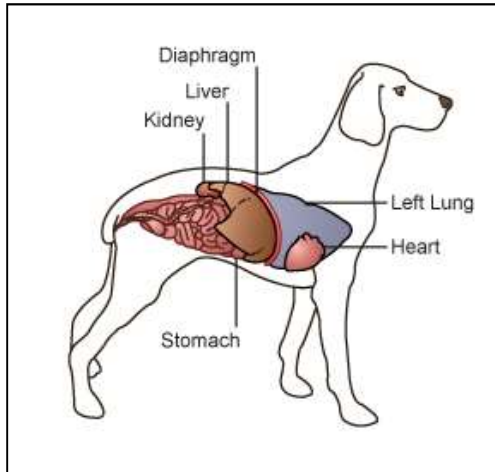


# DIAPHRAGMATIC HERNIAS

## ***What is a diaphragmatic hernia?***

The diaphragm is the muscular partition that separates the abdomen and the chest. Tearing or disruption of this thin muscle is also called a diaphragmatic hernia (DH), a diaphragmatic rupture, or a pleuroperitoneal diaphragmatic hernia (the three terms are synonymous). Peritoneal-pericardial diaphragmatic hernia (PPDH) is somewhat different – it is a congenital form present at birth. Though the condition is most often found in puppies or kittens, it may not become apparent



until later in life, when organs that are normally found in the abdomen make their way through the hernia and into the chest cavity, near the heart. Sometimes, this can be brought about by a physical trauma. Congenital diaphragmatic hernias can be present in any breed dog or cat, but are a recognized problem in Weimeraners and cocker spaniels.

Once a tear in the diaphragm is present, abdominal contents such as the stomach, liver, and intestines are able to enter the chest cavity, after passing through the hernia. The liver is the most commonly herniated organ. This can compress the lungs to prevent them from fully inflating, causing respiratory distress. When the stomach is trapped in the thoracic chamber, dilation may occur causing severe respiratory distress.

The abdominal tissues may irritate the heart muscle, which may cause abnormal heart rhythms. Fluid may leak into the chest cavity from the abdomen, further complicating and worsening cardiopulmonary function. If the blood supply to the herniated organ(s) is compromised, those organs can be damaged. If the hernia is corrected surgically, strangulated organs (especially liver) can release toxins into circulation when they are removed from the chest, resulting in shock which can be potentially life threatening. Over time, if the hernia is not corrected, scar tissue can form, which can make surgical correction tricky.

## ***What causes a diaphragmatic hernia or rupture?***

The most common cause of an acquired (not congenital) diaphragmatic hernia is trauma. This type of trauma can occur after a fall from a high place (such as out of a window or from a tree), an automobile accident or a blow to the abdomen. With traumatic DHs, most animals are presented in shock acutely after the trauma, but about 15% to 25% of traumatic DHs are diagnosed weeks after the injury because signs are absent or non-specific.

Congenital diaphragmatic hernias can sometimes become apparent during a first anesthetic procedure. A dog or cat with a congenital diaphragmatic hernia may breathe just fine while awake, but not so well when anesthetized. PPDH is more common in the cat than in the dog, and is sometimes associated with congenital defects of the heart and even liver shunts.

## ***What are the symptoms of diaphragmatic hernia?***

Symptoms are dependent on the severity of herniation. With small tears or in pets born with a diaphragmatic hernia, there may be no discernable clinical signs. With large defects, the



contents may move freely from one cavity to the other and cause minimal clinical signs.

The pet owner may report mild breathing difficulties, especially when stressed or exercising, and periods of mild gastrointestinal upset (vomiting and/or diarrhea). In severe or acute cases, there is often respiratory distress, an abnormal heart rhythm, congestive heart failure, muffled heart and lung sounds and other signs of systemic shock. The abdomen may feel empty when palpated.

### ***How is a diaphragmatic hernia diagnosed?***

Diagnosis is based on medical history, physical examination, radiographs (x-rays) and ultrasound. Blood and urine tests may be performed to determine if the patient is well enough for surgical correction. In certain cases, ultrasound or special radiographic dye studies will be required for definitive diagnosis. Barium can be swallowed by the dog or cat, and then seen in the chest if the gastrointestinal tract is herniated. Or a different kind of contrast can be injected into the abdominal cavity, to see if it flows into the chest through the hernia. If any portion of the lung is collapsed, it can be difficult for the sonographer to tell the difference between lung and liver tissue. If only omentum and no other organs are herniated, the diagnosis can be difficult to arrive at.

### ***What is the treatment for diaphragmatic hernia?***



If there is a history of recent trauma, the pet must be stabilized before the hernia can be corrected. Some patients will require emergency thoracocentesis (a chest 'tap') to remove any fluid that is accumulating in the chest cavity. Once the patient is stabilized and a diagnosis is made, the hernia must be corrected surgically. In congenital forms, surgical intervention as early as possible is important to prevent organ entrapment or scarring between the intestines and the chest cavity. Many congenital diaphragmatic hernias are discovered during ovariohysterectomy (spay) surgery, and are corrected at that time. Often, the patient will have a chest tube in place for some time after surgery.

### ***What is the prognosis?***

The prognosis for any patient with diaphragmatic hernia is always initially guarded. It improves once the patient has been stabilized and the heart rhythm and circulation are normalized. After surgery, the risk of a condition called re-expansion pulmonary edema requires that a guarded prognosis be given for at least twenty-four hours after successful surgery. The prognosis for young pets with congenital diaphragmatic hernia is guarded to good, and is based on the specific findings during surgical correction.

### ***If the patient stabilizes with medical treatment, is it possible to avoid surgery?***

In trauma cases, adhesions may form between the lungs and any herniated abdominal contents after approximately seven days. These adhesions will affect the ability of the lungs to inflate properly, and will cause the surgery to become more complicated and dangerous. However, each case needs to be assessed individually.

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