Respiratory Distress Due to Retropharyngeal and Neck Swelling in a Horse With Mediastinal Lymphosarcoma

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A 9-year-old, 1494-lb (679-kg) Quarter horse gelding in good body condition was admitted to the Veterinary Teaching Hospital, Western College of Veterinary Medicine (WCVM), University of Saskatchewan, for evaluation and treatment of acute respiratory distress. On a trail ride 26 days before presentation, the gelding had been exposed to a horse with clinical signs of an upper respiratory tract infection. The gelding performed well on the trail ride but, 4 days later, developed a mild swelling in the retropharyngeal area and a slight bilateral mucoid nasal discharge. The gelding was examined at the farm by its primary veterinarian, who made a presumptive diagnosis of strangles. Treatment was initiated using a combination of trimethoprim/sulfamethoxazole (30 mg/kg PO q12h for 1 week) and phenylbutazone (6 mg/kg PO q24h for the first 2 days, followed by 3.5 mg/kg PO q24h for 5 more days). The gelding did not respond satisfactorily to antimicrobial and antiinflammatory therapy. During the following 2 weeks, the retropharyngeal swelling gradually became more pronounced and extended to the upper portion of the neck. Two days before presentation at WCVM, the gelding also developed a dry cough with difficult breathing, and the retropharyngeal and neck swelling extended to the pectoral region and ventral pectoral area extending to the cranial ventral abdomen. Because of progressing clinical signs and poor response to treatment, the horse was referred to WCVM for further evaluation.

On presentation, the gelding had tachypnea (60 breaths/min; normal: 12 to 20 breaths/min), tachycardia (88 bpm; normal: 28 to 40 bpm), and normothermia (rectal temperature: 37.9°C [100.2°F]; normal: 37.5°C to 38.5°C [99.5°F to 101.3°F]). The patient was in respiratory distress: inspiratory stridor was audible, and airflow from both nostrils was reduced. The mucous membranes were slightly cyanotic, and the capillary refill time was 3 seconds. The patient had nonpitting and nonpainful edema involving the submandibular and retropharyngeal areas, the neck, the chest, the proximal part of the forelimbs (extending to the proximal limit of the carpi), and the ventral aspect of the cranial abdomen (FIGURE 1). Thoracic auscultation revealed bilaterally increased vesicular lung sounds in the dorsal aspect of the lung fields, whereas the lung sounds were notably dull in the ventral aspect of the thorax. No adventitial lung sounds were auscultated, but the heart sounds radiated over a wide area. Percussion of the ventral third of the thorax was dull compared with the dorsal aspect, which revealed a clear, loud sound.

Figure 1. The horse’s body condition is good. Note the distribution of edema, which is restricted to the throat latch area, neck, pectoral region, cranioventral abdomen, and upper portion of the front limbs.
Results of a complete blood cell count were within normal limits. Abnormalities in the serum biochemical profile included an increased total bilirubin concentration (2.9 mg/dL; reference range: 0.5 to 2.3 mg/dL)\(^1,2\) attributable to indirect hyperbilirubinemia, hyperglycemia (136 mg/dL; reference range: 89 to 112 mg/dL),\(^1,2\) and an increased anion gap (22 mEq/L; reference range: 12 to 16 mEq/L).\(^1,2\) Blood gas analysis revealed an increased lactate concentration (35.3 mg/dL; reference range: 10 to 16 mg/dL).\(^2\)

**Treatment and Clinical Course**
Based on marked inspiratory stridor, decreased airflow in the nostrils, and swelling in the face and retropharyngeal area, an upper respiratory tract obstruction was suspected and emergency tracheotomy was performed. Soon after the procedure, the stridor resolved and the horse’s respiratory and heart rates decreased to 24 breaths/min and 58 bpm, respectively.

Endoscopic examination of the upper respiratory tract, including the guttural pouches, was performed. The laryngeal and pharyngeal mucosae were hyperemic and severely edematous. Both guttural pouches appeared normal, with no evidence of soft tissue (i.e., retropharyngeal lymph nodes) protrusion.

Because findings of thoracic auscultation suggested pleural effusion, ultrasonography of the thorax was performed. On both sides of the thorax, 8 to 12 cm of nonseptated hypoechoic homogenous fluid, with no fibrin or free gas echoing, was seen between the visceral and parietal pleura, with a fluid line starting at the level of the midscapula and extending ventrally in the pleural space (**FIGURE 2**). The cranial mediastinum could not be imaged due to excessive pleural effusion. The gelding was started on intravenous balanced polyionic fluid (lactated Ringer solution) at a rate of 90 mL/kg/d. After surgical preparation of the skin, 32-French (10.7-mm), 16-inch (41-cm) indwelling chest tubes were placed bilaterally in the eighth intercostal space. Fifteen liters of serosanguineous fluid was initially obtained from the left side of the thorax, and 8 L was obtained from the right side.

Pleural fluid analysis revealed an increased protein concentration of 30 g/L and a red blood cell count of 1.08 \(\times\) 10\(^{12}\) cells/L. Cytologic examination of direct smears showed low cellularity and scant hemodilution. Of the nucleated cells present, medium-size to large (i.e., 10 to 14 µm in diameter) lymphoid cells predominated. These cells were characterized by a high nucleocytoplasmic ratio; small amounts of basophilic, finely granular cytoplasm; and round nuclei with finely stippled to clumped chromatin and, occasionally, distinct single nucleoli. Few of the lymphoid cells had cytoplasmic blebbing; elongated cytoplasmic tails were rarely noted. Furthermore, few of the lymphoid cells had tightly lobulated nuclei. Rare small lymphocytes, neutrophils, and macrophages were present. Few ruptured cells and pyknotic cells were noted. These cytologic findings were cytomorphologically interpreted as neoplastic effusion consistent with a lymphoid tumor (i.e., lymphosarcoma; **FIGURE 3**).

Based on physical and cytologic examination findings, a tentative diagnosis of lymphosarcoma was made. Because of the grave prognosis for the horse, the owners elected euthanasia. Necropsy revealed that the throatlatch area, the neck, and the ventral abdomen were diffusely and severely edematous, with amber-colored fluid trapped within the subcutaneous tissue. The retropharyngeal lymph nodes were normal in size and macroscopic appearance. A massive, firm neoplasm (**FIGURE 4A; FIGURE 4B**) was found cranial and dorsal to the heart. The tumor was composed of coarse, large lobes and was tan/whitish, with irregular paintbrush hemorrhages and areas of softening consistent with necrosis (**FIGURE 4C**). The tumor completely blocked the cranial aperture of the thorax and slightly displaced the heart caudally and ventrally. The usually imperceptible lymph nodes along the vertebral bodies of the thoracic spinal vertebrae were quite prominent (**FIGURE 5**). The mesenteric lymph nodes were moderately enlarged.
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On histologic examination, the precordial mass consisted of sheets of similar-looking lymphocytes separated by strands of delicate fibrovascular septa. The tumor cells were round, with indistinct borders, scant pink cytoplasm, and prominent, round to angular nuclei containing irregularly stippled chromatin and one to three nucleoli. There was a high degree of anisokaryosis. The mitoses were uneven, ranging from none to seven per high-power field. The average mitotic index was 2.5 to 3 based on 10 high-power fields. The tumor was dotted by irregular areas of necrosis and hemorrhage. The histologic appearance of a mesenteric lymph node was identical.

The gross and microscopic necropsy findings confirmed the clinical diagnosis of lymphosarcoma.

Discussion
Lymphosarcoma is one of the most common tumors involving the hemolymphatic system in horses. It usually affects young horses aged 5 to 10 years. Clinical signs vary and are related to the organs involved or the location of the tumor. The anatomic forms of lymphosarcoma are mediastinal, intestinal, cutaneous, and multicentric. Clinical signs common to all forms include chronic weight loss, ventral subcutaneous edema, and regional lymphadenopathy. Horses with thoracic lymphosarcoma may also present with tachypnea, expiratory dyspnea, cough, and pleural effusion. According to a retrospective study investigating clinicopathologic features of lymphosarcoma involving the thoracic cavity in horses, the most common clinical findings were inappetence, ventral edema, pleural effusion, distension of jugular veins, and expiratory dyspnea. Postmortem examination revealed abdominal lesions in eight of the 11 horses in the study.

The gold standard for diagnosing lymphosarcoma is the detection of neoplastic lymphocytes in affected tissues or lymph nodes. Biopsy of tumor masses or affected lymph nodes is a reliable way to establish a diagnosis; however, in cases with thoracic involvement and pleural effusion, careful cytologic examination of pleural fluid samples may also yield a definitive diagnosis. Approximately 30% to 40% of cases may have abnormal or neoplastic lymphocytes in peripheral blood smears, and peripheral lymphocytosis is a rare finding in horses with lymphosarcoma.

The case reported here is notable because the historical data, initial clinical signs, and presenting complaint suggested an upper respiratory tract infection such as strangles. Retropharyngeal swelling and respiratory distress were initially present, with no clinical evidence of lung or pleural disease. Clinical signs on presentation at our hospital were more severe, and the horse had evidence of pleural effusion. Physical and endoscopic examination findings did not corroborate any evidence of mucopurulent exudate in the upper respiratory tract, retropharyngeal or submandibular lymph node abscessation, or guttural pouch empyema, which could
suggest a primary *Streptococcus equi* infection causing an upper respiratory tract obstruction with secondary lung involvement.

Interestingly, and in contrast to other reported cases of lymphosarcoma, the case reported here had reduced airflow and severe inspiratory dyspnea and stridor, which are consistent with an upper airway obstruction, with no evidence of retropharyngeal lymph node enlargement or neoplastic infiltration of the nasal passages, larynx, or pharynx. Other horses with lymphosarcoma presenting with signs of upper respiratory tract disease (i.e., bilateral mucopurulent nasal discharge, stridor, inspiratory dyspnea, and submandibular lymphadenopathy) were found to have diffuse or localized neoplastic infiltration of the nasal cavity, pharynx, or larynx. Based on endoscopic and postmortem findings, the inspiratory dyspnea in this case was attributed to generalized and severe edema in the throat latch area, the neck, and the mucosa of the upper airways (the pharynx and larynx). Further, the most common clinical presentation in horses with thoracic lymphosarcoma is expiratory dyspnea with increased abdominal effort, which is consistent with lower respiratory tract disease but was not apparent in this case.8

The location and distribution of peripheral edema in the patient described here were mainly restricted to the head, neck, upper forelimbs, pectoral area, and cranioventral abdomen, with no involvement of the lower forelimbs, hindlimbs, and caudoventral abdomen. This typical pattern of edema with mediastinal lymphosarcoma is likely due to impaired venous return or lymphatic drainage from the head, neck, and chest. In contrast to most horses with lymphosarcoma, this gelding was in very good body condition, and its appetite appeared to be normal based on history and observation throughout hospitalization. In addition, jugular distention—a common sign in horses with thoracic lymphosarcoma—was not noted on repeated physical examinations.9

The most common hematologic abnormalities reported in 37 horses with lymphosarcoma were hyperfibrinogenemia (70% of cases), hypoalbuminemia (51% of cases), anemia (51% of cases), leukemic lymphocytes (38% of cases), increased globulin concentration (35% of cases), and thrombocytopenia (35% of cases).11 Conversely, a retrospective study of 11 horses with thoracic lymphosarcoma revealed that none of the horses had evidence of lymphocytosis or abnormal lymphocytes in peripheral blood.9 In the case reported here, the complete blood count results were within normal limits and biochemical abnormalities included a mild increase in the total bilirubin concentration due to indirect hyperbilirubinemia. Indirect bilirubinemia in horses may be due to anorexia, hemolytic disease, hepatocellular damage, or intrahepatic cholestasis. The appetite of this gelding appeared to be normal during a 24-hour hospitalization, there was no evidence of hemolytic anemia, and further investigation regarding liver disease was not pursued. Hyperglycemia was attributed to stress, and the increased anion gap resulted from an increased lactate concentration, most likely caused by poor peripheral circulation due to impaired venous drainage and/or decreased lymphatic return.

This case report highlights the wide array of clinical signs displayed by horses with lymphosarcoma and the importance of performing a thorough physical examination and considering endoscopy and diagnostic thoracocentesis for identifying potential infectious organisms or neoplastic cells in affected tissues within the respiratory tract. Lymphosarcoma should be considered in the differential diagnosis in horses with retropharyngeal swelling, edema, and respiratory distress, even in the early stages when lower respiratory tract disease is not clinically apparent, and particularly in cases that are refractory to conventional treatment for upper respiratory tract infections such as strangles.

**References**