Learning objectives

To describe and illustrate the multiple bursae around the knee.

Background

Knee bursae appear as cystic structures around the knee joint. Other common cystic structures in the same location are ganglia and meniscal cysts.

Bursae are normal, synovial lined cavities serving to reduce friction between neighbouring moving structures such as tendons, ligaments and bones. They become visible on imaging studies only when they are distended due to accumulation of fluid, usually as a result of traumatic, inflammatory, degenerative or other pathologic processes. Distended bursae may be symptomatic or asymptomatic and may be incidentally discovered on imaging studies. When symptomatic they may present as a palpable mass, painful knee, mechanical dysfunction or limitation in range of motion. The symptoms may mimic pathology of adjacent structures, i.e. ligaments, menisci or bone. They are grouped according to location into anterior, posterior, medial and lateral bursae. The frontal bursae include the suprapatellar, prepatellar, the subcutaneous infrapatellar and the deep infrapatellar or pretibial bursa. In the posterior aspect of the knee, the gastrocnemius-semimembranosus bursa or popliteal or Baker cyst is found and is the commonest cystic lesion in the knee area. This is in fact a posterior extension of the medial gastocnemius bursa located in the medial compartment. The medial bursae also include the anserine bursa, the semimembranosus-tibial collateral ligament bursa and the medial collateral ligament or tibial bursa. The lateral bursae include the lateral gastrocnemious bursa, the fibular and fibulopopliteal and the subpopliteal bursa.

Imaging findings OR Procedure details

We retrospectively reviewed a total of 517 knee examinations preformed in our institution from January 2009 to July 2009. Examinations were preformed in 1.5 T unit and images were obtained in coronal, sagittal and axial planes with T1-W, T2-W, 3D T2 W GRE and PD W fat sat sequences. Evidence of bursitis was present in 138 examinations. The distension was attributed to a variety of pathologies including trauma, inflammation, arthritis, pigmented villonodular synovitis, synovial osteochondromatosis. Distended bursae are also found in asymptomatic individuals. We present characteristic examples of knee bursitis according to location and underline pathology.
The appearance of a distended bursa reflects its serous contents. Fluid has high signal intensity on T2 W images and low signal intensity on T1 W images. The signal is more heterogeneous when hemorrhage, thickened inflamed synovium, calcification, or loose bodies complicate the procedure. Anterior and posterior bursae are better demonstrated on sagittal and axial images while medial and lateral bursae are better demonstrated on coronal and axial images.

**Anterior**

*Suprapatellar bursa*

The suprapatellar bursa is located between the quadriceps tendon and the femur. It usually communicates freely with the articular cavity but sometimes a complete septum, the suprapatellar plica, forms a closed cavity.

*Fig.*: Suprapatellar bursa. The bursa is distended with inhomogeneous signal intensity due to synovitis. The thickened synovium displays vivid contrast enhancement.

**References:** P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

*Prepatellar bursa*

The prepatellar bursa is located anterior to the patella, between the patella and patellar tendon and the overlying skin. Bursitis is usually the result of repetitive micro trauma and/or inflammation and is also called housemaid’s knee or carpet layer’s knee.
**Fig.**: Prepatellar bursa. The prepatellar bursa, between the patella and the skin is distended with fluid.

**References**: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

**Fig.**: Prepatellar bursa. In this example the prepatellar bursa extends between the patella and the patellar tendon and the overlying skin

**References**: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

*Superficial infrapatellar or pretibial*

This bursa, also called pretibial bursa, is located between the tibial tuberosity and the overlying skin. Bursitis in this location is rare and it may be caused by occupational kneeling, known as clergyman's knee, or by trauma. The fluid collection is usually ill defined and it may be heterogeneous.
Fig.: Superficial infrapatellar bursa. An ill-defined fluid collection is seen superficially to the patellar tendon insertion and the tibial tuberosity.

References: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

Fig.: Prepatellar and superficial infrapatellar bursae. There is fluid in both superficial anterior knee bursae. A small enchondroma is seen in the femur.

References: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

Deep infrapatellar

The deep infrapatellar bursa is located between the distal end of the patellar tendon and the tibia. It does not communicate with the articular cavity. Deep infrapatellar bursitis is usually the result of repetitive stress, especially in runners and jumpers. A small amount of fluid may be seen in asymptomatic individuals.
Fig.: Deep infrapatellar bursa. A small amount of fluid, as in this example, is a common finding in this small bursa between the patellar tendon and the tibia.

References: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

Posterior

**Gastrocnemius-semimembranosus bursa or popliteal or Baker cyst**

This is the commonest cystic lesion around knee joint. Popliteal or Baker cysts are the result of extension of joint fluid to the gastrocnemius-semimembranosus bursa through a week point at the posteromedial joint capsule. The collection may be unilocular or multilocular. It is identified crossing the space between the medial head of gastrocnemius and the semimembranosus tendon; it wraps around the medial head of gastrocnemius and is concave towards the midline.

Fig.: Baker's cyst. There is a meniscus shaped fluid collection between the medial head of gastrocnemious and the semimembranous tendon.

References: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE
Rupture is a common complication of a Baker cyst and may be clinically confused with thrombophlebitis. On imaging studies fluid is seen dissecting along the medial head of gastrocnemius. Proximal dissection may result in pressure and symptoms from the sciatic nerve.

**Fig.**: Baker's cyst rupture. The popliteal cyst is ill-defined and fluid dissects along the medial head of gastrocnemius.

**References:** P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

**Medial**

**Pes anserine bursa**

The anserine bursa separates the conjoined tendons of sartorius, gracilis and semitendinosus from the distal tibial collateral ligament. Bursitis in this location is usually caused from overuse, especially in runners. On MR imaging a fluid collection in the medial aspect of the joint is seen. This collection does not communicate with the knee joint, in distinction to meniscal cysts.
**Fig.**: Pes anserine bursa. Fluid is seen along the tendons of sartorius, gracilis and semitendinosus.

**References**: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

**MCL or tibial collateral bursa**

The tibial collateral ligament bursa is located between the superficial and deep layers of the medial collateral ligament. Imaging reveals a circumscribed and elongated fluid collection, which spans the joint line. Smaller fluid collections must sometimes be differentiated from meniscal cysts and meniscocapsular separation.

**Fig.**: MCL bursa. Fluid distends the cavity between the superficial and deep portion of the ligament. In case of ligament rupture, the fluid is seen in a different location, superficial to the ligament.

**References**: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

**Semimembranosous-tibial collateral ligament bursa**

This is a coma-shaped fluid collection between the semimembranosus tendon and the tibial collateral ligament at the level of the medial tibial condyle. This bursa does not communicate with the joint cavity or other medial bursa but multifocal bursitis may be present.
Fig.: Semimembranosus-tibial collateral ligament bursa. This bursa has a typical, coma-shaped appearance and is located near the posteromedial corner of the knee. Fluid in the anserine bursa coexists.

References: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE

Latera

Fibular collateral ligament bursa

The fibular collateral ligament - biceps femoris bursa is located superficial to the fibular collateral ligament. It is a constant finding on cadaveric studies with the distal end at the insertion of the ligament to the fibular head and the proximal end at the superior edge of the anterior arm of the long head of the biceps. It often has an inverted J shape on axial images.

Fig.: Fibular collateral ligament bursa. This is an uncommonly distended bursa. A popliteal (Baker's) cyst coexists in this example.

References: P. Papadopoulou; Radiology Department, Asklipios, Thessaloniki, GREECE
Fig. 1: Prepatellar bursa. The prepatellar bursa, between the patella and the skin is distended with fluid.

Fig. 2: Prepatellar bursa. In this example the prepatellar bursa extends between the patella and the patellar tendon and the overlying skin.
**Fig. 3:** Superficial infrapatellar bursa. An ill-defined fluid collection is seen superficially to the patellar tendon insertion and the tibial tuberosity.

**Fig. 4:** Prepatellar and superficial infrapatellar bursae. There is fluid in both superficial anterior knee bursae. A small enchondroma is seen in the femur.

**Fig. 5:** Deep infrapatellar bursa. A small amount of fluid, as in this example, is a common finding in this small bursa between the patellar tendon and the tibia.
**Fig. 6:** Baker’s cyst. There is a meniscus shaped fluid collection between the medial head of gastrocnemius and the semimembranosus tendon.

**Fig. 7:** Baker’s cyst rupture. The popliteal cyst is ill-defined and fluid dissects along the medial head of gastrocnemius.

**Fig. 8:** Pes anserine bursa. Fluid is seen along the tendons of sartorius, gracilis and semitendinosus.
Fig. 9: MCL bursa. Fluid distends the cavity between the superficial and deep portion of the ligament. In case of ligament rupture, the fluid is seen in a different location, superficial to the ligament.

Fig. 10: Semimembranosus-tibial collateral ligament bursa. This bursa has a typical, coma-shaped appearance and is located near the posteromedial corner of the knee. Fluid in the anserine bursa coexists.

Fig. 11: Suprapatellar bursa. The bursa is distended with inhomogeneous signal intensity due to synovitis. The thickened synovium displays vivid contrast enhancement.
**Fig. 12:** Fibular collateral ligament bursa. This is an uncommonly distended bursa. A popliteal (Baker's) cyst coexists in this example.
Conclusion

Knee bursitis is a common condition, which should not be overlooked. The anatomic location along with the characteristic morphology of the various distended bursae help to identify, correctly characterize, and also differentiate them from other common cystic lesions around the knee.

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References


