



Traumatic Diaphragmatic Hernia in a 2-year old Nigerian Female Mongrel Dog

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INTRODUCTION

The diaphragm is a sheet of muscle that separates the abdominal and thoracic cavity and plays a great role in ventilation (Hermanson and Evans, 1993). Hernia is known to be a pathologic disorder in which a part or parts of the body protrudes abnormally through a tear or opening into an adjacent part. The location and size of the tear depends on the position of the animal at the time of impact and location of the viscera (Fossum, 2005).

Diaphragmatic hernias are mainly traumatic or congenital. Traumatic diaphragmatic hernia results from trauma, the congenital pleuroperitoneal hernia which is rare, and usually take the form of a defect in the dorsolateral diaphragm, with or without central tendon involvement. (Cooper *et al.*, 1988). We also have the congenital peritoneopericardial hernia which contains the omentum, liver lobes, gallbladder, and small intestine, as a result of a simple communication between the peritoneal and pericardial cavities. Stomach, colon, falciform ligament, and spleen have also been reported (Sisson *et al.*, 1993).

Diaphragmatic Hernia occurs when there is an orifice in the diaphragm. (Tovar, 2012). Based on literature, timing of surgical intervention of diaphragmatic hernias in dogs and cats has been identified as a major risk factor for death when treated via herniorrhaphy (Boudrieau and Muli, 1987; Sullivan and Reid, 1990). They also added that dyspnea and tachypnea are the most common clinical signs in diaphragmatic hernias. In addition to diaphragmatic dysfunction, rupture of the diaphragm causes loss of parietal pleural contact with the lungs, and impairs on the animal's ability to generate negative intrathoracic pressure. Roudebush and Burns (1979) reported that hypoxia, ventilation/ perfusion mismatch, and hypoventilation can occur as a result of pulmonary atelectasis.

The most common clinical signs in diaphragmatic hernia are the dyspnea of tachypnea which may result from plural effusion following obstruction to lymphatic drainage, inflammation of herniated or displaced organ and leakage of bile, urine and feces (Stork *et al.*, 2003). Traumatic diaphragmatic in small animals has been statistically reported to constitute 85% while

10 % are congenital and the rest are of unknown etiology (Wilson *et al.*, 1971; Wilson and Heyes, 1986; Boudrieau, 1993).

CASE REPORT

A 2-year-old female Nigerian local dog (Mongrel) was presented at the Veterinary Teaching Hospital, Usmanu Danfodiyo University, Sokoto, with complaints of rapid abdominal movement, inappetance and emaciation. This was noticed three days prior to presentation, following an automobile accident. The bitch whelped 5 puppies two weeks earlier and was kept for security purpose.

Case Management

On physical examination, we observed irregular heartbeat, labored breathing and rapid movement of the abdomen which made us to suspect diaphragmatic hernia. Contrast radiography was to be used to arrive at a confirmatory diagnosis.

Contrast radiograph was performed before surgery using barium sulphate (P J Chemicals Industry, India) as a contrast media (Figure 1) which showed the intestinal segment containing barium entering the thorax from the right side of the diaphragm due to the hernia. From the radiograph, we observed loss of diaphragmatic silhouette at the right aspect of the diaphragm suggesting diaphragmatic hernia.

Surgery was opted for to resolve the hernia. All preoperative physical examination parameters were determined and observed to be within normal range. The dog was premedicated with a combination of Acepromazine (Kryon prescription company 0.1mg/kg intramuscular (I.M), Ketamine hydrochloride (Pauco pharmaceutical industry, Nigeria) 11mg/kg I.M, Lactated ringers infusion at a dose rate of 20ml/kg/hr was administered intravenous. On opening the peritoneal cavity, respiration was altered

because of the absence of diaphragm in which ambubag was used to deliver oxygen to the animal. The patient was monitored with anaesthetic monitoring (Gradyet 9200, China) machine containing both a pulse oximeter and an apnea alert device and the oxygenation status was evaluated by pulse oximetry to be 84%. A ventral midline incision of about 8-12 cm length was made from the level of the xiphoid process to the umbilicus which permitted access to the abdominal cavity and diaphragm. Several loops of the intestine, the omentum, and the entire spleen and liver were found in the thoracic cavity and were removed from the thorax into the abdominal cavity (Figure 2). Hydrothorax was also found which was drained out before suturing the diaphragmatic wall.

The diaphragm was repaired with simple interrupted sutures using nylon size (Huaian angel medical instruments co. Ltd, China) 1.0, the muscle and subcutaneous layer was sutured using simple continuous sutures with chromic catcut® (Huaian angel medical instruments co. Ltd, China) size 1.0 while the skin was sutured with nylon® size 1.0. The excess air in the thorax was evacuated using an improvised catheter and a syringe. Artificial ventilation using the ambubag continued until the animal breathing was improved. The dog was treated with 2.5% diclofenac sodium inj. (Pauco Pharmaceutical Industry ,Nigeria) 2.5 mg/Kg $\times^{5/7}$ I.M, procaine penicillin (Alembic Chemical Works Co Ltd, India) 20,000 I.U/Kg $\times^{5/7}$ I.M, streptomycin (Alembic Chemical Works Co Ltd, India) 12.5 mg/Kg $\times^{5/7}$ I.M, Caniverm® (MEGAVET, Russian.) (Fenbendazole 150mg, Pyrentel pamoate 144mg), praziquantel 50mg) P.O. stat postsurgery, oxytet® (Nigeria. Allen & Hanburys Ltd. Nigeria) spray, Vitamin B₁₂ (Elbe pharmaceuticals company, Nigeria) (cyanocobalamin 500 mcg) $\times^{5/7}$ IM.

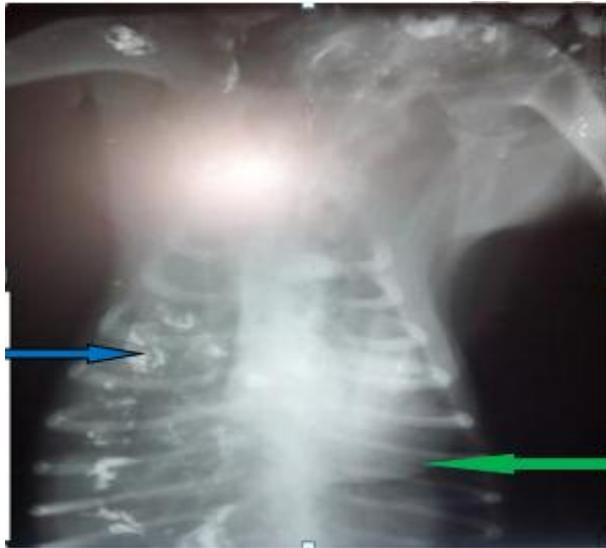


Figure 1: Dorsoventral thoraco abdominal pre-surgical radiograph. Contrast medium in the intestine within the thorax. Absence of diaphragm in the right side (Blue arrow); Diaphragm present in the left side (Green arrow)



Figure 2: Removal of herniated content from the thorax. Diaphragmatic tear (Arrow)



Figure 3: Ventro-dorsal postsurgical radiograph Arrow (Sutured diaphragm-right side)



Figure 4: Post mortem result showing collapsed lungs

After the surgery, ventrodorsal radiograph was taken which indicated the diaphragm was well sutured (Figure 3). This is evident by the movement of the animal. Unfortunately the animal died five days post-surgery.

Post Mortem Findings

The liver was slightly enlarged, adhered to the diaphragm, and fibrin deposits were seen at the adhesion site (Figure 4 and 5). The spleen was slightly contracted. Segment of



Figure 5: Post mortem result showing enlarged adhered liver with fibrin deposit at site of adhesion the ileum (5") invaginated into adjacent segment prior to ileocecolic junction. (Intussusceptions) (Figure 6 and 7).

DISCUSSION

Early report (Stickle, 1984; Williams *et al.*, 1998), indicated that interruption of diaphragmatic shadow is the major radiographic finding associated with diaphragmatic hernia. After laparotomy, hydrothorax and hydroperitoneum were found due to pleural effusion which occasionally results from damage to viscera, this is consistent with the findings of Stork *et al.* (2003) and Bellenger *et al.* (1975), who also documented that effusions are commonly reported in association with diaphragmatic hernias, and occurs as a result of obstruction to lymphatic drainage, inflammation of herniated or displaced organs, and leakage of bile, urine, or faeces. They also added that in most cases the effusion is usually present in both peritoneal and pleural cavity, only in few instances where abdominal organs seal the diaphragmatic defect and the effusion may be restricted to the pleural cavity. When the animal was opened during

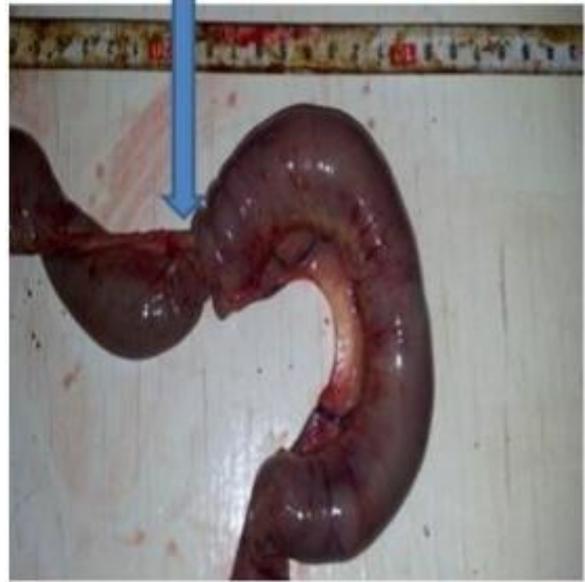


Figure 6: Post mortem result showing intussusceptions



Figure 7: Post mortem result showing mild hepatomegaly

surgery, the gastrointestinal tract, liver and other abdominal content were found in the thoracic cavity. The passage of these contents through the diaphragmatic ring along with the intestines must have led to the strangulation and obstruction of the intestine, leading to intussusception that was discovered at post mortem. This is in line with the findings of Roe *et al.* (1986), who observed that the main effect of

diaphragmatic hernia on the abdominal contents are incarceration, obstruction, and strangulation leading to incomplete or complete obstruction.

In this case, the surgery was performed five days after the occurrence of diaphragmatic hernia, and it has been documented that early surgical intervention in diaphragmatic hernia results in good postoperative survival rates (Stampley and Waldren, 1979). The dog died on the fifth day post-surgery, suggesting that death may not have been due to surgical procedure but some other underlying traumatic events like obstruction and strangulation of the intestines. This is in line with the report of Wallace *et al.* (1992) who observed that deaths occurring days after surgical procedures, tend to occur due to rupture, obstruction, or strangulation of the gastrointestinal tract, secondary changes in the herniated organs, or diseases that are not related to the hernia.

The adherence of the liver to the diaphragm which was observed at post mortem could have been due to the presence of fibrous tissue due to the pressure applied by the edge of the diaphragmatic tear leading to adhesion. This is consistent with the studies of Noden and deLahunta (1985) who reported that fibrous formation can lead to adhesions and strictures of the affected organs.

CONCLUSION

It was concluded that as at the time of correction of the diaphragmatic hernia, strangulation and obstruction of the intestines had already occurred which may have caused the death of the animal. Therefore, early correction of diaphragmatic hernia within 24 hours is recommended for a favorable outcome and survival of the patient.

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