

INTRODUCTION

Unilateral, left-sided paralysis is the most common presentation of recurrent laryngeal neuropathy (RLN). Apart from localized trauma to the nerve in the remaining vast majority of cases the cause of the neuropathy is unknown. The dorsal cricoarytenoideus muscle (CAD), innervated by the recurrent laryngeal nerve, is the main abductor of the arytenoid cartilage and vocal fold and thus RLN results in a significant reduction in airflow in exercising horses.

Clinical signs of RLN are abnormal inspiratory noise at exercise and poor exercise performance and hence the goals of surgery are to eliminate or reduce respiratory noise and/or improve athletic performance in affected individuals. Recurrent laryngeal neuropathy in the horse is common with a prevalence ranging from 2.6% - 11% in light breeds up to 42% in draught breeds. The incidence is highest in young horses.

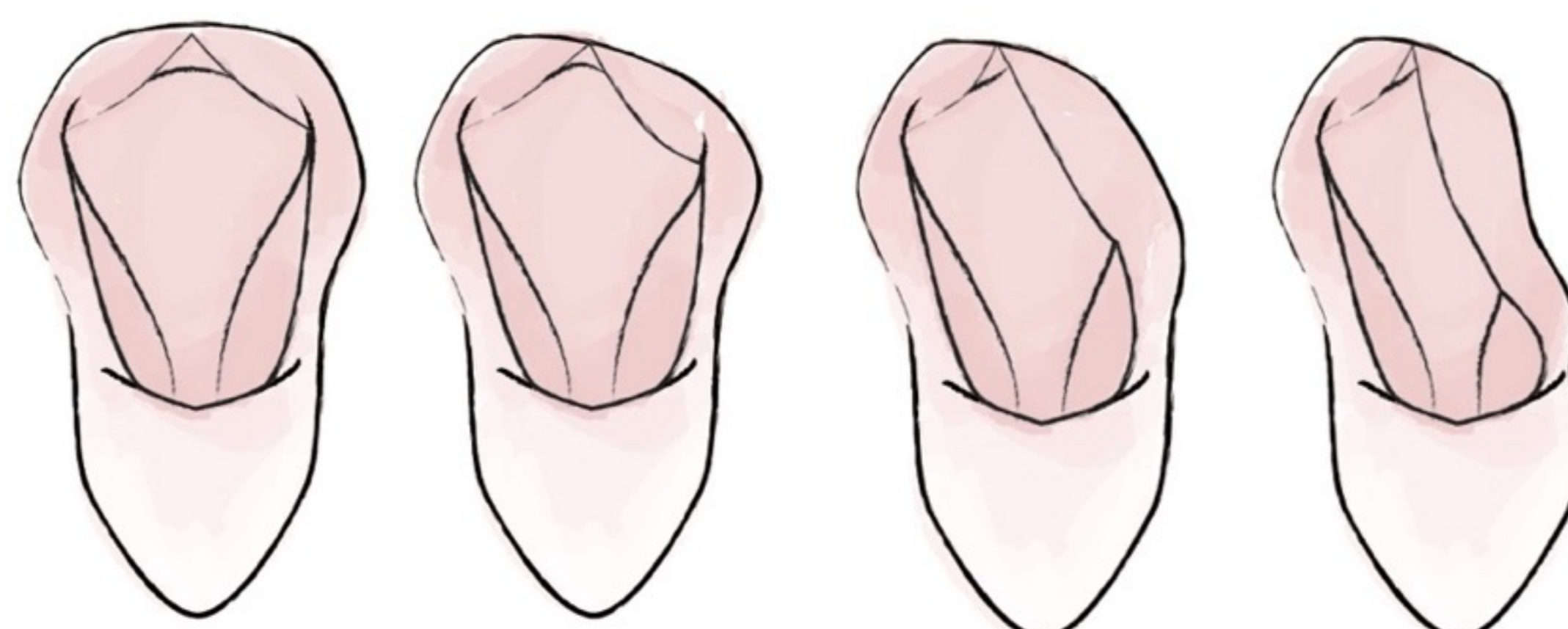


Figure 1. Schematic examples of 4 grading system of laryngeal hemiplegia

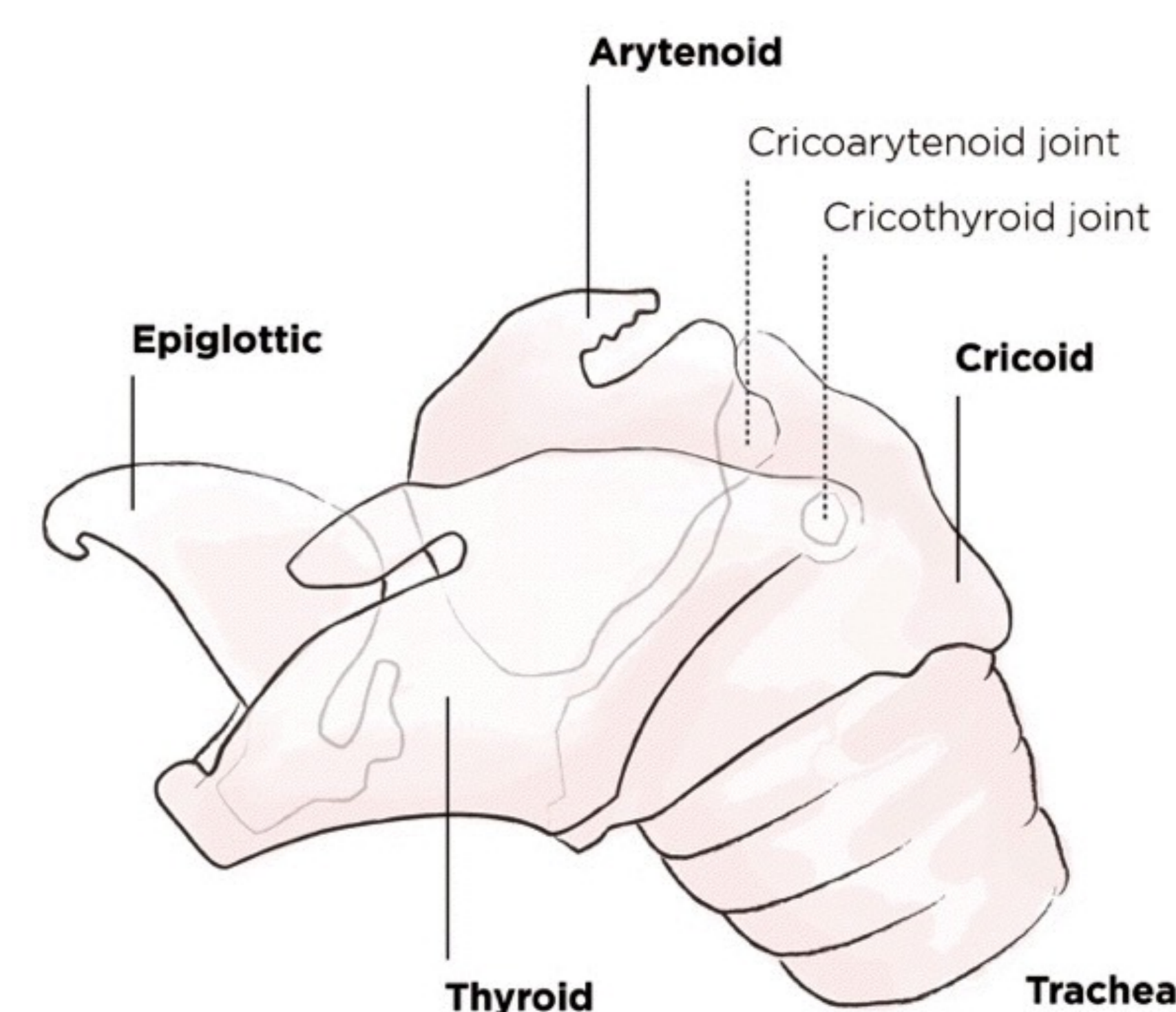
OBJECTIVES

The bibliographic revision carried out in this project describes the existent surgical techniques to solve laryngeal hemiplegia in horses, weighting the advantages and disadvantages of each one of them, putting emphasis on the modifications introduced by the different authors with the objective of improving the classical techniques, as well as providing a set of recommendations and opinions of the clinics gathered based on their experience and their operational practice

SURGICAL TREATMENTS FOR LARYNGEAL HEMIPLEGIA

ANATOMY OF THE LARYNX

Figura 2: Laryngeal anatomy in the horse. The cricoarytenoid joint sets the origin of the cricoarytenoideus dorsalis muscle. Each CAD muscle has 2 distinct NMCs, each innervated by a primary nerve branch of the recurrent laryngeal nerve.



Laryngoplasty (LP)

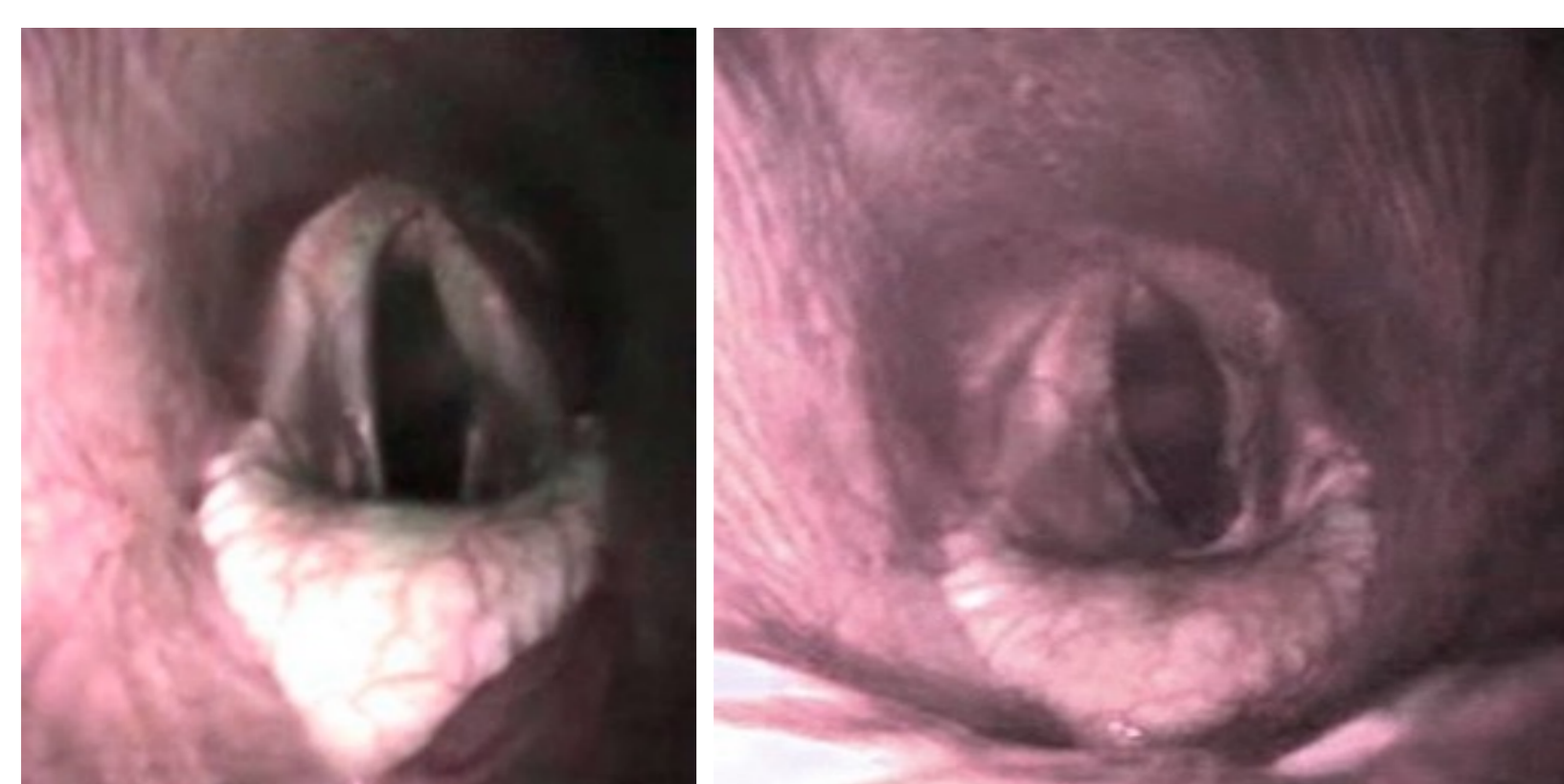
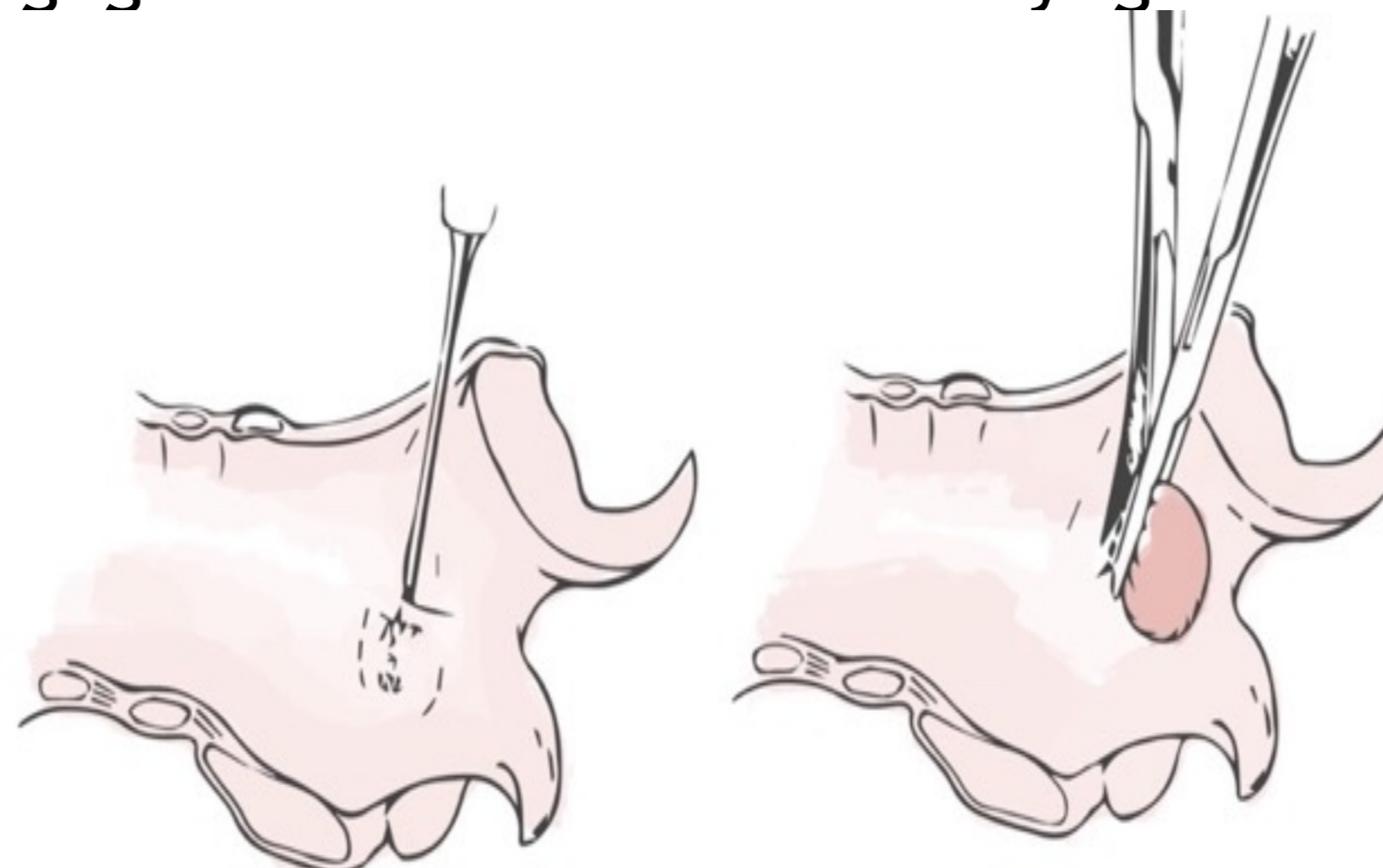


Figure 3. Endoscopic image of the larynx of a horse at rest with grade III RLC- left sided (before and after LP) (Courtesy Dra. Marta Prades & Dr. Frederic Climent, UE Hospital Clínic Veterinari UAB).

Ventriculectomy (VEC), Vocalcordectomy (VOC) and Ventriculocordectomy (VC)

Figure 4. Schematic illustration of the VEC technique. The "roaring" burr is placed into the laryngeal ventricle and rotated so that the head of the burr engages the mucosa of the laryngeal sacculus



Laryngeal reinnervation

There are a number of methods for reinnervation, including nerve-to-nerve anastomosis, electrical stimulation, neuromuscular pedicle grafting (PGN)

Arytenoidectomy

Arytenoidectomy can be total, subtotal or partial

EQUESTRIAN DISCIPLINE	Slow progression of clinical signs	Quick progression Of clinical signs
Racehorse	<p>Yearling with good genetic potential:</p> <p>1.PGN or functional electrical stimulation 2.VC bilateral +/- LP</p> <p>Experienced horses: VC bilateral + LP</p>	VC bilateral + LP
Sport horse (Jumping horse & Dressage horse)	<p>Yearling with good genetic potential:</p> <p>1.PGN or functional electrical stimulation 2.VC bilateral +/- LP</p> <p>Experienced horses: VC bilateral + LP</p>	VC bilateral + LP
Draught horse	VEC bilateral + VOC unilateral/bilateral	VEC bilateral + VOC unilateral/bilateral
Pleasure horse	Start with VEC bilateral + VOC unilateral/bilateral	Start with VEC bilateral + VOC unilateral/bilateral +/- LP (depending on the budget)

Table 1. Choice of surgical treatment

DISCUSSION

The choice of treatment for RLN is dependent on many factors, including the individual surgeon's preference

1. Discipline of the horse, expectations for the horse, age and breed
2. Severity of RLN and progression
3. Owner budget and surgical morbidity. Select between sedation or general anesthesia
4. Surgeon's experience

CONCLUSIONS

The surgical techniques and experimental studies revised and their obtained results to solve laryngeal hemiplegia in horses are still subject to debate and revision at a worldwide level and controversy amongst surgeons remains. Even though the in vitro experiments and the experimental techniques based on laryngeal reinnervation continue to seem the most promising in the long term for young horses with potentially good athletic careers, it still seems that the day when these new techniques can be applied on a normal basis as part of the routine upper airway surgery protocols is still far.

The two main objectives of this work were firstly to analyze the compilation of updated information about all the different surgical techniques described to solve LH in horses. The second objective was choosing the most adequate techniques and the results are described and summarized in Table 1. The results have then been contrasted with surgeons from 3 different Equine Hospitals and the suggested determining factors found were well accepted. More research needs to be done in the field of neuromuscular grafting.