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Successful diaphragmatic herniorrhaphy in a non-descript puppy

A.R. Ninu[1†], N. Krishnaveni[2], M. Madeena Begum[3], Anisha J. Perumbilly[4], M. Balagangatharathilagar[5] and V. Prabaharan[6]

Tamil Nadu Veterinary and Animal Sciences University, Madhavaram Milk Colony, Chennai-600 051(Tamil Nadu)

[1]Assistant Professor and Head, [2]Assistant Professor, Department of Veterinary Surgery and Radiology, [3]Assistant Professor, Veterinary Clinical Complex, [4]Assistant Professor, Department of Veterinary Physiology and Biochemistry, Veterinary College and Research Institute, Tirunelveli - 627 358 (TN); [5]Professor, Department of Clinics, Madras Veterinary College, Chennai; [6]Professor, Department of Veterinary Gynaecology and Obstetrics, Veterinary College and Research Institute, Namakkal

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Traumatic diaphragmatic hernia (DH) involves rupture of the diaphragm and subsequent migration of abdominal organs into the thoracic cavity. In dogs, DH is a common condition following blunt trauma, most often resulting from road traffic accidents (Kagan, 1980). The most frequently reported clinical sign is dyspnea, with affected dogs often maintaining a "sitting on haunches" posture. The timing and duration of surgery, along with the presence of concurrent soft tissue or orthopedic injuries, play important roles in determining survival (Legallet *et al.*, 2017). In addition to concurrent injuries, intraoperative and postoperative complications may also contribute to increased mortality in dogs with traumatic DH (Pereira *et al.*, 2023). The present case report describes a successful surgical repair of DH in a pup presented one week after a road traffic accident.

A 50-day-old nondescript male puppy was presented with a history of an automobile accident one week earlier. Clinical signs included lethargy, loss of body condition, anorexia, respiratory distress, and muffled heart sounds. Right lateral and ventrodorsal plain radiographs of the thorax revealed loss of the diaphragmatic silhouette and increased radiopacity within the thoracic cavity due to the presence of soft tissue opacity from the stomach and intestinal loops. The lung lobes appeared displaced (Figs. 1 and 2). Haematological parameters were within normal limits except for low haemoglobin (10 mg/dL) and elevated alkaline phosphatase levels, which remained high even on the 24th postoperative day.

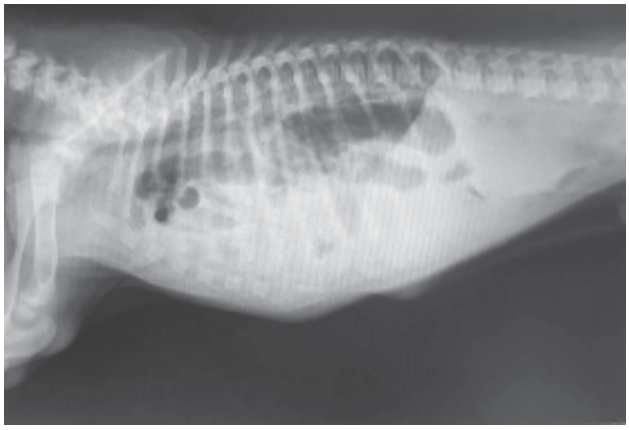

Fig. 1: Thoracic radiograph of the puppy (right lateral view) shows loss of the diaphragmatic silhouette and increased radiopacity within the thoracic cavity.

Fig. 2: The exteriorisation of the herniated organs with the hernia (blue arrow).

Surgical repair of the DH was planned. Pre-oxygenation was administered by allowing tidal volume breathing for 3 min. Positive pressure ventilation was maintained throughout the procedure. Following induction with propofol and maintenance with isoflurane (1–2.5%), a ventral midline incision was made from the xiphoid process to a few inches caudal to the umbilicus. The stomach, pancreas, spleen, left lateral lobe of the liver, small intestine, and a portion of the transverse colon were found herniated into the thoracic cavity (Fig. 3). The stomach was

†Corresponding author; E-mail: ar.ninu@gmail.com

markedly distended, and needle aspiration was performed to relieve the distension. No adhesions were observed; however, mild enlargement of the entrapped left lateral liver lobe was noted. The abdominal viscera were reduced to their normal anatomical positions, and the remaining abdominal organs were explored to rule out any additional trauma. The left-sided circumferential diaphragmatic tear extending from the ribs to the sternum was repaired using 2-0 polyglycolic acid in an interrupted pattern. The Linea alba was closed with 2-0 polyamide, and the skin was sutured using silk in a horizontal Mattress pattern. Thoracocentesis was performed trans-diaphragmatically after completion of the herniorrhaphy to re-establish negative pressure within the thoracic cavity.

A postoperative radiograph taken on the 8th day confirmed reappearance of the diaphragmatic silhouette and restoration of normal thoracic radiolucency (Fig. 3). The postoperative treatment included antibiotics (ceftriaxone 20 mg/kg body weight, i.m., and metronidazole 15 mg/kg body weight, i.v.), fluids (Ringer's lactate 10 mL/kg body weight, i.v.), a proton pump inhibitor (pantoprazole 1 mg/kg body weight, i.v.), an analgesic (flunixin 2 mg/kg body weight, i.m.), and vitamin B complex injections. Gastric distension, nausea, and vomiting persisted for three days postoperatively but subsided following administration of oral antacids. Dietary management involving small, frequent meals was advised. Feeding habits gradually normalized within six days postoperatively, and the pup recovered well. A mild wound-healing complication was observed, which resolved within a week.

Fig. 3: Eighth postoperative day radiograph of the thorax (right lateral view) shows reappearance of the diaphragmatic silhouette and restoration of normal thoracic radiolucency.

The vomiting and gastric distension were attributed to reflux esophagitis resulting from the displacement of the stomach into the abdominal cavity. In most cases, right-sided diaphragmatic hernias involve the liver and pancreas (Hyun, 2004; Zamirbekova *et al*., 2020; Gunay *et al*., 2022). However, in the present case, although the left hemidiaphragm was affected, the stomach, pancreas, spleen, left lateral lobe of the liver, small intestine, and a portion of the large intestine had herniated through a large circumferential tear, leading to entrapment and mild enlargement of the liver lobe, while the other organs remained unaffected. The elevated alkaline phosphatase levels may have resulted from hepatic damage sustained by the entrapped liver lobe. The survival rate in dogs with traumatic DH is reported to be higher when surgical intervention is performed within 48 hr of diagnosis (Pereira *et al*., 2023). In this case, prompt diagnosis and timely surgical repair resulted in a successful recovery. Follow-up examination after 24 days revealed that the pup was active, alert, and healthy.

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