



Bart E. Sjollema, Dipl. Small  
Animal Surgery KNMvD

Medisch Centrum voor  
Dieren, Amsterdam  
Netherlands

chirurg@mcvoordieren.nl

## TRAUMATIC DIAPHRAGMATIC HERNIA

### Introduction

Most cases of diaphragmatic hernia (DH) in the cat and dog are traumatic of origin. Congenital hernia is more common in the cat than in the dog

Clinical symptoms will vary with the cause and type of hernia. The amount of displaced organs into the thoracic cavity, the type of the displaced organs (eg stomach vs omentum), the pressure executed on the lungs and larger vessels and the time passed since the occurrence of the hernia all have their own variable influence. A pendulous breathing pattern and a displaced and abnormal ictus cordis can be identified in most cases of DH.

In most cases diagnosis of DH is suspected on the basis of a history of (suspected) trauma and supportive clinical symptoms. Diagnosis is confirmed by radiographs in most cases. For those cases in which DH can not be confirmed by radiography, additional ultrasonography, contrast radiography or CT may be necessary. Differential diagnosis include congestive cardiomyopathy, pleuritis, chylothorax and neoplasia.

In all cases the moment of surgical interference should be carefully considered. In cases of recent trauma, concomitant trauma as myocardial- and lung-contusion, can be responsible for severe hypoxia and dyspnea. Anesthesia may compromise circulation and ventilation even more.

If the stomach has herniated into the thoracic cavity and is severely distended immediate decompression should be performed and emergency surgery performed as soon as the patient is stabilized.

Most other cases of DH should not be considered as emergency surgical cases. Emergency treatment as oxygen and iv fluids and other supportive measures may be necessary.

### Surgery

Inhalation anesthesia, mechanical ventilation and proper monitoring are mandatory for "responsible" surgery.

Induction of anesthesia should be stress-free. A tracheal tube should be introduced as soon as it is possible and mechanical ventilation and monitoring should be started immediately.

Pre-oxygenation should be considered if necessary.

Standard surgery for DH is an abdominal procedure. The abdominal cavity is opened from the xyphoid to the umbilicus and extended if necessary. The falciform ligament is removed for proper exposure of the ventral surface of the diaphragm. A self-retaining abdominal retractor is placed.

In most cases the defect in the diaphragm can be located easily. Herniated organs are gently repositioned into the abdominal cavity. Enlargement of the defect usually facilitates repositioning. The direction of the enlarging incision should be carefully considered: the vena cava and the innervation of the diaphragm should not be damaged and the additional closure should be easy.

Herniorrhaphy is performed in a continuous or an interrupted suture pattern. Absorbable suture material of adequate tensile strength should be used.

A thoracic catheter is introduced into the thoracic cavity prior to complete closure of the hernia. The catheter is introduced through an intercostal space or through the diaphragm. Negative thoracic pressure should be restored before spontaneous respiration is resumed.

In some cases of long standing DH the abdominal cavity does not allow complete repositioning because of adaptation to the smaller amount of abdominal viscera. Normal positioning of the linea alba will result in excessive pressure on the repositioned organs. Especially the pancreas and the omental fat seem susceptible to pressure necrosis. In these cases the abdominal volume may be enlarged by the use of a longitudinal strip of mesh sutured between the left and right abdominal wall.

### Aftercare

Animals are hospitalized for a minimum of 12-24 hours after surgery.

Adequate monitoring of recovery consist of regular control of respiratory and circulatory parameters. In most cases discharge of the hospital is possible the day after surgery.

### **Prognosis**

Prognosis seems to be more favorable in cats than in dogs. Especially in cases of longstanding DH surgical result may be influenced by adhesions between abdominal organs and thoracic structures. Cats are less prone to adhesion formation than dogs. Even in cases of more than 5-8 years existing hernia repositioning can be easily be performed in most cats.