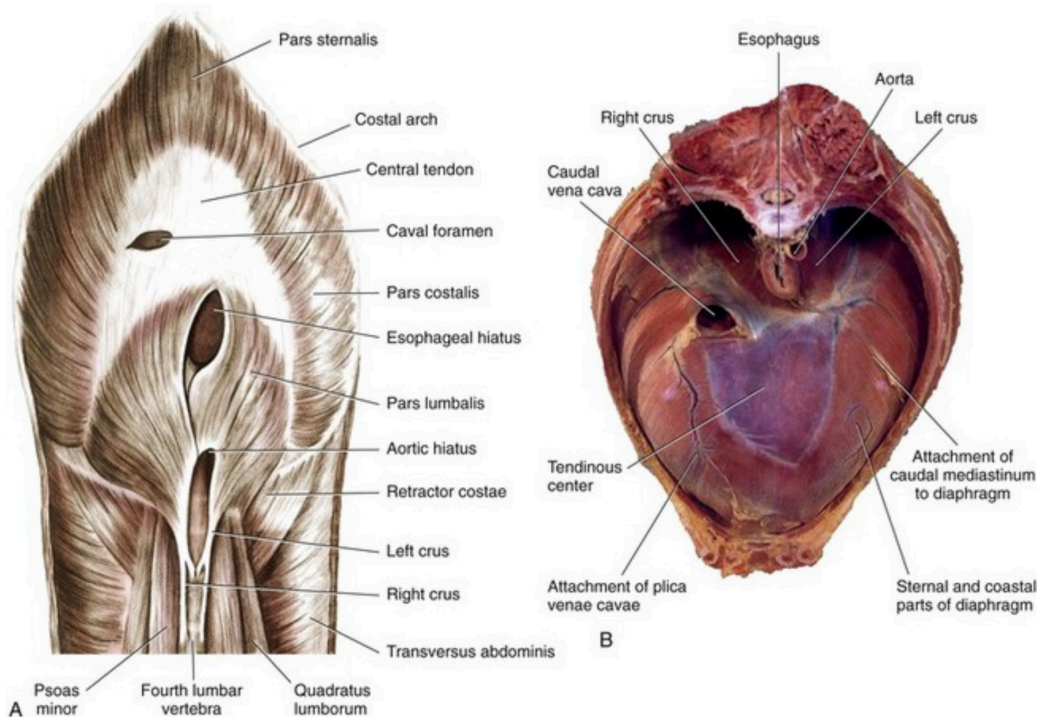


DIAPHRAGMATIC HERNIA

OVERVIEW

The diaphragm is a layer of muscle that extends across the base of the chest. Contraction of the diaphragm causes the lungs to expand and fill with air. The diaphragm is the muscular separation between the chest & abdominal cavities that functions as a barrier & aids in respiration.

Diaphragmatic hernia is the **disruption of the diaphragm which allows abdominal organs to migrate into the chest cavity**. Frequently, diaphragmatic hernias occur in conjunction with a traumatic event, such as being hit by a car (HBC); these animals can have multiple traumas that require medical attention.



2 types of diaphragmatic hernias occur in dogs & cats:

- **Traumatic** – caused by an event that tears the diaphragm
- **Congenital** – pets have these at birth (The most common type of this subcategory is the peritoneal-pericardial diaphragmatic hernia (PPDH).)

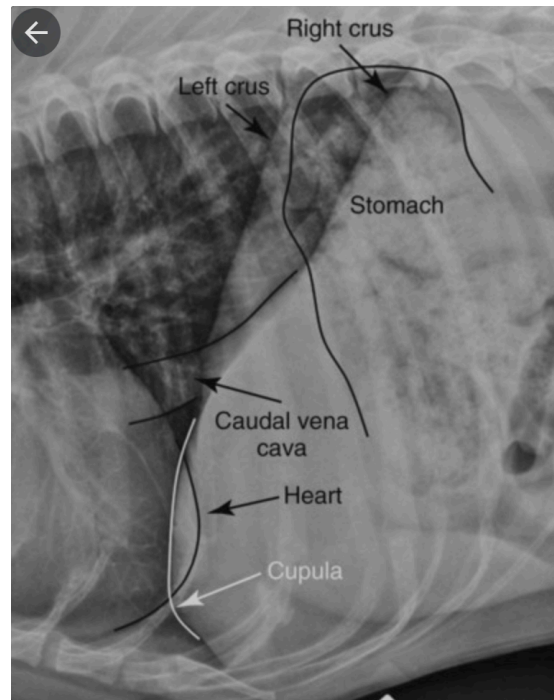
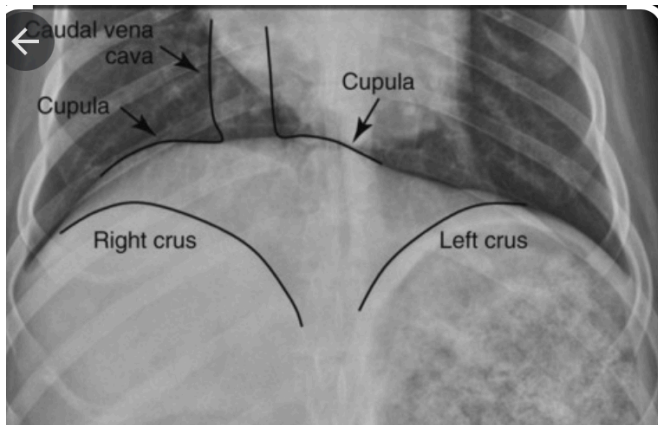
SIGNS & SYMPTOMS

A diaphragmatic hernia can cause **significant respiratory difficulty**. The trauma that caused the hernia may also result in rib fractures, lung lacerations, & lung bruising. These injuries may lead to pneumothorax (air in the chest outside the lungs) or hemothorax (blood in the chest cavity). If abdominal contents have entered the chest cavity, this can further compromise the ability to expand the lungs. Abdominal organs, displaced through a diaphragmatic hernia, may experience compromise to their blood supply.

Signs associated with an acute diaphragmatic hernia are usually related to difficulty expanding the lungs with the additional contents in the chest. Signs observed include:

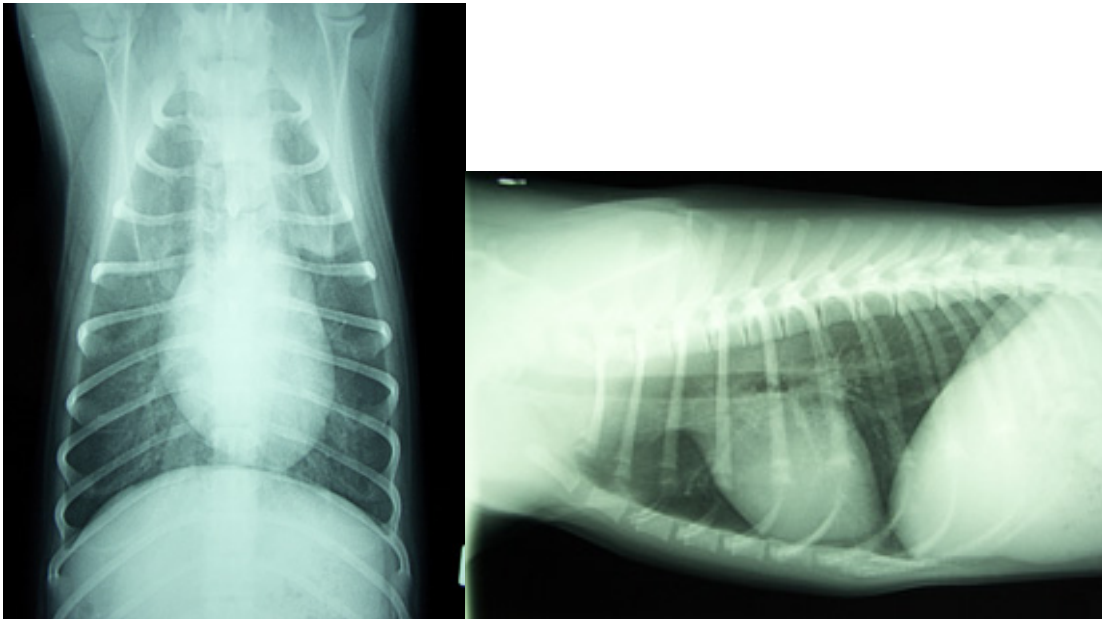
- Abnormal breathing posture with extended head & neck
- Difficulty breathing
- Rapid, shallow breathing pattern
- Gastrointestinal Signs (anorexia, vomiting &/or weight lost)

If the initial insult is tolerated, a diaphragmatic hernia may be diagnosed later in life. Over time, abdominal organs, such as the liver or intestines, can become adhered in the chest cavity & your pet may exhibit signs associated with liver or gastrointestinal (GI) disease.



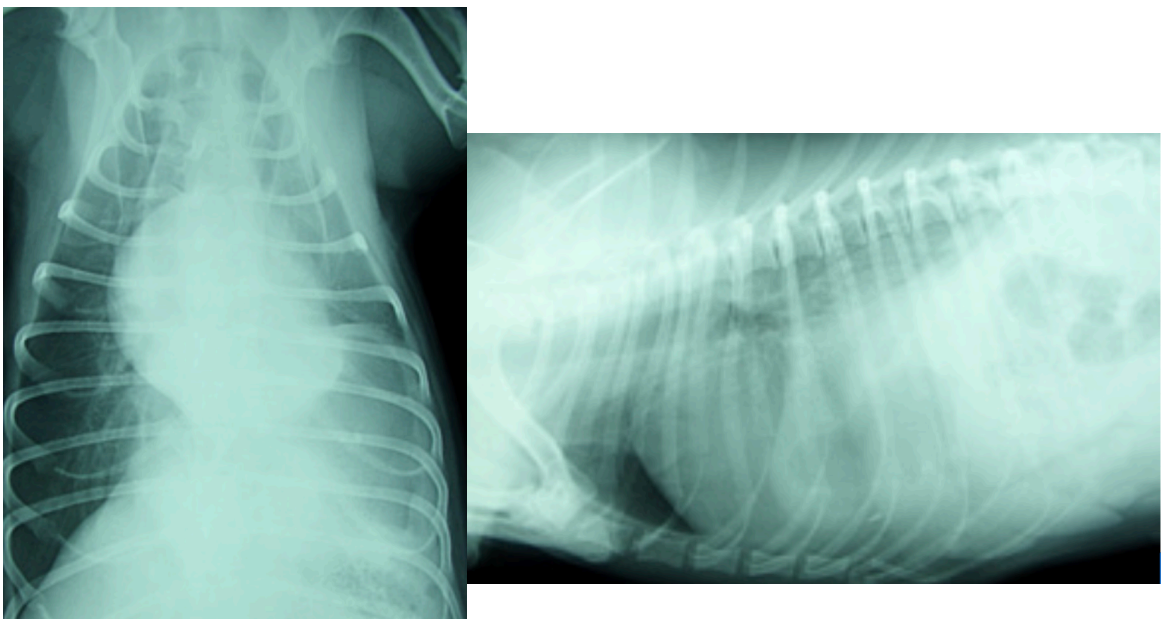
DIAGNOSTICS

Chest radiographs must be taken to diagnose the disease, & to look for any other abnormalities. In the normal animal, a diaphragmatic line, a cardiac silhouette & air-filled lung fields are appreciated on chest radiographs (Figures 1 & 2). In the case of diaphragmatic hernia, loss of the diaphragmatic line, loss of the cardiac silhouette, displacement of lung fields & presence of abdominal contents within the chest cavity may be noted on chest radiographs (Figures 3 & 4).



Your primary care veterinarian may request additional imaging tests to include:

- Abdominal & thoracic ultrasound
- Contrast radiography (taking radiographs after placing a contrast medium in gastrointestinal system)
- Computed tomography (CT scan)
- Electrocardiography (ECG)



TREATMENT

Stabilization of the emergent patient, particularly if in respiratory distress, is the 1st priority. Oxygen supplementation, analgesia (pain relief) & cardiovascular support (ie IV fluid) should be provided 1st. If the diaphragmatic tear is chronic, it is necessary to be especially careful with anesthesia because re-expanding the lungs too quickly & fully may result in pulmonary edema/ inflammation. For peritoneopericardial diaphragmatic hernia, patients without clinical signs or that are poor surgical candidates may be managed medically. However, surgical treatment should NOT be unduly delayed when indicated.

The only treatment to repair the diaphragmatic hernia is SURGERY. Surgical treatment should be performed as soon as your pet is stable for general anesthesia. Some patients with profound respiratory distress will NOT breathe comfortably until the abdominal contents are removed. Surgery is performed on an emergency basis if the stomach is herniated into the chest cavity & becomes distended with gas. This can prevent lung expansion & cause respiratory distress. A needle can be passed through the chest wall into the stomach to decompress the stomach & then surgery can be performed. Surgical repair of the diaphragmatic hernia is typically performed by entering the abdominal cavity along the ventral midline, retracting the abdominal organs back into the abdomen & suturing the tear in the diaphragm. A tube may be placed to remove air, blood or fluid that may accumulate in the chest cavity.

Your veterinarian may refer you & your pet to a veterinary surgeon for this procedure.

Some patients may need a portion of an abdominal organ (liver, gall bladder, spleen, stomach or small intestine removed if the blood supply has been compromised. Each of these procedures has its own set of risks & complications. If the herniation is chronic & adhesions (attachments between organs with scar tissue) have formed, bleeding may be a complication in surgery.

AFTERCARE & OUTCOME

A hospital stay will be recommended after the surgery. Tubes placed during the procedure, such as for fluid removal or air removal, may or may not need to stay in place for a day or 2. Pets may have suffered additional injuries that also require a hospital stay in acute injury.

PAIN MANAGEMENT is a big part of the animal's recovery & can be best managed in a hospital setting. This will be dependent on the severity of the injury & how the diaphragmatic hernia was obtained either through trauma or congenital. Your pet was given an intra-op injection called Nocita into the incisional site during the end of the surgery procedure. Nocita is a slow release bupivacaine numbing medication that will provide pain relief for ~3 days. Bupivacaine is similar to Lidocaine. Your primary veterinarian will instruct you on how, when, what dosage & types of medications that your pet will be taking at home. Please follow the medications instructions carefully & if you are unsure, please ASK!

An adhesive bandage called Primapore, which is a breathable band aid will be applied with antibiotic ointment to keep the incision clean & reduce the incidence of infection. There will be a small amount of skin glue attached to the edges of the Primapore. This band aid may come off in about 5-7 days & should NOT be forced to be removed earlier or the skin glue can induce skin inflammation & irritation. You may consider removing the band aid if it gets dirty or soiled.

E-collar must be worn at all times for about 2 weeks until the skin incision completely heals. If you need to remove the e-collar for meals times or potty breaks, it is ok to do so under your direct supervision. The e-collar is required to come back on when your pet is NOT under your direct supervision. Any self-trauma ie licking &/or scratching will increase the chance of incisional infection & the wound being open to the environment.

If there are skin sutures that were applied during the surgery, please wait 2 weeks before the suture can be removed by your primary veterinarian. Please schedule this follow-up / recheck appointment before your pet is discharged back to your care.

Most animals will begin to feel better after surgery & will want to be active. **It is important to encourage rest & avoid activity during the post-operative period for at least the first 14 days. Over activity may result in surgical suture failure, additional veterinary visits, additional medical treatment, additional medical cost, delay healing, longer recovery & +/- repeat of surgery to correct the initial surgery.**

If respiratory signs are noted; you must take your pet to the nearest emergency hospital immediately. Respiratory signs could be a sign of after surgery complication.

The prognosis for animals presenting with a traumatic diaphragmatic hernia is variable depending on other injuries incurred. It is estimated that **~15% of animals suffering traumatic diaphragmatic hernia will die before presentation**. Successful treatment of shock prior to surgery results in the best survival rates. Animals having surgery greater than 1 year after the initial insult may have a worse prognosis due to the presence of adhesions (fibrous attachments) to other organs or tissues.

The mortality rate for dogs & cats having surgery for congenital hernias (PPDH) is low & the prognosis for return to normal function & performance is excellent.

If you have any questions, please feel free to ask your primary veterinarian &/or veterinary surgeon.

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