Persistent dorsal displacement of the soft palate attributable to a frenulum of the epiglottis in a racing Thoroughbred

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Case Description—A 7-year-old sexually intact male Thoroughbred racehorse was evaluated at the Oklahoma State University Center for Veterinary Health Sciences because of exercise intolerance and abnormal respiratory tract noise during exercise. The horse’s owners reported that the horse did not perform well when racing. The horse also had a history of abnormal-sounding vocalizations and coughing both when eating and when turned out onto pasture. A prosthetic laryngoplasty had been performed at least 3 years previously to treat left laryngeal hemiplegia. The horse had previously raced, once as a 2-year-old colt and 3 times as a 3-year-old, all at distances of ≤ 6.5 furlongs. In one of the latter races over a distance of 5.5 furlongs, the horse was placed third; it was commented that the horse appeared to have faltered late in the race.1 The current owners had purchased the horse 3 to 4 months before the evaluation at the Center for Veterinary Health Sciences.

The initial physical examination revealed that the horse’s heart and respiratory rates were slightly high (52 beats/min and 56 breaths/min, respectively; reference range, 28 to 44 beats/min and 8 to 15 breaths/min, respectively). On thoracic auscultation, no abnormalities were detected. The horse was placed in a set of stocks and restrained with a nose twitch. An endoscopic examination of the upper portions of the respiratory tract was performed. During that endoscopic examination, DDSP was identified; the epiglottis did not move dorsal to the soft palate at any stage of the examination.

Clinical Findings—A persistent dorsal displacement of the soft palate was identified during endoscopic examination of the upper portions of the respiratory tract. Radiography of the pharyngeal and laryngeal regions revealed a hypoplastic epiglottis that was ventral to, and not in contact with, the soft palate. The horse was anesthetized, and an oral endoscopic examination revealed a subepiglottic frenulum that had resulted in the dorsal displacement of the soft palate.

Treatment and Outcome—The frenulum was transected transendoscopically by use of a diode laser. Twenty-four hours following surgery, repeat endoscopic and radiographic examinations revealed that the epiglottis had returned to its correct anatomic position in relation to the soft palate. Four weeks after surgery, endoscopy of the upper portions of the airway revealed recurrence of the dorsal displacement of the soft palate.

Clinical Relevance—A subepiglottic frenulum should be considered as a cause of persistent dorsal displacement of the soft palate in horses. An endoscopic examination of the oropharyngeal region should be performed in horses prior to undertaking any surgical interventions to treat persistent dorsal displacement of the soft palate. (J Am Vet Med Assoc 2007;231:751–754)
base of the tongue (Figure 2). During the same anesthetic episode, the epiglottis was elevated by use of bronchoesophageal forceps. A diode laser with a 600-µm fiber was advanced through the biopsy portal of the endoscope. The frenulum was transected horizontally 1 to 2 cm distal to its attachment on the epiglottis to a depth of approximately 25 mm with the laser in contact mode (20 W, 500 J; used with a laser firing time of approx 25 seconds).

On the day following surgery, another endoscopic examination of the upper portion of the respiratory tract was performed; findings indicated that the epiglottis was in its normal position dorsal to the soft palate (Figure 3). The rostral edge of the epiglottis appeared ulcerated. Radiography of the pharynx and larynx was performed and revealed an apparently normal configuration of the epiglottis with respect to the soft palate. The epiglottic length was unchanged from the preoperative radiographic finding.

After surgery, antimicrobial treatment was continued for 24 hours and flunixin meglumine (1.1 mg/kg, q 12 h) was administered for 60 hours. The horse was discharged from the hospital, and the owners were instructed to administer phenylbutazone (2.2 mg/kg, PO,
At the recheck examination, the owners reported that the horse no longer coughed while eating. The horse was manually restrained, and an endoscopic examination of the upper portion of the respiratory tract revealed recurrence of the DDSP; the epiglottis did not assume its correct position at any time during the examination. The owners declined further surgical treatment and instead opted to retire the horse to stud.

**Discussion**

Intermittent DDSP is a cause of exercise intolerance and respiratory noise in Thoroughbred racehorses and may affect approximately 10% to 20% of young racehorses in training. Several mechanical factors have been proposed as predisposing Thoroughbred racehorses to DDSP, such as an elongated soft palate or a hypoplastic or deformed epiglottis. The elongated soft palate may be a cause of DDSP in foals, but has not been confirmed in adult horses. Subepiglottic or palatal masses, such as cysts or granulomas, may also induce DDSP. Experimental damage to the pharyngeal branch of the vagus nerve, where it crosses through the auditory tube diverticulum, has resulted in persistent DDSP.

In addition, experimental resection of the thyrohyoid muscles results in intermittent DDSP because this pair of muscles moves the larynx rostrally. Dorsal displacement of the soft palate has also been reported in approximately 10% to 15% of horses after undergoing surgery for correction of epiglottic entrapment.

Persistent DDSP has been previously reported in adult horses and may be the result of a hypoplastic epiglottis or an excessively long soft palate. Persistent frenulum of the epiglottis has been previously reported in 4 foals. Those foals were evaluated because of oronasal reflux and respiratory distress that was attributed to a rare congenital anomaly that was likely the result of an aberration during embryologic development. The authors suggested several possible hypotheses for the formation of the frenulum. During development, both the epiglottis and the caudal portion of the tongue are derived from the hypobranchial eminence. Typically, those structures migrate apart, but if that does not occur completely, a frenulum could result. Another possibility is that the frenulum was derived from the glossoepiglottic fold or hypoeiglottis muscle that underwent fibrosis. A third explanation is that the frenulum was a result of an abnormality in the closure of the thyroglossal duct.

Because of the incomplete history of the horse of this report, the etiology of the epiglottic frenulum is unknown. It is possible that the frenulum was associated with a congenital abnormality and may have resulted in clinical signs, such as oronasal reflux, as a foal. Development of the frenulum may also have been a complication of previous surgery involving the aryepiglottic folds. The only surgical procedure reported by the current owners was a prosthetic laryngoplasty. A complete history from the original owner would be required to determine the etiology of the epiglottic frenulum.

In the previous report of foals with persistent frenulum of the epiglottis, transection of the frenulum via sharp dissection with scissors resulted in normal positioning of the epiglottis dorsal to the soft palate. The 3 foals that lived more than a few days after surgery did not have recurrence of clinical signs and, several years later, were considered to be normal by their owners. The horse of this report was mature, and transection of the persistent epiglottic frenulum by use of a diode laser resulted in immediate correction of the anatomic positioning of the epiglottis.

From the race records prior to treatment, the horse of this report was reported to falter, weaken, or make no effort at the end of each race. Intermittent DDSP
is a dynamic, performance-limiting condition, which becomes apparent during intense exercise (eg, during racing conditions). Pleasure-type horses may have respiratory tract noise, but owners typically do not report exercise intolerance. In a case report of 2 horses with a hypoplastic epiglottis that resulted in persistent DDSP, the horses had failure of exercise over distances > 4 or 5 furlongs. The race record for the horse of this report suggested exercise intolerance, a potential explanation for which was persistent DDSP attributable to a subepiglottic frenulum and hypoplastic epiglottis. However, the contribution of the DDSP to the horse’s exercise intolerance cannot be determined because of the concurrent left laryngeal hemiplegia and grade 4/5 arytenoid abduction. In horses, laryngeal hemiplegia results in exercise intolerance because of reduced airflow that leads to development of hypoxemia, hypercarbia, and metabolic acidosis. A previous study revealed that 88% of horses with grade 4/5 arytenoid abduction following surgery returned to full work.

Recurrence of DDSP in the horse of this report 4 weeks after surgery may have been a result of the development of adhesions, scarring, or fibrosis at the surgical site. Another explanation for recurrence of the DDSP was that the horse’s hypoplastic epiglottis was unable to hold the soft palate in its anatomically normal position. The reported reference range for epiglottic length in a Thoroughbred is 7.5 to 8.5 cm. The epiglottic length in the horse of this report was 5.3 cm, which is approximately 66% of the expected length. It is possible that a second surgical treatment, such as a laryngeal tie-forward procedure (ie, surgical advancement of the larynx), may have resulted in permanent correction of the DDSP.

As this case report illustrates, persistent epiglottic frenulum should be considered as a differential diagnosis for persistent DDSP in adult horses, as well as in neonatal foals. After determination of the diagnosis via endoscopic examination of portions of the upper respiratory tract, further diagnostic procedures, such as radiography and an endoscopic examination of the oropharyngeal region, should be performed prior to correction of the DDSP (eg, by use of the laryngeal tie-forward procedure). In horses with persistent DDSP, it is especially important to adequately view the subepiglottic tissues before undertaking corrective surgical procedures.

References