What Is Your Diagnosis?

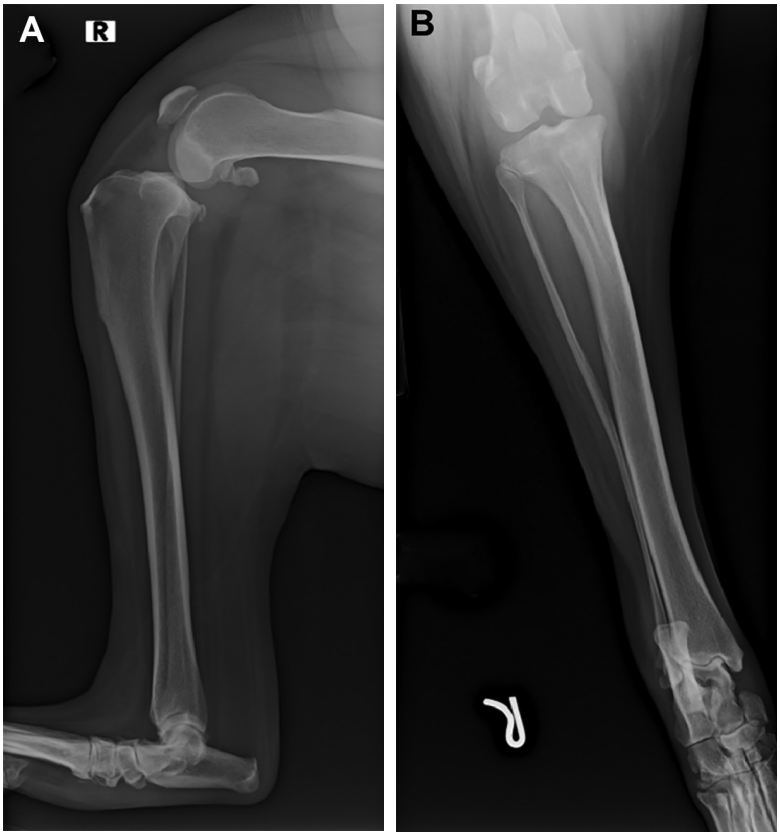

Figure 1—Mediolateral (A) and craniocaudal (B) radiographic views of the right stifle joint of a 4-year-old 43.5-kg (96-lb) castrated male Great Pyrenees that was referred for evaluation of right pelvic limb lameness of approximately 3 months' duration.

History

A 4-year-old 43.5-kg (96-lb) castrated male Great Pyrenees was referred for evaluation of right pelvic limb lameness of approximately 3 months' duration. No history of trauma was documented. Orthopedic examination revealed a grade 2/5 lameness of the right pelvic limb at a walk. An audible click was appreciable on maximal flexion and extension of the right stifle joint, with palpable joint effusion both medial and lateral to the patellar ligament, decreased range of motion, and signs of pain when placing the right stifle joint through a range of motion. A cranial drawer sign was present on examination of the right stifle joint, as well as moderate tibial thrust. Radiography of the right stifle joint was performed **(Figure 1)**.

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page →

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Diagnostic Imaging Findings and Interpretation

On the craniocaudal view, there is evidence of an incidental supernumerary tarsal bone medial to the distal portion of the talocalcaneocentral joint, considered to be a normal breed variant. On the mediolateral view, a marked increase in synovial volume of the right stifle joint is evident, characterized by effacement of the infrapatellar fat pad, caudal displacement of fascial planes, and distention of the femoropatellar joint pouch **(Figure 2)**. Enthesophytes are present at the base and apex of the patella. A focal, smoothly marginated concave depression of the craniodistal cortex of the femur (metaphyseal area) with an associated soft tissue structure is evident in the supracondylar region of the femoropatellar joint pouch.

A diagnosis of degenerative joint disease secondary to cranial cruciate ligament injury was made on the basis of radiographic and physical examination findings. The probable cause of the radiographic changes of the distal portion of the femur was pressure resorption secondary to proliferative villonodular synovitis or less likely a soft tissue neoplasia such as synovial cell sarcoma or histiocytic sarcoma.

Ultrasonography of the right stifle joint was performed. A concavity of the cortex (approx 4 cm in length in the sagittal view) at the craniodistal portion of the femur was present **(Figure 3)**. A heterogeneous and irregularly marginated hyperechoic structure (24 mm long X 7.6 mm thick) was present cranial to the concavity, extending distolaterally to the level of the femoral metaphysis, with no vascularity observed on color-flow Doppler ultrasonography. This structure was surrounded by a small amount of intra-articular anechoic fluid. The synovium and synovial capsule around this region was irregularly thickened. Differential diagnosis of the changes included chronic villonodular synovitis and less likely a soft tissue neoplasia. No evidence of neoplastic disease was found on cytologic evaluation of ultrasound-guided fine-needle aspirates of the heterogeneous structure.

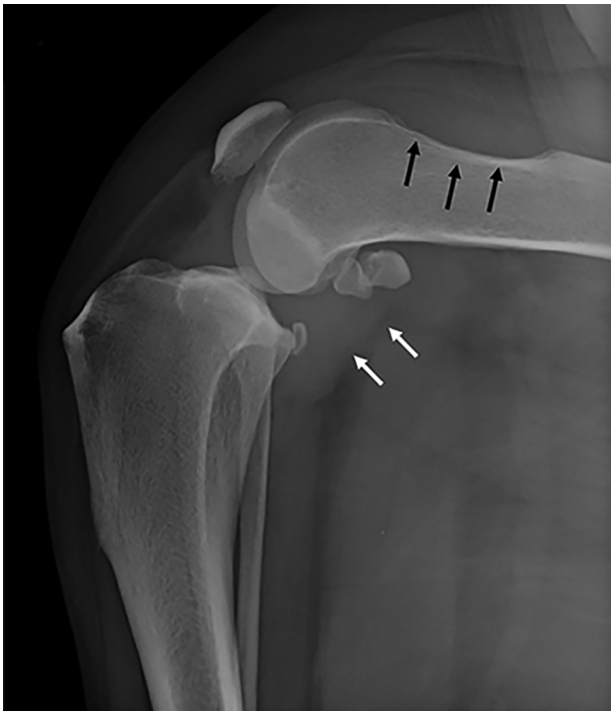

Figure 2—Same mediolateral radiographic image as in Figure 1 with magnification of the distal portion of the femur. Notice the concavity of the craniodistal cortex of the femur (black arrows), with a soft tissue structure adjacent to it, and the distension of the caudal aspect of the joint capsule of the right stifle joint (white arrows).

Treatment and Outcome

A right exploratory medial arthrotomy was performed. A firm, intra-articular soft tissue mass was present in the supracondylar aspect of the femoropatellar portion of the stifle joint capsule, firmly attached to the surrounding synovium. A subtotal synovectomy was performed, and the soft tissue mass was resected and submitted for histologic evaluation. Complete rupture of the right cranial cruciate ligament and a displaced longitudinal tear of the caudal pole of the medial meniscus (commonly referred to as a bucket handle tear) were confirmed intraoperatively. Subsequently, a partial meniscectomy and tibial plateau leveling osteotomy were performed. The dog had complete resolution of signs of pain and associated lameness at 12 weeks after surgery.

Histologically, the edematous synovial membrane was in villous folds that were coated with fibrin and a few leukocytes and lined by crowded synovial cells with no mitotic figures in most fields. There was no apparent invasion into the underlying stroma. However, the subsynovium did contain focal fibroplasia and patchy infiltration by lymphocytes, plasma cells, and macrophages. These findings were consistent with chronic proliferative villonodular synovitis.

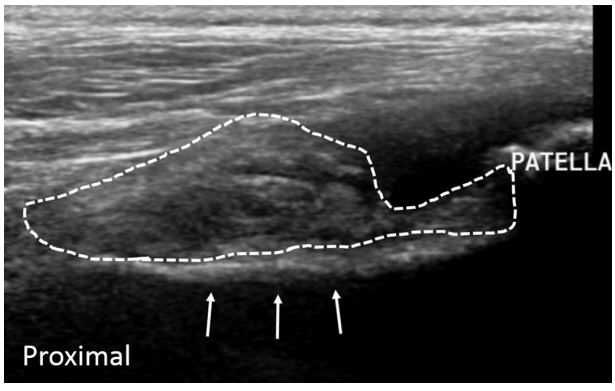

Figure 3—Sagittal ultrasonographic image of the distal portion of the right femur of the dog in Figure 1. A heterogeneous and irregularly marginated hyperechoic structure (dotted line) that is causing pressure resorption of the bone (arrows) is evident. A small amount of anechoic synovial effusion is present in the right femoropatellar joint space. Image was obtained with a 5- to 12-MHz linear transducer.

Comments

In the case described in the present report, the concurrent proliferative villonodular synovitis and cranial cruciate ligament disease complicated the determination of the exact cause of lameness. The nature of proliferative villonodular synovitis is obscure. Inflammation of the synovium, neoplastic disease, metabolic disturbance, and recurrent hemorrhage and inflammation secondary to trauma have all been considered as possible causes.[1–3] Clinical signs associated with proliferative villonodular synovitis alone are typically nonspecific and include progressive lameness of any major weight-bearing joint as a result of pain, swelling of the joint, and decreased joint mobility as the lesion expands.[1,4] Misdiagnosis of this disease has also been recognized (ie, as sarcoma)[5]; however, radiographic evidence of osseous pressure resorption rather than lysis and no evidence of popliteal lymphadenomegaly or associated soft tissue swelling are more supportive of a nonmalignant process.

Previous reports have described radiographic findings of proliferative villonodular synovitis in hip, stifle, and carpal joints in dogs as intra-articular soft tissue swelling with narrowing of joint space, periosteal new bone formation, and subchondral osteolytic lesions.[1,6,7] In human patients, the typical radiographic appearance of proliferative villonodular synovitis can be characterized by well-defined erosions forming a concavity, dense joint effusion, and soft tissue swelling.[4] In the dog of the present report, pressure resorption was observed proximal to the condyles of the femur and was due to a soft tissue mass similar to the classical appearance of equine proliferative villonodular synovitis at the metacarpophalangeal joint.[8] Similarly, the dog of the present report had ultrasonographic findings similar to those of affected horses, including an increase in synovial thickness and a concavity or irregular resorptive lesion in the underlying bone.[8,9] Synovial thickening with villous projections and fluid effusion on ultrasonographic examination are also characteristic findings in human patients.[2,3]

Other imaging modalities such as CT and MRI may help characterize these lesions. On CT images, villonodular synovitis in people appears as a high-density soft tissue mass, often nodular, with underlying bone erosions that are clearly evident.[10] In people, MRI is the imaging modality of choice with the lesion appearing as a mixed signal intensity that has a low signal, compared with that of normal synovial lining tissue, on T1-weighted sequences.[10] However, only findings on histologic evaluation of a synovial tissue specimen can provide a definitive diagnosis.[1,7,10]

References

1. Akerblom S, Sjostrom L. Villonodular synovitis in the dog—a report of four cases. *Vet Comp Orthop Traumatol* 2006;19:87–92.
2. Yang PY, Wang CL, Wu CT, et al. Sonography of pigmented villonodular synovitis in the ankle joint. *J Clin Ultrasound* 1998;26:166–170.
3. Kaufman RA, Towbin RB, Babcock DS, et al. Arthrosonography in the diagnosis of pigmented villonodular synovitis. *AJR Am J Roentgenol* 1982;139:396–398.
4. Al-Nakshabandi NA, Ryan AG, Choudur H, et al. Pigmented villonodular synovitis. *Clin Radiol* 2004;59:414–420.
5. Marti JM. Bilateral pigmented villonodular synovitis in a dog. *J Small Anim Pract* 1997;38:256–260.
6. Hanson JA. Radiographic diagnosis—canine carpal villonodular synovitis. *Vet Radiol Ultrasound* 1998;39:15–17.
7. Kusba JK, Lipowitz AJ, Wise M, et al. Suspected villonodular synovitis in a dog. *J Am Vet Med Assoc* 1983;182:390–392.
8. Vanderperren K, Saunders JH. Diagnostic imaging of the equine fetlock region using radiography and ultrasonography. Part 1: soft tissues. *Vet J* 2009;181:111–122.
9. Steyn PF, Schmitz D, Watkins J, et al. The sonographic diagnosis of chronic proliferative synovitis in the metacarpophalangeal joints of a horse. *Vet Radiol* 1989;30:125–127.
10. Kransdorf MJ, Murphey MD. Synovial tumors. In: *Imaging of soft tissue tumors*. Philadelphia: Lippincott Williams & Wilkins, 2006;381–436.