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SHORT COMMUNICATION

Successful surgical management of diaphragmatic hernia in companion animals: a study of nine cases

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Diaphragmatic hernia (DH) is a common surgical emergency in small animals, most frequently resulting from blunt trauma. This study evaluated the clinical presentation, diagnosis, perioperative management, and surgical outcome of DH in nine clinical cases (six cats and three dogs). Automobile accidents accounted for eight cases, while one kitten had congenital peritoneopericardial DH. Diagnosis was confirmed using plain and contrast radiography. Anaesthesia was induced with propofol, maintained with isoflurane, and supported with mechanical ventilation using pressure- or volume-controlled modes. Herniated abdominal organs were reduced through a ventral midline celiotomy, and diaphragmatic defects were repaired using simple interrupted polydioxanone sutures. The liver and gall bladder were the most frequently herniated organs (80%), with right-sided rupture observed in 55.6% of cases. Mild hepatic laceration occurred in one case during adhesion release. The overall survival rate was 78%. Early diagnosis, prompt surgical intervention, and appropriate perioperative anaesthetic and postoperative management contributed to favourable clinical outcomes in cats and dogs with diaphragmatic hernia.

Keywords: Cat, Diaphragmatic hernia, Dog, Herniorrhaphy

Diaphragmatic hernia (DH) is a common surgical emergency in small animals, usually caused by blunt trauma such as automobile accidents. It is defined as displacement of abdominal viscera into the thoracic cavity through a diaphragmatic defect (Mehrjerdi *et al*., 2022). Herniation of abdominal organs results in pulmonary compression, atelectasis, impaired ventilation, and pleural fluid accumulation (Gaikwad *et al*., 2024). The present study evaluated the clinical presentation, diagnosis, perioperative management, and surgical outcome of DH in dogs and cats.

Nine clinical cases, including six cats and three dogs, were studied. Seven animals were males and two were females, with an average age of about 2 years. Automobile accidents were the cause in eight cases, while one case was suspected congenital. Most animals presented acutely with paroxysmal breathing. Diagnosis was confirmed using plain and contrast radiography (Figs. 1 and 2) with oral barium sulphate (5 mL/kg), and sequential radiographs were obtained at 0, 5, 15, 30, and 60 minutes. Radiographic exposure factors were 40 mA, 60 kVp, and 24 mAs for dogs, and 50 kVp and 2 mAs for cats.

All animals were pre-oxygenated and sedated with butorphanol (0.2 mg/kg body weight, i.v.) and midazolam (0.2 mg/kg, i.v.). Anaesthesia was induced using propofol (4 mg/kg, i.v.) and maintained with isoflurane (2-3%). Mechanical ventilation was provided using pressure- or volume-controlled modes. Pressure-controlled ventilation was preferred in kittens because of reduced lung compliance and lower tidal volume requirements. Tidal volume was maintained at 6-8 mL/kg, PIP at 15-25 mmHg, and PEEP at 4-5 cm H_2O. An inspiratory-to-expiratory ratio of 1:2 was maintained, while peak airway pressure remained below 25 cm H_2O. SpO_2 was maintained between 95–99%, and respiratory rate was adjusted to 25–32 breaths/minute according to ETCO2 levels (Blumenthal *et al*., 1998; Gaikwad *et al*., 2024a, 2024b).

After aseptic preparation, a ventral midline

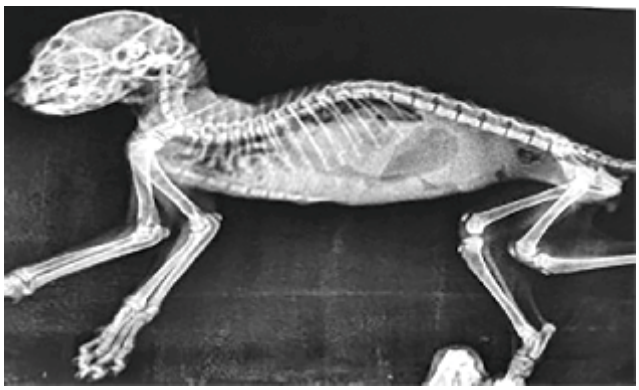

Fig. 1: Plain radiograph shows herniation of intestinal loops into thoracic cavity in a cat.

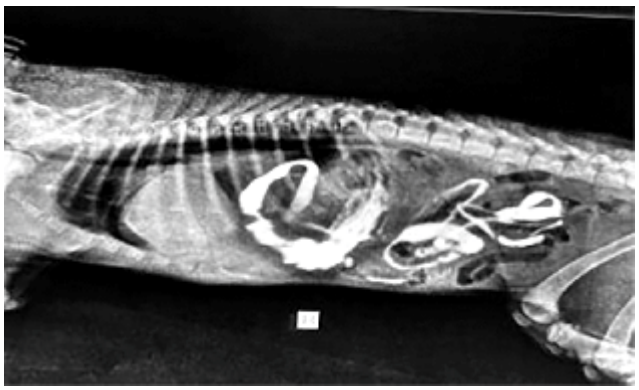

Fig. 2: Contrast radiograph shows herniation of intestinal loops into thoracic cavity.

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Fig. 3: Diaphragmatic hernial ring at right dorsal aspect.

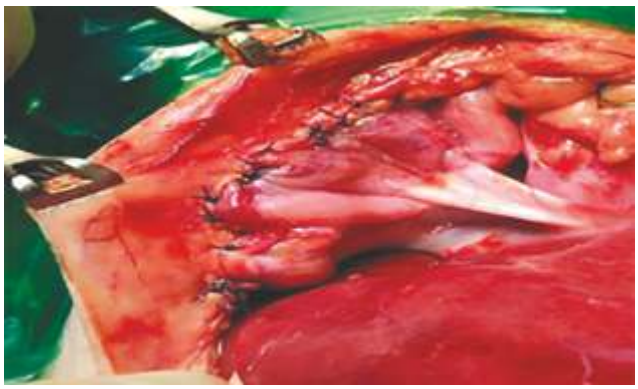

Fig. 4: Closure of ring with simple interrupted suture pattern using 3-0 Polydiaxone.

incision from the xiphoid to pubis was made under IPPV. Herniated organs were reduced and the diaphragmatic defect was repaired using 3-0 polydioxanone (PDS) in a simple interrupted pattern (Figs. 3 and 4). In the kitten with congenital peritoneopericardial diaphragmatic hernia (PPDH), herniated liver lobes were reduced from the pericardial sac, followed by diaphragmatic reconstruction using PDS sutures. Negative intrathoracic pressure was restored. The abdomen was lavaged and routinely closed. The hernial ring was mainly located on the right side near the diaphragmatic attachment to the lateral thoracic wall.

Postoperatively, the animals were monitored for 24 hr with oxygen supplementation. Treatment included amoxicillin–clavulanic acid (20 mg/kg, i.v.) and buprenorphine (0.02 mg/kg, s.c.). Radiographs confirmed diaphragmatic integrity, correct abdominal organ positioning, and absence of pneumothorax.

The higher incidence of DH in cats may be associated with their larger urban population, outdoor roaming behaviour, vehicular trauma, and "high-rise syndrome" (Mehrjerdi *et al*., 2022). The liver and gall bladder were most commonly herniated (80%). Right-sided rupture (55.6%) may be associated with traumatic forces and liver position (De Bastiani *et al*., 2023). Mild hepatic laceration occurred in one case during adhesion release. The survival rate was 78% and was influenced by chronicity, respiratory compromise, and timing of surgery. Overall, early diagnosis, timely surgery, and appropriate perioperative management were essential for successful outcomes.

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