

What Is Your Diagnosis?

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Figure 1—Lateral radiographic view of the thorax of a 9-day-old pony colt that was evaluated because of tachycardia and tachypnea since birth. Milk had been observed coming from both nostrils when the foal was in lateral recumbency and the foal had developed a persistent mild upper respiratory tract noise. The radiograph was obtained while the foal was in right lateral recumbency.

History

A 9-day-old pony colt was referred for evaluation of tachycardia and tachypnea observed since birth. Gestation and parturition had been normal. Since birth, milk had been observed coming from both nostrils when the foal was in lateral recumbency. During the first week after birth, a mild upper respiratory tract noise developed that was persistent.

On evaluation, the foal was bright and alert and in fair body condition. Physical examination revealed a rectal temperature of 38.4°C (101.2°F), a heart rate of 110 beats/min, and a respiratory rate of 80 beats/min. No murmurs or arrhythmias were detected on thoracic auscultation, and bilateral diffuse wheezes were heard over the lung fields. No nasal discharge was observed when suckling; however, copious amounts of milk were seen in both nostrils when the foal was in lateral recumbency. A CBC and serum biochemistry analysis revealed a mildly high plasma fibrinogen concentration of 500 mg/dL (reference range, 100 to 400 mg/dL) and a high serum lactic acid concentration of 54.7 mg/dL (reference range, 4.5 to 18.4 mg/dL). Thoracic radiography was performed with the foal standing (not shown) and in right lateral recumbency (Figure 1).

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

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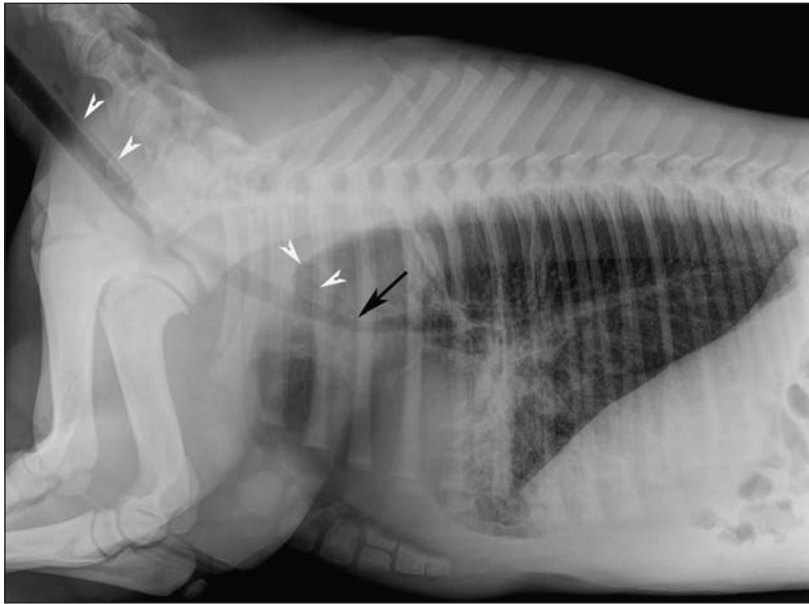


Figure 2—Same radiographic image as in Figure 1. A mixed bronchointerstitial-alveolar pattern is evident and is most severe in the caudoventral aspect of the lung fields. Notice the focal ventral deviation and mild narrowing (arrow) of the intrathoracic trachea at the level of the cranial aspect of the heart base. A small amount of intraluminal gas is evident in the cervical and cranial thoracic portions of the esophagus (arrowheads).

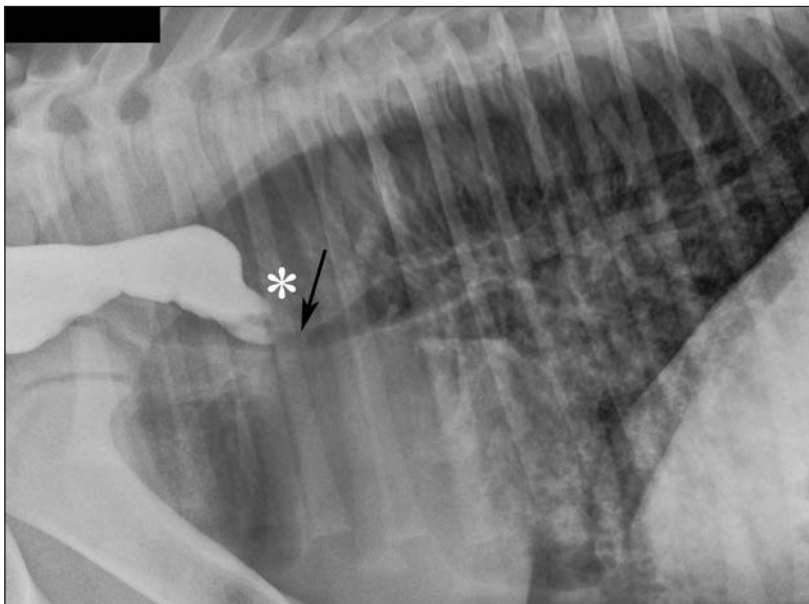


Figure 3—A lateral positive-contrast esophagram of the same pony colt as in Figure 1. The esophagus is distended with contrast medium to the level of the cranial aspect of the heart base. No barium is evident caudal to the third intercostal space (asterisk). Moderate focal narrowing and ventral displacement of the trachea (arrow) are also evident.

Radiographic Findings and Interpretation

With the foal in right lateral recumbency, an alveolar pattern is evident in the caudoventral aspect of the lung field, and a bronchointerstitial pattern with bronchial wall thickening is also apparent throughout the lungs. Additionally, a focal ventral deviation and mild narrowing of the intrathoracic trachea at the level of the cranial aspect of the heart base are evident on both lateral radiograph views of the thorax (ie, with the foal in

a standing [not shown] or laterally recumbent position). A small amount of intraluminal gas is evident in the cervical and cranial thoracic portions of the esophagus (Figure 2).

On the basis of these findings, barium positive-contrast esophagraphy was elected. A 30% barium suspension was administered into the esophagus via nasoesophageal tube. The nasoesophageal tube could only be advanced to the level of the third ribs. The contrast medium distended the esophagus to the level of the cranial aspect of the heart base (Figure 3). Persistent tapering of the esophageal lumen was evident. Barium within the esophagus caudal to this region was not identified. The primary differential diagnosis was bronchopneumonia, likely secondary to aspiration. A congenital vascular ring anomaly was considered probable, with persistent right aortic arch being most likely.

Treatment and Outcome

Surgical correction of the vascular ring anomaly was attempted. Observation of the defect during surgery confirmed the presence of a persistent fourth right aortic arch, with the ligamentum arteriosum looping across the esophagus and connecting with the pulmonary trunk, thereby trapping the esophagus. The ductus arteriosus was extremely friable and was deemed patent. Because of uncontrolled hemorrhage from the ductus arteriosus, the foal was euthanized. Necropsy was performed, and no additional congenital abnormalities were found.

Comments

Persistent right aortic arch is a congenital anomaly that occurs during embryonic development when the right fourth aortic arch persists instead of the left. As a result, a vascular ring forms, constricting the esophagus and trachea between the ligamentum arteriosum and the aorta thereby causing cranial esophageal dilation and dysphagia.¹ Persistent right aortic arch has been

reported most frequently in small animals,² with several reports³⁻⁷ of the anomaly in horses. Clinical signs in horses vary depending on the degree of constriction and include failure to thrive despite a vigorous appetite, regurgitation of food through the mouth and nasal passages, and aspiration pneumonia. Onset of clinical signs varies in age with reports from several days to 14 months of age.^{4,5} The most common clinical sign in foals is regurgitation of milk, which can be seen with several differential diagnoses, including cleft palate, hypoplasia

of the palatal shelf, esophageal stricture, and esophageal dilation or megaesophagus. The most prominent radiographic change suggestive of persistent right aortic arch is esophageal dilation in the caudal cervical and cranial thoracic regions and ventral displacement of the trachea. Positive-contrast esophagraphy may enhance visualization of the stricture.⁸ Additionally, the use of CT has been reported as a useful diagnostic imaging modality.⁴ Advanced diagnostic imaging such as CT angiography may have been beneficial in this case to more accurately define the morphology of the constriction and to identify the patency of the ductus arteriosus; however, further imaging was declined by the owners.

Evaluation of the thorax should also be performed radiographically to rule out aspiration pneumonia. Medical treatment may be effective in less severe cases; however, surgical repair is typically required. Surgical ligation and transection of the constricting vascular ring is usually performed via a thoracotomy. Prognosis is considered poor depending largely on early diagnosis, surgical correction, and successful supportive care. In this case, the focal ventral deviation and mild narrowing of the intrathoracic trachea, combined with the presence of pneumonia and clinical signs, supported the initial diagnosis of a persistent right aortic arch.

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