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Recurrent Laryngeal Neuropathy (RLN):

Pathogenesis and management

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- **Laryngeal collapses:**
 - Recurrent Laryngeal Neuropathy:
 - Naturally-occurring disease is a bilateral mono-neuropathy of the recurrent laryngeal nerves. (Collins et al., 2009)
 - **Acquired/preventable:** Trauma, iatrogenic damage, hepatic disease, lead poisoning.
 - Non-RLN Laryngeal collapses:
 - Unilateral/bilateral non-RLN laryngeal collapse
 - Unilateral or Bilateral Ventral Midline Arytenoid Deviation
 - Congenital structural malformation: Fourth branchial arch defect (4-BAD)
 - Acquired structural malformation: Arytenoid chondritis



Recurrent laryngeal neuropathy (RLN)

- Naturally-occurring disease:
 - Prevalence **3% (TB) – 43% (Draft)**- Lane *et al.*, 2003, Brakenhoff *et al.*, 2005.
 - Can be **genetic** (see presentation of Professor Vince Gerber “Genetic risk factors for equine respiratory disease”)



- Not all horses with laryngeal collapse have **naturally-occurring** recurrent laryngeal neuropathy.
- The prognosis, treatment and/or management varies depending on the various causes of laryngeal collapse.
- AND the co-morbid disease: AE fold collapses, DDSP
- So identify acquired/trauma RLN and other causes of laryngeal collapse.

RLN does not always mean naturally-occurring disease

- Need to assess:
 - Look for physical evidence of iatrogenic or trauma to recurrent laryngeal n. (i.e., Horner syndrome)
 - Focus on appearance of laryngeal collapse.
 - Neuromuscular status of laryngeal musculature.
 - Status of laryngeal cartilages.



Current understanding in treatment of RLN

- Static treatment- non-physiological:
 - **Ventriculo-cordectomy (i.e. Hobday)**
 - Laryngoplasty (i.e. tieback)
 - Arytenoidectomy
- Dynamic treatment (physiological):
 - Laryngeal reinnervation
 - Laryngeal pacemaker (muscle and nerve? Rehabilitation?)

Sound Analysis

Experimental Data - Cordectomy and Ventriculocordectomy (VC)

- Bilateral VC significantly improved abnormal inspiratory noise by end of 90 days (Brown et al., 2003).
- Unilateral laser VC significantly improved sounds but not as effectively as bilateral VC (Robinson et al., 2006).
- Unilateral laser vocal cordectomy only gave mild improvement in abnormal inspiratory noise (Brown et al, 2005).



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Unilateral/bilateral VE/VEC in client-owned horses

Naturally-occurring disease

- Elimination of abnormal sounds in 66% n=92 (Taylor et al., EVJ 2006).
- Elimination of abnormal sounds in 82%, n=22 (Henderson et al., JAVMA 2007).
- Reduction of abnormal sounds in draught horses better after VEC (n=19) than VE (n=11) (Cramp et al., 2009).

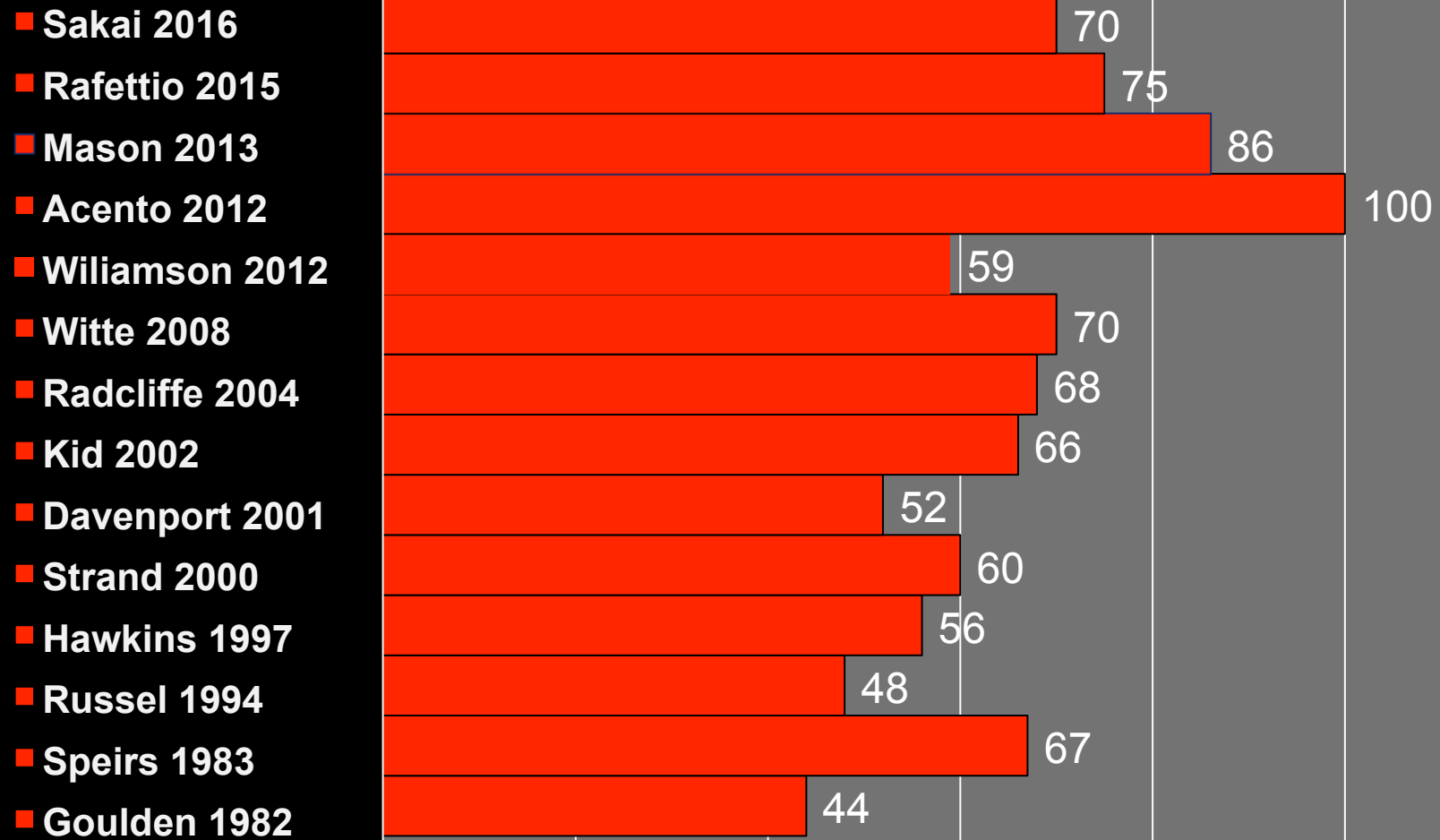
Laryngoplasty

	80% HR MAX		100% HR MAX	
	control	LPVC	control	LPVC
V_T (liters/breath)	13	12	14.5	12.5
V_E (liters/min)	1013	948	1293	1128*
P_{ui} (mm Hg)	-4	-4	-13	-17
PIF(L/sec)	-43	-39	-59	-49
Z_1 (mmHg/l/sec)	0.29	0.35	0.46	0.59
PaO_2	86	84	73	66
$PaCO_2$	37	39	43	50*

* Different from control, Adjusted Means Results (n=6)

Radcliffe et al., 2006

Prosthetic Laryngoplasty in Racehorses (Performance)





Tracheal aspirations post surgery

- 95 horses with persistent DDSP and/or dysphagia cases.
- 57 treated with laryngeal tie-forward.
- 23 treated with injection bulking.
- 15 other treatments.



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Dynamic treatments



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After nerve-pedicle laryngeal reinnervation (n=63)

- Time to first start range from 7.5-8.6 months.
- 95% return to racing.
- 58% earned more money per start after surgery.

Nerve-pedicle being replaced by nerve implantation laryngeal reinnervation

Fulton 2003

Rossignol et al., 2016



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