Acute Upper Airway Obstructions in the Horse

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Abstract

The equine upper airway (UA) begins at the nares and includes the nasal passages, pharynx, paranasal sinuses, guttural pouches, larynx, and trachea and is also referred to as the "*extrathoracic airway"*. It is the only (with horses being obligate nasal breathers) conduit for airflow to and from the lungs, making a normal UA essential for the horse. Obstructions of the UA often result in characteristic symptoms that allow a differentiation from lower airway problems without pursuing further diagnostics. Familiarity with these symptoms can be particularly helpful in cases where severe respiratory distress requires emergency treatment before a thorough diagnostic workup can be performed.

Causes of Acute Upper Airway Obstruction

Nasal Obstruction

Obstructions of the nasal passages must be bilateral to cause significant airflow reduction and are an unusual reason for respiratory distress.

Laryngeal and Pharyngeal Obstruction

Like nasal obstructions, edema is often a significant component of laryngeal and pharyngeal conditions that cause acute airway obstruction. The swelling results in increased respiratory

effort and airway turbulences, which, in turn, encourage further edema formation. This vicious cycle can facilitate the development of a life-threatening airway obstruction.

Tracheal Obstruction

Tracheal *stenosis* can develop following neck trauma or be the result of a mass (*S. equi* or *Rhodococcus equi* abscesses, tumors, etc.) that compresses the trachea. Chondromalacia of the tracheal rings is the cause of tracheal *collapse*, a condition that most commonly affects ponies and American Miniature Horses.

Symptoms of Acute Upper Airway Obstruction

Sudden onset of severe respiratory distress in the resting horse is an uncommon presentation that can rapidly develop into a life-threatening situation. Respiratory distress is characterized by an inappropriate effort to breathe; this can include an increased respiratory rate, exaggerated intercostal and/or abdominal effort, flared nostrils, an extended head/neck position and respiratory noise.

Stridor, an abnormal, intense respiratory noise that is audible without a stethoscope, is more likely to be present in horses with obstruction of the upper rather than in animals with a problem in the lower airway. Although some UA diseases result in abnormal in- *and* expiratory noise (e.g. deviated nasal septum), UA obstructions predominantly cause noise during *in*spiration. This is the result of the sub-atmospheric airway pressures that develop during inhalation and can cause collapse of the nostrils, larynx, and pharynx; the structures of the extrathoracic airway that are not supported by bone or cartilage.

If stridor is apparent at rest, it is best to assume that ≥80% of the airway is compromised. Once noise and labored breathing are clinically noticeable, the progression towards complete obstruction can be rapid and it is advisable to treat any acute respiratory noise at rest as an emergency.

Treatment for Selected Conditions

While identification and resolution of the underlying disease are the ultimate goals when treating a horse with UA obstruction, it may be necessary to secure or establish a patent airway before a thorough diagnostic workup can be completed. If available, oxygen insufflation (10 – 15 l/min in a 500kg horse) should be offered until adequate airflow has been restored.

Nasal Obstruction

Nasal trauma: When treating a horse with blunt trauma to the nose, considerate use of tranquilizers is recommended. Prolonged lowering of the head leads to increased edema formation, and most sedatives tend to increase upper airway resistance and thus further decrease airflow. Icing of the nose is most likely to help in cases where the nares are swollen, while swelling within the nasal passages is better addressed by spraying lidocaine with epinephrine 2% (25ml per nostril in and adult) or 0.1% epinephrine spray (25-30ml total/adult) into the nose. If concerns about continued swelling exist, introduction of a small naso-tracheal tube may be helpful (diameter should be at least 1-1.5 cm). In cases where these treatments fail, a tracheotomy is recommended.

Choanal atresia: The hallmark of this congenital defect is persistence of the bucconasal membrane that separates the nasal cavity from the nasopharynx. If present bilaterally, foals will

show signs of extreme respiratory distress immediately after birth. Prompt emergency tracheotomy is required to establish airflow. The diagnosis is made via UA endoscopy after the foal has been stabilized.

Bilateral acute jugular vein thrombosis: In horses where thrombosis of one jugular vein is present or developing, the contralateral vein should only be used for blood collection or administration of fluids/medication if other veins (lateral thoracic, facial sinus) are not available. If both jugular veins are affected, maintaining the head of the patient at or above shoulder level is important to avoid the development of additional, dependent edema. Administration of furosemide should be considered. Depending on the extent of the swelling, a temporary naso-tracheal tube can be placed in the nasal passages, or an emergency tracheotomy may be necessary to ensure sufficient airflow.

Bee stings and ant bites: Insect stings can lead to severe swelling around the nares and insertion of a naso-tracheal tube, shortened stomach tube, or syringe case into the nostrils may prevent airway obstruction. Furthermore, cold compresses, an elevated head position and the administration of antihistamines should be considered. Administration of dexamethasone and epinephrine as well as a tracheotomy may be necessary in severe cases.

Snake bites: Severe swelling can result from snakebites and is often followed by necrosis and infection of the affected tissues. In addition to the above-mentioned steps (head elevation, securing airway with tubes, etc.) NSAIDS and broad-spectrum antimicrobials should be administered. The use of metronidazole, to prevent the development of an infection with anaerobe organisms, is recommended. Antivenin (equine origin) should be given if it can be injected within 24 hours of the bite.

Laryngeal and Pharyngeal Obstruction

Even though tracheotomy is the treatment of choice in severe cases, naso-tracheal intubation should be considered in cases where instruments for a tracheotomy are not available. If the patient has collapsed, naso-tracheal intubation is the fastest way to secure the airway. Since pharyngeal and laryngeal as well as pulmonary edema are common findings in horses with severe upper airway obstructions, administration of furosemide is recommended.

Epiglottitis: The cause of this condition is unknown. Affected horses, usually racehorses, present with a history of respiratory noise and exercise intolerance. Occasionally, epiglottitis can lead to respiratory distress, like croup in people, and require immediate attention. Once the diagnosis has been made with UA endoscopy, horses should be rested and treated with throat-spray, NSAIDs and broad-spectrum antibiotics (e.g., Trimethoprim-sulfamethoxazole). Feeding pelleted or cubed hay may help to reduce epiglottic irritation and swelling. Tracheotomy is rarely necessary.

Arytenoid chondropathy: Even though arytenoid chondropathies usually develop over an extended period, affected horses can present with acute UA obstruction. Once the condition has been diagnosed endoscopically, treatment with throat spray, systemic antibiotics and NSAIDs should be initiated. In severe cases, an emergency tracheotomy may be required. This procedure should be performed caudal enough to allow subsequent creation of a permanent tracheostomy, which may become necessary to permanently secure the airway in bilaterally affected horses. Partial arytenoidectomy is the surgical treatment of choice in unilateral cases.

Guttural pouch tympany: Guttural pouch tympany is the distention of one or both guttural pouches with air. Affected foals usually present with an easily compressible, retropharyngeal swelling and respiratory noise shortly after birth, even though symptoms can develop at any time

in the first year of life. The condition can also cause respiratory distress and predisposes the foal to aspiration pneumonia. In many cases, temporary relief can be achieved by decompressing the distended pouches with manual pressure or by inserting a catheter into the distended guttural pouch(es). Transcutaneous needle decompression should be avoided since hemorrhage may occur and lead to further complications. Radiographs usually show extension of the guttural pouches beyond the second cervical vertebra in affected foals. Tracheotomy is rarely necessary and various surgical treatments are available for persistent cases.

Retropharyngeal lymphadenopathy: Obstruction usually occurs in horses that suffer from a septic lymphadenopathy of the retropharyngeal lymph nodes as part of a Streptococcus equi equi infection. In cases where a mature abscess is present, draining may sufficiently open up the airway, but it is not unusual that a tracheotomy is needed to improve airflow until the horse has recovered from the disease.

Tracheal Obstructions

Depending on the location of the tracheal obstruction, diversion of airflow from the site of compression/collapse may not be accomplished with a routine tracheotomy. In most cases of tracheal obstruction, endoscopy and/or radiographs are recommended to identify the exact location and extent of the lesion.

Tracheal trauma: Tracheal injuries are relatively uncommon, since especially the thoracic part of the trachea is well protected. However, the cervical trachea can be severely damaged by a kick to the ventral neck or by collision with a solid object or a rope. If the trauma results in serial cartilage ring fractures, the tracheal wall may collapse during inspiration and cause acute, severe UA obstruction. Even in less severe cases, formation of granulation or scar tissue can lead to

airway stenosis in the weeks following the injury. Similarly, prolonged intubation with an overinflated, cuffed endotracheal tube can result in circular mucosal trauma with subsequent fibrosis and tracheal narrowing. A tracheotomy caudal to the injury site can redirect airflow temporarily, but surgical correction of the actual injury (possibly including tracheal resection and anastomosis) may eventually be necessary.

Tracheal collapse: Idiopathic, primary collapse of the trachea has been reported in American Miniature Horses (AMH) and Shetland Ponies and is typically characterized by dorso-ventral flattening of the cartilage rings. Lateral collapse is uncommon. In AMH, the disease usually occurs in middle-aged animals, but has been documented in foals as young as 2 months. In most cases, the intra- as well as the extra-thoracic trachea is compromised, leading to respiratory distress with honking noises during inspiration and increased abdominal expiratory effort. Radiography and endoscopy are the imaging modalities of choice. Since larger aspects of the trachea, including the intra-thoracic part, are commonly affected, a tracheotomy may not relieve the respiratory distress. Severe tracheal collapse can also lead to shifting of the surrounding anatomical structures, increasing the risk of inadvertently incising the esophagus, jugular vein or external carotid artery. Naso-tracheal intubation with a small nasogastric tube may therefore be a better method to bypass the affected trachea temporarily. However, long-term prognosis, even with surgical intervention, is guarded to poor.

Take home points

1. Inspiratory stridor and an inappropriate respiratory effort are typical signs of upper airway obstruction.
2. If stridor is apparent at rest, it is best to assume that >80% of the airway is compromised.

3. Endoscopy is the diagnostic tool of choice for horses with (acute) upper airway obstruction.
4. A tracheostomy secures the airway in *most* cases of upper airway obstruction.
5. Treatment of the underlying disease needs to commence as soon as the airway has been secured.

References/Suggested Reading

1. Aleman M, Nieto JE, Benak J, et al (2008). Tracheal collapse in American Miniature Horses: 13 cases (1985-2007). *Journal of the American Veterinary Medical Association*, *233*(8), 1302–1306.
2. Divers, J. A. O. J. (Ed.). (2014). Chapter 25 - Respiratory System. In *Equine Emergencies (Fourth Edition)* (pp. 450–484). St. Louis: W.B. Saunders.
3. Mair, T. S., & Lane, J. G. (1996). The differential diagnosis of sudden onset respiratory distress. *Equine Veterinary Education*, *8*(3), 131–136.
4. Siger, L., Hawkins, J. F., Andrews, F. M., & Henry, R. W. (1998). Tracheal stenosis and collapse in horses. *Compendium on Continuing Education for the Practicing Veterinarian*, *20*(5), 628–635.
5. Tomasic, M., Mann, L. S., & Soma, L. R. (1997). Effects of sedation, anesthesia, and endotracheal intubation on respiratory mechanics in adult horses. *American Journal of Veterinary Research*, *58*(6), 641–646.