

## Left Recurrent Laryngeal Hemiplegia in Show Jumping Horses



Many people have heard the term “roaring” or “roarers” but what exactly does it mean and how do you know if your horse may be suffering from this condition? The first thing you may hear is an abnormal noise when you are riding. As the condition progresses, the noise can become louder and your horse may seem to tire easily. If your horse is exhibiting these signs, you should have your veterinarian out for an examination.

Roarers are horses that make a respiratory noise during inspiration (breathing in) when exercising. Depending on the severity of the condition, horses can produce a barely audible whistling sound to a harsh roaring sound. Roaring can result in exercise intolerance during strenuous exercise and may impair performance in jumping horses.

To increase airflow to the lungs during exercise, horses dilate their nostrils, nasopharynx, and larynx. Anything that results in obstruction of smooth air flow to the lungs will result in air turbulence, which in turn will result in respiratory noise. In

left recurrent laryngeal hemiplegia, the noise results from partial or total paralysis of the left side of the larynx. As the horse breathes in during exercise; the decrease in air pressure results in collapse of the left arytenoid cartilage and vocal cord. This creates obstruction of the airway. Exercise intolerance and poor performance are common sequelae of horses suffering from left recurrent laryngeal hemiplegia.

Left recurrent laryngeal hemiplegia is the most common cause of abnormal respiratory noise during inspiration at exercise. The condition is most commonly seen in large breed horses (thoroughbreds, draft horses and warmbloods). The incidence ranges from approximately 3 to 8% in thoroughbreds and up to 35% of draft horses. In a study of 375 horses with left recurrent laryngeal hemiplegia, 5% of the study population were show jumping horses. The condition is progressive and is caused by a degenerative neuropathy of the left recurrent laryngeal nerve. Damage to the left recurrent laryngeal nerve subsequently results in left sided laryngeal paralysis.

### Diagnosis

Roaring is often suspected if there is a history of abnormal inspiratory noise with or without associated exercise intolerance. Many show jumping horses will have respiratory noise but do not show significant signs of exercise intolerance (compared to a racehorse where exercise intolerance is almost always associated with the condition). A clinical exam performed with the horse ridden or lunged is usually the first step in evaluating a suspected Roarer. If the horse is making an abnormal respiratory noise and/or tires easily, an endoscopic examination of the upper airway is then performed. Normally, both sides of the larynx (arytenoid



Figure 1



Figure 2



Figure 3

### Table 1. Grading System of Laryngeal Function

Grade 1: Both left and right arytenoid cartilages abduct completely and synchronously during respiration.

Grade 2: Left arytenoid cartilage abducts asynchronously during respiration. Full abduction of the left arytenoid cartilage can be achieved and maintained.

Grade 3: Left arytenoid cartilage abducts asynchronously during respiration. Full abduction of the left arytenoid cartilage cannot be achieved and maintained.

Grade 4: Left arytenoid cartilage does not abduct during respiration and stays at or near the midline of the larynx when the right arytenoid cartilage abducts.

cartilages) should open and close synchronously and completely (Figure 1). In horses with left recurrent laryngeal hemiplegia, the left arytenoid cartilage fails to abduct (open) and “hangs” in the airway (Figure 2). The degree of abduction of the left arytenoid cartilage in horses with left recurrent laryngeal hemiplegia is variable and a grading system has been developed (Table 1). Grades 1 and 2 are considered normal. In equivocal cases (grade 3), endoscopic examination during exercise is recommended. Traditionally, this was performed using a high speed treadmill. More recently, this is performed using wireless dynamic respiratory endoscopes (DRS) which allow the horse to be evaluated under saddle in its normal environment. The advent of the DRS is very helpful in making a definitive diagnosis when standing endoscopic examination yields equivocal results, and helps determine the appropriate course of treatment (Figure 3).

### Treatment for Left Recurrent Laryngeal Hemiplegia

Surgical treatments for Roarers are many and include prosthetic laryngoplasty (tie-back), ventriculectomy (removal of the laryngeal saccule), ventriculocordectomy (removal of the laryngeal saccule and vocal cord), vocal cordectomy (removal of the vocal cord), partial arytenoidectomy (removal of part of the affected arytenoid), and neuromuscular pedicle graft to allow the larynx to function normally. Prosthetic laryngoplasty (with or without ventriculocordectomy) is the most common surgical procedure performed today. At our practice, prosthetic laryngoplasty (tie-back) and laser vocal cordectomy is our preferred technique. Prosthetic laryngoplasty and laser vocal cordectomy is a two-step procedure that is thought to provide the most improvement in laryngeal function (improves athletic performance and reduces noise production). Prosthetic laryngoplasty involves placing a prosthesis between the cricoid and arytenoid cartilage. The goal is to achieve permanent abduction (opening) of the affected arytenoid cartilage. Essentially, the affected arytenoid cartilage is “tied-back” which prevents collapse of the arytenoid cartilage into the airway during exercise. Laser vocal cordectomy is a standing procedure that is performed just before or after the tie-back procedure. Laser vocal cordectomy removes the left vocal cord and therefore prevents its collapse into the airway during exercise. This is thought to improve airway mechanics and reduce noise when combined with the tieback procedure. The main advantage of using a laser to remove the vocal cord is that a second surgical incision (under the throat) into the larynx is not required. Horses are generally rested for 60 days following a tie-back and laser vocal cordectomy. The prognosis following prosthetic laryngoplasty and laser vocal cordectomy is quite variable and has been reported to be between 50 and 70% for improved athletic function. The prognosis is superior for show jumping horses compared to racehorses as racehorses have to perform at higher speeds and distances where airflow obstructions have a more deleterious effect on performance. Even racehorses that have excellent surgical outcomes will have airflow limitations at racing speeds.

It is very important to recognize that many show jumping horses with left recurrent laryngeal hemiplegia can perform to their full potential without surgical intervention. Horses that do not exhibit exercise intolerance generally do not require surgery. If the horse does develop exercise intolerance that is affecting performance however, surgical intervention is recommended. Complications following tie back surgery (suture failure, loss of arytenoid abduction over time, infection of the surgical site, coughing, dysphagia, aspiration pneumonia) are unfortunately frequent and can have devastating consequences. Therefore, careful consideration of surgical options, benefits, and risks is important. A thorough physical examination, endoscopic examination at rest (and during exercise if necessary), and thoughtful discussion with your veterinarian is critical to insure the appropriate diagnosis is made and appropriate treatment is recommended for your horse.

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### Figures

Figure 1. Endoscopic image of a horse with a normal larynx (Grade 1). Image courtesy of Renaud Leguillette (University of Calgary Faculty of Veterinary Medicine).

Figure 2. Endoscopic image of a horse with left recurrent laryngeal hemiplegia (Grade 4). Image courtesy of Renaud Leguillette (University of Calgary Faculty of Veterinary Medicine).

Figure 3. Endoscopic video (Dynamic Respiratory Scope) of a horse with left recurrent laryngeal hemiplegia (Grade 4). Video courtesy of Renaud Leguillette (University of Calgary Faculty of Veterinary Medicine).

### Tables

Table 1. Grading System of Laryngeal Function

### References

1. Fulton I, Anderson B, Stick J and Robertson J. Larynx In: Auer and Stick. Equine Surgery. 2011; Philadelphia: WB Saunders Co, 2011; 592-623.
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3. Ducharme N. G., Goodrich L., Woodie B., Vocal Cordectomy as an Aid in the Management of Horses With Laryngeal Hemiparesis/Hemiplegia. Clinical Techniques in Equine Practice, 2002; 1: 17-21.