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A Case of Mesenteric Myxosarcoma in a Dog

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Abstract : A 6-year-old male Shih tzu dog was presented for evaluation of abdominal distention. Abdominal radiography and ultrasonography revealed a soft tissue density mass containing large amount of fluid. Ultrasonography-guided fine needle aspiration of the mass was performed and cytologic impression was granulation tissue with hematoma and fibroplasias. On exploratory laparotomy a mass was identified at the root of mesentery adhered to distal jejunum. Because the mass could not be separated from the attached jejuna loops, the mass and the adhered sites were surgically removed all together and enteroanastamosis was performed. Histologically a low grade myxosarcoma was diagnosed. Tumor cells were positive with alcian blue stain and Ki67 index by immunohistochemistry was 2.5. The dog recovered from surgery uneventfully, and has been in good condition without any signs of recurrence or metastasis for about 30 months after surgery.

Key words **:** myxosarcoma, mesentery, jejunum, Ki-67, dog.

Introduction

Myxosarcomas are rare tumors originated from fibroblast and characterized by abundant myxoid matrix rich in mucopolysaccharide (9,19). Skin is the most commonly affected site, and rare occurrences in dogs were reported in heart, muscle, eye, brain, vertebra, spleen, odontogenic site and mesentery (2,5,6,8,11,13,16,20,22). Their gross appearances include soft, gray-white color, poorly defined margin, and stringy clear mucoid fluid (9). Because margin of a tumor is uncertain, complete surgical removal may be difficult. As a result local recurrences frequently occur in dogs with a myxosarcoma (8). But metastasis is uncommon (11).

Mesenteric tumors were usually forms of metastatic tumor, especially with mesenteric lymphoma and adenocarcinoma (23). In dogs and cats, a primary mesenteric tumor is uncommon as in humans (10). Only few cases of sarcoma including extraskeletal osteosarcoma, spindle cell sarcoma, and myxosarcoma were reported in dogs (7,18,20,21).

In this report, we describe a dog having a low grade myxosarcoma arising from the distal jejunal mesentery with a good prognosis.

Case

A six-year-old male Shihtzu dog was admitted to the Haemaru referral animal hospital for evaluation of abdominal distention. About one month ago, the dog showed vomiting and diarrhea and was cured with conservative treatment. In physical examination, a large mass was palpated within mid-abdomen and any pain was not elicited upon palpation. General condition and appetite of the dog was good.

Abdominal radiography and ultrasonography were performed to identify a mid-abdominal mass. A soft tissue density mass was detected cranial to the urinary bladder which displaced the stomach cranially. The mass contained a large amount of hyperechoic fluid and was demarcated by irregular and thick wall. There was no invasive lesion into adjacent organs. But adhesion could not be excluded because a mass was too large. Other abdominal organs including liver, spleen, bilateral kidneys, adrenal glands, urinary bladder and gastrointestinal tract were identified as intact. The mass was suspected to be originating from mesentery and fat necrosis or other metastasizing tumor was included as differential diagnosis. Exploratory laparotomy was planned to figure out the origin of the mass and to surgically remove it. Before surgery, pre-anesthetic examinations of thoracic radiography, blood test, and ultrasonography-guided fine needle aspiration for cytology were performed. There were no metastatic lesions in thorax and the results of blood work were all within reference ranges.

In cytologic examination, cellularity was relatively low and was composed of spindle cells with a low number of activated macrophages, RBC phagocytes, and lymphocytes. Spindle cells showed moderate N:C ratio, and moderate amount of weakly basophilic cytoplasm. These cells were singular or in aggregation with eosinophilic proteinaceous background. Nuclei were elongated, and had none or one prominent nucleolus. Chromatin was granular. Rare neutrophils and no infec-

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tious organisms were found. Granulation tissue formation with hematoma and fibroplasias were suspected.

Exploratory laparotomy revealed a mass wrapped by greater omentum with neovascularization. It was 11 cm in diameter and whitish, slightly firm, multilobulated and well defined. The mass was located at the root of the mesentery and was adhered to distal jejunum. The mass could not be separated from the attached jejuna loops and was removed all together. Enteroanastomosis was performed. The mass did not connect directly with the lumen of the jejunum. As the removed mass was excised, a large amount of serosanguineous fluid spouted. Cytologic examination of the internal fluid revealed macrophages phagocytizing numerous polymorphous nuclear cells and red blood cells. Infectious organisms were not detected. The dog recovered uneventfully and discharged after three days of surgery. Two partial biopsy sections of the mass were fixed in 10% buffered formalin for histopathology.

Microscopically, there was a proliferation of loosely associated neoplastic spindle/stellate cells embedded within a myxomatous background matrix (Fig 1). The cells had distinct cell borders and a moderate amount of eosinophilic cytoplasm. Nuclei are round and lightly stippled. There was mild to moderate nuclear pleomorphism. Mitosis was observed, but rare, averaging less than 1 per 10 at high power fields (40 × objective lens). There were occasional lymphoid aggregates, along with scattered eosinophils, plasma cells, and macrophages. There were many dilated blood vessels and lymphatics. Neoplastic cells were presented at the margins. Myxosarcoma with low grade was diagnosed. Alcian blue staining was positive proving the abundant matrix of mucopolysaccharide (Fig 2).

Immunohistochemical staining for Ki-67 was carried out by the avidin-biotin-peroxidase complex (ABC) method using a Vectastain ABC kit (Vector Laboratories, Burlingame, CA) on a paraffin embedded cut section. Monoclonal mouse anti-human Ki-67 antigen (Dako Corporation, Glostrup, DK; clone MIB-1, pre-diluted) was used as primary antibody. Total 1000 cells were counted in microscopic images randomly captured at hpf (40 × objective lens) and Ki-67 positive tumor cells were detected by clearly granular or globular staining nuclei (Fig 3). Ki-67 index is the percentage of positive cells in 1000 tumor cells. The result was 2.5. The dog has been followed up for 30 months after surgery and is in good general condition with no signs of recurrences.

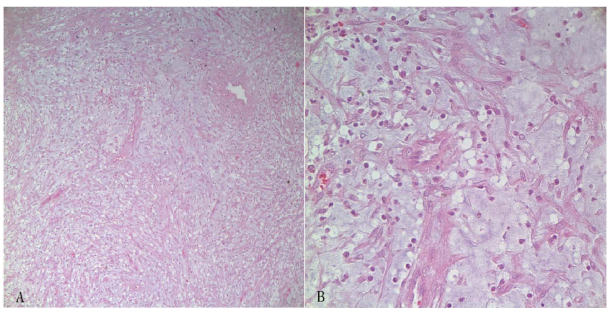

Fig 1. Histopathologic examination of an excised tissue from a mesenteric mass. (A) Stellate and spindle cells are loosely distributed through an abundant mucinous stroma (H&E, × 100). (B) Mild to moderate nuclear pleomorphism of tumor cells was noted (H&E, × 400).

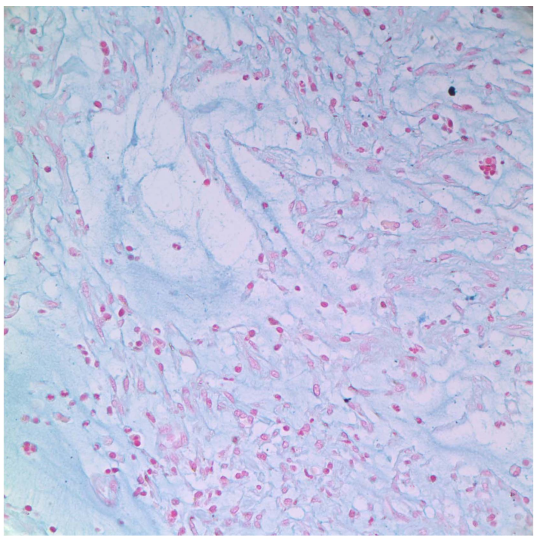

Fig 2. Alcian blue staining of a tissue section. A myxoid matrix was confirmed by positive staining with light blue color (× 400).

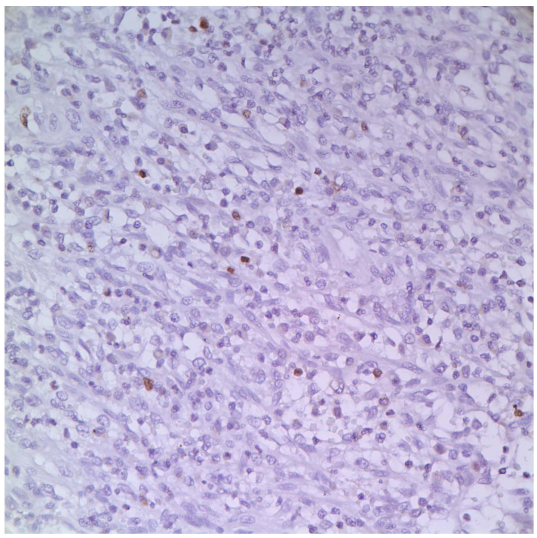

Fig 3. Immunohistochemical staining of Ki-67. Diffusely granular nuclear staining is identified in a low number of tumor cells (ABC method, × 400).

Discussion

Tumors originating in the intestine account for less than 10% of all neoplasia in the dog. Intestinal tumors can all be found as neoplasia of epithelial, mesenchymal, neuroendocrine, and discrete/round cell types. Malignant forms are predominant in dogs and its metastatic sites include mesenteric

lymph nodes, liver, mesentery, omentum, spleen, kidney, bone, peritoneum, lung, testes, and skin in decreasing frequency (23). A mesentery is the main metastatic site and thus almost mesenteric tumors occur as metastatic tumors. Primary mesenteric tumors are rare. In dogs, there were reported only few cases including extraskeletal osteosarcoma, spindle cell sarcoma, and myxosarcoma (7,18,20,21). This report is a case of mesenteric myxosarcoma identified nearby the jejunum. Although rare, myxosarcoma should include in the differential diagnosis for an abdominal mass.

To date, myxosarcomas in dogs have been reported to occur in skin, heart, muscle, eye, brain, vertebra, spleen, odontogenic site and mesentery (2,5,6,8,11,13,16,20,22). Among these sites, the skin is relatively common (9). Because local invasion is frequent, a mass is likely to be non- encapsulated and infiltrate into adjacent tissues (12). In this case a mass was encapsulated and relatively well defined. The mass was attached to jejuna and could not surgically separate between them. But complete removal of the mass could make through jejunectomy. A low grade malignant tumor was diagnosed depend on its histopathologic finding including increased cellular pleomorphism. Low malignancy often reflects low infiltrative nature of the tumor (3). But it is not always consistent in the myxoid tumors because myxomas can also be invasive and all myxosarcomas do not show aggressive invasiveness (12). In a report of ten dogs with skin myxosarcomas, the median survival time was 66 weeks and four dogs were sacrificed by tumor recurrence within 26 weeks of surgery (1). But most cases of myxosarcoma of minor sites (other than skin) were invasive except for a well-circumscribed cardiac tumor and the prognosis was poor (2,5,6,8,11,13,16,20,22). Comparatively long survival time was noted in the left ventricular tumor which was 358 days. But the mass was not capsulated and the dog was euthanized with a recurrence and local metastasis (6). The dog in this report has been alive with no metastatic lesions and recurrences for 30 months from surgery until now. Only complete surgical removal was carried out and no other adjunctive chemotherapy was administered. Although there was a possibility of invasion as in other myxosarcoma cases, this long survival time and good prognosis may due to complete surgical removal including adjacent jejunum despite.

Metastasis of myxosarcoma is not common; however recurrence is likely and the major cause of death (9). One report attributed the recurrence to the incomplete surgical removal of the tumor (8). In human, the only factor which may augment the risk of recurrence was a positive surgical margin (17). Surgical excision was selected as the treatment in many dogs with a myxosarcoma. As myxosarcomas tend to exhibit slow growth rates, adjunctive chemotherapy or radiotherapy may not be effective (6).

Low Ki-67 index may reflect benign tumor behavior. A positive correlation between Ki-67 and histological grade in soft tissue sarcomas ($P < 0.001$) was reported (4). A mean Ki-67 score of all sarcomas (60 cases) and myxosarcoma (3 cases) were 7.8 and 4.3, respectively in the report. Ki-67 index of our case was 2.5 which were consistent with low grade malignancy of this case. In human, several researches showed that Ki-67 index is a useful prognostic and therapeutic marker of soft tissue sarcomas (14,15,24). But there is no report studying the correlation between Ki-67 and myxosarcoma in humans as well as in dogs.

This report presented a dog with myxosarcoma originating primarily from mesentery and revealed that complete surgical removal and low KI-67 index may have a concern in good prognosis of a dog with myxosarcoma.

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개에서 발생한 장간막 점액육종의 한 증례

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요 약 : 6 년령의 수컷 시츄 견이 복부 팽만을 주 호소로 내원하였다. 복부 방사선 검사와 초음파 검사에서 많은 양의 액체를 포함하고 있는 연부조직 밀도의 종괴가 발견되었다. 종괴의 세포학적 검사를 위해 초음파 유도 세침흡인을 실시하였으며, 세포학적 검사 결과 섬유화가 동반된 육아조직이 의심되었다. 종괴의 확인과 수술적 제거를 위해 진단적 개복술을 실시하였다. 개복시 원위 공장부위에 인접한 장간막의 뿌리에서 유래한 종괴가 확인되었고 종괴는 원위 공장 부위에 부착되어 있었다. 종괴와 부착 부위의 분리가 어려웠기 때문에 종괴와 부착 부위를 모두 수술적으로 제거하였으며 장문합술을 실시하였다. 종괴의 조직병리학적 검사 결과 저 악성도 점액육종이 진단되었으며, 종양 세포는 알시안 블루 염색에 양성 반응을 보였다. 추가로 실시한 Ki67 항체를 이용한 면역조직화학 염색 결과 Ki-67 지수는 2.5 였다. 환축은 절제술 실시 후 현재까지 30개월 동안 전이와 재발의 증거 없이 살고 있다.

주요어 : 점액육종, 장간막, 공장, Ki-67, 개