

Improving the Standard Tieback Technique

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Performing tieback surgery on a standing sedated horse is faster, easier, and more precise than the traditional surgery under general anesthesia.

Photo: Courtesy Steven E. Garib

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Airway collapse during exercise, known as dynamic collapse of the airway, can affect performance horses of all disciplines, limiting their ability to breathe. Better known as [laryngeal hemiplegia](#), or colloquially as “roaring” because of the abnormal sound it can cause, this condition most commonly affects

Thoroughbred and Standardbred racehorses and working Draft horses.

Paralysis of the left arytenoid cartilage causes the vocal folds to deviate inward and hamper air flow in and out of the lungs during work. The result is poor performance from inadequate air exchange and tissue oxygenation during exercise. The restriction in airway diameter near the vocal cords is what causes the airway noise. This paralysis of the arytenoid cartilage results from denervation to the cricoarytenoideus dorsalis (CAD) muscle, which is responsible for

opening the larynx. Without appropriate laryngeal musculature, the larynx cannot open sufficiently. As such, the increased inspiratory pressure causes further airway collapse.

To diagnose laryngeal hemiplegia, veterinarians use an endoscope (a slender tubular instrument with a video camera passed through the horse's nostril) to examine the larynx. There are two types of endoscopy: static and dynamic. Static endoscopy occurs in the standing unsedated horse. Dynamic endoscopy involves working the horse either on a treadmill or on a track or arena with the endoscope in place so the veterinarian can see laryngeal action in real time during work.

After making a diagnosis, the veterinarian might conduct additional investigation, including an external or esophageal ultrasound to assess the degree of atrophy, or muscle wasting, and/or a thoracic ultrasound to assess pulmonary (lung) status.

Historically, surgeons have corrected laryngeal hemiplegia in horses with a procedure called tieback surgery under general anesthesia in right lateral recumbency (lying on their right side). The surgeon performs a laryngoplasty, placing one or two very strong sutures between the muscular process of the arytenoid cartilage and the cricoid cartilage (the ring of cartilage around the trachea). These sutures are designed to mimic the action of the CAD muscle. Once the sutures are in place, the horse is considered to be "tied back"—hence, the name of the surgery.

When a horse is in lateral recumbency, the endotracheal tube, which is used to ventilate horses with oxygen and anesthetic gases, compresses the larynx from side to side, interfering with its positioning and/or assessment during surgery. Herein lies the surgical dilemma. Given this change in tissue tone, surgeons can over- or undercompensate and tie the arytenoid back too far or not far enough. This can predispose the horse to aspirate food when eating and develop pneumonia when tied too far or to underperform if not tied far enough.

Recently we have developed and refined the tieback surgical technique in standing sedated horses. The technique was originally developed at Cornell University in draft horses, as the risk of undergoing general anesthesia is a significant issue in horses of that weight range. With Fabrice Rossignol, DVM, Dipl. EVCS, and his team in France, we adapted the technique to sport horses. We discovered that this was a much more precise way to adjust the arytenoid cartilage, because the larynx is in a natural position and not compressed by external tissues. Furthermore, there is no tube in the airway to interfere with the veterinarian's assessment of the arytenoid's position. As such, we have a procedure that is easier on the horse, is performed in a shorter time, and leads to a better outcome. The surgeons at Cornell Ruffian Equine Specialists now perform all tieback surgeries on standing sedated horses.

The elements of this new procedure include a special head support, head and neck “garment” that includes a blind on the left eye, and surgical draping. Special surgical instruments help us access the larynx, and titanium buttons reinforce the placement of the sutures. Lastly, a skilled operating team of dedicated and talented anesthesia and surgical nurses is essential to the procedure’s success. After the last stitch or staple is placed in the skin, the horse simply walks back to his stall.

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