

Surgical management of feline traumatic diaphragmatic hernia – a case report

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Abstract

A 2 year old queen cat was presented with clinical signs of shock, dyspnea, tachycardia and vomiting, after being fallen from height. Right lateral plain radiography identified a diaphragmatic hernia with its characteristic radiographic signs. Obligation of proper pre-anaesthetic stabilization, surgical techniques and maintenance of adequate postoperative measures was rewarded with uncomplicated, successful recovery.

Keywords: diaphragmatic hernia; Feline; cat.

Introduction

The diaphragm is a musculotendinous partition that separates abdominal and thoracic organs, assists in ventilation, and has a role in movement of lymphatic fluid. Traumatic diaphragmatic hernia most often develops as a result of blunt abdominal trauma resulting in sudden increase in abdominal pressure and subsequent disruption of the diaphragm (Vesal and Parizi, 2012; Fossum, 2013). The present communication deals with the incidental diagnosis and successful surgical management of traumatic diaphragmatic hernia in a queen cat.

Case history and clinical examination

An approximately 2 year old non-descript queen cat, weighing 3.5 kg was presented to the department of Veterinary Surgery & Radiology, College of Veterinary Science & Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha with clinical signs of shock, depression, dehydration, pale mucous membrane, dyspnea, abdominal breathing, tachycardia, exercise intolerance, anorexia and vomiting. Anamnesis affirmed falling of animal from a height, 2 days before presentation to the department. During the period, animal had undergone fluid and symptomatic therapy. Physical examination and palpation ruled out presence of any associated injury or, fracture but divulged presence of gastric tympany. C-arm IITV radiograph system helped in incidental yet definitive diagnosis of traumatic diaphragmatic hernia by delineating characteristic radiographic signs like loss of diaphragmatic lines, loss of cardiac silhouette, dorsal displacement of lung fields, presence of gas filled pyloric stomach and intestines in the thoracic cavity, pleural effusion and failure to observe complete stomach in the abdomen (Fig. 1). Hence it was recommended to perform exploratory celiotomy with diaphragm herniorrhaphy on an emergency basis.

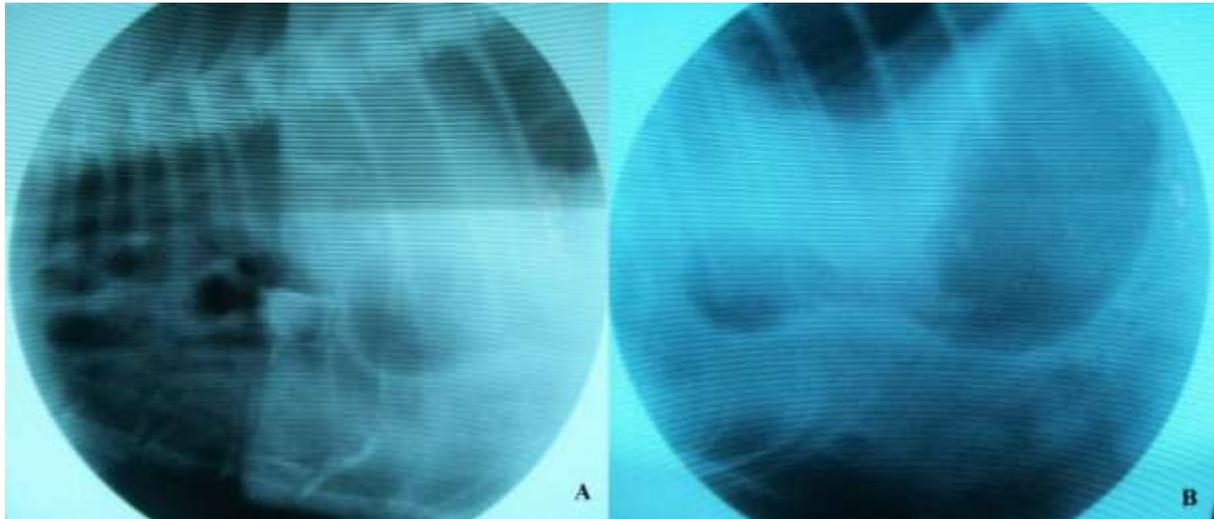


Fig.1. Right lateral C-arm IITV thoracic radiograph of a queen cat with a traumatic diaphragmatic hernia depicting loss of diaphragmatic lines, loss of the cardiac silhouette, dorsal displacement of lung fields, presence of gas filled pyloric stomach and small intestines in the thoracic cavity.

Treatment

The animal was pre-anaesthetised with a cocktail of 0.7 mg Midazolam (Mezolam®; Neon laboratory Pvt. Ltd.) and 20 mg Ketamine hydrochloride (Aneket®; Neon Laboratories Pvt. Ltd.) administered intravascularly to achieve sedation. After achievement of adequate sedation and smooth muscle relaxation, animal was intubated and positioned in dorsal recumbency with elevated thoracic region. Anaesthesia was maintained with 1.5 to 2% Isoflurane inhalation anaesthesia and maintained under Intermittent Positive-Pressure Ventilation (IPPV). The saphenous vein was catheterized and saline-dextrose solution was administered at 10 mL/kg/hr perioperatively. After aseptic preparation of entire abdomen and caudal one half of the thoracic cavity, a cranioventral midline celiotomy incision was given from the level of the xiphoid process to the umbilicus and the diaphragm was visually inspected. An approximately 2” circumferential rent was identified in the ventral left portion of the diaphragm with herniated pyloric stomach, loops of small intestine, parts of liver lobes, spleen and omentum within the thoracic cavity (Fig. 2). Herniated abdominal organs were tenderly retracted back into the abdominal cavity and the circumferential diaphragmatic rent was closed with using #1 polyglactin 910 (Vicryl®; Ethicon, Johnson & Johnson India Pvt. Ltd.) in simple continuous pattern, intermittently

incorporating the rib (Fig. 3). Transdiaphragmatic thoracocentesis was performed to ascertain negative pressure within the thoracic cavity. Celiotomy incision was closed routinely.

Post-operative care consists of parenteral administration of ceftriaxone + tazobactam at 10 mg/kg BW (Montaz®, Aristo pharmaceuticals Pvt. Ltd.) and Meloxicam at 0.1 mg/kg BW (Melonex®; Intas pharmaceuticals Pvt. Ltd.) cover for 5 days. The patient recovered well without any lasting effects, complications and recurrence from its trauma.



Fig.2. Midventral celiotomy incision revealing 2” circumferential rent in the ventral left portion of the diaphragm

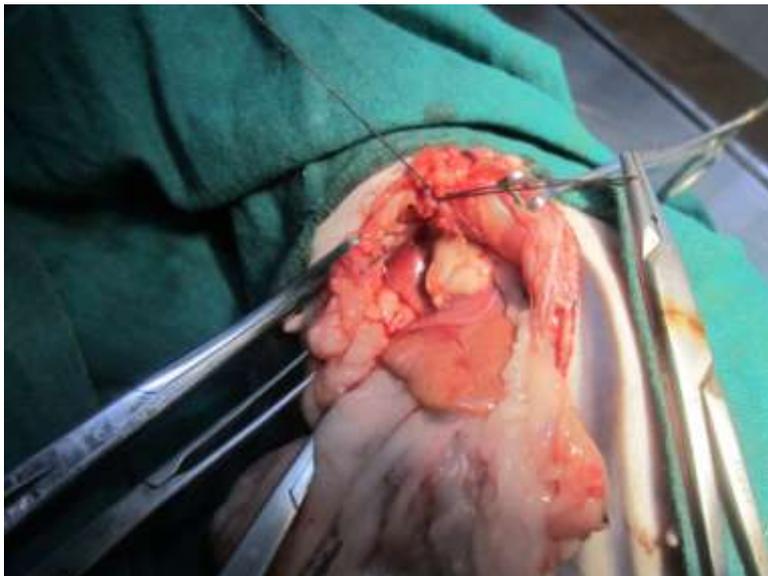


Fig.3. Diaphragmatic herniorrhaphy using #1 polyglactin 910 in simple continuous pattern

Discussion

A rapid rise in intra-abdominal pressure following a forceful blow and failure of the glottis to remain closed, allowing the stabilizing effect of the air filled lungs to be lost acutely, is the classical explanation for traumatic diaphragmatic rupture. The presence and severity of clinical signs may vary with the length of time the hernia has existed, specific organs that have herniated and the degree to which their blood supply has been compromised, the degree of pulmonary or cardiovascular compromise, and concurrent trauma. Many clinical signs characteristic to diaphragmatic hernia, like muffled heart or lung sounds, borborygmi in the thorax and a tucked-up abdomen, have proven unreliable for diagnosis. Conversely radiography is the initial imaging technique of choice in diagnosing traumatic diaphragmatic herniation. In this case, the diagnosis of diaphragmatic hernia was relatively undemanding with the aid of plain radiographs (Litman, 2001; Worth and Roslyn, 2005; Hoddinott, 2013).

Injectable anaesthetics, excluding respiratory depressant like α_2 -adrenergic agonists, opioids and barbiturates are always preferred in respiratory compromised patients because these permit rapid intubation and oxygenation. Midazolam, co-administered with ketamine, is preferable in respiratory compromised mammals to enhance muscle relaxation and facilitate intubation with minimal effects on cardiopulmonary function. Inhalation anaesthetics, except Nitrous oxide, should be used for maintenance of anaesthesia. With IPPV, airway pressure is maintained above ambient pressure during inspiration and airway pressure falls to ambient pressure to allow passive expiration (Grubb, 2010; Vesal and Parizi; 2012; Fossum, 2013).

Surgical intervention is the only resort in all cases of traumatic diaphragmatic hernia (Vesal and Parizi; 2012; Slensky, 2009). Our present finding of left-sided circumferential diaphragmatic tear in a cat and subsequent herniation of abdominal organs like liver, stomach, small intestine, spleen and omentum is in accordance to previous literatures (Litman, 2001; Worth and Roslyn, 2005; Hoddinott, 2013). Needle thoracocentesis was performed to restore intrathoracic negative pressure (Vesal and Parizi; 2012, Seim III, 2014).

The overall survival rate for animals diagnosed as having diaphragmatic hernias in the published literature is 52 to 94%. In this case, the time elapsed between injury and surgical intervention was probably the major factor in the success of surgical repair. When surgery was performed within the first 24 h, deaths were most often attributed to multisystem organ failure due to cardiovascular insufficiency or other traumatic injuries. Hence the prudent course of action is to stabilize the animal for the first 24 h and then correct the problem surgically as soon as it is feasible to do so. Also the feline patient was already been attended by a referring veterinarian prior to presentation to the referral institution, allowing stabilization measures to be performed before initiation of surgical intervention (Gibson et al, 2005; Worth and Roslyn, 2005; Hunt, 2012; Hoddinott , 2013).

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