

Ganglion Cysts Arising from a Canine Stifle Joint

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ABSTRACT. A 10-year-old, neutered male Labrador retriever presented with progressive left hind lameness. Ultrasonography revealed large, subcutaneous, ovoid cysts around the stifle joint. Radiographic and computed tomographic images revealed periosteal reaction of the distal femur. Magnetic resonance (MR) imaging showed a large cyst that was hypointense in T1-weighted images, hyperintense in T2-weighted images and had a thin lining that was enhanced by intravenous gadolinium injection. The cyst communicated with the joint cavity and other small cysts around the joint. Histopathology of an excisional biopsy specimen led to diagnosis of ganglion cyst. This report provides MR images of a ganglion cyst in a canine stifle.

KEY WORDS: dog, ganglion cysts, magnetic resonance imaging, stifle joint.

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Ganglion cysts are relatively common in humans [7], however, only a small number of cases (including a horse [3] and several dogs [2, 4, 8]) have been reported in the veterinary literature. To our knowledge, MR images of ganglion cysts formation relating to the canine stifle joint have not been previously reported. Here, we described the clinical features, diagnostic imaging including ultrasound, radiography, CT and MR images, and histopathologic finding.

A 10-year-old, neutered male Labrador retriever was examined for left hind leg lameness that developed over a period of 3 months. A large mass was present on the lateral aspect of the stifle joint, and there were superficial scratches on the skin over the mass. The mass was sclerotic, and feverish, but there was no obvious pain without vigorous palpation. Fine needle aspiration (FNA) of the mass produced a clear, viscous fluid that contained 482 nucleated cells per μ l, 0.8 g of protein per dl and demonstrated good clot formation during the mucin clot test. These results were consistent with normal synovial fluid.

Ultrasound revealed a large, anechoic, cystic lesion in the subcutaneous tissues around the stifle joint, and it seemed to communicate with the stifle joint. No obvious, large, vascu-

lar structures were observed (Fig. 1A). Routine radiographs revealed periosteal reaction on the distal femur and multiple radiolucent focal lesions adjacent to the articular surfaces of the femur and tibia (Fig. 1B and 1C). It seemed likely there were periarticular osteophytes noted at the distal patella, femoral condyles and proximal tibia along with an apparent osseous fragment/new bone production at the origin of the cranial cruciate ligament present as well. Computed tomography (CT) images (4 row helical: Asteion Super 4[®], TOSHIBA Medical, Tokyo, Japan) showed hypoattenuate cystic lesions in the subcutaneous tissues at the cranial and caudal aspects of the stifle joint (Fig. 2A). CT images also confirmed the radiographic findings and detected a small calcified region at the cyst margin in the cranial aspect of the distal femur, which was not visible in the radiographs (Fig. 2B). On magnetic resonance (MR) images obtained using a 0.4 T magnet (Aperto Inspire[®], HITACHI, Tokyo, Japan), T1-weighted images revealed a large, hypointense oval shaped lesion at the cranial aspect of the distal femur (Fig. 3A). This lesion appeared to be continuous with the stifle joint distal to the patella. T2-weighted images showed hyperintense material in the corresponding area that was hypointense on T1-weighted images (Fig. 3B). Contrast enhancement by intravenous injection with 0.2 ml/kg of gadolinium (ProHance[®], Eisai, Tokyo, Japan) highlighted an inner lining area of this lesion by T1-weighted images at the cranial aspect of the distal femur (Fig. 3C). Multiple small, round irregular subcutaneous lesions were observed caudal to the stifle. These lesions were characterized as hypointense by T1-weighted images and hyperintense by T2-weighted images. Although we could not examine the detail of the cruciate ligaments or menisci because of limitation of low

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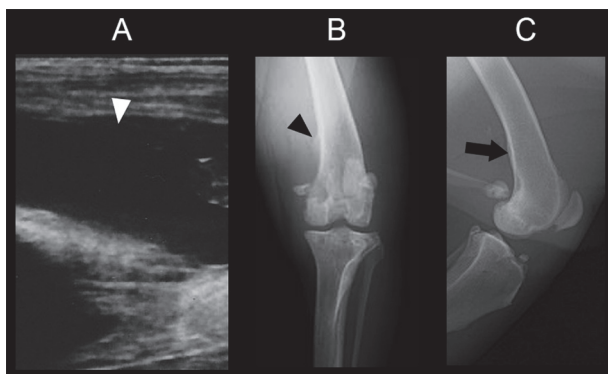


Fig. 1. Ultrasonographic and radiographic images of the stifle joint of the left hind leg. (A) This ultrasonographic image of the femur shows the anechoic lesion (white arrowhead) in the subcutaneous tissues around the stifle joint. (B) This craniocaudal radiographic image of the stifle shows periosteal reaction of the distal femur (black arrowhead) and multiple radiolucent focal lesions adjacent to the articular surfaces of the femur and tibia. (C) This lateral radiographic image of the stifle shows periosteal reaction of the distal femur (black arrowhead) was present as well as periarticular osteophytes.

magnetic field MR instrument which we used, no obvious changes in the cruciate ligaments or menisci were visible.

The size of the largest cystic lesion and its connection with the stifle joint were likely causing the lameness by restricting joint movement. We thus decided to remove the large cystic lesion on the cranial aspect of the stifle in order to obtain a histopathological diagnosis while simultaneously treating the lameness. A $3.0 \times 2.0 \times 1.0$ cm cyst was found beneath the subcutaneous tissues, attached to both the femur and patella. The cyst was dissected free of the surrounding tissues and surgically excised. Since the wall of the cyst was composed of an inner myxomatous layer and an outer fibromatous layer, but lacked synovial lining cells, the lesion was diagnosed as a ganglion cyst (Fig. 4).

The differential diagnosis of swelling of stifle joint includes small fractures, cruciate ligament damage, disruption of the long digital extensor tendon, osteoarthritis, synovitis, infection within the articular joint, tumors such as synovial cell sarcoma, synovial cyst and ganglion cyst. We were able to exclude many of these diseases after identifying synovial fluid within a cyst-like structure. In addition, radiography, ultrasound, CT and MR image were useful for investigating the relationship between the cyst and bone.

Radiographs and CT images are useful for excluding small fractures or bone tumors, but are not ideal for imaging for soft tissues. Ultrasound can help evaluate the swelling to determine if it is fluid-filled (cystic) or solid, can detect whether there is a blood vessel associated with the mass and can assist with guidance for FNA. The advantages of ultrasound are that it is a widely available procedure and non-invasive and quick to perform. In our case, the ultrasound revealed an anechoic cyst connecting with the stifle. Although Lunhao *et al.* discuss the advantages of the ultrasound for the detection

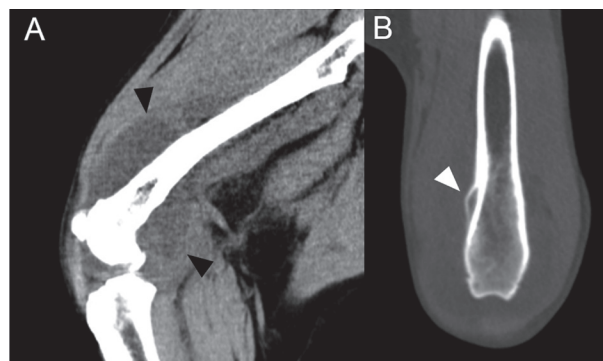


Fig. 2. CT images of the left stifle. (A) Sagittal CT images, soft tissue window, of the stifle; there is the hypoattenuation area of the distal femur (black arrows). (B) Coronal CT images, bone window, of the distal femur; there is the periosteal reaction of the distal femur (white arrowhead).

of small cruciate ligament cysts and assessment of the other joint components in human medicine [5], we were not able to visualize the cruciate ligaments or the caudal cysts in this case because of the extremely large cyst presented over the cranial portion of the stifle joint.

Overall, the MR images were very useful for determining the area of the cystic lesion and provided superior visualization of the anatomic relationship between cyst and the stifle joint and surrounding tissues. MR images were also useful for planning the surgical biopsy. In this case, our MR images allowed us to diagnose the number and size of the cystic lesions and their connection to the stifle joint, to determine that the ligaments and tendons of the joint were not ruptured and to confirm that no tumor-like solid masses were present. The lesions in this dog had a similar appearance in the MR images to those reported for ganglion cysts in both humans and dogs [5, 6, 8]. Ganglion cysts usually have a homogenous low signal intensity in T1-weighted images and a high signal intensity in T2-weighted images, as we saw in this case. Because MR images are useful for visualizing soft tissues and high tissue contrast, we were able to identify this characteristic of the lesion and the association between the cystic lesion and other joint components before biopsy.

In general, ganglion cysts contain clear, watery or mucinous fluid and do not directly communicate with the synovial cavity of the adjacent joint [1, 8]. However, MR images in this dog revealed a large, cystic lesion that seemed to communicate with the stifle joint. Although the etiology of ganglion cysts is still unknown, trauma has been suggested as potential inciting factor [2]. In this dog, there were skin wounds over the stifle joint, indicating that accidental trauma may have caused the cyst to develop. Although we could not elucidate the initial cause of cyst in this case, there are several possible explanations for the apparent communication of the ganglion cyst with joint space. The suspected trauma ruptured the joint capsule, resulting in inflammation and growth of the cyst; the original ganglion cyst may have led to rupture of the joint leading to direct communication;

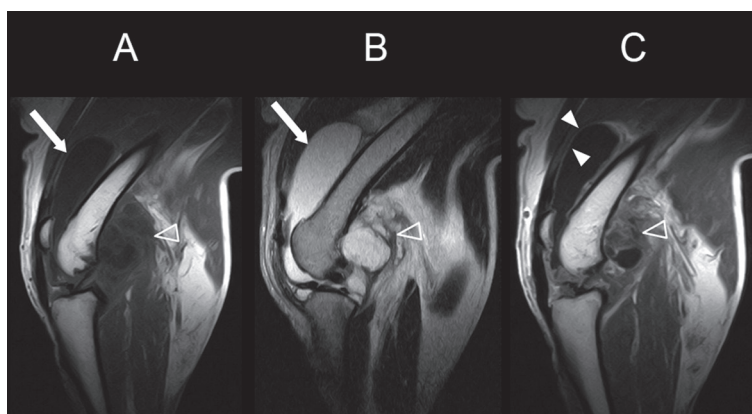


Fig. 3. Sagittal magnetic resonance images of the left stifle. (A) The oval shape lesions were hypointense in T1-weighted images (white arrows). (B) The lesions that were hypointense in T1-weighted images were hyperintense in T2-weighted images (white arrows). (C) The lining of the cyst, which was hypointense in T1-weighted images, was enhanced by gadolinium injection (white arrowheads). Multiple small, subcutaneous, irregular round like shape lesions were observed caudal to the stifle (open arrowheads).

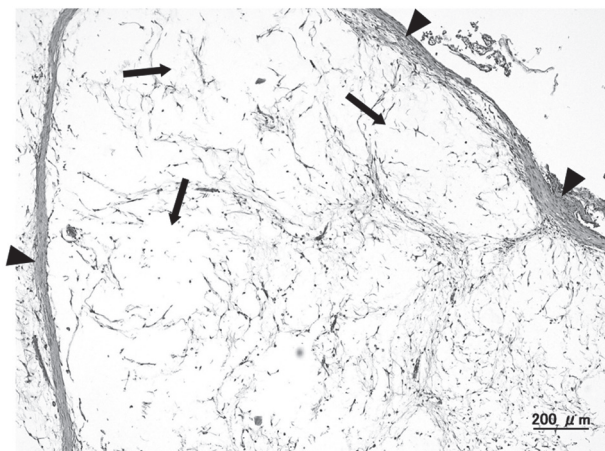


Fig. 4. Histopathological findings of the removed cyst. The cyst was composed of an inner myxomatous layer (black arrows) and an outer fibromatous layer (black arrowheads). No synovial lining cells were seen in the wall, and the lesion was diagnosed as a ganglion cyst.

the cyst may have expanded and compressed the joint capsule. With the radiographic and CT changes present, it seems most likely that trauma leads to a ruptured joint capsule with subsequent progression of the cyst.

This is the first report that describes the MR image of large ganglion cyst in canine stifle joint. Unfortunately, complete excision of the ganglion cyst in this case was not possible

due to the large size. For future case, we should include the ganglion cyst in the differential diagnosis list and utilize MR for both diagnosis as well as surgical planning.

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