

A white horse is captured in a full gallop across a sandy desert landscape. The horse's mane and tail are flowing, and a cloud of dust is kicked up from its hooves. The background is a hazy, light-colored sky and ground.

# PROSTHETIC LARYNGOPLASTY

## PRE-OPERATION CONSIDERATIONS

# *What is PL?*

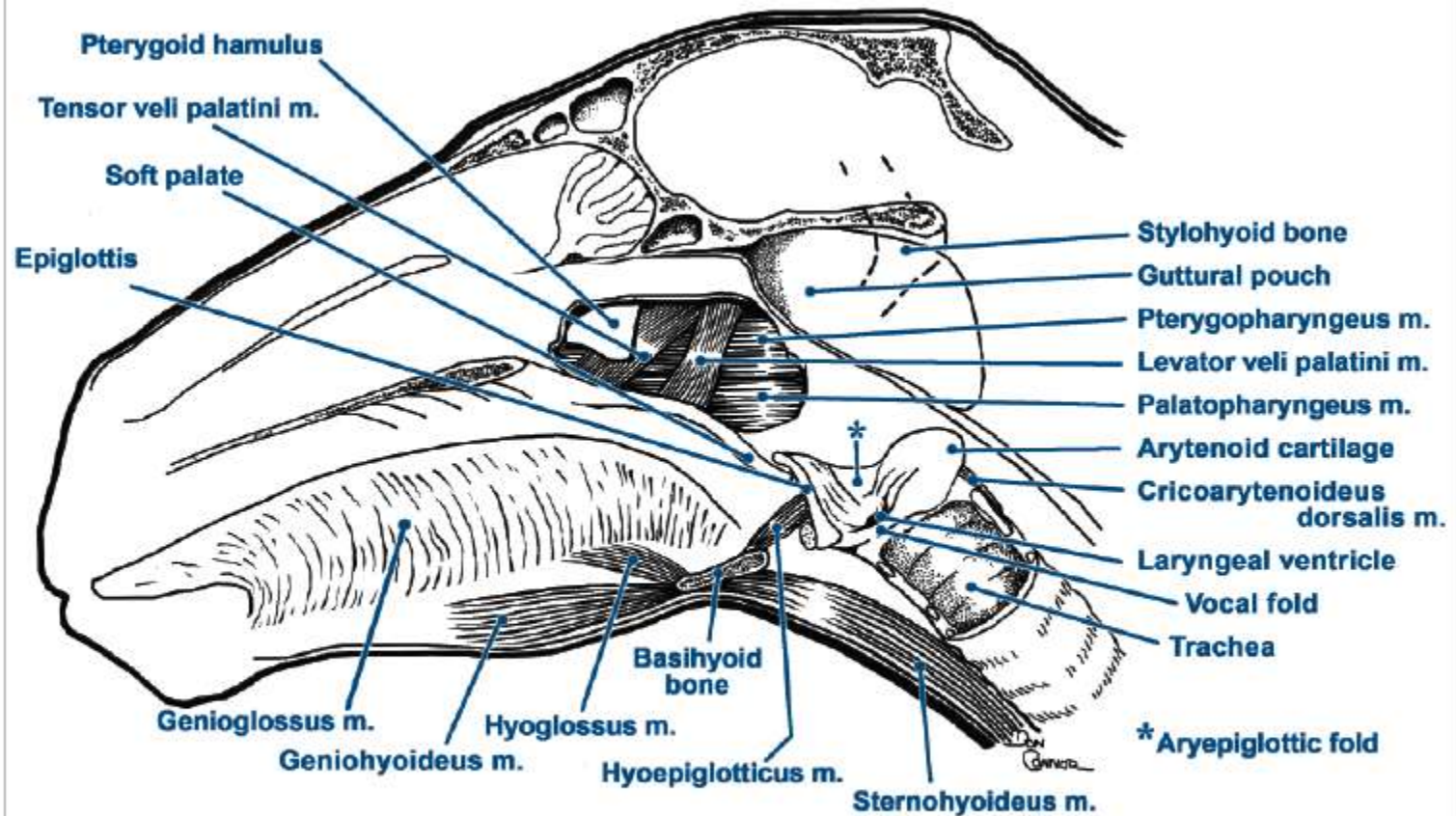
- Also referred to as a ‘Tie- back’, the objective of prosthetic laryngoplasty (PL) is to maintain a stable glottis that will provide enough airflow for the horse to perform its intended use without complications.
- The procedure involves placing a non-absorbable suture (prosthesis) between the cricoid cartilage and the muscular process of the arytenoid cartilage. The procedure involves placing a non-absorbable suture (prosthesis) between the cricoid cartilage and the muscular process of the arytenoid cartilage.

# Uses for PL

- Treatment of recurrent laryngeal neuropathy (RLN) or laryngeal hemiplegia.
- Done usually in association with ventriculectomy and vocal cordectomy.



# Equine Respiratory Anatomy

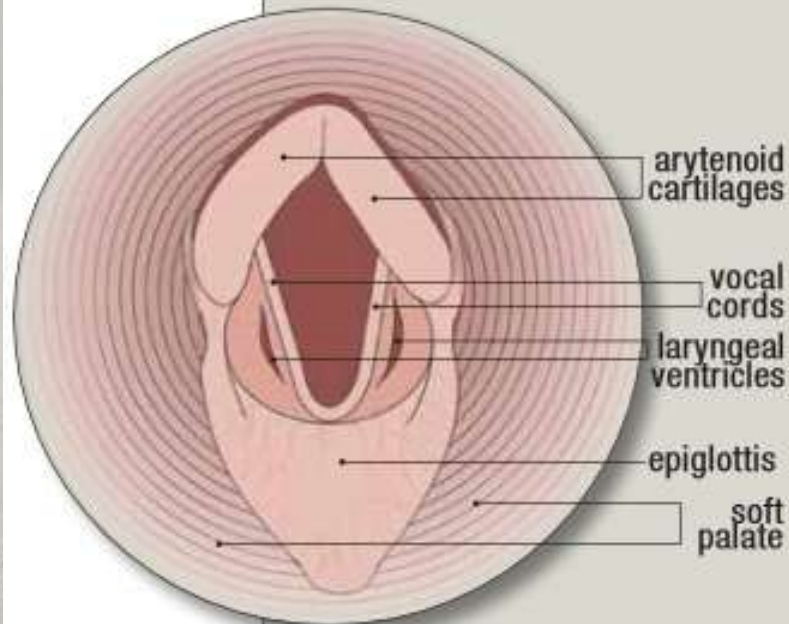


**Figure 1.** Illustration of the equine upper airway anatomy from a midline sagittal view. (Illustration by Don L. Connor, University of Missouri)

# Equine Laryngeal Anatomy

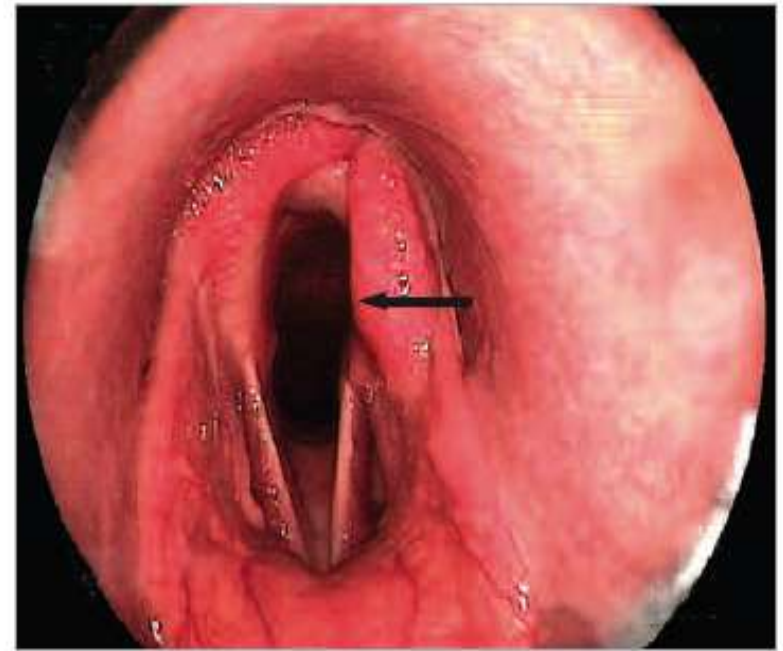
## ANATOMY OF THE LARYNX

Located at the throatlatch, a horse's larynx allows air to enter his windpipe. Cartilage on either side of the larynx opens when the horse inhales and closes as he exhales. In laryngeal hemiplegia, one of the cartilages cannot open, obstructing airflow.





**Figure 1: Normal larynx of a horse; arrows point to the arytenoid cartilages. (Left arrow points to the right arytenoid cartilage of the horse, right arrow points to the left arytenoid cartilage.)**



**Figure 2: RLN. Grade 4 left RLN is present. The right corniculate process of the arytenoid cartilage is fully abducted, while the left corniculate process (arrow) of the arytenoid cartilage is drawn down axillary into the airway, resulting in a reduced rima glottides cross-sectional area.**

# *Advantages of PL*

A white horse is running in a dusty environment, kicking up sand. The horse is the central focus of the image, and its movement is captured in a dynamic, slightly blurred manner. The background is a light, hazy landscape, suggesting an outdoor setting like a track or field. The overall tone is bright and somewhat ethereal due to the dust and light.

- Stabilizes and abducts the arytenoid cartilages and associated structures.
- Restores airflow to normal in exercising horses affected with recurrent laryngeal neuropathy, by preventing collapse of the arytenoid cartilage into the laryngeal lumen (rima glottidis) during exercise.

# *Disadvantages of PL*



- Technically difficult - requires surgeon experienced with procedure.
- Requires general anesthesia.
- Amount of abduction achieved at surgery may reduce due to the suture stretching or pulling through the muscular process of the arytenoid or through the cricoid cartilage.
- The risk of this may be higher in younger horses with immature cartilage.
- Over abduction may result in a higher incidence of coughing and feed aspiration.



# Prognosis



- In racehorses, prosthetic laryngoplasty plus ventriculocordectomy is the treatment of choice. Success ranges from 48% to 71%
- For horses that are not used for athletic speed events, a prognosis for successful outcome after prosthetic laryngoplasty is estimated to be 80% to 90%
- In the long-term there may be gradual loss of abduction over a period of years possibly affecting the later athletic performance.
- 5-10% of horses remain chronic coughers.

# Prognosis

A white horse is running from left to right across a sandy or dusty surface. The horse is in motion, with its legs extended and a cloud of dust or sand kicked up behind it. The background is a light, hazy sky.

- 5-10% of horses remain chronic coughers.
- If the suture fails (due to infection, breakage or pulling through the cartilage) a 2nd tieback can be performed; however, success rates decrease and chance of subsequent failure increases.
  - Careful dissection is required because of the previous surgery.

# *Pre-Operative Medication*

A white horse is running across a sandy desert landscape, kicking up a cloud of dust behind it. The horse is in profile, facing left, and its mane and tail are slightly flowing. The background is a vast, open desert under a clear sky.

- **Pre-op medications include:**
  - Potassium penicillin, 22,000IU/kg (IV)
  - Gentamicin, 6.6mg/kg (IV)
  - Phenylbutazone, 4.4mg/kg (IV)
  - Tetanus toxoid (IM)

# Anesthesia

A white horse is running in a desert, kicking up sand. The horse is in the center of the frame, moving from left to right. The background is a vast, open desert landscape under a clear sky. The sand is light-colored and the horse's hooves are dark.

- Most sinus surgeries nowadays are performed under standing sedation rather than under general anaesthesia. This reduces the risk to the patient as well as allowing the surgeon to operate in a more comfortable position. It is also easier for the surgeon to appreciate the relevant anatomy, and haemorrhage is reduced compared to a horse lying on its side. Standing sedation also reduces the cost associated with general anaesthesia.

# Anesthesia

- **General anesthesia:**
  - Small endotracheal tube
  - Left lateral recumbency
  - Neck extended
  - IV catheter low in left jugular vein or on right side
  - 5L fluid bag under proximal neck (helps extend the throatlatch upwards)



# Anesthesia

A white horse is running in a field, kicking up a cloud of dust. The horse is in the center of the frame, moving from left to right. The background is a bright, hazy outdoor setting.

- Before laryngeal surgery, horses are fasted for 8 to 12 hours. Preoperative and perioperative nonsteroidal anti-inflammatory medication (phenylbutazone) and broad-spectrum antibiotics are indicated for these surgeries for a period of 5 days. The anaesthetist should be aware that some horses with a longstanding unilateral arytenoid paralysis can be difficult to intubate with a standard-size tube, and a smaller-diameter tube should be available.
- In unique situations, the horse may be first placed in dorsal recumbency to allow for visual and digital inspection of the arytenoid cartilages through a laryngotomy. This approach might be taken when endoscopic observations suggest the presence of subtle arytenoid chondritis or when there has been previous laryngeal surgery.

# Anesthesia

A white horse is running across a sandy desert landscape, kicking up a cloud of dust behind it. The horse is in full gallop, and the background is a hazy, sunlit desert.

- Prior to surgery (ideally, 4 hours prior), the patient is given 2 g of phenylbutazone intravenously to minimize postoperative laryngeal oedema. The surgical area at the caudal aspect of the mandible is clipped and prepared aseptically.

# *Required Suture Material*

A white horse is running across a sandy or dusty field, kicking up a cloud of dust behind it. The horse is in profile, facing left, and its mane and tail appear to be blowing in the wind. The background is a bright, hazy outdoor setting.

- Various prosthetic materials have been used for PL. Materials reported include catgut, wire, nylon, polyester, polytetrafluoroethylene, ultra-high molecular weight polyethylene, and braided cable. These sutures are non-absorbable.
- Many of these materials are much stronger than the necessary requirements to obtain and maintain arytenoid abduction.



# *Contraindications*

A white horse is running in a desert, kicking up dust. The horse is the central focus of the image, and the background is a hazy, sandy landscape.

- **Horses with Grade 1, Grade 2 or Grade 3 RLN are not treated surgically.**
- **Do not perform if there is necrosis, abscesses, neoplasia or other lesions present at the surgery site**