

What Is Your Diagnosis?

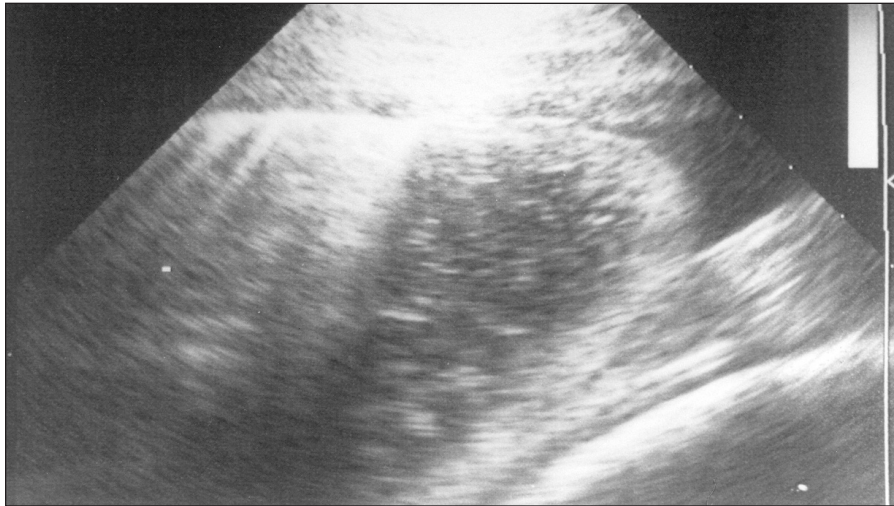


Figure 1—Long-axis sonogram of the left side of the thorax of a 5-year-old Thoroughbred gelding evaluated because of muffled lung sounds and sudden onset of signs of abdominal pain. Dorsal is to the left, ventral is to the right.

History

A 5-year-old Thoroughbred gelding was evaluated because of sudden onset of signs of abdominal pain. That morning during a schooling show, the gelding reared up and landed on its right side. Although the gelding stood and appeared clinically normal, signs of abdominal pain developed 6 hours later.

On physical examination, rectal temperature was 38 C (100.5 F), respiratory rate was 20 breaths/min, and heart rate was 52 beats/min. Mucous membranes were dark red, and capillary refill time was prolonged. Auscultation of the left side of the thorax revealed marked airway sounds throughout the lung field with an occasional wheeze. Auscultation of the right side of the thorax revealed minimal airway sounds over the dorsal lung field but considerably reduced sounds in the ventral field. Mild cecal gas distention was palpable per rectum. No gastric reflux occurred after nasogastric intubation, although the tube could not be manipulated well in the stomach. During examination, the gelding collapsed into left lateral recumbency. Breathing became quite labored, and mucous membranes became dark purple. The horse was encouraged to stand and thoracic ultrasonography, using a 5-MHz transducer, was performed (Fig 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page ▶

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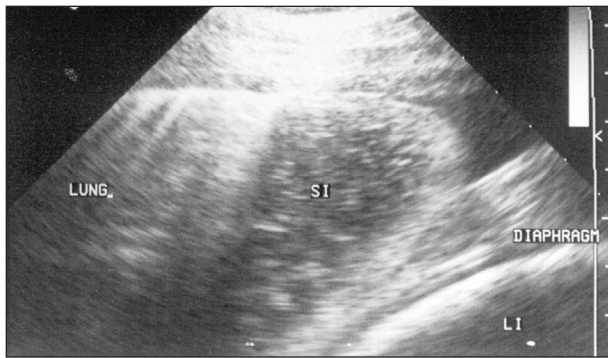


Figure 2—Same sonogram as in Figure 1. A portion of the left lung overlies herniated small intestine (SI), which is imaged dorsal and cranial to the diaphragm. The large intestine (LI) lies caudal to the diaphragm.

Diagnosis

Ultrasonographic diagnosis—Herniation of the intestines into the caudal region of the thorax (Fig 2).

Comments

Moderate pleural effusion was observed in the left pleural cavity, and prominent curved hyperechoic interfaces were within the right pleural space. Reverberation artifact and attenuation of the ultrasound beam and slow peristaltic contractions were suggestive of a gas-filled tubular structure. These ultrasonographic findings were consistent with a diaphragmatic hernia.

A ventral celiotomy was performed and revealed a 40-cm tear involving the right crus of the diaphragm, extending from the muscular to the tendinous portion. A portion of the large colon and multiple loops of small intestine were herniated into the thoracic cavity. A poor prognosis was given because of the extensive size of the tear, and the owners elected to have the gelding euthanized.

Diaphragmatic hernias may be congenital or acquired.¹ Acquired hernias typically occur secondary to trauma or an increase in intra-abdominal pressure following a fall, heavy exercise, or parturition.^{1,2} In the gelding of this report, the hernia likely occurred during the fall at the show.

Thoracic radiography and ultrasonography are useful diagnostic imaging methods for evaluation of horses with suspected diaphragmatic hernia.^{3,5} Radiography may reveal defects in the dorsal portion of the diaphragm or bowel in the thorax. However, small diaphragmatic ruptures resulting in minimal displacement of viscera or ventrally located tears may go undetected, because pleural effusion silhouettes the ventral portion of the diaphragm.^{3,5} In these instances, ultra-

sonography may be indicated as the more diagnostic procedure.

Previous reports describing sonographic confirmation of diaphragmatic hernia emphasize recognition of a disruption in the diaphragmatic line.⁶ Although this is true and must be recognized, identification of abdominal structures within the thoracic cavity is equally pathognomonic for diaphragmatic hernia.⁶ If effusion or hemorrhage is within the thoracic cavity, this may further provide a background contrast for identification of displaced abdominal structures.^{3,4}

The diaphragm may be imaged by use of a 5- or 7.5-MHz transducer, although a 3-MHz or lower frequency transducer can be used. The diaphragm lies adjacent to and parallel with the body wall in the most ventral portion of the thorax, then gradually diverges dorsally and medially to disappear behind the echogenic lung surface. It is recognized by its curvilinear parallel echogenic fascial planes, with hypoechoic muscle in between.^{3,4}

Air-filled lung limits sonographic evaluation to the most ventral portion of the diaphragm. An acoustic window to structures deep within the thoracic cavity occurs when pleural effusion displaces air-filled lung dorsally.^{2,4} Thus, more of the diaphragm can be evaluated in the presence of pleural effusion. However, because structures are best seen when perpendicular to the ultrasound beam, the curved shape of the diaphragm precludes its complete evaluation, even in the presence of pleural fluid.^{2,4,6}

Ultrasonography may be used to confirm a radiographic suspicion of diaphragmatic hernia or to provide a diagnosis when radiographic findings are equivocal. This technique may provide information regarding the location and size of the diaphragmatic tear and the identity, size, and internal characteristics of the aberrant structures in the pleural space.

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