Surgical Correction of Peritoneopericardial Diaphragmatic Hernia with Hepatic Necrosis in a Himalayan Cat

Joon-young Kim, Soon-wuk Jeong, Bo-yeon Choi, Hiw-gon Go*, Hun-young Yoon, Man-bok Jeong, Hyun-jung Han, Min Hwang and Byung-kuk No

Department of Veterinary Surgery, College of Veterinary Medicine, KonKuk University, Seoul 143-701, Korea
*Bak-san Animal Hospital, Seoul 135-010, Korea

Abstract: A five months old, female Himalayan cat was referred to the Veterinary Medical Teaching Hospital at Konkuk University, because of suspecting peritoneopericardial diaphragmatic hernia (PPDH). After consecutive examination, the patient was diagnosed as PPDH and hepatic dysfunction. In spite of medical therapy for a month, the serum chemistry profiles for liver enzymes (aspartate transferase: 469 U/L, alanine transferase: above analysis, gamma-glutamyl transferase: above analysis) did not decrease to the normal range. In operation, some of liver was necrotized and was adhesive to diaphragm, these were gently dissected from thoracic structures, and resected. After debriding, the edges of the defect of diaphragm were closed with a simple continuous suture pattern. One month after operation, the cat had normal condition, recovery was uncomplicated, and the serum chemistry profiles for liver enzymes decrease to the normal range.

Key words: peritoneopericardial diaphragmatic hernia, liver necrosis, Himalayan cat

Introduction

Peritoneopericardial diaphragmatic hernia (PPDH) was first introduced in dogs in 1951 and in cats in 1966. PPDH is an opening or hiatus between the abdomen and the pericardial sac. So abdominal organs and structures may be found in the pericardial sac. In humans the diaphragm forms one wall of the pericardial sac. Rupture of the diaphragm in this area results in communication between the pericardial sac and peritoneal cavity. Therefore peritoneopericardial diaphragmatic hernia in humans may be either congenital or secondary to traumatic diaphragmatic hernia. But in dogs and cats this anomaly is always a congenital defect. PPDH are less commonly recognized by small animal clinicians than are traumatic diaphragmatic hernias. With this reason, the animals with PPDH may not be recognized easily by owners, if clinical signs don’t happen.

Liver is the most frequently displaced organ, when PPDH is happened. Liver in the pericardial sac can be torsional and adhesive to pericardial sac and diaphragm. After that, liver couldn’t normally function.

This report is the occurrence and the successive medical and surgical therapy of PPDH with hepatic necrosis in a Himalayan cat.

Case

History and Physical findings

A five months old, female Himalayan cat was referred to the Veterinary Medical Teaching Hospital of College of Veterinary Medicine at Konkuk University, because of suspecting peritoneopericardial diaphragmatic hernias. The cat had a history of anorexia, falling in lethargy and mild diarrhea. In physical examination there was mucous discharge from eye, nose, and mouth. The cat had painful palpations of the cranial abdomen. Body temperature (38.7°C) and respiratory rate (39 breaths/min) were normal. Tachycardia (210 bpm) was happened at the resting state. Heart sounds were clearly audible on the left side and muffled on the right side.

Hematologic and Serologic findings

In CBC, there was a leukocytopenia (2.48 × 10^3/µl). Abnormalities on the serum chemistry profile included elevated values for liver enzymes (alkaline phosphatase (ALP): 889 U/L, aspartate transferase: 469 U/L, alanine transferase: above analysis, gamma-glutamyl transferase: above analysis) did not decrease to the normal range. In operation, some of liver was necrotized and was adhesive to diaphragm, these were gently dissected from thoracic structures, and resected. After debriding, the edges of the defect of diaphragm were closed with a simple continuous suture pattern. One month after operation, the cat had normal condition, recovery was uncomplicated, and the serum chemistry profiles for liver enzymes decrease to the normal range.

Radiological findings

In physical examination there was mucous discharge from eye, nose, and mouth. The cat had painful palpations of the cranial abdomen. Body temperature (38.7°C) and respiratory rate (39 breaths/min) were normal. Tachycardia (210 bpm) was happened at the resting state. Heart sounds were clearly audible on the left side and muffled on the right side.

Ultrasonographic findings

Survey radiographs of the thorax revealed a enlarged, irregular cardiac silhouette that was smooth and globular in both the lateral and dorsoventral views. Loss of the diaphragmatic line was showed at the right side. The space occupied by the lungs was reduced markedly. The trachea was displaced dorsally so that it was parallel to the thoracic vertebra. The liver size in the abdomen was small. But the liver silhouette was continued though caudal thoracic cavity (Fig 1).

Two-dimensional echocardiographic imaging showed the liver within the pericardial sac between the heart and the right lung. The discontinuity in the diaphragm was also seen (Fig 2).
Medical treatment

5% glucose & isotonic saline (Dai han Pharm. Co. Ltd.) with hepacoma (Dai han Pharm. Co. Ltd.) (1:1) was administered intravenously for 8 days. Taurine (Samyang Pharma-chemicals. Co. 1 ml, i.v., b.i.d.) was injected 2 times a day for 2 days. Lactulose (Duphalac® syrup, Choongwae Pharma. corp., 1 ml, p.o., t.i.d.), Urazamide (Recover®, Yuh an corporation, 25 mg/head, p.o., b.i.d.), amoxicilline (Dong wha pharm. Ind. Co. Ltd., 20 mg/kg, p.o., b.i.d.), Ursodesoxycholic acid (Uso-san, Korea united Pharm., 25 mg/head, p.o., b.i.d.) were administered. Liver function was evaluated every week.

One month later, the cat had normal condition, and all hematological indexes were normal except liver enzymes (ALT: above analysis range, AST: 469 U/L, GGT: above analysis range). In spite of medical therapy for a month, the serum chemistry profiles for liver enzymes did not decrease to the normal range.

Surgical treatment and findings

Before surgery patient was hydrated with 5% glucose & isotonic saline with hepacoma (1:1) for 12 hours. Antibiotics (amoxicilline, Shin poong, 20 mg/kg, i.v.) and analgesics (Butorphan®, Myungmoon pharm., 0.4 mg/kg, i.v.) were administrated. After anticholinergic (atropine sulfate, Kwang Myung pharm. Co. Ltd., 0.02 mg/kg, s.c.) was injected, anesthesia was inducted with thiopental sodium (Pentotal sodium 0.5gr. inj. Choong wae Pharm. Corp., 15 mg/kg, i.v.). With isoflurane (Rhodia Orgranique Fine Ltd., 0.5~2.5%) was maintained and mechanical ventilation was performed.

The entire abdomen and caudal two thirds of the thoracic cavity was prepared for aseptic surgery. The patient was placed in dorsal recumbency.

From the beside xyphoid process about 10 cm ventral midline abdominal incision was performed. Right medial lobe, Quadrate lobe and left medial lobe of liver was entered to the pericardial sac in the thoracic cavity via opened diaphragm. And Quadrate and left medial lobe was necronized and was abhesive to diaphragm. So these was gently dissected from thoracic structures, and resected. After debriding the edges of the defect of diaphragm was closed with a simple continuous suture pattern. We did not close the pericardial sac. During closing the diaphragm, an over-the-needle catheter attached to extension tubing, and a three-way stopcock and syringe was