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Pancreatic Exocrine Adenocarcinoma in a Cat

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Abstract : An 8-year-old, neutered female Korean short hair cat was referred with severe vomiting and anorexia. Abdominal mass effect was seen in the cranial abdomen on radiographs, and a mass with a heterogeneous echogenic pattern was observed medial to the right kidney on ultrasonography. On computed tomography, a large mass with soft tissue attenuation and a contrast-enhanced capsule was seen. In histopathological findings, the acinar structures were lined with irregular cuboidal cells that have pale eosinophilic cytoplasm and round to oval nuclei. Based on these diagnostic imaging and histopathological findings, the mass was diagnosed as pancreatic exocrine adenocarcinoma.

Key words : cat, pancreatitis, pancreatic adenocarcinoma.

Introduction

Pancreatic tumors are rare in cats (12,13). When pancreatic tumor does arise, it normally occurs in older animals, and adenocarcinoma is the most common type of pancreatic tumor (6). The primary cause of pancreatic tumor is unknown, but a previous study reported that DNA damage due to chronic pancreatitis can lead to pancreatic tumor (10). Pancreatitis is a major exocrine disease and often occurs in cats (2). This report describes the diagnosis of a pancreatic tumor with various diagnostic imaging modalities and its confirmation with histopathological testing in a cat.

Case

An 8-year-old, neutered female Korean short hair cat weighing 4 kg was referred to the Veterinary Medical Teaching Hospital of Konkuk University due to severe vomiting and anorexia. A positive reaction was found with fPLI kit (SNAP® fPL™ test, IDEXX laboratories, Inc., Westbrook, Maine, US). The concentrations of glucose (200 mg/dL, reference rage 76-145 mg/dL), AST (77 U/L, reference range 0-48 U/L), ALT (153 U/L, reference range 12-130 U/L), GGT (6 U/L, reference range 0-1 U/L), amylase (2,182 U/L, reference range 500-1,500 U/L), and lipase (4,303 U/L, reference range 100-1,400 U/L) were increased in serum chemistry tests and lymphocytosis (14×10^9 cells/L, reference range $1.5\text{-}7.8 \times 10^9$ cells/L) was found in a complete blood cell count. Radiographs (Titan 2000M, Comed Medical Systems, Co., Ltd., Seongnam, Gyeonggi, Korea) showed bronchial markings in the right caudal lobe of the lung on a ventrodorsal view and a mass with soft tissue opacity in the cranial abdomen (Fig 1). Ultrasonography (Sonoace 9900, Medison, Co., Ltd., Seoul, Korea) showed that the omentum had become hyperechoic and contained hypoechoic nodules. A mass with a heterogeneous echogenic pattern was seen medial to the right kidney, and no vascular response was observed using power Doppler mode (Fig 2). The cat then underwent computed tomography (CT; Light Speed Plus, GE Medical Systems LLC, Waukesha, WI, US). A mass (34.8 mm × 37.6 mm × 34.4 mm) with soft tissue attenuation was seen in the peritoneal cavity, medial to both kidneys. The small intestine and caudal vena cava were displaced to lateral due to the mass. It was difficult to identify the direction of the small intestine due to close association with the mass. Contrast enhancement was observed along the capsule of the mass (Fig 3). Pancreatic tumor, abscess, necrotizing pancreatitis were among the differential diagnostic list for the cat. The cat died 2 days after CT scanning. Necropsy was performed for histopathological diagnosis. There were adhesions between the small intestine

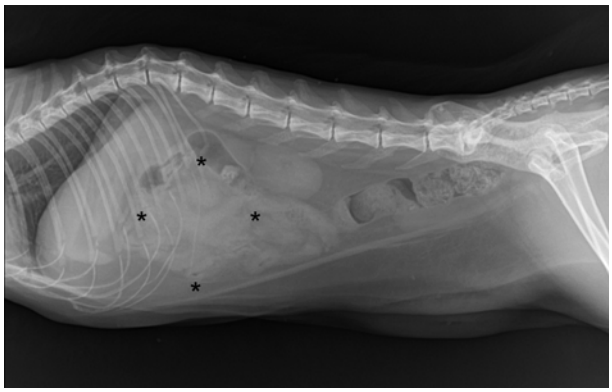

Fig 1. Right lateral abdominal radiograph of the patient. A mass with soft tissue opacity was seen in the cranioventral abdomen (margins indicated by *).

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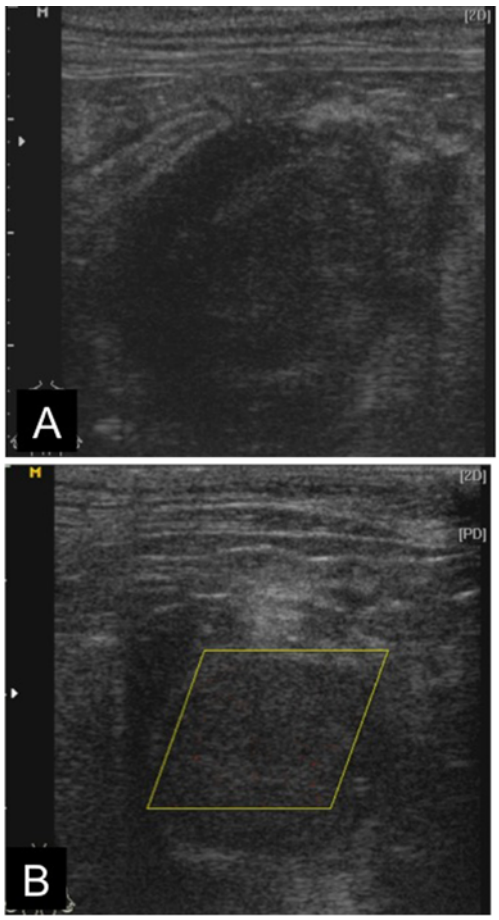

Fig 2. Ultrasonography of the Mass. (A) A hyperechoic omentum containing hypoechoic regions and a mass with a heterogenous echogenic pattern was observed. (B) Vascular response was not seen in the mass on the power Doppler mode.

and the mass, and liquefaction necrosis had occurred in the mass. Lymphocytes were scattered within the pancreatic parenchyma. Margin of the mass showed that Neoplastic cells formed acinar structure and solid sheets and acinar structures were lined with irregular cuboidal cells that had pale eosinophilic cytoplasm and round to oval nuclei. The

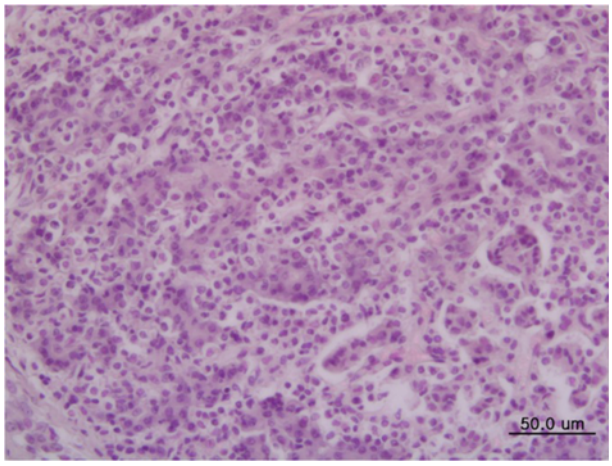

Fig 4. Microscopic findings in margin of the mass. Neoplastic cells formed acinar structure and solid sheets. The acinar structures were lined with irregular cuboidal cells that had pale eosinophilic cytoplasm and round to oval nuclei. The solid sheets had a high nuclear/cytoplasmic ratio and small nuclei (hemotoxylin and eosin, bar = 50 μm).

solid sheets had a high nuclear/cytoplasmic ratio and small nuclei. (Fig 4). Pancreatic carcinoma cells were negative for the insulin, but some cells in intact islet of langerhans were positive for the insulin in immunohistochemical detection of insulin (Fig 5). Pancreatic exocrine adenocarcinoma was confirmed in the cat by histopathological diagnosis.

Discussion

Pancreatic tumors are very rare in cats. Previous studies have reported that their incidence is less than 0.5% and that the most common type of pancreatic tumor is adenocarcinoma (6). Causes of pancreatic adenocarcinoma are variable, and include heredity, smoking, familial breast cancer, and pancreatitis in humans. In the current case, pancreatitis was detected by positive reaction in fPLI kit, so referring hospital diagnosed pancreatitis previously although histologically confirmed diagnosis was pancreatic exocrine adenocarcinoma.

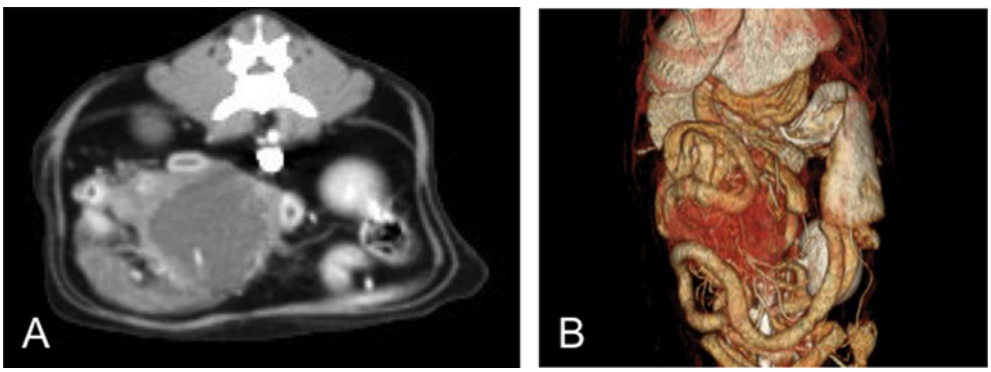

Fig 3. Abdominal transverse image on CT (A) and 3D reconstructed image (B). (A) A large mass with soft tissue attenuation was seen medial to both kidneys and the capsule of the mass was enhanced after contrast administration. (B) The small intestine was displaced around the mass and its direction was difficult to determine.

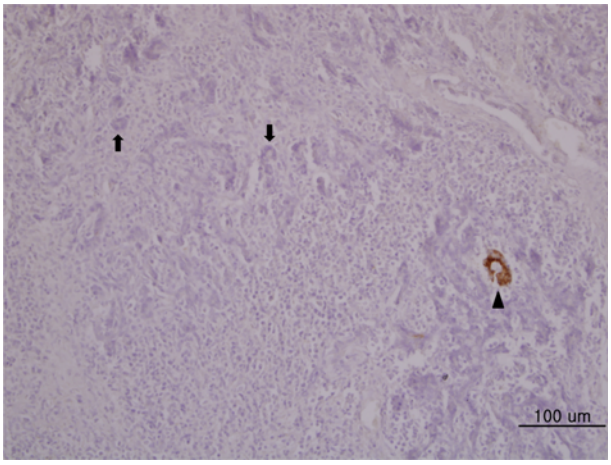

Fig 5. Immunohistochemical detection of insulin in pancreas. Pancreatic carcinoma cells (arrows) were negative for the insulin, but some cells in intact islet of langerhans (arrowhead) were positive for the insulin (Bar = 100 μm).

Even though evaluation of pancreatic lipase concentration in feline pancreatic tumor has not been reported yet, it seems to be somewhat similar with dogs suffered pancreatic tumor with concurrent pancreatitis (15). It is known that the pathogenesis of human pancreatic adenocarcinoma involves damage and mutation of oncogenes and tumor suppressor genes, which results in the growth of undifferentiated cells and disturbance of the exocrine function of the pancreas (9,10). The causes of the pancreatic exocrine carcinoma were not clarified in this case, however relationship between the pancreatic neoplasia and concurrent pancreatitis do seem to exist from the base of pathogenesis of pancreatic adenocarcinoma as described previously. Pancreatitis is a common disease in cats. A previous study showed that 60% of 115 cats with a median age of 102 months were diagnosed with chronic pancreatitis on necropsy (2).

In the present case, various diagnostic imaging modalities showed findings corresponding with those of previous studies. The mass effect caused by the mass in the cranioventral abdomen was observed from the right lateral view of abdominal radiographs. Hyperechoic omentum and a mass with mixed echogenicity which measures up to 2 cm wide with absence of vascular reaction from the power Doppler mode was ultrasonographicaly detected (1,3,5,6,12). The CT findings of previous studies in dogs and human were also confirmed in the current report (3,4,8). Only the margins of the mass were enhanced by contrast medium, and it was located medially to the duodenum. The cause of the mass is assumed to be from the damaged omentum caused by the enzymes released from the destroyed exocrine pancreatic cells. (3). A large nodule with a diameter of up to 2 cm is a typical CT finding in imaging diagnosis of pancreatic carcinoma.

In the current case, the concentrations of amylase, lipase, and glucose were increased in serum chemistry tests. Amylase and lipase are specific digestive enzymes contained within the pancreas. It is likely that as the pancreas was destroyed by inflammation, pancreatic enzymes were released into the peritoneal cavity, and the concentration of these enzymes was therefore elevated by pancreatitis. This has been confirmed by a previous study in humans (14). But retrospective study about 10 cats with exocrine pancreatic neoplasia reported that changes of hepatic enzymes were various and these enzymes were not helpful diagnosing in feline pancreatic disease (12). It is likely that the hyperglycemia seen in serum chemistry tests was the result of diabetes mellitus. It is a commonly encountered complication in chronic pancreatitis, and it indicates that the pancreas has been permanently damaged by the recurrent inflammation. Diabetes mellitus has also been reported to be a complication of chronic pancreatitis in human medicine (11). The previous study reported mild hyperglycemia was present in 63% of cats with pancreatic tumor (8). Hyperglycemia was promptly returned to baseline in this study, from which hyperglycemia is a transient injury in pancreatitis assumption can be made (7).

Conclusion

This report describes diagnosis of pancreatic exocrine adenocarcinoma in a feline patient with variable modalities including CT. Feline pancreatic tumor has been well described in previous studies, even though it is rare disease in feline patients. Clinicians should consider the presence of a pancreatic tumor in patients with pancreatitis, abdominal mass effect on radiography, a hyperechoic omentum and heterogeneous large mass on ultrasonography, and a mass with a contrast-enhanced margin on CT.

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고양이에서 발생한 췌장 외분비 선암종 1례

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요 약 : 8년령 중성화된 암컷 한국 고양이가 심한 구토와 기력저하로 내원하였다. 방사선 사진상 복부 전방에 종괴음영이 관찰되었으며, 초음파상 혼합에코를 가지는 종괴가 우측 신장 안쪽으로 관찰되었다. 컴퓨터 단층촬영상 종괴는 연부조직 밀도의 감쇠를 보이며, 종괴주변으로 증강효과를 보이는 캡슐이 종괴를 둘러싸고 있는 것으로 관찰되었다. 조직병리학적 검사상 파리샘 구조들은 옅은 호산성 세포질과 원형 혹은 난원형 핵을 가지는 불규칙한 입방형 세포들로 구성되어 있었다. 영상진단학 및 조직병리학적 검사결과를 바탕으로, 본 증례는 췌장 외분비 선암종으로 진단하였다.

주요어 : 고양이, 췌장염, 췌장 선암종