial bursitis. Note also the small amount of fluid within the deep infrapatellar bursa (dashed arrow) located at the inferior aspect of Hoffa's fat pad between the patellar tendon (o) and anterior tibial cortex (represented by the shadowing hyperechoic line).



**Figure 4.** Deep Infrapatellar bursa. Sagittal fat suppressed T2WI demonstrates a small fluid focus within the deep infrapatellar bursa (arrow). This small amount of fluid in the infrapatellar bursa is normal.



**Figure 5.** Suprapatellar Bursa. Sagittal fat suppressed T2WI demonstrates fluid within a distended suprapatellar bursa or recess.

Medial Bursae.

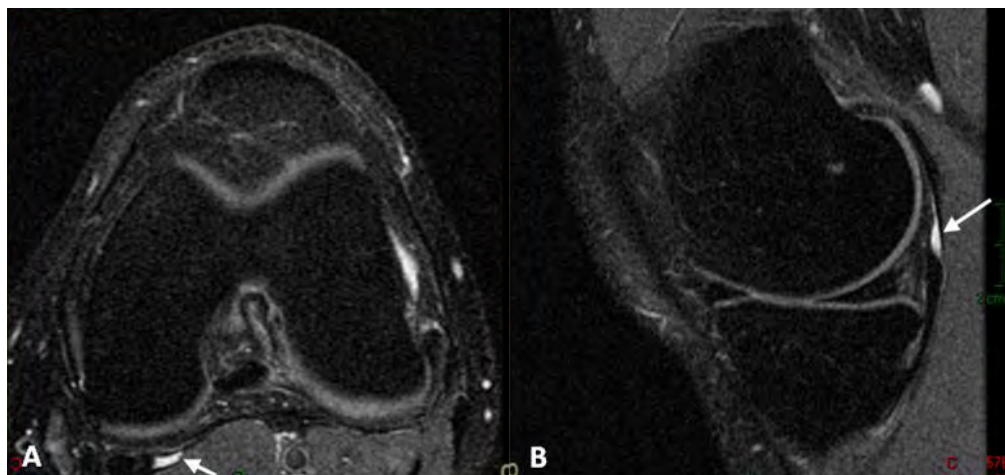
The medial gastrocnemius (MG) bursa is located between the medial head of the gastrocnemius and the joint capsule (**Fig. 6**).<sup>5</sup> The medial collateral ligament (MCL) bursa is intimately related to the MCL (**Fig. 7**).<sup>4,6</sup> The semimembranosus-tibial collateral ligament (SMTCL) bursa is located between the semimembranosus tendon and the deep posteroinferior portion of the medial collateral ligament complex (**Fig. 8**).<sup>1</sup> The pes anserine consists of the conjoined tendons of the gracilis, sartorius, and semitendinosus tendons. The pes anserine bursa resides at, and distal to, the level of the joint, situated between the medial collateral ligament and the pes anserinus (**Fig. 9**).<sup>4</sup> Anserine bursitis results from overuse, commonly in runners.

Lateral Bursae.

The iliotibial bursa is located deep to the distal

iliotibial band proximal to its tibial attachment (**Fig. 10**) and may become distended in iliotibial band friction syndrome.<sup>2</sup> Iliotibial band bursitis or iliotibial band syndrome is a common overuse injury in runners. The fibular bursa is located between the fibular collateral ligament and the distal biceps femoris tendon (**Fig. 11**).<sup>7</sup> The fibulopopliteal bursa is contained between the fibular collateral ligament and the popliteus tendon. The popliteal bursa communicates with the joint and therefore may be referred to as the popliteal or subpopliteal recess (**Fig. 12**).<sup>8</sup> This bursa extends between the popliteus tendon and lateral femoral condyle and in some individuals communicates with the fibulopopliteal bursa.<sup>9</sup> The lateral gastrocnemius (LG) bursa is present between the lateral head of the gastrocnemius and joint capsule (**Fig. 13**). The gastrocnemius bursae and fibulopopliteal bursae will commonly become distended in chronic internal derangement of knee.

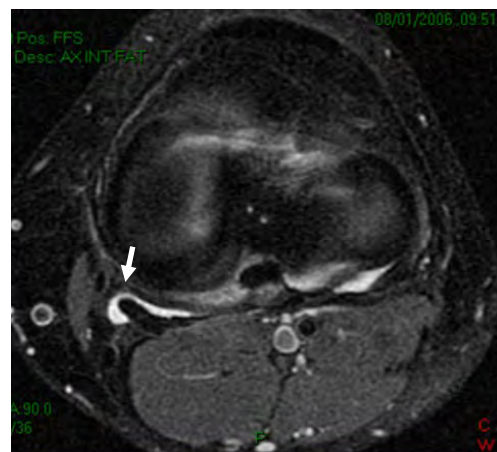
**Figure 6.**  
Medial gastrocnemius (MG) bursa.  
Axial fat suppressed T2WI (A) shows small amount of fluid within the MG bursa (arrow). Sagittal fat sat T2WI (B) shows small amount of fluid within the MG bursa (arrow).



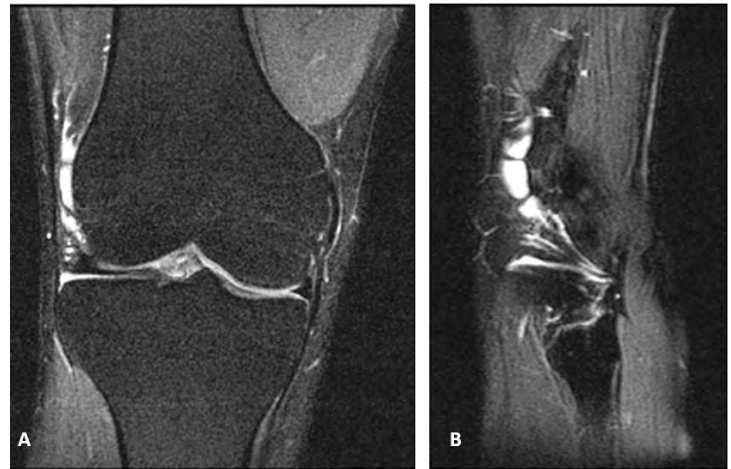
**Figure 7.**  
Medial Collateral Ligament (MCL) Bursa. Coronal fat suppressed PDWI demonstrates fluid signal within the MCL bursa in this patient with MCL bursitis.



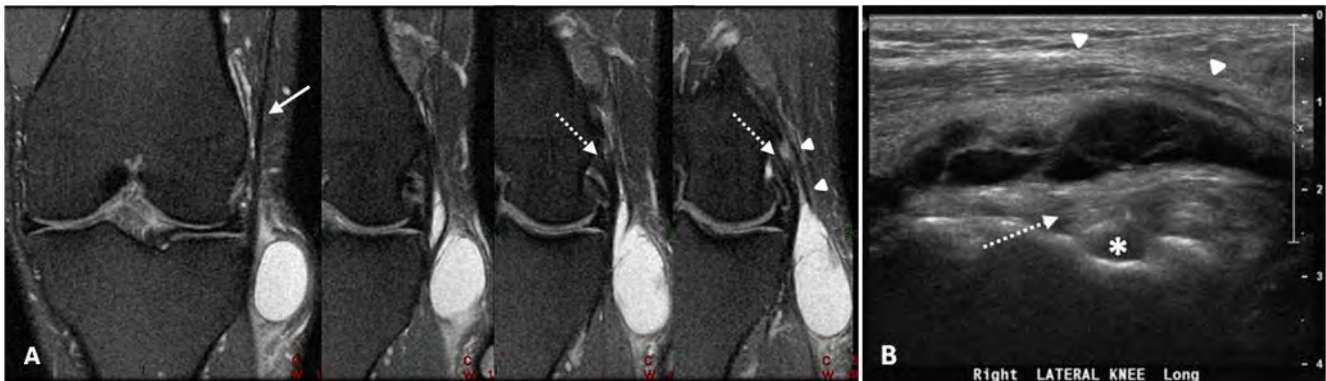
**Figure 8.**  
Semimembranosus-Tibial Collateral Ligament Bursa (SMTCL). Axial fat suppressed T2WI demonstrates fluid within the SMTCL bursa which resides between the semimembranosus tendon superficially and the deep posteroinferior portion of the MCL complex at the deep margin.



**Figure 9.**  
Pes Anserine Bursa.  
Sagittal fat suppressed T2WI shows fluid distending the pes anserine bursa along the medial proximal tibia just inferior to the joint, differentiating it from the SMTCL bursa which is typically at the joint level.

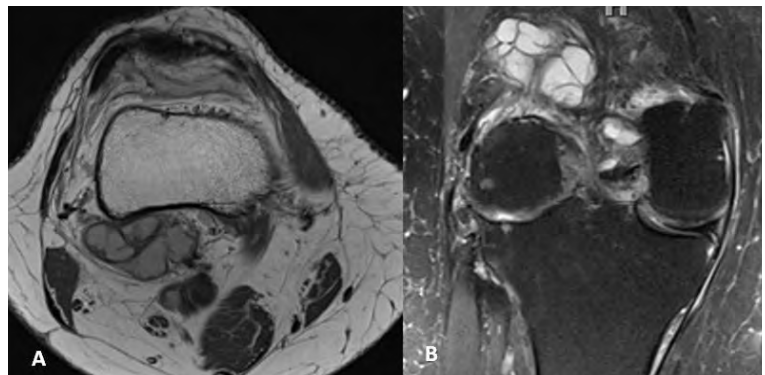
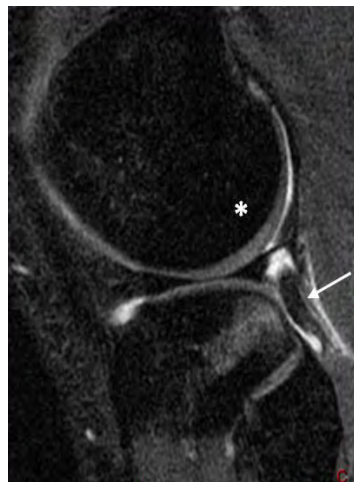


**Figure 10.** Iliotibial (IT) Bursa. Coronal (A) and sagittal (B) fat suppressed T2WI of a 21-year-old runner with distended iliotibial (IT) bursa. The IT bursa is identified by its position between the distal iliotibial band and the lateral femoral condyle.



**Figure 11.** Fibular bursa. Sequential coronal fat suppressed T2WI (A) from anterior to posterior show a multilocular cystic mass posterolateral to the iliotibial band (solid arrow), insinuating between the fibular collateral ligament (dashed arrow) and the distal biceps femoris tendon (arrow head), consistent with fibular bursitis. Sagittal ultrasound of the lateral knee (B) at the level of the popliteal notch (\*) demonstrates a loculated hypoechoic focus between the fibular collateral ligament (dashed arrow) and the biceps femoris tendon (arrow heads).

**Figure 12.**  
Popliteal Bursa.  
Sagittal fat suppressed T2WI demonstrates a small amount of fluid between the popliteus tendon (arrow) and the lateral femoral condyle (\*), consistent with fluid tracking into the popliteal bursa. This bursa communicates directly with the joint and is often distended in cases with joint effusions.



**Figure 13.** Lateral Gastrocnemius Bursa. Axial PD (A) and coronal fat sat T2WI (B) demonstrating a distended multiloculated lateral gastrocnemius bursa.



**Figure 14.**

**Adventitial Bursa.** AP radiograph of the knee (A) shows an osteochondroma at the medial distal femur in a 12-year-old boy with palpable mass and pain at the medial knee. Axial fat suppressed T2WI (B) reveals a small crescent-shaped hyperintense focus (arrow) along the posteromedial margin of the osteochondroma, consistent with an adventitial bursa. This bursa was produced by repetitive friction of the distal vastus medialis over the osteochondroma.

## Adventitial Bursae

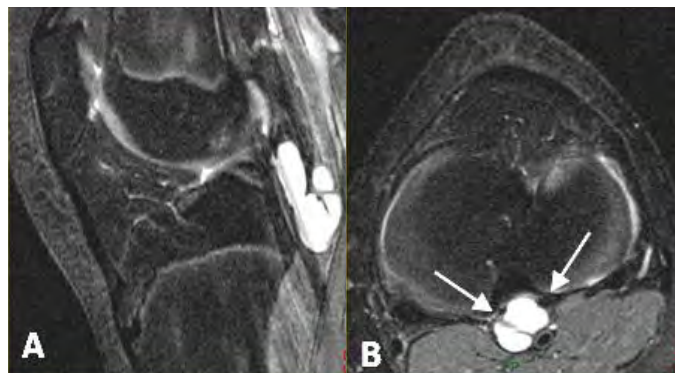
In contrast to the anatomic bursae described which reside over normal anatomic areas of friction, the body may also produce bursae as a result of friction between a normal anatomic structure and a pathologic or iatrogenic friction point. Some examples include adventitial bursae produced adjacent to an osteochondroma (Fig. 14) or orthopedic hardware.

## CYSTS

### Synovial Cysts

Synovial cysts are juxta-articular fluid collections which are distinguished from other juxta-articular fluid lesions in that they are synovial lined, a feature which can normally be identified on post contrast images as peripheral enhancement. Because of their synovial lining, these cysts are subject to synovial processes, including synovial hyperplasia (e.g. inflammatory arthropathy), pigmented villonodular synovitis (PVNS), and synovial osteochondromatosis. Specific types of synovial cysts at the knee include the popliteal and tibiofibular cysts.<sup>1,10,11</sup>

A cyst which communicates with the joint through a defect in the joint capsule but does not insinuate between the semimembranosus and medial head of the gastrocnemius is given the general term of



**Figure 15.**

**Synovial Cyst.** Sagittal (A) and axial (B) fat suppressed T2W images demonstrate a multilocular cystic mass extending through a defect (between arrows) in the posterior joint capsule, indicative of a synovial cyst. The rent in the joint capsule may persist or close, rendering the synovial-lined cyst to persist in the juxta-capsular location, a common location for synovial cysts.

synovial cyst (Fig. 15). These synovial cysts are seen more commonly and with greater frequency in patients with increased internal knee pressure due to chronic derangement or from prior arthroscopy when excessive amounts of fluid are pushed into the joint as part of the procedure.<sup>10</sup> The common mechanism includes capsular rupture, leading to the formation of a pseudodiverticulum, followed by closure of the neck, ultimately resulting in the formation of a simple synovial or multiloculated chronic ganglion cyst. Uncomplicated cysts are typically managed conservatively. If there is no intra-articular communication, these cysts can be decompressed in symptomatic patients by percutaneous aspiration and corticosteroid injection.<sup>12</sup>

### Popliteal (Baker's) Cysts.

Popliteal cysts are specific types of synovial cysts which communicate with the joint through a rent in the posteromedial capsule; they insinuate between the medial head of the gastrocnemius and the tendon of the distal semimembranosus (Fig. 16). These synovial cysts are commonly associated with joint effusions and are present in up to 40% of patients with posterior knee masses. Popliteal cysts are associated with internal derangement, even in the absence of a joint effusion.<sup>10</sup> Patients may present acutely secondary to rupture of the cyst. Popliteal cysts may be complicated by hemorrhage, inflammation, or

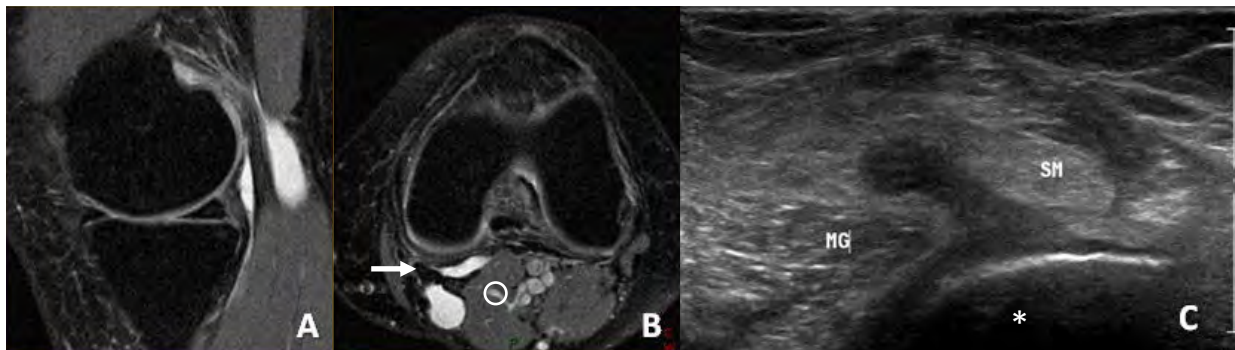
loculation from chronic or partial decompression. Also, due to their communication with the underlying joint, popliteal cysts may at times contain loose bodies (Fig. 17).

#### Proximal Tibiofibular Cysts.

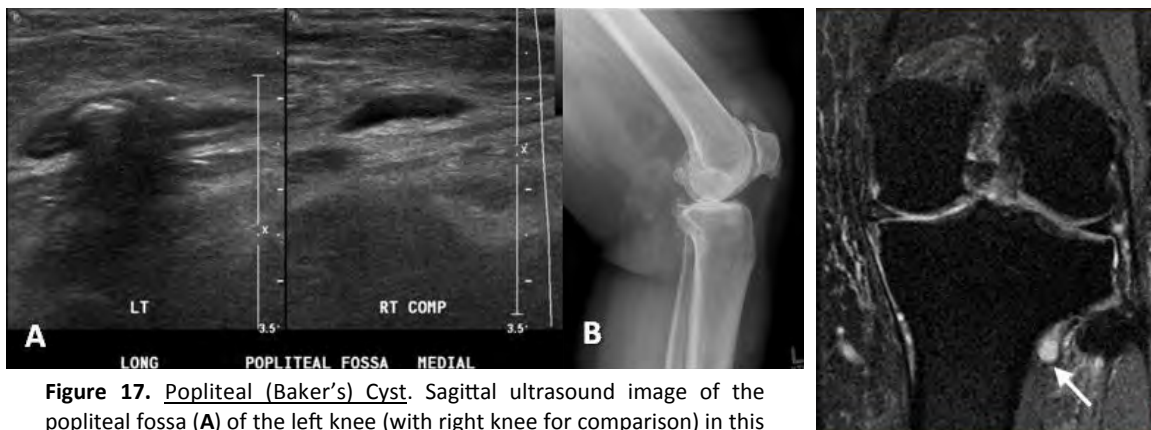
These synovial cysts arise from chronic arthritic changes of the proximal tibiofibular joint (Fig. 18). The size and location of the cyst will determine the clinical presentation. Tibiofibular cysts may compress the common peroneal nerve or extend intra-epineurally and retrograde along the intra-articular branches, causing neuropathy and foot drop.<sup>13-15</sup>

#### **Parameniscal and Intrameniscal Cysts**

Parameniscal cysts are thought to be produced by the extension of joint fluid through a meniscal tear and into the adjacent parameniscal soft tissues (Fig. 19).<sup>16</sup> These cysts may extend long distances from the joint, mimicking sarcomas; however, the neck can often be traced to the joint line and the meniscal level. Pericruciate meniscal cysts are seen adjacent to the PCL and arise from tears in the posterior horn of the medial meniscus.<sup>17</sup> This particular location of a parameniscal cyst may be confused with a PCL ganglion. It is critical to differentiate the parameniscal cysts from PCL ganglia as the treatment approaches will often differ. Additionally, while parameniscal cysts

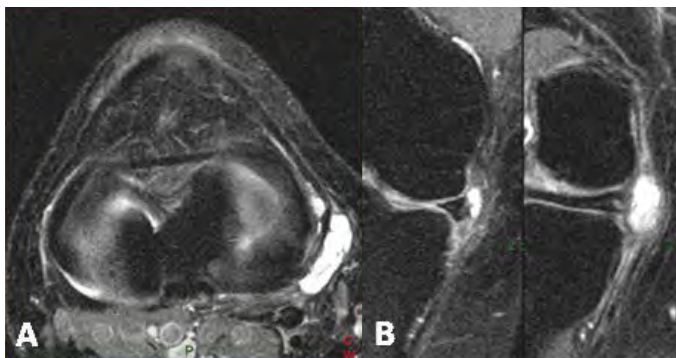


**Figure 16.** Popliteal (Baker's) Cyst. Sagittal (A) and axial (B) fat suppressed T2W images show fluid extending posteriorly between the semimembranosus (arrow) and medial head of the gastrocnemius (circle). Transverse ultrasound of the posteromedial knee (C) at the level of the medial femoral condyle (\*) in a different patient demonstrates the neck of a Baker's cyst identified by the hypochoic echotexture between the medial head of the gastrocnemius (MG) and semimembranosus (SM) tendons.



**Figure 17.** Popliteal (Baker's) Cyst. Sagittal ultrasound image of the popliteal fossa (A) of the left knee (with right knee for comparison) in this patient with small bilateral popliteal (Baker's) cysts. Note the shadowing structure representing a calcified body within the left popliteal cyst. Lateral radiograph of the knee (B) demonstrate the calcified body within the Baker's cyst projecting at the popliteal fossa.

**Figure 18.** Proximal Tibiofibular Cyst. Coronal fat suppressed T2WI demonstrates a cystic mass extending from the proximal tibiofibular joint (arrow), compatible with a proximal tibiofibular cyst.



**Figure 19.**  
Parameniscal Cyst. Axial (A) and two sagittal (B) fat suppressed T2W images demonstrate a multilocular cystic mass abutting the body of the medial meniscus, consistent with a parameniscal cyst. These findings may indicate an underlying occult meniscal tear.



**Figure 20.**  
Intrameniscal Cyst. Coronal T1W (A) and fat suppressed T2W (B) images demonstrate mass-like cystic enlargement of the lateral meniscal body secondary to a large intrameniscal cyst.



**Figure 21.**  
Cruciate Ligament Ganglia. (A) Sagittal fat suppressed T2WI demonstrates a cystic mass intimately associated with the proximal anterior cruciate ligament (solid arrow) and a smaller cyst anterior to the tibial insertion of the anterior cruciate ligament (dashed arrow). Sagittal fat suppressed T2WI in a different patient (B) with an ACL ganglion; in this case, there is mucoid cystic degeneration of the ACL with the ganglia expanding posterior and adjacent to the proximal attachment. Sagittal (C) and axial (D) fat suppressed T2W images of a patient with a PCL ganglion (solid arrows) intimately associated with the otherwise normal appearing PCL.

reflect an underlying meniscal tear, cruciate ligament ganglia are not associated with tears of the ACL or PCL, but rather reflect chronic mucoid degeneration from micro-injuries.

Similar to parameniscal cysts, intrameniscal cysts may form from trauma or degeneration within the meniscus. When the fluid remains contained within the torn or degenerated meniscus, it is referred to as an intrameniscal cyst. An intrameniscal cyst may be seen as a small cystic focus of fluid signal to a larger cystic lesion with focal enlargement of the meniscus (Fig. 20). An adjacent horizontal tear may be demonstrated in some cases.<sup>16,18</sup>

### Intra-articular Ganglion Cysts

In general, most ganglion cysts are found in locations which are under constant stress. Although somewhat controversial, one common explanation for the formation of ganglion cysts is that they are the result of mucoid cystic degeneration in collagenous structures.<sup>4,18</sup> This degeneration produces a cyst with a well-defined fibrous capsule and highly viscous fluid internally, which will typically be demonstrated by intermediate or intermediate low T1 and high T2 signal.<sup>2,19</sup> Intra-articular ganglia may be extrasynovial but intracapsular, commonly arising from the alar folds



**Figure 22.** Ganglion Cyst of Hoffa's Fat Pad. Sagittal fat suppressed T2WI reveals a lobular hyperintense collection in the posterior infrapatellar fat pad of Hoffa. The lesion abuts and partially surrounds the transverse intrameniscal ligament. Findings are consistent with an intra-articular ganglion cyst of Hoffa's fat pad.

of either the infrapatellar fat pad or cruciate ligaments. Since patients with intra-articular ganglia often present with pain or locking and the lesions may mimic sarcoma, identification of these ganglia is of clinical importance. Contrast examination aids in differentiation of these lesions (peripheral enhancement) from malignancy (central, nodular peripheral, or solid enhancement) when the cyst is in an atypical location or the diagnosis is uncertain.

#### Cruciate Ligament Ganglia.

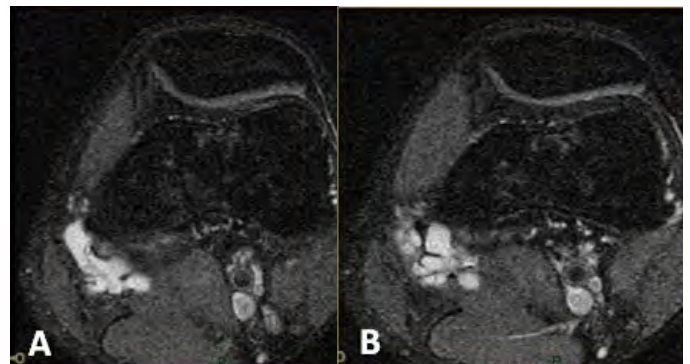
Most intra-articular ganglia are located within the intercondylar notch and are associated with the cruciate ligaments (**Fig. 21**).<sup>19-23</sup> These ganglia may reside within or adjacent to the cruciate ligaments. Ganglia of the anterior cruciate ligament (ACL) are typically fusiform, often within and splaying the ACL fibers.<sup>1,19,20,23</sup> In the case of posterior cruciate ligament (PCL) ganglia, the ganglia will appear as a well-defined multilocular cyst immediately adjacent to the PCL.<sup>1,19,20,23</sup> There is no association with cruciate ligament tears in most cases. It is not uncommon for there to be an associated intraosseous ganglion at the cruciate ligament insertions (see intraosseous ganglia). Symptoms may include restricted range of motion (locking in terminal extension) and localized pain, exacerbated by squatting or full flexion.<sup>23</sup>

#### Ganglion of Hoffa's Fat Pad.

The infrapatellar fat pad is one of the most common locations for a ganglion cyst to occur at the knee, accounting for approximately 13% of all intra-articular ganglia (**Fig. 22**).<sup>24-25</sup> Ganglion within the infrapatellar fat pad are most often located adjacent to the anterior horn of the lateral meniscus or transverse intermeniscal ligament. It is important to identify this relationship in order to avoid confusion of this ganglion with adventitial bursa formation due to Hoffa's fat pad impingement.<sup>24</sup> Small ganglia are typically asymptomatic. However, larger ganglia within the infrapatellar fat pad may produce anterior knee pain at full extension and produce tenderness of the patellar tendon.<sup>21</sup>

#### Extra-articular Ganglion Cysts

Similar to intra-articular ganglia, extra-articular ganglia are well-defined, homogenous, round, or lobular cystic structures demonstrating intermediate or intermediate low T1 and high T2 signal. Fine internal septations may be present giving the ganglia its multiloculated or "bunch of grapes" appearance.<sup>2</sup> Ganglia are common along tendon sheaths and adjacent to the joint capsule, but rarely have communication with the underlying joint.<sup>1,2,22</sup> Soft tissue ganglia, however, may occur anywhere within the soft tissue with a predilection for peri-articular locations (**Fig. 23**).<sup>2</sup>



**Figure 23.** Extra-articular Ganglion Cyst. Axial fat suppressed T2W images (**A & B**) show a multilocular cystic mass intimately associated with the tendon sheath of the adductor magnus tendon at the level of the adductor tubercle. This is one of countless locations in which extra-articular ganglia may reside.



## Intraosseous Cysts

### Subchondral Cyst or Geode.

A subchondral cyst (**Fig. 24**) is an intraosseous cyst which occurs beneath an articular surface of a bone. These cysts are produced in areas of damaged articular cartilage, subjacent to the underlying subarticular cortical plate. The exact pathogenesis of these degenerative cysts is not certain.<sup>26,27</sup> Subchondral cysts are most often seen in association with osteoarthritis, but may occur as the result of degeneration or injury of the overlying articular cartilage by other causes. Subchondral cysts are of variable size from a few millimeters to over a centimeter. A large subchondral cyst may be referred to as a geode. These cysts will appear as round, homogenous, intermediate-low T1, and high T2 signal foci within the articular bone marrow. Overlying full-thickness cartilage fissures or defects are often present.<sup>4,27</sup>

### Insertional Cysts and Intraosseous Ganglia:

These intraosseous cystic lesions are typically located at the attachment of the cruciate ligaments or meniscotibial attachments (**Fig. 25**).<sup>2</sup> Like soft tissue ganglia, insertional cysts and intraosseous ganglia are believed to be the result of chronic degeneration. Insertional cysts, also known as avulsive cystic changes, are formed by chronic tensile stress at the



**Figure 24.**

Subchondral Cyst. Sagittal PD (**A**) and fat suppressed T2W (**B**) images demonstrate the typical appearance of subchondral cysts. In this case, there is a large full thickness cartilage defect overlying the intraosseous cysts. The subchondral location is a key feature to discern these from other intraosseous cystic lesions. When large, they are referred to as geodes.



**Figure 25.**

Intraosseous Ganglion/Insertional Cyst. Coronal fat suppressed T2WI reveals several small and lobular high signal foci within the marrow of the distal femur and proximal tibia. Although by signal these are identical to the subchondral cyst, their non-subchondral location

differentiates these from the other degenerative cysts. When located at attachment sites such as ligaments or tendons, they may be referred to as insertional cysts.

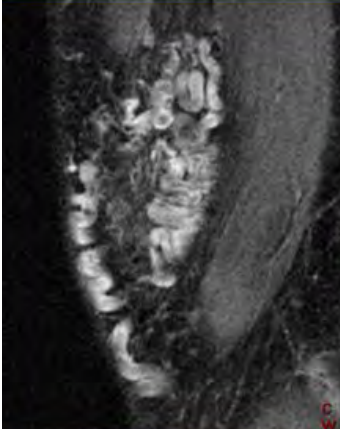
attachment of ligaments or menisci, producing focal necrosis and cyst formation.<sup>28</sup> In the case of intraosseous ganglia, abnormal stress within the bone undergoes mucoid degeneration.<sup>28</sup> Less commonly, these ganglia may result from extension of an adjacent soft tissue ganglia.<sup>29</sup> The appearances of these degenerative intraosseous cysts are similar to the subchondral cyst, differing only on imaging by a location which is not subchondral.

## CYST-LIKE LESIONS

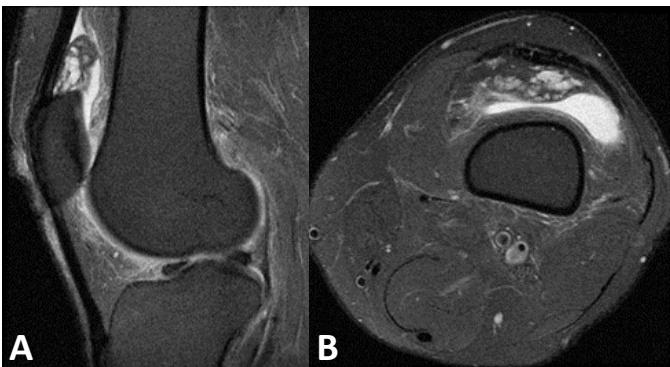
There are a variety of cyst-like lesions which may mimic cysts depending on the modality utilized. Etiologies of these lesions include vascular, traumatic, infectious, and neoplastic.

### **Vascular**

Vascular lesions and normal and abnormal vascular structures may mimic cystic masses. The popliteal artery aneurysm or pseudoaneurysm is distinguished by its location and flow void. Slow flow lesions include popliteal vein varices, superficial varicosities (**Fig. 26**), lymphatic malformations, mixed venolymphatic malformations, and hemangiomas. Hemangiomas are rare in adults and should have an enhancing soft tissue mass. Most commonly, it is a slow flow venous malformation (**Fig. 27**) that is mistakenly referred to as a hemangioma. Normal vessels in and around the knee may occasionally be mistaken for cyst-like lesions (**Fig. 28**), depending upon the flow and signal intensity within the vascular structure. An understanding of the vascular anatomy and following the course of the vessel will help avoid this potential pitfall.



**Figure 26.**  
Subcutaneous Varicocities. Sagittal FS T2WI demonstrates multiple bright tubular structures within the subcutaneous tissue anterior to the knee consistent with subcutaneous varicocities.

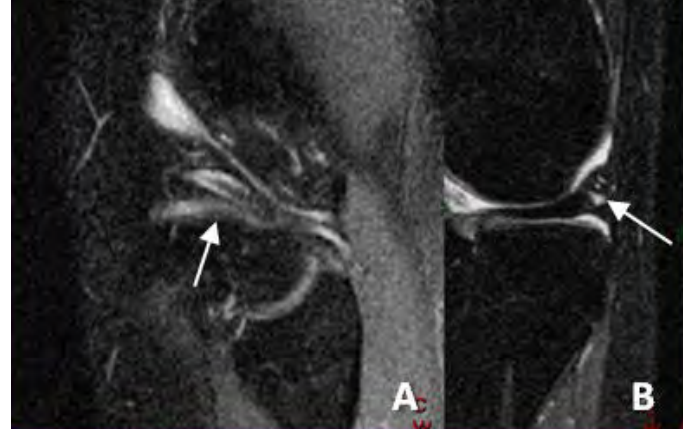


**Figure 27.**  
Venous malformation. Sagittal (A) and axial (B) fat suppressed T2WI demonstrates a tubular high signal structure within the quadriceps fat pad causing distention of the fat pad. A reactive effusion is present due to mass effect and impingement. Findings are consistent with a venous malformation, which is typically asymptomatic unless large or in a location where it may cause symptomatic mass effect.

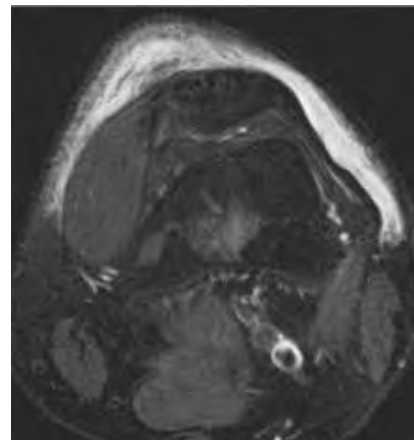
## Hematoma and Abscess

Fluid collections from trauma or infection may occur around the knee. The clinical findings are helpful in arriving at the definitive diagnosis. However, imaging clues include T1 shortening from blood products in hematoma versus diffuse fascial edema and enhancement noted with abscesses. These lesions should be followed to resolution clinically and/or by imaging. Expanding lesions may need further assessment with contrast to exclude underlying malignancy.

Of note, a degloving lesion may persist in the soft tissues for prolonged periods in the fascial or subcutaneous layers of the knee (**Fig. 29**). First identified by French surgeon Morel-Lavallée in 1863, the post-traumatic soft tissue degloving injury was originally described as occurring in the soft tissues of



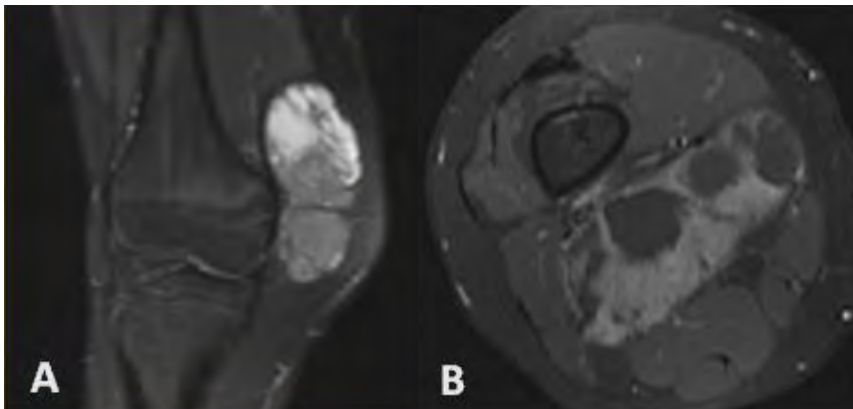
**Figure 28.**  
Normal Vessel/Inferior Geniculate Artery. Sagittal fat suppressed T2WI (A) demonstrates a linear high signal tubular structure, consistent with a normal inferior geniculate artery. On the coronal fat suppressed T2WI (B), this focal high signal adjacent to the meniscus should not be mistaken for a meniscal cyst (arrow), particularly laterally where the lateral inferior geniculate artery courses within the parameniscal fat.



**Figure 29.**  
Degloving Lesion. Axial fat suppressed T2WI in a patient with a degloving lesion involving the anterior knee. Note the fluid extending across the confines of the prepatellar bursa in this patient with a history of recent trauma.

These lesions are termed Morel-Lavallée lesions when present at the hip and proximal thigh. The mechanism is identical, representing a closed degloving injury, typically occurring as a result of the skin and subcutaneous tissue abruptly separating from the underlying fascia.

the proximal thigh over the greater trochanter.<sup>30</sup> Closed degloving lesions most commonly occur adjacent to bony protuberances. They form as a result of direct or tangential shearing forces which separate the skin and subcutaneous tissues from the underlying fascia forming a potential space which can fill with blood, lymph and/or fat.<sup>31-33</sup> Degloving lesions can be identified by their well defined oval or fusiform shape and tapering margins which merge with the subjacent fascia. These lesions may show fluid-fluid levels,



**Figure 30.**

**Soft Tissue Sarcoma.** Coronal fat suppressed T2WI (A) demonstrates a multilocular juxta-articular cystic and solid mass within the soft tissues along the lateral distal femur. The solid area of T2W signal predominately inferoposterior demonstrates contrast enhancement on the post-contrast fat suppressed T1WI (B). When a significant solid component or nodular enhancing soft tissue is present within a cyst-like lesion, soft tissue sarcoma should be a diagnostic consideration.

septations, and variable internal signal intensities dependent on the concentration of hemolympathic fluid and age of the lesion.

### Synovial Sarcoma

Synovial sarcoma is a relatively common primary soft tissue sarcoma. These lesions are most prevalent between the ages of 15 and 30 years of age and often present as a painful enlarging mass.<sup>34</sup> Synovial sarcomas are seen on MR as nonspecific inhomogeneous mass with T1 signal isointense to skeletal muscle and T2 signal hyperintense relative to subcutaneous fat. These lesions may be multilocular and may have varying degrees of a cystic component with or without fluid-fluid levels (Fig. 30).<sup>34</sup> Synovial sarcoma will often have a soft tissue component that heterogeneously enhances.<sup>34</sup>

### Summary

To conclude, a variety of bursae, cysts, and cyst-like lesions exist about the knee joint, many of which have fairly characteristic locations and imaging features. Knowledge of these variants and lesions is essential for accurate diagnosis and to avoid mistaking them for aggressive soft tissue lesions, including sarcomas.

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