



Treatment options for RLN (Recurrent laryngeal neuropathy)

Nicola Lynch MVB MVetMed (Hons) CertAVP Dipl. ECVS MRCVS
Via Nova Equine Hospital, Bree, Belgium

Recurrent Laryngeal Neuropathy (RLN) remains a major cause of poor athletic performance. RLN is a distal axonopathy that predominantly affects the left recurrent laryngeal nerve¹. RLN causes axonal loss, demyelination, and subsequent loss of cricoarytenoideus dorsalis (CAD) muscle volume. This results in a loss of arytenoid abduction particularly during fast exercise. Several studies have identified RLN associated neuropathological changes in both left and right recurrent laryngeal nerves in thoroughbred horses that are clinically unaffected, indicating that many horses are subclinical cases²⁻⁶. The current standard treatment for RLN is the prosthetic laryngoplasty or tie-back as described by Marks et al (1970) with the goal of permanently abducting the left arytenoid cartilage. This is commonly performed in combination with a vocalcordectomy or ventriculocordectomy. In horses that perform at lower exercise intensities where the main complaint is an upper respiratory noise vocalcordectomy or ventriculocordectomy alone may be sufficient. Several modifications to the laryngoplasty procedure have been made in recent decades in an attempt to reduce the adverse effects on upper airway health. The discovery of the close anatomic relationship between the vestibulum oesophagi and the muscular process of the arytenoid cartilage has made surgeons aware of the risk of penetrating the oesophageal lumen when placing the prosthesis through the muscular process⁷. In many clinics prosthetic laryngoplasty is now performed in the standing horse avoiding the risk of general anaesthesia. The ability to tighten the suture with the larynx in its normal anatomical position under endoscopic visualization may be the most important advantage of performing laryngoplasty in the standing horse and may reduce the likelihood of inappropriate abduction⁸.

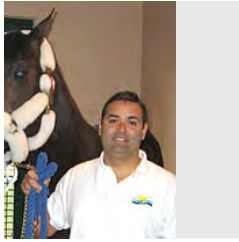
Laryngeal reinnervation using the first and second cervical nerves⁹ remains a more physiologically viable treatment option for horses with RLN. This technique is not suitable for all horses with RLN, particularly those with advanced disease where minimal CAD muscle remains. Recently the laryngeal reinnervation procedure has been modified to include transplantation of the ventral branch of the spinal accessory nerve into the CAD muscle. In many horses this procedure can be performed standing. Evidence of reinnervation has been seen as early as 3 months with most horses returning to their previous use by 9 months. The ventral branch of the spinal accessory nerve provides motor innervation to the sternomandibularis muscle and has the advantage of being activated both at inspiration when horses are galloping, and when horses are grazing¹⁰. This means that exercise is not mandatory for the rehabilitation period and that the horse can maintain muscle volume at rest even in the absence of training¹⁰.

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Complications of Prosthetic Laryngoplasty

Nicolas Ernst DVM, MS, DACVS

Professor of Equine Surgery, Sports Medicine and Lameness

University of Minnesota, Leatherdale Equine Center

St. Paul, Minnesota, USA

Despite good surgical techniques, surgical complications after a laryngoplasty have always been the most difficult part of managing a case.

Intra-operative Complications

- **Hemorrhage:** Initial problem reducing visualization, increasing difficulty of surgery, and predisposing for other incisional complications. During the approach, the linguofacial vein or one of its branches can be the first source of hemorrhage. Then, when increasing the size of the surgical incision caudally from the cricoid, the cranial thyroid artery and venous plexus can be lacerated. Identification of the bleeding vessel and direct ligation usually stops the bleeding. When inserting the needle through the cricoid cartilage and cricoarytenoideus_dorsalis muscle the plexus of laryngeal vessels can be punctured. Temporary packing with sponges often slows bleeding and allows the placement of the prosthetic sutures. Once sutures are placed, tightened, and tied, hemorrhage usually stops or reduces significantly.

- **Laryngeal and nasopharyngeal penetration:** Perforation of the laryngeal mucosa can occur when placing the needle under the caudal border of the cricoid cartilage. This can cause chronic incisional infection and coughing. Intra-operative endoscopy should be used to prevent and correct this problem. During surgery, manipulating the cricoid cartilage and soft tissue caudal to the cartilage can also help avoid this problem. If mucosal penetration is detected, sutures should be transected at the caudal aspect of the cricoid cartilage. The area should be lavage and sutures replaced.

- **Suture pullout:** This is a serious problem, especially when it affects the muscular process. The suture must be replaced, avoiding the damaged portion of the muscular process and placing the new suture down the spine of the muscular process avoiding the penetration of the adventitia of the vestibulum of the esophagus.

Immediate Post-operative Complications

- **Seroma formation:** Common problem that usually resolves itself, unless it becomes extensive or infected. If severe, it can cause a collapse of the pharynx and compression of the esophagus causing dysphagia. Aseptic aspiration of the seroma with fluid analysis (cytology) can be performed. Usually this is not necessary unless the swelling is extensive. Post-operative anti-inflammatory and anti-microbial medication should suffice.

- **Surgical site infection and dehiscence:** Deep wound infection with dehiscence is not a common problem. This can occur when there is penetration through the laryngeal mucosa. Treatment: opening the wound, wound lavage and broad-spectrum anti-microbials. Laryngoplasty sutures do not need to be removed; however, in chronic cases this is the only thing that stops the infection.

- **Loss of abduction:** Partial or complete loss of arytenoid abduction occurs in 3–11% cases, usually in the first week following surgery. Suture pull-through or fractures in the muscular process can be a cause of this complication. Suture breakage is a less common cause of loss of abduction.

- **Dysphagia:** This is one of the most feared complications. It has been proposed that this happens due to: 1) excessive retraction of the cricopharyngeus and thyropharyngeus muscles during surgery affecting the esophageal sphincter function, 2) excessive surgical abduction of the arytenoid, or 3) penetration in the adventitia or lumen of the vestibulum esophagus when placing sutures in the muscular process. Good surgical technique and intra-operative endoscopic assessment should prevent excessive abduction and help ameliorate this complication.

- **Coughing:** Incidence of coughing in the immediate post-operative period has been reported to be as high as 43%. This commonly occurs in the immediate post-operative period and is usually associated with high levels of arytenoid abduction with concurrent aspiration of food and/or saliva. The presence and frequency subsides 7–10 days post operatively, but long-term coughing during eating persists in a small proportion of cases.

Longer-term Complications

- **Persistent Coughing:** This may or may not be associated with eating, and is usually associated with cases that have high levels of arytenoid abduction and subclinical aspiration of food/saliva. Aspiration can lead to a chronic inflammation of the lower respiratory tract affecting the performance of the horse. Diagnosis can be confirmed via endoscopy. Feeding from the ground, washing the mouth prior to exercise and muzzling horses shortly after feeding and prior to exercise can improve this problem. Removal of the prosthesis can resolve the problem if the above does not work.

- **Progressive Loss of Abduction:** During the first 6 weeks following surgery, nearly all cases can lose 1–2 grades of arytenoid abduction. Further arytenoid abduction loss is rare after 6 weeks. The cause is unclear, however, several theories have been proposed such as: 1) softer cartilage in younger horses may predispose to prosthesis pull-through, 2) residual laryngeal adductor function in cases with less severe degrees of laryngeal hemiplegia can contribute to loss of abduction due to cyclical loading, or 3) contraction of the caudal pharyngeal sphincter muscles during swallowing can cause marked medioventral pressure on the abducted arytenoid. Irrespective of the cause, some post-operative loss of abduction is inevitable in most horses. Prevention for this problem may be possible by placement of the prosthesis deeper into the muscular process to prevent pull-through or promoting ankyloses of the cricoarytenoid joint at the time of surgery.

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Nicolas Ernst DVM, MS

Diplomate American College of Veterinary Surgeons

Professor of Equine Surgery, Sports Medicine and Lameness

University of Minnesota, Leatherdale Equine Center

- *Graduated from the University of Chile in 2000.*
- *Equine Rotating Internship (medicine, surgery, anesthesia and reproduction) at UC Davis in 2000.*
- *Equine Surgery Internship at Chino Valley Equine Hospital, Chino, California 2000-2001.*
- *Masters in Clinical Epidemiology at University of Florida 2001-2002.*
- *Equine Surgery Residency at University of Florida 2003-2006.*
- *Diplomate American College of Veterinary Surgeons 2007.*
- *Assistant Professor on Equine Surgery, Emergency and Critical Care at The Ohio State University 2006-2007*
- *Professor of Equine Surgery, Sports Medicine and Lameness at University of Minnesota 2007- present.*



Advances in the Approach to DDSP

Nicola Lynch MVB MVetMed (Hons) CertAVP Dipl. ECVS MRCVS

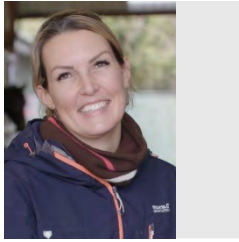
Via Nova Equine Hospital, Bree, Belgium

Dorsal displacement of the soft palate has been recognized as a common cause of upper airway obstruction in racehorses with a reported prevalence of 10 – 20% in 2 – 3-year-old racehorses^{1,2}. In affected horses the caudal border of the soft palate moves dorsal to the epiglottis during exercise. This results in increased airflow turbulence and respiratory impedance³. Horses will often present with clinical signs of exercise intolerance and a gurgling or vibrating noise on exhalation. These signs can be exacerbated by head and neck flexion⁴. Resting endoscopy often fails to diagnose horses with DDSP, occasionally ulcers will be seen on the caudal soft palate and there will be bruising in the nasopharynx secondary to DDSP. Exercising endoscopy is the gold standard for diagnosis of DDSP⁵⁻⁷. In racehorses' treadmill endoscopy has been shown to be superior to overground endoscopy for identification of horses with DDSP⁸ whereas in sport horses overground endoscopy is often required for a diagnosis of DDSP⁹. This is because in racehorses DDSP is related to exercise intensity and hypothesized thyrohyoid muscle fatigue¹⁰ whereas in sport horses it can be related to rider effects, head, and neck position⁹ or the presence of equine asthma¹¹. This is evidenced by the increased prevalence of DDSP in dressage horses when compared with showjumpers⁹. Numerous etiologies have been proposed as causative factors in horses with naturally occurring DDSP including dysfunction of the pharyngeal branch of the vagus nerve¹², dysfunction of the hypoglossal nerve¹³, dysfunction of the thyrohyoid muscles¹⁴, inflammation of the upper and lower airways and the use of certain items of tack and training methods. Identifying the cause of DDSP in individual cases is essential as treatment should be tailored to the cause. A wide variety of surgical and conservative treatments are used by clinicians to manage horses with this condition with similar published success rates of around 60 – 70%. These treatments address the proposed etiologies by reducing inflammation, altering the position of the hyoid apparatus or by increasing the stiffness of the soft palate. Conservative methods include the use of systemic and topical anti-inflammatories, tack changes such as the use of a tongue tie, spoon bit, Cornell® collar and a cross or grackle noseband. Surgical treatment options include laryngeal tie-forward with a recent report describing a technique for performing this in the standing horse¹⁵, myectomy, staphylectomy, and palatoplasty to reduce compliance of the soft palate including tension, thermal and laser palatoplasty techniques. Recently injection of the soft palate with Genipin® (a self-polymerizing collagen cross linker) has been utilized to reduce soft palate compliance. This treatment has the benefit of minimal convalescence and good initial reported success rate¹⁶. There is also emerging evidence for the efficacy of training of inspiratory muscles¹⁷ which may alter our future approach to the management of horses with DDSP.

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Hernia Repairs

Nov 10th 2023 – Hall 3 (16:30-17:00)

Francesca Compostella

DVM, MRCVS, MSC(One Health)

SEA Exec Director of Veterinary and Welfare for Saudi Arabia and WVS Int Project Director (Large Animal)
Hernias can affect horses of all breeds, ages and sex, but the aetiology differs.

Umbilical hernias are commonly found in foals, affecting approximately 2% of any newborn stock. These rarely require treatment, unless still present after the age of 4 months and with a diameter wider than 5 cm. Treatment is elective aside from rare cases, when the hernial contents are strangulated. These can be done standing or recumbent, depending on the severity and type of procedure opted for.

Incisional and or traumatic hernias can affect horses of any age and are not uncommon amongst working horses as a result of collisions or post abdominal surgery, particularly when the correct postoperative regime is not observed. As per umbilical ones, these hernias are also treated as an elective procedure, allowing the surgeon to carefully plan the treatment method to be used. Depending on the originating cause, a period of systemic antibiotics may be required ahead of performing any repair, unless there is a severe dehiscence and or rupture of the abdominal body wall, in which case an emergency repair is performed.

Lastly, scrotal or inguinal hernias differ as they are usually strangulating and require immediate intervention. The prolapse of small intestine within the scrotum can affect the blood flow of either the entrapped intestine or the testicle, or both. Such hernias are accompanied by severe signs of pain and are easily discernible from other types of hernias.

While hernias may initially appear tricky to assess and treat, they usually heal well and allow horses to return to a full athletic and or working career.

During this talk we will look at some treatment methods and handy pre and post operative measures to enhance your success rate.

Francesca Compostella, DVM, MRCVS, MSc

Veterinary & Welfare International Director WVS

Dr. Francesca Compostella has worked in the development sector since completing a surgical residency in 2012. Having grown up in Mozambique she has always been passionate about the human animal bond, and the incredible role animals hold in supporting communities. Her focus is on promoting education at all levels, where she applies a One Health approach to maximize the limited resources faced in some parts of the world. She is currently designing, implementing, and leading International projects on behalf of WVS.



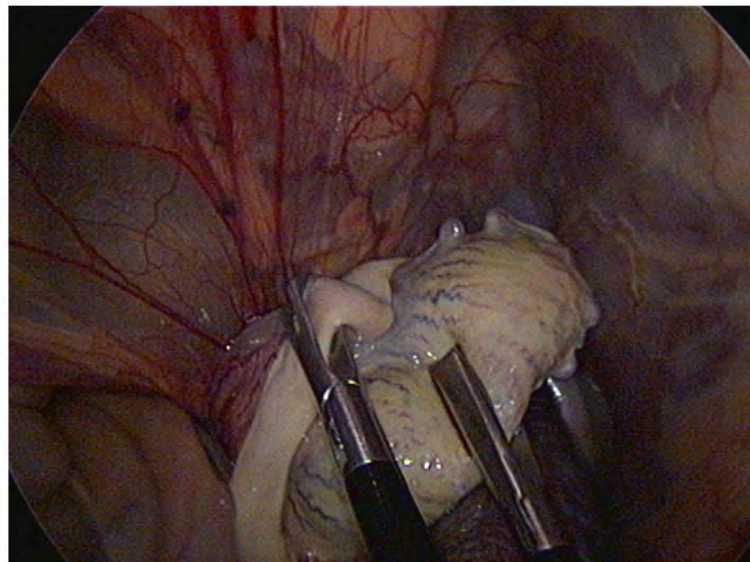
Cryptorchid Castration

Professor Tim Greet BVMS, MVM, CertEO, DESTS, Dip ECVS, FRCVS
Consultant, Rossdales, Newmarket, UK.

Castration is the commonest surgical procedure carried out in equine practice. With fully descended testicles or even when a testicle is sitting just outside the external inguinal ring, castration is usually uncomplicated; either using an open technique in a standing patient, or by a closed or semi-closed technique under general anaesthesia. However, when a testicle is retained either within the inguinal canal or the abdomen, it may be necessary to adjust this procedure, or to use an alternative technique.

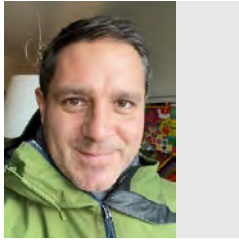
This presentation will briefly describe the diagnosis and two surgical approaches to castrating equine cryptorchids. The first method is using a minimally invasive inguinal approach under a general anaesthetic and the second is a laparoscopic approach in the standing patient under sedation and a local anaesthetic. Both methods are effective depending upon the location of the retained testicle and have benefits and disadvantages which will be presented and discussed.

There are basically three types of cryptorchid. A true abdominal cryptorchid where the testicle is located somewhere in the peritoneal cavity, an abdominal testicle with a long epididymis and an extra-abdominal epididymal tail, and a testicle within the inguinal canal. The location of the testicle, as assessed preoperatively, may encourage the surgeon to use one or other method. Such techniques may also be used when operating on teratomatous testicles.



Prof Tim Greet BVMS, MVM, Cert EO, DESTS, Dip ECVS, FRCVS

Tim Greet is a Glasgow graduate, who spent most of his career working as an equine surgeon in private practice in Newmarket, England. A diplomate of the European College of Veterinary Surgeons, he is a past president of BEVA, BVA, WEVA and ECVS. He has published widely and spoken at meetings around the world.



Penile and preputial surgery

Christoph Koch, DACVS & ECVS, Prof. Dr. med. vet., Division of Equine Surgery, ISME Equine Clinic Bern, Vetsuisse Faculty of the University of Bern, Switzerland

Disorders of the equine penis and prepuce amenable to surgery include neoplasia, habronemiasis, chronic paraphimosis, and rarely priapism or congenital malformations. Squamous cell carcinoma (SCC) is the most common tumor type affecting the equine male external genitalia in aged horses, mainly affecting unpigmented skin covering the glans and free part of the penis. Most neoplastic lesions involving the glans and free part of the penis necessitate partial phallectomy with or without en bloc resection of the prepuce.¹ Particularly SCC are malignant tumors with a locally aggressive growth behavior, and (depending on the stage at presentation) usually require more aggressive forms of excisional surgery. Lesions extending proximal to the free portion of the penis yet not extensively invading the tunica albuginea or regional lymph nodes can be treated by sheath ablation and partial phallectomy, creating an urethral stoma at the level of the former preputial orifice or slightly caudal to that.² If solely the glans or the free portion of the penis are affected, partial phallectomy can be performed, sparing most of the penile shaft. Techniques for partial phallectomy include those described by Scott, Vinsot, and Williams and mainly differ regarding the orientation and shape of the surgically created urethral stoma or how hemostasis of the penile cavernous bodies is achieved.¹ If the neoplastic lesion has invaded the tunica albuginea, prepuce and regional lymph nodes, preputial ablation and penile amputation and creating a perineal urethrostomy are indicated. A recently described technique using a strangulating latex loop applied with a so-called Callicrate Bander³ can be performed in standing, sedated equids thus offering a well-tolerated⁴ and cost-effective treatment option for aged subjects with advanced stages of SCC.

In younger and middle-aged equids, equine sarcoids, melanoma (in grey horses), papilloma, cutaneous lymphoma, and fibrosarcoma are other neoplastic conditions that may affect the external male genitalia. However, and unlike with SCC, these usually involve the prepuce and rarely the glans or free part of the penis. Therefore, segmental posthetomy (or reefing) to remove a circumferential segment of the affected prepuce can be curative. Although it is usually recommended to restrict segmental posthetomy to the inner lamina of the preputial fold¹ (i.e. portions of the prepuce distal to the preputial ring), this may also include the preputial ring and outer lamina of the preputial fold. Such a more extensive posthetomy, often referred to as "Adam's procedure", can also be used to salvage horses with chronic paraphimosis accompanied by penile paralysis and fibrosis. More extensive surgeries involving the resection of the normally well-vascularized preputial and penile tissues are inherently associated with the risk of postoperative swelling and hematoma formation. Importantly, intact stallions should be castrated two to three weeks prior to partial phallectomy or posthetomy surgery to avoid penile erection post-operatively and decrease the risk of hematoma formation. Whenever a urethral stoma is created in conjunction with a partial phallectomy, post-urination haemorrhage is a frequently encountered complication of penile surgery. In most cases, post-urination hemorrhage is self-limiting and transient in nature. If, however, persistent post-urination hemorrhage develops and needs to be addressed, a perineal incision into the corpus spongiosum reliably helps resolve this complication.⁵

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6. Christoph Koch Mercier, Prof. Dr. med. vet.
7. Computer-assisted surgery, Equine sarcoid disease, general large animal surgery topics
8. Head of Equine Surgery and Deputy Head of the ISME Equine Clinic Berne, Vetsuisse, University of Berne, Switzerland
9. Supervising Clinical Faculty / Lecturer in Equine Surgery, ISME Equine Clinic Berne, Switzerland
10. Resident in Large Animal Surgery, University of Wisconsin Madison, Madison WI, USA
11. Intern in Equine Surgery, Hagyard Equine Medical Institute, Lexington KY, USA

Christoph Koch Mercier, Prof. Dr. med. vet.

Computer-assisted surgery, Equine sarcoid disease, general large animal surgery topics

Head of Equine Surgery and Deputy Head of the ISME Equine Clinic Berne, Vetsuisse, University of Berne, Switzerland

Supervising Clinical Faculty / Lecturer in Equine Surgery, ISME Equine Clinic Berne, Switzerland

Resident in Large Animal Surgery, University of Wisconsin Madison, Madison WI, USA

Intern in Equine Surgery, Hagyard Equine Medical Institute, Lexington KY, USA