

Imaging Diagnosis: Biphasic Synovial Sarcoma in a Dog

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(Accepted: February 2, 2007)

Abstract : An 11-year-old castrated male, Shih-tzu dog was admitted for progressive weight-bearing lameness and mass on the right hindlimb. Radiography and ultrasonography revealed a large well-marginated multinodular mass with mixed echogenicity. On T1 and T2-weighted magnetic resonance imaging (MRI), the mass has a heterogenous signal intensity similar to or higher than muscle. The masses were extended to the pelvic cavity through obturator foramen and displaced the rectum dorsally. It was diagnosed as synovial sarcoma which was composed with mesenchymal and epithelial elements on histopathological findings of the multifocal biopsied specimen. MRI was helpful to determine the definitive margin for surgical resection of the mass. The mass was recurred at the 6th month after surgery. On the 10th month, the patient was euthanized by owner's request.

Key words : synovial sarcoma, joint tumor, magnetic resonance imaging, dog.

Introduction

Joint tumors are rare in dogs, and these are usually primary and malignant (3-5,9). Synovial sarcoma (SS) is considered the most common in the canine joint (1,2,4-6,8). SS mainly occurs in male, aged, large-breed dogs, most frequently involving the stifle and elbow (2,4-6,8). SS are malignant tumors arising from mesenchymal cells within tenosynovial tissue of joint, bursa, and tendon sheaths (1,2,4,6,9). Diagnosis is based on history, physical examination, radiology, ultrasonography and histopathology (1-6,8). Immunohistochemistry (IHC) is required for differential diagnosis; it is not clearly defined yet (4,5). In humans, CT and MRI findings are used for the diagnosis and prognosis (7). However, the reports on small animal medicine is focused on radiography, history and IHC. We experienced a case which is histologically diagnosed as biphasic SS, and reported the magnetic resonance imaging (MRI) findings of this case.

History and Examination

An 11-year-old, neutered male, 6.5 kg, Shih-tzu dog had a 2 months history of a weight-bearing lameness with large mass on the right hindlimb. The referring veterinarian had treated the patient for pain and inflammation, but there were no responses. The mass was bigger and more extended than previous.

On physical examination, solid and irregular nodular

mass was palpated. The hindlimb was outwardly stretched in standing posture. When walking, the dog swung its right hindlimb, but patellar and withdrawal reflex test were normal. On CBC and blood chemistry there were no specific findings except moderate lymphocytosis and mild increased creatine phosphokinase.

Imaging findings

On radiographic findings, a mass with diffuse soft-tissue density which made difficult to take a radiographic position identified from the pelvic cavity to the stifle joint region. General shape and critical margin of the mass could not be demonstrated. When compared with the left side, degenerative changes including shallow acetabular depth, widened left hip joint, mild disuse bony atrophy and irregular radiodensity of the pubis were found. While the patient had a normal defecation, the rectum was displaced dorsally and compressed to the left; there were no other lesions which could indicate an invasion to bone or metastasis on routine thoracic and abdominal radiographs (Fig 1).

On ultrasonographic examination, a mass with coarse texture and mixed echogenicity was found. It was shown to be a well-marginated multinodular mass. After tissue-core biopsy under sonographic guidance, it was diagnosed with a fibrous sarcoma tentatively in histopathological findings (Fig 2).

MRI was performed to confirm a margin of the mass and invasion for surgical resection of it. The mass had similar signal intensity to circumferential muscle on T1-weighted images and T2-weighted images. The mass extended from caudal part of the femur to the pelvic cavity through obtu-

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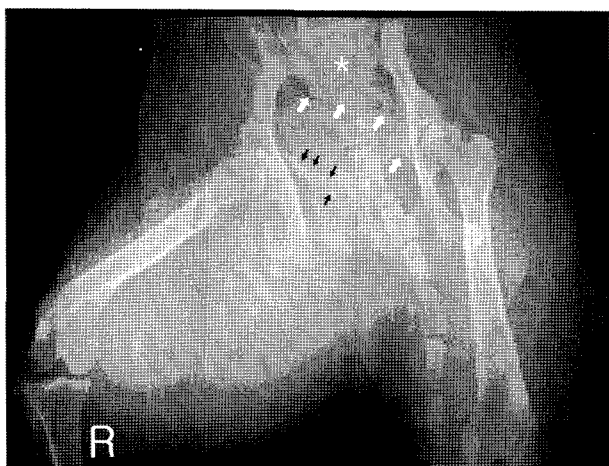


Fig 1. On radiograph, a mass is seen with increased soft tissue density in the posterior region of the femur. The pubis shows an irregular radiographic density and margin (black arrows). The rectum (*) is displaced by the mass (white arrows) in the pelvic cavity.

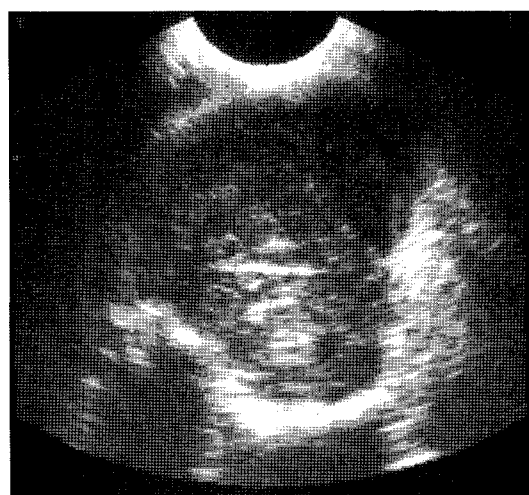


Fig 2. On ultrasonograph, a well-margined multinodular mass with mixed echogenicity is seen.

rator foramen. The rectum was displaced dorsally by the mass in the pelvic cavity (Fig 3).

In histological findings, the mass was composed of distinct 2 cell populations, such as mesenchymal and epithelial elements (6,7,9). Malignant mesenchymal tumor cells form interwoven patterns with fusiform spindle cells resembling fibroblast. Many necrotic areas were scattered in these mesenchymal tumor cell. Other parts of tumor mass were occupied with sheets of synovioblastic cells. Many tumor cells in tendon or connective tissues were distributed along perivascular perpendicular orientation and had lots of mitotic figures (2,4,5,9).

On the basis of above findings, we made definitive diag-

nosis as synovial sarcoma. As the owner declined to amputation and chemotherapy but want to remove the mass for relieving lameness. Under general anesthesia, the mass was isolated from the tight region with surgically undermining and pelvic cavity via pelvic symphysiotomy. On the 5th month after surgery, patient didn't show any metastatic sign, but remain lameness caused by severe muscle atrophy. On the 6th month, a small mass was palpated and progressively enlarged. The patient was euthanized on the 10th month after surgery by the owner's request.

Discussion

SS is a clinically and morphologically well-defined soft

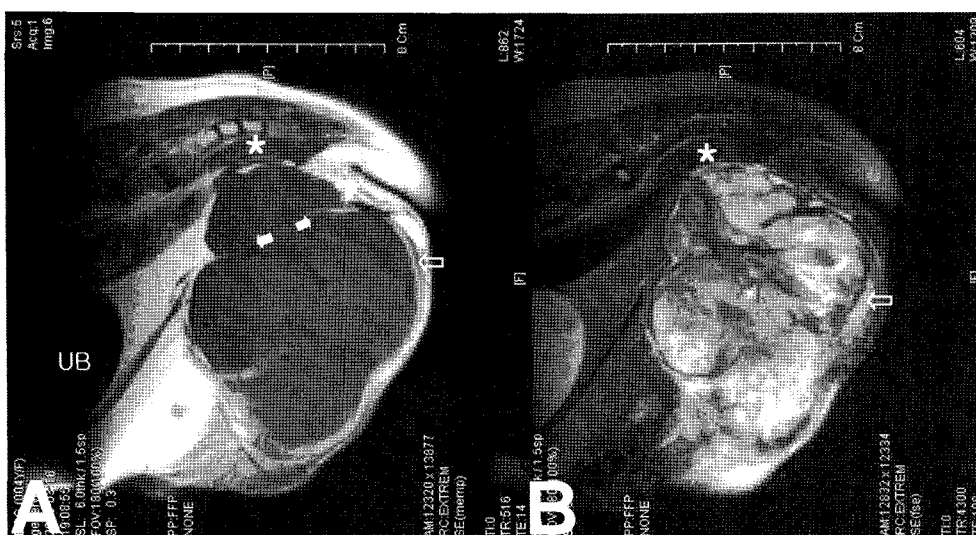


Fig 3. MRI findings: A, On T1-wighted image (TR/TE, 516/14), a mass has heterogenous signal intensity with similar to circumferential muscle (blank arrow). B, On T2-weighted image (TR/TE, 4300/95), this mass shows higher or similar to muscle, or lower than fat signal intensity. A nodular and well-circumscribed mass is seen in the pelvic cavity through the obturator foramen (white arrows). The rectum (*) is displaced dorsally by the mass in the pelvic cavity.

tissue tumor and rare in dogs (3-5,7,8). The stifle, elbow, shoulder, carpal, tarsal, and hip joints are most commonly involved, and show lameness with pain (2,4-6). SS occurs mainly in male, middle-aged (the mean age at presentation is 6 to 8 years) large breed dogs (4-6,8,9), but the presented dog was old and small breed, and has lameness without a pain.

SS can be broadly classified into the following four types with histologically: biphasic (mesenchymal and epithelial), monophasic fibrous, monophasic epithelial, and poorly differentiated (3-6,7,9). SS may resemble malignant fibrous histiocytoma, fibrosarcoma, giant-cell tumor of soft tissue or other tumor and may be underdiagnosed (2,4,5,9).

Regional radiographs will often reveal a soft tissue density adjacent to the affected joint (1,3-6,8). Mineralization of the soft tissue mass is occasionally seen in humans but rarely in dogs like this case. Bone involvement is observed in 11% to 100% of cases and can either be smooth and well delineated. A permeative to punctate lysis can be occurred as a result of bony invasion (4). A pressure necrotic lesions resulting from the expansile mass was observed in the pubis, and it has not a relation with SS on histopathological examination of the biopsied bone specimens. Although, we cannot be completely sure that degenerative changes of the hip joint were presented independently with mass, which was resulted from an abnormal joint movement induced by mass. Periosteal response or metastasis to lungs was not found in this case.

The MRI features of SS are variable according to size and tumor component (solid, cystic, hemorrhagic, and necrotic) in human beings (7). In this patient, MRI findings were well-marginated multinodular masses with lower or similar to muscle signal intensity on T1-weighted images. On T2-weighted images, heterogenous signal intensity (greater than fat or lower than muscle) was detected, and it

was similar results of human beings.

This case report is of value in presentation of SS on MRI, which is rare to be found in dogs. Although MRI could not provide the information about cell types of tumor, it was thought helpful to determine the definitive margin of mass and prognosis of disease after resection.

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개에서 발생한 이상성 활막육종 증례

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요 약 : 우측 후지가 점진적인 파행을 보이는 11년령의 수컷 시츄견이 내원하였다. 신체검사 결과 부정형의 종괴가 촉진되었다. 방사선 촬영에서는 균질한 연부 조직성 밀도를 보였으며, 초음파 검사에서는 혼합성 에코를 보이는 경계가 명료한 특징을 갖고 있었다. MRI 검사에서는 주변 근육과 비교한 결과 유사 또는 강한 비균질성 신호강도를 보였다. 종괴는 주로 대퇴부 주변에 형성되어 있었으며, 일부는 골반뼈 폐쇄구멍을 통해 골반강내에서 직장의 변위를 일으키고 있음이 확인할수 있었다. 병리조직 검사 결과 중간엽 세포와 상피세포로 구성된 활막육종으로 진단되었다. 종괴는 외과적으로 적출하였으나, 지속적인 근위축으로 있었으며 인해 파행은 개선되지 않았다. 적출 후 6개월에 종괴가 형성됨이 확인되었으며 점진적으로 그 크기 비대해져 10개월이 되는 시점에서 견주의 요청으로 안락사 하였다. MRI는 활막육종 형성됨이 확인되었으며이 대한특징적인 소견은 내포하고 있지 않지만 종괴의 수술적 적출과 종괴의 범위를 확인하는데 있어 유용한 정보를 제공함을 알 수 있었다.

주요어 : 활막육종, 관절종양, 자기공명 영상, 개