

Walled-off Pancreatic necrosis in a Dog

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Abstract : A 7-year-old, castrated, male Maltese dog presented with hyporexia and depression for 3 days. Elevated serum amylase, lipase activities, and liver enzyme values were found upon blood examination. An abdominal mass was seen on radiographs caudal to the gastric body in the left middle abdomen. In the left middle abdomen, abdominal ultrasonography also revealed a massive, irregularly marginated, heterogeneous mass of unknown origin, and in the right cranial abdomen, heterogeneously hypoechoic pancreatic tissue and hyperechoic change of adjacent mesenteric fat were observed. Contrast-enhanced computed tomography showed an irregular contour of the left pancreatic limb as well as heterogeneously enhanced parenchyma. A low-attenuating peripancreatic fluid collection with a thin and irregular wall was also seen. Based on these findings, an atypical pancreatic abscess with necrotizing pancreatitis which manifested as walled-off necrosis was suspected. The mass was excised, and the pancreatic abscess was confirmed by histopathologic examination. No complications were found in the patient after two months of follow-up examination.

Key words : pancreatic abscesses, walled-off pancreatic necrosis, ultrasonography, computed tomography, dog.

Introduction

Pancreatic masses, including pancreatic pseudocysts, necrotic mass lesions, and pancreatic abscesses, are uncommon in dogs (1). Pancreatic abscesses, as one of the local complications of severe necrotizing pancreatitis, have become the primary cause of death in dogs with severe pancreatitis (1). Based on several previous reports in veterinary literature, pancreatic abscess has been defined as circumscribed collections of purulent materials or purulent exudates within the pancreatic parenchyma, with or without extending into adjacent tissues (7,8,10,13). Since pancreatic mass is infrequently reported in dogs, however, it is difficult to obtain clear data from the veterinary literature regarding the definition, incidence, natural history, and characterization on diagnostic imaging of pancreatic mass.

For this reason, human pancreas literature can be a useful guide. For example, the 2012 revision of the Atlanta classification of acute pancreatitis updated the terminology describing inflammatory pancreatic fluid collections to improve assessment and management of acute pancreatitis, as well as to clarify appropriate terms for peripancreatic fluid collections, pancreatic and/or peripancreatic necrosis, and their changes over time (2). Terms such as “acute peripancreatic fluid collections (APFCs),” “pseudocyst,” “acute necrotic collections (ANCs),” and “walled-off necrosis (WON)” are now recommended to describe the evolution of fluid collections resulting from both interstitial and necrotizing pancreatitis. Nonspecific terms such as “pancreatic abscess” and “phlegmon” have been abandoned (14). The definition of WON, formerly known as pancreatic abscess, is a mature,

encapsulated, acute necrotic collection with a well-defined inflammatory wall. WON tends to occur more than 4 weeks after the onset of necrotizing pancreatitis (2).

This report describes the case of a dog with atypical pancreatic abscess formation manifested as WON, which was first suspected on the basis of ultrasonographic findings and subsequently confirmed by computed tomography.

Case

A 7-year-old, castrated, male Maltese dog weighing 5.0kg presented with a 3-day history of hyporexia and depression. A physical examination identified moderate abdominal distension and severe abdominal pain. The concentrations of amylase (2,195 U/L, reference range 500-1,500 U/L), lipase (6000 U/L, reference range 200-1800 U/L), Alkaline Phosphatase(ALP) (1448 U/L, reference range 23-212 U/L), and Gamma-glutamyltransferase(GGT) (24 U/L, reference range 0-7 U/L) were increased in serum chemistry, and a complete blood cell count found mild leukocytosis ($22.71 \times 10^9/l$; reference range $0.6-17.0 \times 10^9/l$).

Abdominal radiographs showed an ill-defined mass with soft tissue opacity caudal to the gastric body. The exact margin of the mass was hard to define, however, due to mild loss of serosal detail in the middle abdomen and bony ingesta in the gastrointestinal tract. Severe hepatomegaly with concurrent caudal displacement of the gastric axis was also found (Fig 1). Furthermore, ultrasound examination identified a thick and irregular walled complex cystic structure with internal echogenic substance in the left middle abdomen (Fig 2A). The structure was approximately 22×40 mm and did not seem to be associated with a specific abdominal organ. No vascular response was observed using power Doppler mode. A mildly enlarged (8 mm) pancreatic tissue with het-

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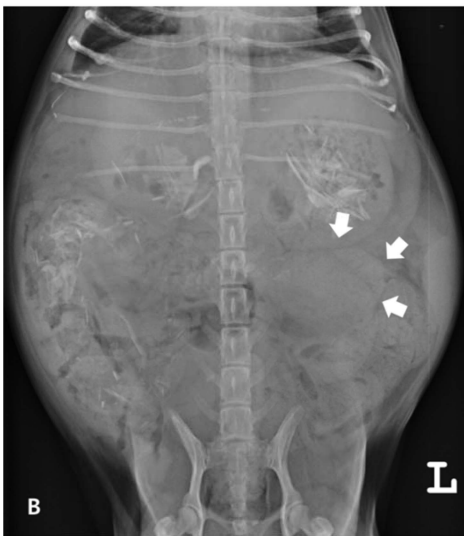
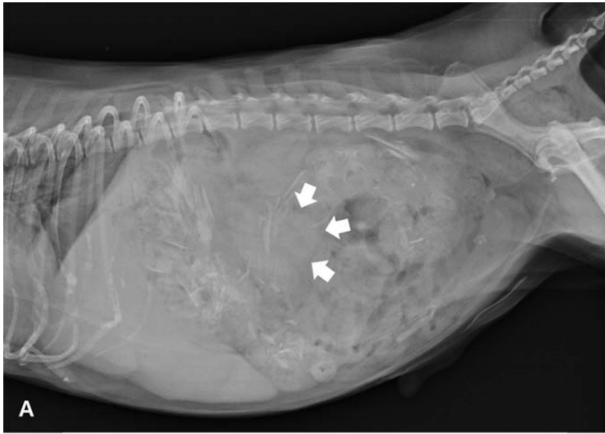


Fig 1. Lateral (A) and ventrodorsal (B) abdominal radiographs of the dog. There is an ill-defined mass with soft tissue opacity (arrows) caudal to the stomach and mild loss of serosal detail in the mid abdomen.

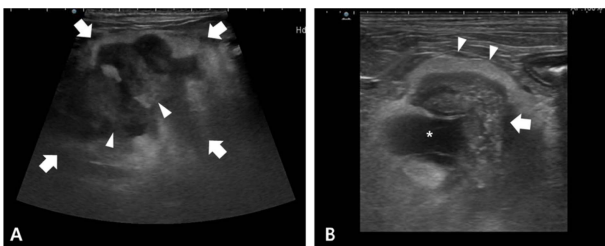


Fig 2. Abdominal ultrasonographic images of the dog. (A) In the left mid abdomen, the complex cystic structure with a thick, irregular wall (arrows) and internal echogenic substance (arrowheads) is observed. (B) In the right cranial abdomen, pancreatic parenchyma (arrow) which has decreased heterogeneous echogenicity and adjacent hyperechoic mesenteric fat (arrowheads) were seen. Anechoic area (asterisk) surrounded by mesenteric fat is also seen.

erogeneously hypoechoic parenchyma and hyperechoic change of adjacent mesenteric fat was observed in the right cranial abdomen. Additional findings included an anechoic

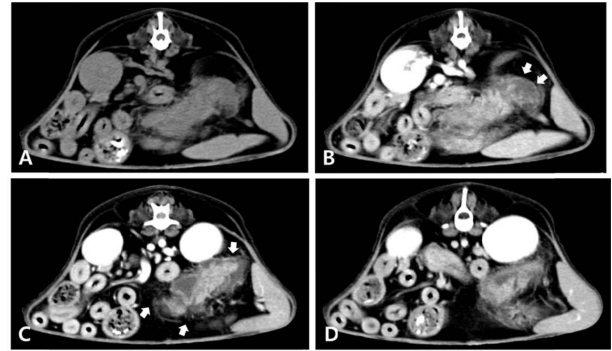


Fig 3. Transverse view of CT images of the dog. The precontrast (A) and contrast-enhanced (B, C, D) images; Multifocal non-enhancing low-attenuating regions in the left limb of the pancreas and heterogeneous peripancreatic fluid with thin enhancing wall (arrows) is seen.

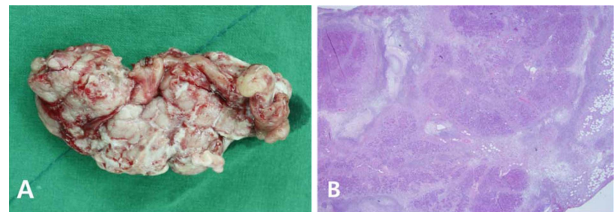


Fig 4. Macroscopic photograph (A) and histopathological photograph (B) of the pancreatic mass. (A) The part of left pancreatic limb dissected during pancreatectomy is encapsulated by firm fibrous tissue. (B) Histopathological examinations revealed inflammatory cell infiltration, necrosis and fibrosis in the connective tissue surrounding pancreatic acinar cells

area adjacent to the pancreatic tissue, which was thought to be a developing pancreatic pseudocyst or an area of hemorrhage and necrosis (Fig 2B).

A contrast-enhanced computed tomography (CECT) scan showed the left limb of the pancreas with ill-defined borders manifesting as heterogeneous enhancement with multifocal nonenhancing areas. Heterogeneous peripancreatic fluid collections surrounded with contrast-enhanced irregular wall were also seen (Fig 3).

Based on ultrasonography and CT findings, the patient was presumptively diagnosed with an atypical pancreatic abscess that manifested as WON.

Because of this, a pancreatectomy was performed to remove the distal half of the left limb of the pancreas. The dissected part of the left pancreatic limb was firm and encapsulated by fibrous or granulated tissue (Fig 4A). Severe pancreatic necrosis and abscess formation were both confirmed in the dog by histopathological diagnosis (Fig 4B). The patient was hospitalized for two days and recovered uneventfully with routine postoperative antibiotics. Ten days after surgery, abdominal ultrasonography identified hyperechoic mesenteric fat within the left cranial abdomen. Three months following surgery, ultrasonography detected no remarkable findings.

Discussion

The clinical signs associated with pancreatic pseudocysts, necrotic lesions, and abscesses are nonspecific and do not significantly differ from those of pancreatitis. These signs include vomiting, weight loss, and anorexia. Additional clinical signs that may be seen in a dog with pancreatic necrosis and abscesses are lethargy, abdominal pain, icterus, and fever (5). In this case, the dog showed nonspecific clinical signs such as hyporexia, depression, and abdominal pain.

There is no definitive diagnostic laboratory test to detect pancreatic abscesses (5). In cases of pancreatic abscesses, the results of a complete blood cell count and a serum biochemistry profile are similar to those of pancreatitis, including leukocytosis, neutrophilia with a left shift, and elevated serum amylase and lipase activities (5). In this case, the concentrations of amylase, lipase activities, ALP, and GGT were increased in serum chemistry tests, and mild leukocytosis was found in a complete blood cell count. The elevated liver enzyme values were considered to be related to steroid hepatopathy resulting from prednisolone, a medication the patient had been on for five years.

Survey abdominal radiography displays a low sensitivity for the diagnosis of pancreatic masses. In several reported cases of pancreatic mass, however, abdominal radiography reveals an ill-defined soft tissue opacity in the cranial abdomen. Focal or diffuse loss of serosal detail may be also seen (3,6,17). Similar to previous reports, abdominal radiography in this case showed a mass with soft tissue opacity caudal to gastric body as well as mild serosal detail loss, but it proved difficult to identify the exact origin of the mass.

One study reported that pancreatic abscess presents on ultrasonogram as a cavity filled with homogeneous echogenic fluid within the parenchyma of the pancreas (8). Another study reported that pancreatic abscess may be seen as a mass of mixed echogenicity not directly related to the pancreas (1). In this case, a cystic mass with a thick wall and internal echogenic debris which measured up to 5cm wide was detected in the left middle abdomen by the ultrasound. Additionally, there was no vascular signal around the mass. The origin of the mass was also hard to identify, as it was with abdominal radiography. Images of the other abdominal organs such as the kidneys, spleen, and gastrointestinal tracts seemed normal. An abscess or neoplasia of unknown origin was considered in the differential diagnosis of the mass, partially because ultrasonographic findings consistent with pancreatitis were identified in the right cranial abdomen.

On CECT imaging, WON appears as a heterogeneous collection with liquid and non-liquid density surrounded by a mature, enhancing wall of reactive tissue (2,11). WON may involve the pancreatic parenchymal tissue and/or the peripancreatic tissue (12). Extraluminal gas within the collection of necrosis seen on CECT may indicate infection, but not in all cases (9,11). In addition, the distinction between a pseudocyst and WON is important because it influences a patient's treatment plan (9). Pseudocysts may be diagnosed on CECT as well-circumscribed, homogeneous fluid collections mostly located adjacent or distant to pancreas. In this case, CECT findings of the lesions were similar to those of WON. CECT

scanning also showed non-enhancing low-attenuating regions within the left pancreatic limb, indicative of parenchymal necrosis. A heterogeneous peripancreatic fluid collection with thin and irregular enhancing wall was also observed. Additionally, no evidence of gas was found within the areas of WON collection. These findings indicated WON with fat necrosis involving pancreas and peripancreatic tissues, and as a result pseudocysts were ruled out.

As mentioned above, there is no definitive diagnostic laboratory test to detect pancreatic abscesses (5). In pancreatic abscesses, results of complete blood cell count and serum biochemistry profiles are similar to those of pancreatitis including leukocytosis, neutrophilia with a left shift, and elevated serum amylase and lipase activities (5). In the present case, the concentrations of amylase, lipase activities, ALP, and GGT were increased in serum chemistry tests and mild leukocytosis was found in complete blood cell count.

Unlike in humans, canine pancreatic abscesses are usually reported as sterile (4,5). In this case, no microbial agents were isolated from any samples of pancreatic tissue on histopathological examination.

Conclusion

This report describes diagnosis of atypical pancreatic abscess formation in a dog, manifested as WON does in humans. It is important to obtain accurate diagnosis of local complications in patients with severe pancreatitis for their treatment and a good prognosis. In this case, CECT was a useful tool to evaluate the progression, morphology, and extent of these local complications of pancreatitis.

References

1. Anderson JR, Cornell KK, Parnell NK, Salisbury SK. Pancreatic abscess in 36 dogs: a retrospective analysis of prognostic indicators. *J Am Anim Hosp Assoc* 2008; 44: 171-179.
2. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, Tsiotos GG, Vege SS. Classification of acute pancreatitis-2012: revision of the Atlanta classification and definitions by international consensus. *Gut* 2013; 62: 102-111.
3. Bellenger CR, Ilkiw JE, Malik R. Cystogastrostomy in the treatment of pancreatic pseudocyst/abscess in two dogs. *Vet Rec* 1989; 125: 181-184.
4. Bello B, Matthews JB. Minimally invasive treatment of pancreatic necrosis. *World J Gastroenterol* 2012; 18: 6829-6835.
5. Coleman M, Robson M. Pancreatic masses following pancreatitis: Pancreatic pseudocysts, necrosis, and abscesses. *Compend Contin Educ Vet* 2005; 27: 147-153.
6. Edwards DF, Bauer MS, Walker MA, Pardo AD, McCracken MD, Walker TL. Pancreatic masses in seven dogs following acute pancreatitis. *J Am Anim Hosp Assoc* 1990; 26: 189-198.
7. Johnson MD, Mann FA. Treatment for pancreatic abscesses via omentalization with abdominal closure versus open peritoneal drainage in dogs: 15 cases (1994-2004). *J Am Vet Med Assoc* 2006; 228: 397-402.
8. Lee M, Kang JH, Chang DW, Na KJ, Yang MP. Pancreatic

- abscess in a cat with diabetes mellitus. *J Am Anim Hosp Assoc* 2015; 51: 180-184.
9. Ramia JM, Plaza R, Quinones-Sampedro JE, Ramiro C, Veguillas P, Garcia-Parreno J. Walled-off pancreatic necrosis. *Neth J Med* 2012; 70: 168-171.
 10. Salisbury SK, Lantz GC, Nelson RW, Kazacos EA. Pancreatic abscess in dogs: six cases (1978-1986). *J Am Vet Med Assoc* 1988; 193: 1104-1108.
 11. Sarr MG. 2012 revision of the Atlanta Classification of acute pancreatitis. *Pol Arch Med Wewn* 2013; 123: 118-124.
 12. Thoeni RF. The revised Atlanta Classification of acute pancreatitis: Its importance for the radiologist and its effect on treatment. *Radiol* 2012; 262: 751-764.
 13. Warsaw AL. Inflammatory masses following acute pancreatitis: Phlegmon, pseudocyst, and abscess. *Surg Clin North Am* 1974; 54: 621-636.
 14. Zaheer A, Singh VK, Qureshi RO, Fishman EK. The revised Atlanta classification for acute pancreatitis: updates in imaging terminology and guidelines. *Abdom Imaging* 2013; 38: 125-136.