CASE REPORT

Surgical Management of Diaphragmatic Hernia in a Dog

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Diaphragmatic hernia is a serious condition with a high mortality rate, characterized by the passage of abdominal organs into the thoracic cavity due to tear in the diaphragm. This condition, often resulting from trauma, leads to significant clinical symptoms (Ozer *et al*., 2007; Radlinsky and Fossum, 2013; Park and Lee, 2018; Yaygıngul *et al*., 2019; Zamirbekova *et al*., 2020). The diaphragm, which has a musculotendinous structure, is more robust at its center compared to its peripheral areas. Consequently, most abnormal openings occur where the diaphragm attaches to the ribs (Zamirbekova *et al*., 2020). In cats and dogs, diaphragmatic hernias result from congenital (5-10%) and traumatic (85%) causes, while 10-15% of cases have unknown origins (Radlinsky and Fossum, 2013; Park and Lee, 2018; Zamirbekova *et al*., 2020). A definitive diagnosis of diaphragmatic hernia requires radiography. Key radiographic indicators include the absence of the diaphragm line, a silhouetted appearance of the heart, lung displacement, and the presence of abdominal organs and gas within the chest cavity (Burns *et al*., 2013; Nikiphorou *et al*., 2016; Ozer *et al*., 2007). Surgical intervention is the sole treatment for diaphragmatic hernias (Park and Lee, 2018; Yaygıngul *et al*., 2019). This study details the diagnosis and successful surgical management of a traumatic diaphragmatic hernia in a 3-year-old stray dog.

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Case History and Observations

A 3-year-old, non-descript male dog weighing 12 kg was presented to the surgical department of the Bai Sakarbai Dinshaw Petit Hospital for Animals, Parel, Mumbai, following a traumatic vehicle accident. The dog exhibited symptoms of decreased appetite, mild dyspnea, abdominal respiration, and lethargy. Auscultation revealed unclear lung and heart sounds, with bowel sounds audible in the thoracic region. Radiographic examination (Fig. 1) confirmed the presence of a diaphragmatic hernia, indicated by the absence of the diaphragmatic line and the presence of stomach and intestinal loops in the chest.

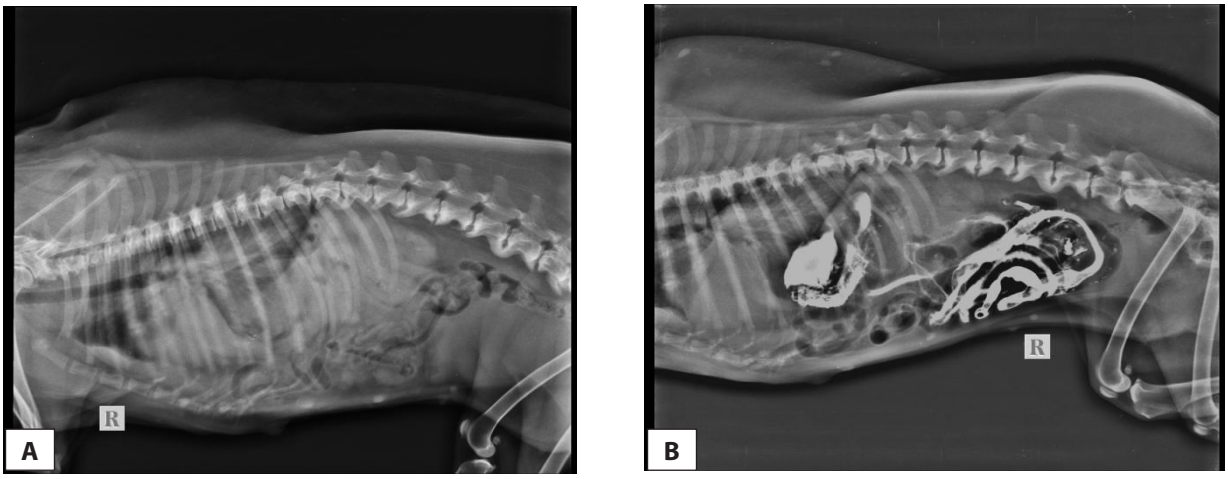

Fig. 1: (A) Plain radiograph (B) Barium radiograph preoperatively

Treatment and Disscussion

As per standard procedure, the dog was aseptically prepared for surgery. Premedication included butorphanol (0.2 mg/kg b.wt.) and midazolam (0.2 mg/kg b.wt.) administered intravenously. General anaesthesia was induced using intravenous propofol at dose of 4 mg/kg b.wt. and was maintained with isoflurane in oxygen through intermittent volume control ventilation. Additionally, cefotaxime (20 mg/kg) and meloxicam (0.2 mg/kg) were administered preoperatively. The dog was positioned in dorsal recumbency and a midline incision was made from the xiphoid to the umbilicus. The falciform ligament was excised to improve exposure of the hernia. In this case, the left-sided hernia caused the stomach, spleen, and part of the intestine to displace into the thoracic cavity (Fig. 2A, 2B). The herniated stomach, spleen, and intestines were carefully retrieved from the thoracic cavity. The diaphragmatic defect was repaired using polyglactin-910 No. 0 in a simple continuous suture pattern (Fig. 2C). Negative pressure in the thoracic cavity was reestablished using manual suction with a cannula (Fig. 2D), and simultaneous lung expansion via manual ventilation during the final herniorrhaphy suture. The abdominal wound was closed routinely. A postoperative radiograph taken after 8 h of surgery confirmed the correction (Fig. 2E). The owner was advised to keep the dog on cage rest and provide semisolid food for the first five days. Skin sutures were removed on the 10th postoperative day, and an uneventful recovery was reported (Fig. 2F).

In cases of diaphragmatic hernia, digestive symptoms such as diarrhea, constipation, vomiting, and loss of appetite can occur depending on the affected organs (Burns *et al*., 2013; Nikiphorou *et al*., 2016). However, in this case, the dog did not exhibit any digestive system symptoms other than decreased appetite. Common clinical findings in diaphragmatic hernia include dyspnea and exercise intolerance due to respiratory impairment (Burns *et al*., 2013; Nikiphorou *et al*., 2016; Park and Lee, 2018; Zamirbekova *et al*., 2020). Radiographic evaluation is crucial for the definitive diagnosis of diaphragmatic hernias, with prominent findings including the absence of the diaphragm line, a silhouetted heart appearance, lung displacement, and the presence of abdominal organs and gas within the chest cavity (Burns *et al*., 2013; Nikiphorou *et al*., 2016; Ozer *et al*., 2007). Left-sided diaphragmatic hernias typically involve the stomach, spleen, and small intestines, while right-sided hernias usually affect the liver, small intestines, and pancreas (Hyun, 2004; Zamirbekova *et al*., 2020). Surgery is the only treatment for diaphragmatic hernias. During surgery, the herniated organs are first carefully repositioned into the abdominal cavity. The diaphragm is then repaired using simple continuous sutures with both absorbable and non-absorbable materials. To

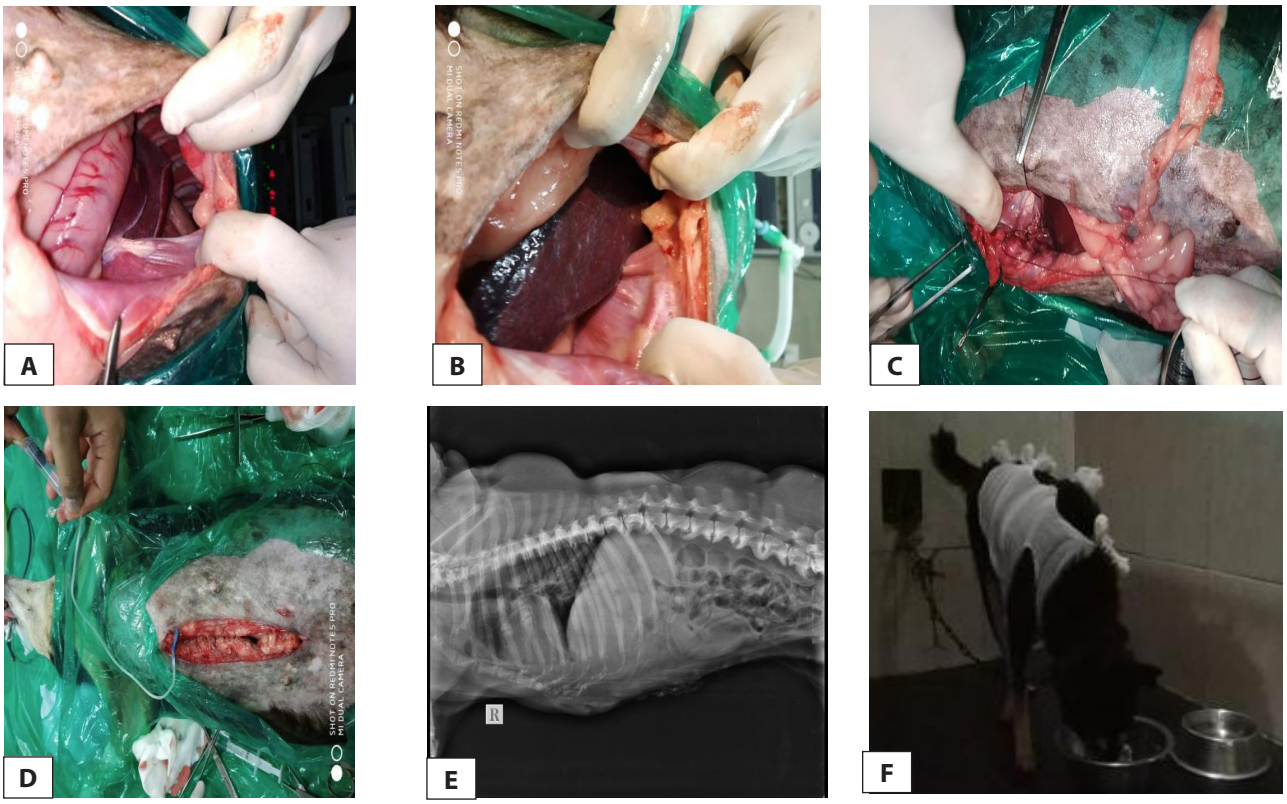

Fig. 2: Surgical procedure showing step by step images: (A) Herniated organ - stomach, (B) Herniated organ - spleen and intestine, (C) Herniorraphy, (D) Negative pressure ventilation manually, (E) Radiograph after 8 h of surgery, (F) Recovered dog.

restore negative pressure in the thorax, the lungs are fully inflated before placing the final suture (Ozer *et al*., 2007). This case report determined that the prognosis for the dog operated on for diaphragmatic hernia was good.

In conclusion, traumatic diaphragmatic hernia is a critical requiring life-saving procedure in a dog, and can be successfully corrected surgically, if presented early.

Acknowledgment

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