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CASE REPORT

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Gastric Dilatation and Volvulus in Thorax of a Cat

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Abstract

In this report, a case of gastric dilatation and volvulus (GDV), which was developed after a traumatic diaphragmatic hernia in a cat, has been described.

This cat was brought to the emergency clinic at the Animal Hospital, Faculty of Veterinary Medicine Bursa Uludağ University, with signs of acute dyspnea, left-sided thoracic distension, and lameness. On clinical examination, heart sounds on the right side were more pronounced and audible than on the left. On radiographic examination, loss of the regular diaphragm line, shift of the heart to the right, and shadow of the excessive gas-containing stomach were observed in the thoracic cavity. The cat's current severe respiratory distress was managed with oxygen administration, intravenous fluid therapy, and relief of diaphragmatic pressure by utilizing stomach decompression with a needle. Despite all interventions, the cat died during the operation.

To our knowledge, this is the first reported case of gastric dilatation and volvulus (GDV) entering the thoracic cavity in cats. This case report highlights the significance of an overall examination in patients with diaphragmatic hernia and respiratory distress.

Keywords: Cat, diaphragmatic hernia, gastrothorax, trauma

Introduction

Trauma is the most common cause of diaphragmatic hernia in small animals. Approximately 85% of the cases are traumatic in origin, 5%-10% are congenital, and the rest are of unknown causes(1,2). Radiographical examination is the most important method of detecting diaphragmatic hernia in dogs and cats. However, it is not always easy to identify the radiographical signs when other pathologies like pleural effusion are present. Characteristic radiographic signs of diaphragmatic hernia include loss of the diaphragmatic line and cardiac shadow, abdominal gas shadow in the thorax, and a wasp-shaped abdomen. In the literature, perioperative survival rates of surgical diaphragmatic hernia corrections have been reported to be ranging from 54% to 90%(3-5).

The most common complication after surgical repair of diaphragmatic hernias has been reported as pneumothorax, especially in case the hernia is chronic and adhesions are present11. Re-expansion pulmonary edema may occur in lungs that have been chronically collapsed. Moreover, dyspnea, pleural effusion, hemothorax, gastric torsion, shock, hemorrhage, and arrhythmia can be observed as complications (3,12).

Tension gastrothorax, first described by Ordog et al. (1984), refers to a clinical condition in which a herniated intrathoracic stomach becomes significantly distended by trapped air, leading to respiratory distress, mediastinal shift, and hemodynamic compromise. Such cases are typically observed in pediatric patients with congenital diaphragmatic defects or later in life because of acquired defects, most commonly in the context of trauma(6-8).

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The aim of this case report is to provide veterinarians with a comprehensive tension gastrothorax as a complication of diaphragmatic hernia.

Case History

One-year-old male mixed breed cat was presented to three small animal clinics after falling from the second floor, complaining of lameness in the left hind leg. In the small animal clinics, the clinicians did not detect any abnormality except for the left tibia fracture, and a bandage procedure was applied to the fracture under sedation. The examining physicians could not recognize the diaphragmatic rupture with the single-position thoracic radiography. Subsequently, the cat's breathing worsened, and the patient was brought to our emergency clinic at the Animal Hospital, Faculty of Veterinary Medicine Bursa Uludağ University for examination one week after the trauma. During the examination of the patient in our hospital, the

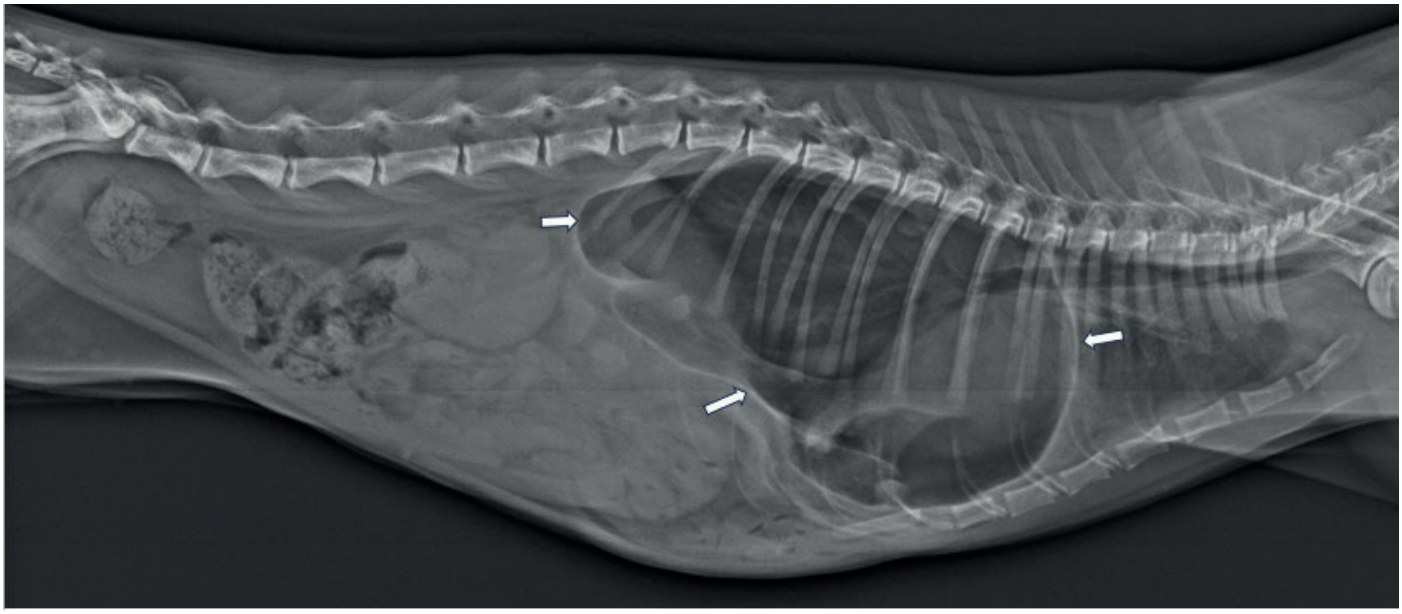


Fig. 1: The lateral image of the thoracic region. The diaphragm line cannot be seen, and the dilated stomach can be seen within the thoracal cavity (white arrows). The cardiac silhouette is not markedly visible.

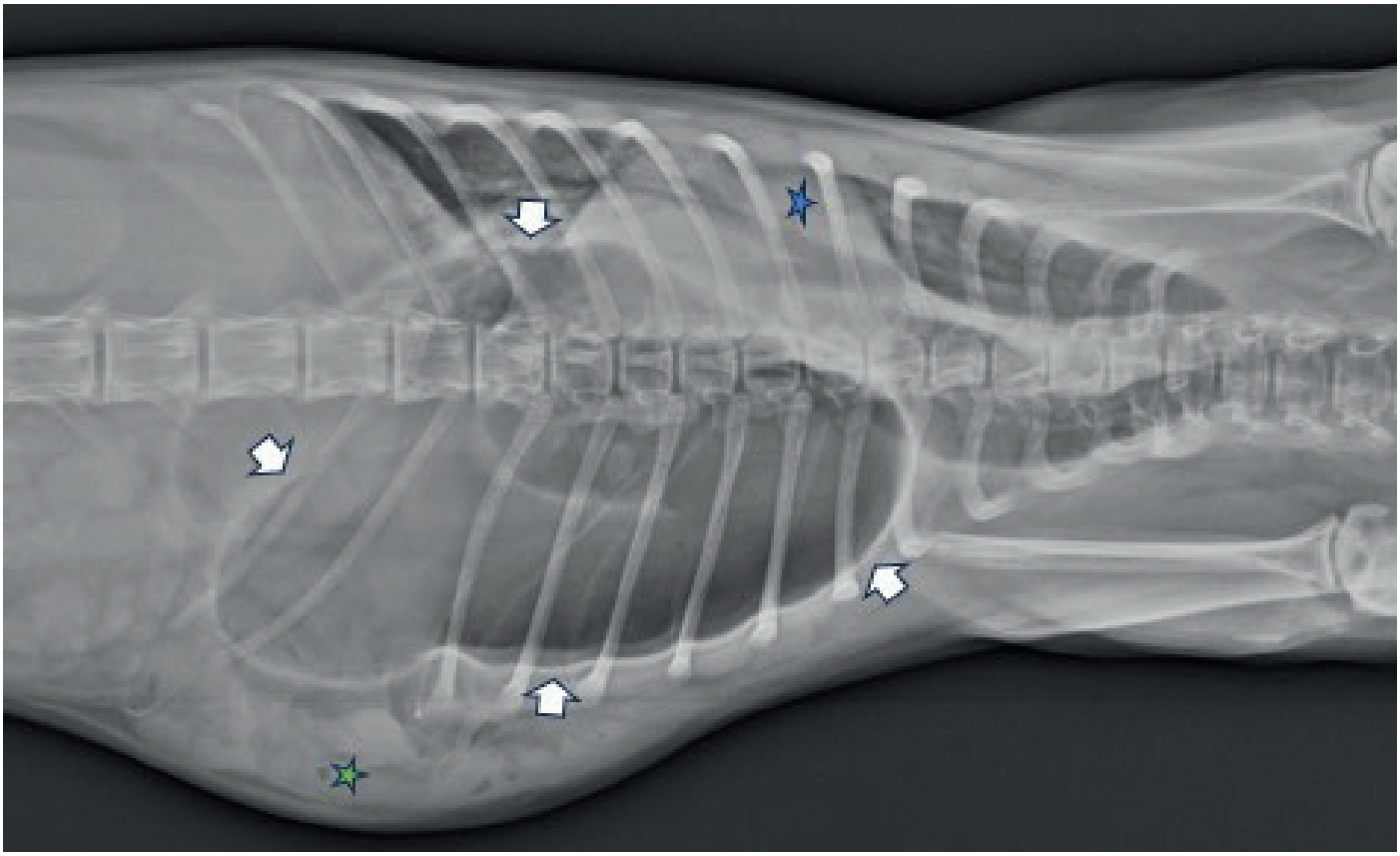


Fig. 2: The dorsoventral image of the thoracic region. The heart has shifted to the right hemithorax (blue star). The thoracal cavity shows an enlarged gas-filled stomach (white arrows). Part of the small intestine, omentum, and fundus were collected under the skin, passing through the damaged tissues in the 11th intercostal space (green star).

patient had breathing difficulty, and the conjunctiva was cyanotic. Dyspnea could be partly relieved when the head and thoracal area were raised. A swelling on the left side of the trunk between the 10th and 13th costae was noticeable, the volume expanding with the patient's breathing. The intestinal ring was palpable under the skin. Heartbeat was not audible from the left side of the chest auscultation, but arrhythmia and tachycardia were distinct on auscultation from the right side. Oxygen therapy was immediately initiated to support the patient's breathing, and oxygen (2 L/min) was administered in the intensive care unit. The cat was pre-stabilized by oxygen therapy and intravenous administration of Lactated Ringer's Solution (LRS) (5ml/kg/h) at a maintenance rate. Prednisolone at a dose of 4 mg/kg (Prednol-L 20 mg, Mustafa Nevzat, Türkiye) and furosemide 4 mg/kg (Desal®, Biofarma, Türkiye) were administered intravenously to relieve the patient's respiratory distress. When the patient's condition was stable, X-rays of the thorax were taken in lateral (LL) and dorsoventral (DV) positions. In the LL radiograph, the stomach was in the thorax, and the stomach volume was significantly enlarged. The heart silhouette was indistinct in the LL position (Fig. 1). In the DV radiograph, the heart had shifted to the right side, the integrity of the diaphragm was ruptured on the left side, and the stomach had passed into the chest cavity. The pylorus was displaced to the left, with the stomach displaced into the thorax. Based on the clinical examination findings and radiographs, it was diagnosed as gastric dilatation and volvulus with a diaphragmatic hernia (Fig. 2).

We could not conduct any blood tests at that time due to a refurbishment in the hospital's labs. The esophageal catheter did not go through the esophagus to the stomach, and the diagnosis of volvulus was confirmed. An urgent surgical intervention was required, so the patient was rapidly intubated and connected to a mechanic ventilator to relieve respiratory distress. The induction was achieved with propofol 5mg/kg (Propofol®, 10 mg/ml ampoule, Abbott, Türkiye). The patient was intubated and connected to an anesthetic device and mechanical ventilator. For the maintenance of anesthesia, 1% isoflurane was administered.

After accessing the abdominal cavity, the gas-distended stomach into the thorax was decompressed using an intravenous cannula (20 gauge). The ETCO2 value exceeded 100 mm Hg, and the SpO2 value was 60%. Meantime, the patient has shown tachycardia. The front part of the operating table was angled at 45 degrees high. The patient was laid dorsally, skin shaved, and antisepsis was provided. A laparotomy was performed with a preumbilical median incision. After laparotomy, the excess gas in the stomach was evacuated by using an angiocath to relieve diaphragmatic pressure. During abdominal exploration, the diaphragm was seen as torn on the left side, and the stomach was not in the abdomen. The spleen had a stiff consistency and was dark-colored. Part of the small intestine, omentum, and fundus were collected under the skin, passing through the torn muscles in the 11th intercostal space (Figures 2 and 3). The stomach was repositioned in the abdominal cavity, but the patient's breathing stopped suddenly during the operation.

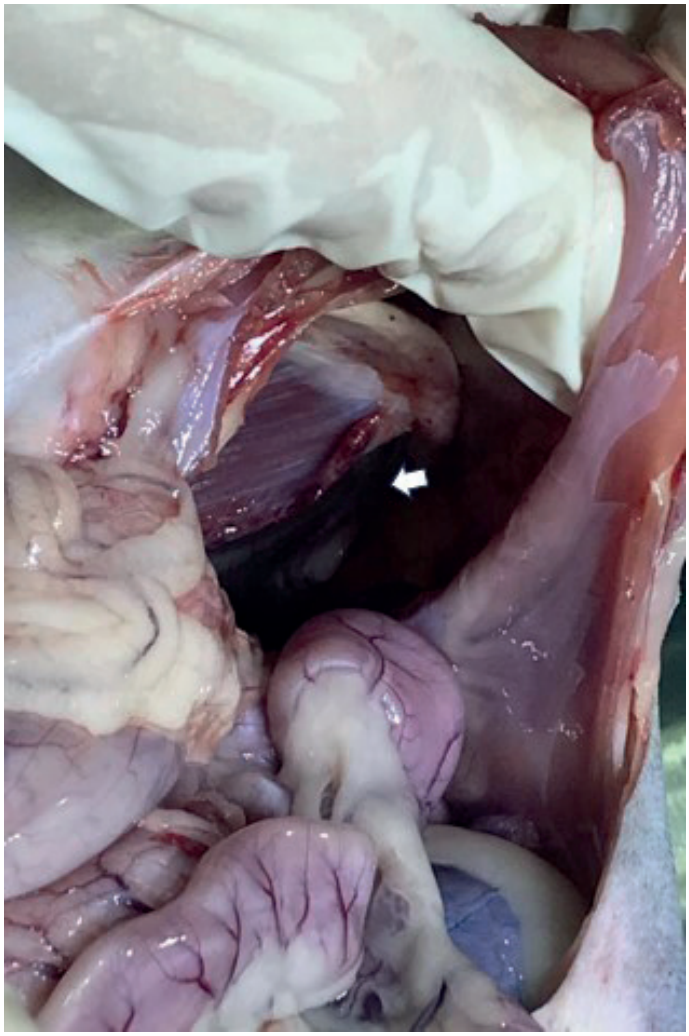


Fig. 3: Intraoperative view of the damaged tissue (white arrow) in the 11th intercostal space after the internal organs passing under the skin are taken into the abdomen.

Discussion

The most frequently herniated organs in diaphragmatic hernia cases have been reported as the liver (64-82%), stomach (47-56%), omentum, and pancreas (4-8%). Additionally, it is reported that the stomach, spleen, and small intestines generally pass into the chest cavity in left-sided hernias. In contrast, in right-sided hernias, the liver, small intestine, and pancreas pass primarily through the chest cavity10. In our case, a part of the small intestine,

omentum and fundus passed through the torn diaphragm, passed through the damaged tissues at the 11th intercostal space and found under the skin.

Before induction of anesthesia, it is essential to avoid all respiratory depressants such as xylazine, medetomidine, dexmedetomidine, and so on. If cardiac function is impaired, propofol can be used for induction; however, caution is required in respiratory distress due to its dose-dependent apnea risk, which increases with dose and injection speed. Nevertheless, its rapid onset and short duration enhance anesthesia control and airway management in critically ill patients15,16, so we preferred it for this case. For the maintenance of anesthesia, isoflurane or sevoflurane were adequate choices.

In terms of mortality rates for diaphragmatic hernia, they have been separated into three categories: pre-operative, peri-operative, and post-operative. Approximately 15% of animals die before the administration of anesthesia and surgical correction of traumatic diaphragmatic hernias(12,13).

Preoperative death reasons have been expressed as a result of hypoventilation, compression of the lungs by abdominal viscera, shock, multiorgan failure, and cardiac dysrhythmias. Surgical repair within the first 24 hours of trauma has the highest mortality rate (33%)(12). In another study, a perioperative survival rate of 89.7% was observed in dogs and cats that received surgical intervention within 24 hours of admission(15). Another study has shown that the post-operative survival rate of traumatic diaphragmatic hernia after discharge is 82% to 89%(12,13).

Early stabilization, oxygen support, and timely surgical intervention improve overall survival rates in cats with diaphragmatic rupture(17). Upon arrival our hospital, immediate surgical intervention was performed but the patient could not tolerate due to the delayed diagnosis and died during the operation. If diagnosed earlier, the success rate would have been higher. This shows us that early diagnosis is vital in GDV cases, especially in the thoracic cavity; every second matters.

Conclusion

In a patient with a sudden onset of massive respiratory distress, the differential diagnosis must include diaphragmatic herniation, gastric dilatation, and volvulus, especially if the patient had previous trauma. Detailed clinical and radiological examination is necessary for accurate diagnosis. Emergency gastric decompression via gastrocentesis should be attempted. After successful decompression, hernia repair can be carried out.

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