비엔동물전문의료센터
BIEN ANIMAL MEDICAL CENTER

비엔 마취 세미나

: Laryngeal examination & secure the airway

Anesthesiologist DVM. Nam

비엔동물전문의료센터 남창훈 마취과장

Today seminar

1. Noisy breathing

- ☐ Wheeze
- ☐ Rhonchi
- ☐ Stridor
- ☐ Stertor

2. Laryngeal exam

- ☐ BOAS
- ☐ Morphological changes
- ☐ Dorsal pharyngeal wall
- ☐ Supraglottic mucosa
- ☐ Cuneiform processes
- ☐ Ventricles
- ☐ Anesthetic protocol for laryngeal examination

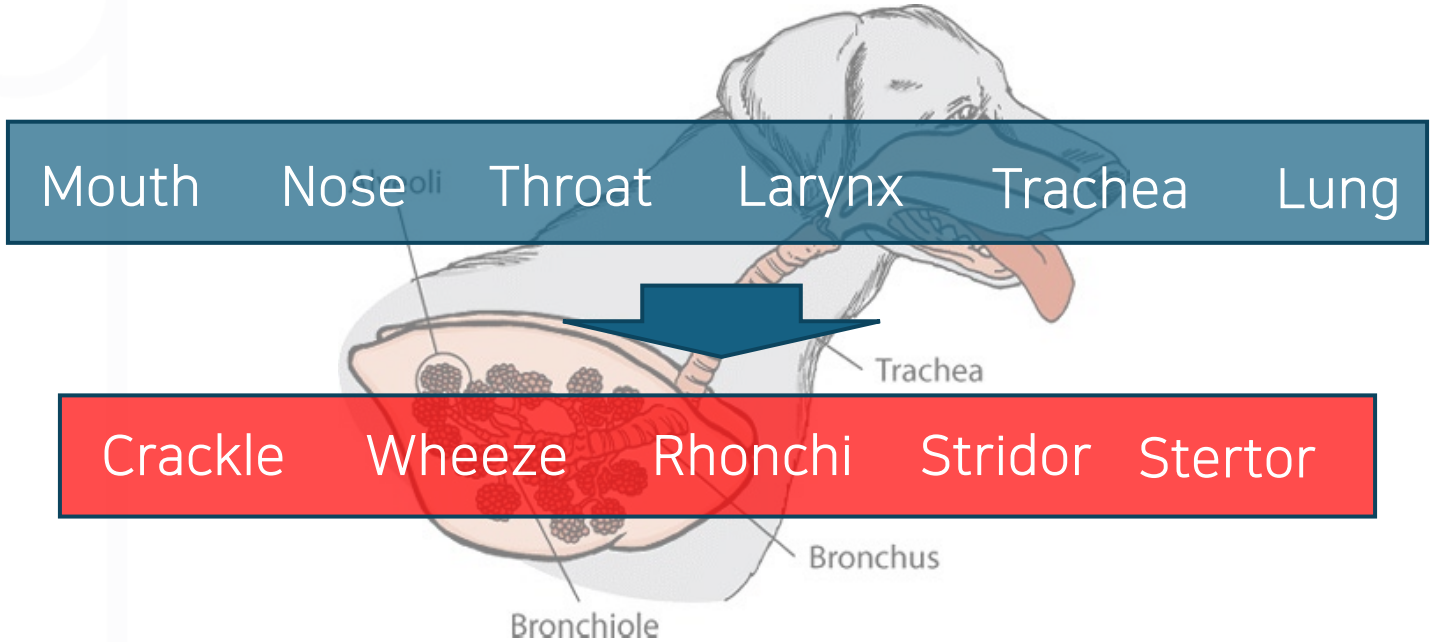
3. Secure the air way

- ☐ Mouth to snout
- ☐ Difficult intubation
- ☐ Retrograde intubation
- ☐ Tracheostomy
- ☐ Cricothyroidotomy

Noisy breathing

Noisy Breathing

: Typically caused by a partial blockage or narrowing at some point in the airways (respiratory tract)



https://www.msdvetmanual.com/-/media/manual/veterinary/images/ddd_dog_lungs_and_airways.gif?thn=0&sc_lang=en

Wheeze

Wheeze

: Continuous, coarse, whistling sound produced in **narrowed** the respiratory airways during breathing.

→ **Usually on exhalation** but may occur during inhalation or both.
→ Long duration (>80 msec), high pitch (>1,000 Hz), sinusoidal (**musical**) sound.

Asthma, bronchoconstriction, pulmonary edema, pneumonia, bronchitis, fibrosis

https://www.medcomic.com/medcomic/adventitious-breath-sounds/

Rhonchi

Rhonchi

: Low pitched, rattling lung sounds that often resemble snoring when obstruction or secretions in larger airways.

→ Inspiration, expiration both
→ Longer duration (>100 msec), low pitch (<2-300 Hz), loud

Bronchitis

https://www.medcomic.com/medcomic/adventitious-breath-sounds/

Stridor

Review

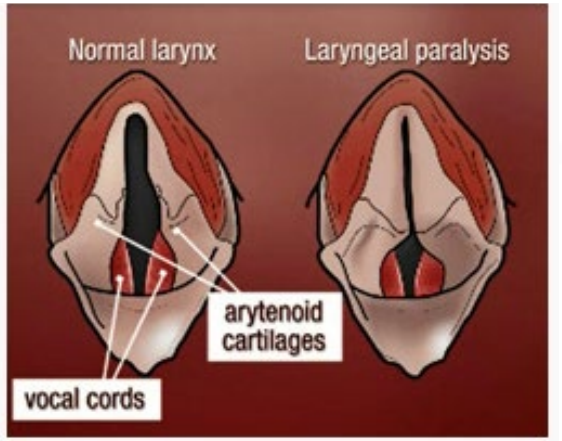
Assessment and causes of stridor

Andreas Pfleger, Ernst Eber*

Division of Paediatric Pulmonology and Allergology, Department of Paediatrics and Adolescent Medicine, Medical University of Graz, Austria

Stridor

: An abnormal, high-pitched, musical breathing sound. It is caused by a **blockage in the throat or voice box (larynx).** It is most often heard when taking in a breath.



→ **Usually on inspiration** (expiratory stridor: intrathoracic tracheal collapse)
→ High pitch

Tracheal collapse, laryngeal paralysis.

http://www.mountpleasant.com.sg/images/maineducation/54/Screen-Shot-2014-06-17-at-10.48.35-AM.jpg

Stertor

Stertor

: The noise that results from vibration of the **pharyngeal tissues (nasopharynx, oropharynx, soft palate)** due to significant upper respiratory obstruction **(nasal/nasopharynx obstruction)**.

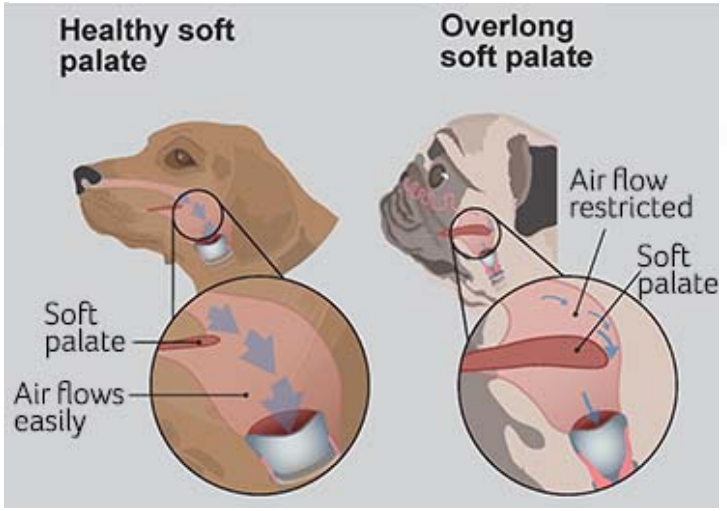
→ Inspiration
→ Low pitch, Loud

Elongated soft palate, redundant pharyngeal tissue, weak pharyngeal musculature, nasal foreign body, nasal tumor.

CLINICAL SIGNIFICANCE OF PULMONARY FUNCTION TESTS

Upper Airway Obstruction*

John C. Acres, M.D., and Meir H. Kryger, M.D.†



https://www.pdsa.org.uk/media/8486/soft-palate-small.jpg

Noisy breathing and respiratory disease

Emergency Respiratory Assessment

World Small Animal Veterinary Association World Congress Proceedings, 2001

Dez Hughes
United States

Respiratory pattern

HELP

Localization of affected airway tract

Heart and Lung Sounds: Good Auscultation

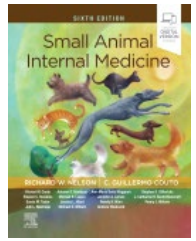
British Small Animal Veterinary Congress 2008

Mike K. Holgate, BVetMed, CertVC, MRCVS
Mike Holgate Cardiology Referrals Ltd
Alsager, Stoke-on-Trent

Figure 2. Lung sound classification after the American Thoracic Society.

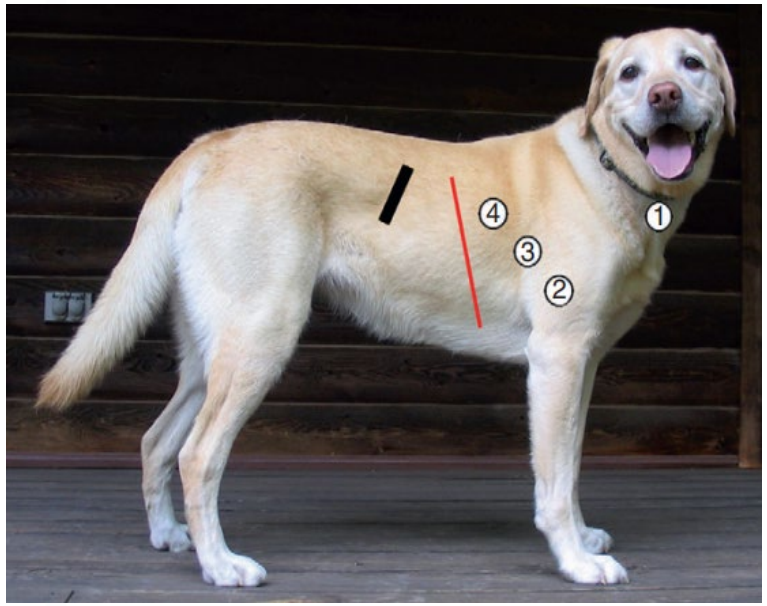
	Produced in	Cause	Example	Characteristics (pitch/amplitude)
Continuous sounds (inspiratory/expiratory)				
Wheeze	Narrowed airways	Airway secretions, airway flutter	Asthma, bronchoconstriction	High/variable
Rhonchi	Large airway with rapid air movement	Large airway secretions	Bronchitis	Low/variable
Stridor	Upper airway Inspiratory	Turbulence/ obstruction	Upper respiratory tract (URT) paralysis, foreign body	High/variable
Stertor	Nasal/nasopharynx	Airway narrowing/ obstruction	Nasal foreign body, nasal tumour	Variable/variable
Discontinuous sounds (inspiratory only)--were 'rales'				
Crackles (fine)	Re-opening small airways	Fibrosis, lower airway disease	Asthma Westie lung	High/low
Crackles (coarse)	Re-opening larger airways	Obstruction, airway secretions	Bronchitis	Low/high

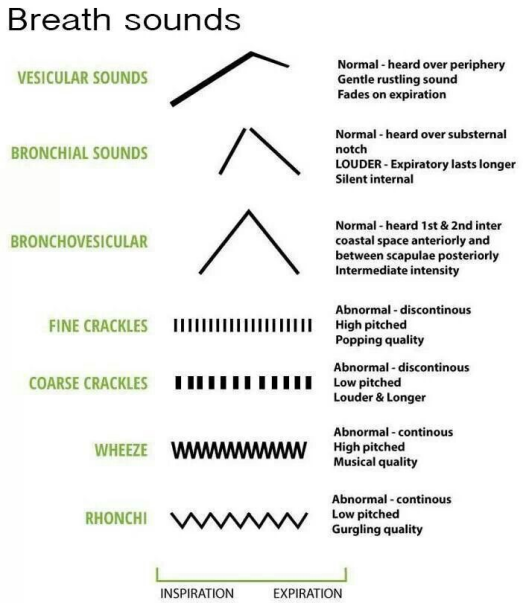
Auscultation



Auscultation

1. Respiratory pattern, respiratory rate
2. Upper airway auscultation (Nasopharynx – Principal bronchi)
3. Lung fields auscultation (Lt. & Rt., cranial, caudal)





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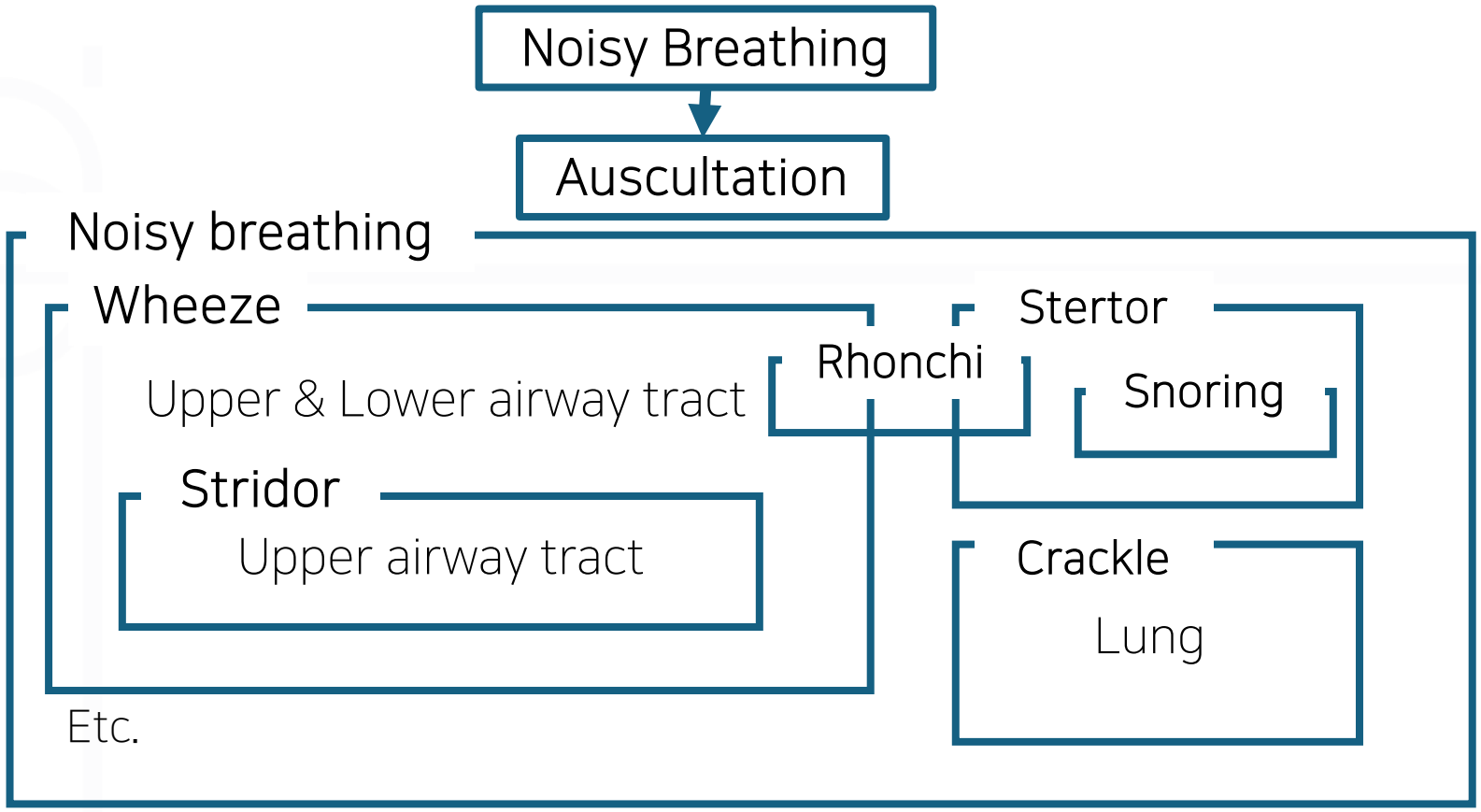


Brachycephalic obstructive airway syndrome

BOAS component

- Stenotic nares
- Elongated soft palate
- Everted laryngeal saccule
- Laryngeal collapse
- Tracheal hypoplasia
- Macroglossia

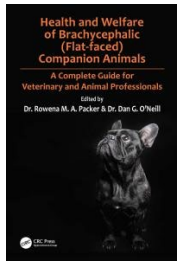
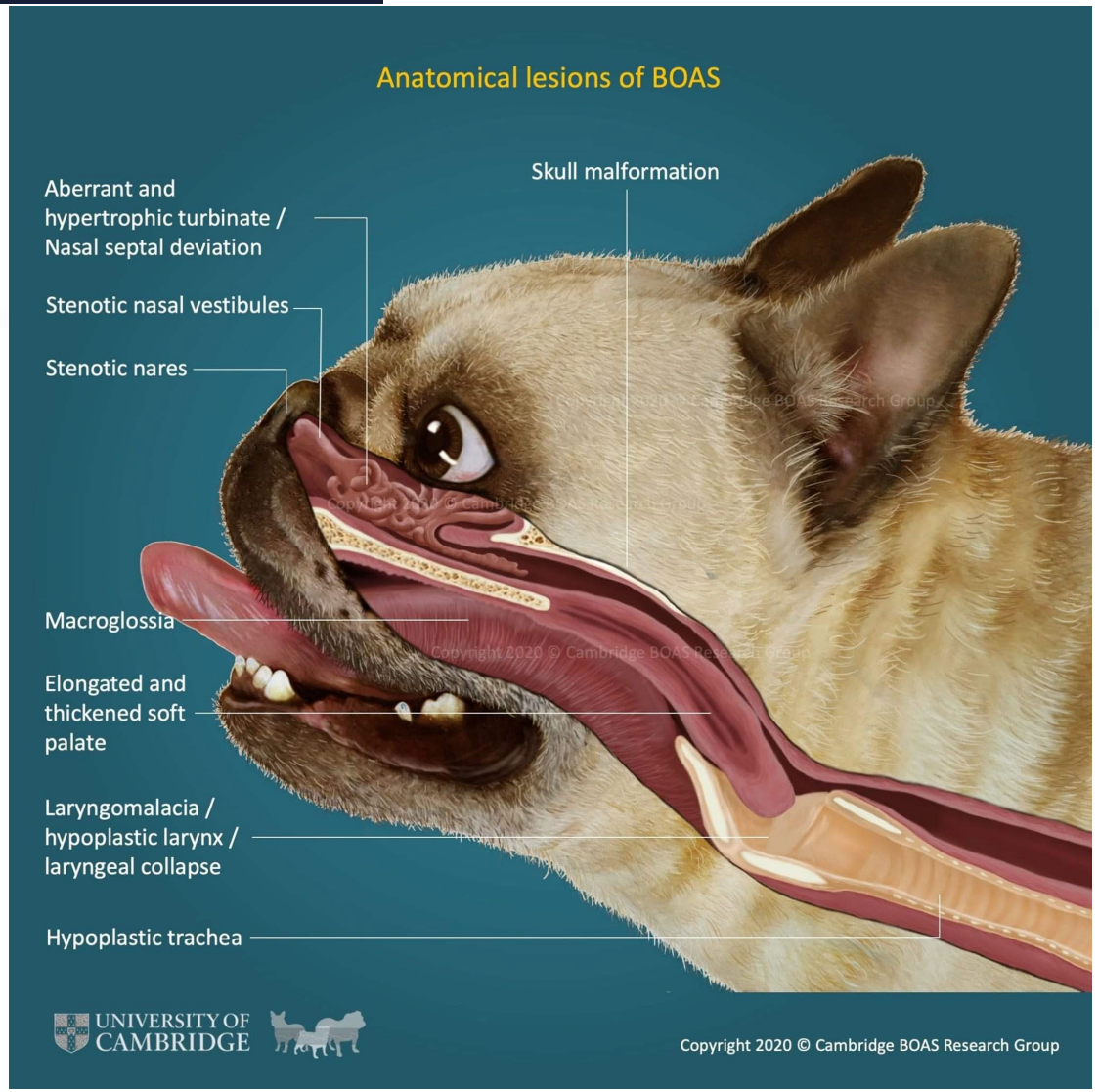
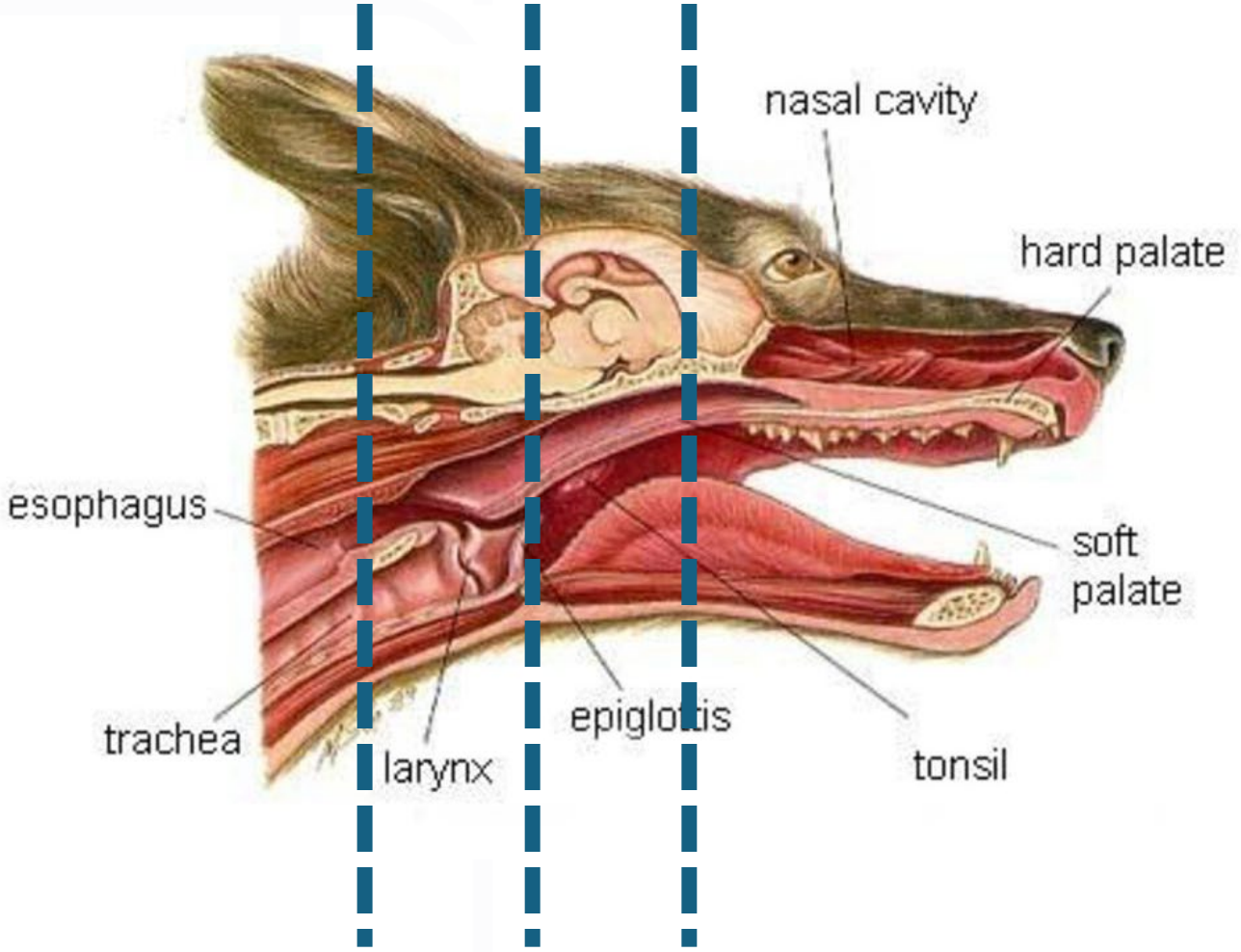


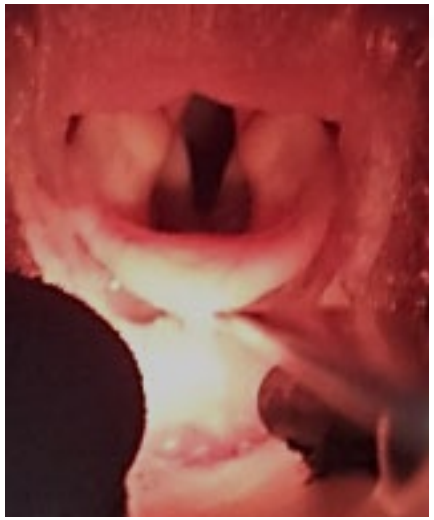
TABLE 10.2
Lesion Sites for Brachycephalic Obstructive Airway Syndrome

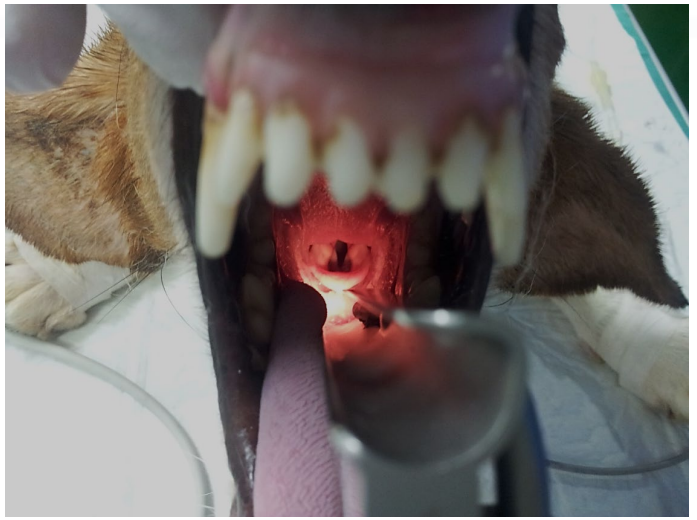
Primary	Secondary
• Stenotic nostrils	• Thickened soft palate
• Elongated and thickened soft palate	• Nasopharyngeal collapse
• Nasal turbinate hypertrophy and malposition	• Tonsillar eversion and hypertrophy
• Nasopharyngeal restriction	• Laryngeal collapse
• Macroglossia	• Bronchial collapse
• Tracheal hypoplasia	• Gastrointestinal reflux with oesophagitis
• Laryngeal hypoplasia	• Hiatal hernia

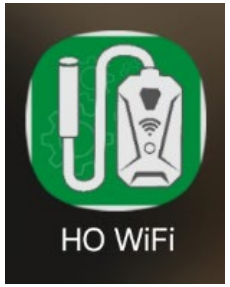


Laryngeal exam



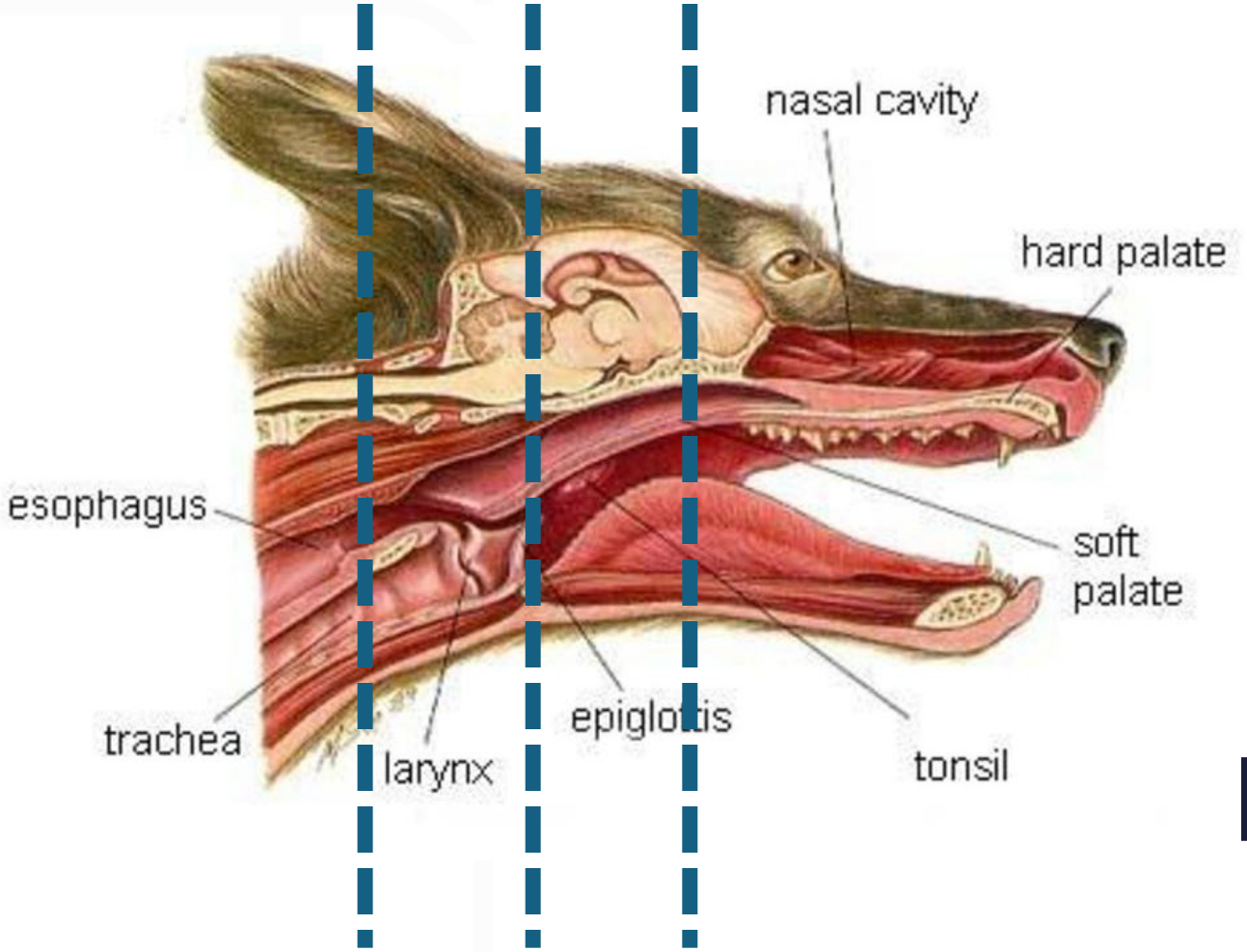




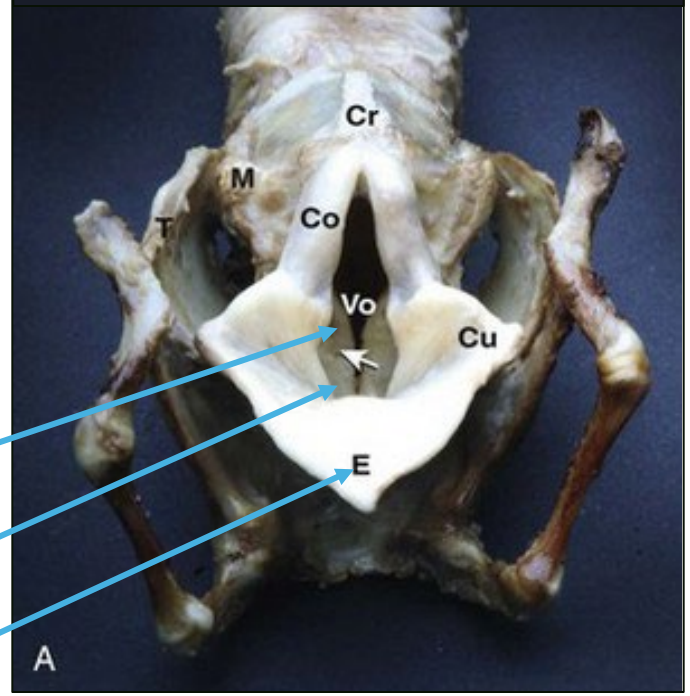


https://www.google.com/url?sa=i&url=https%3A%2F%2Fslideplayer.com%2Fslide%2F13447758%2F

Laryngeal exam



A, Articulation of the thyroid and cricoid
Co, corniculate process
Cr, cricoid cartilage
Cu, cuneiform process
E, epiglottis; M, muscular process
T, thyroid cartilage
Vo, vocal fold
Arrow, location of ventricle (saccule)



Vocal fold

Vestibular fold

Epiglottis

https://www.google.com/url?sa=i&url=https%3A%2F%2Fslideplayer.com%2Fslide%2F13447758%2F

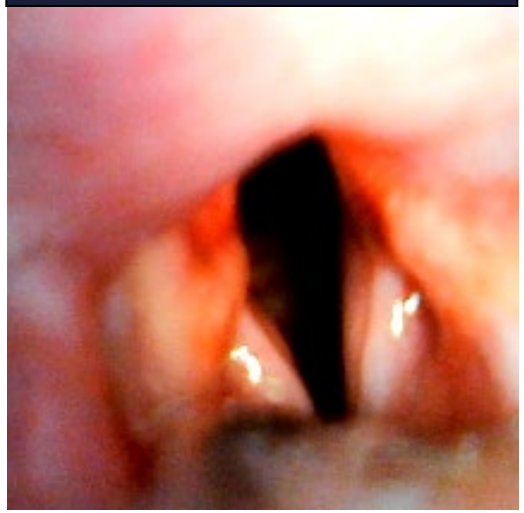
Morphological changes

Normal larynx

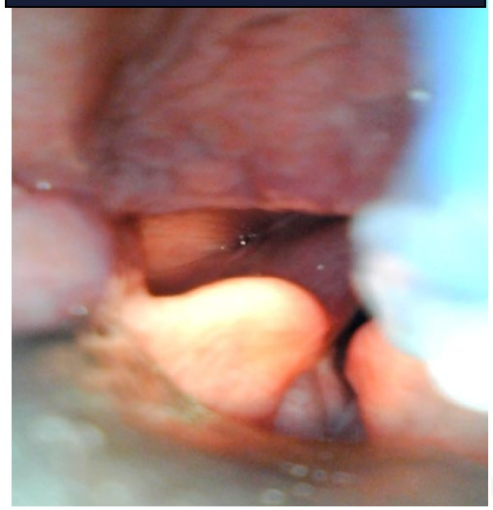
Swelling of vocal fold

Swelling of vestibular fold

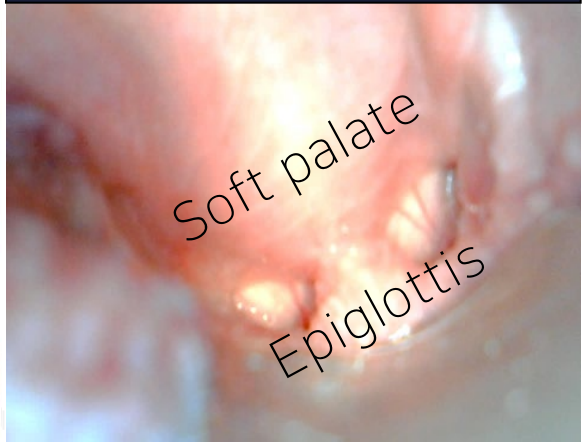
Subglottic edema

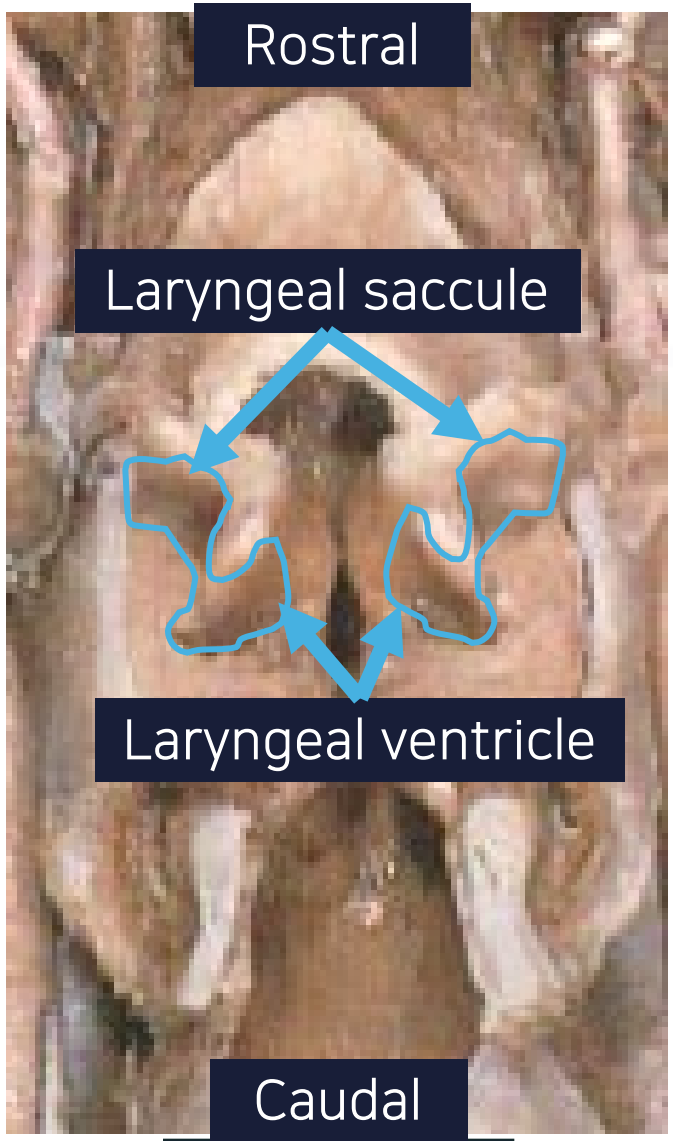


Everted saccule

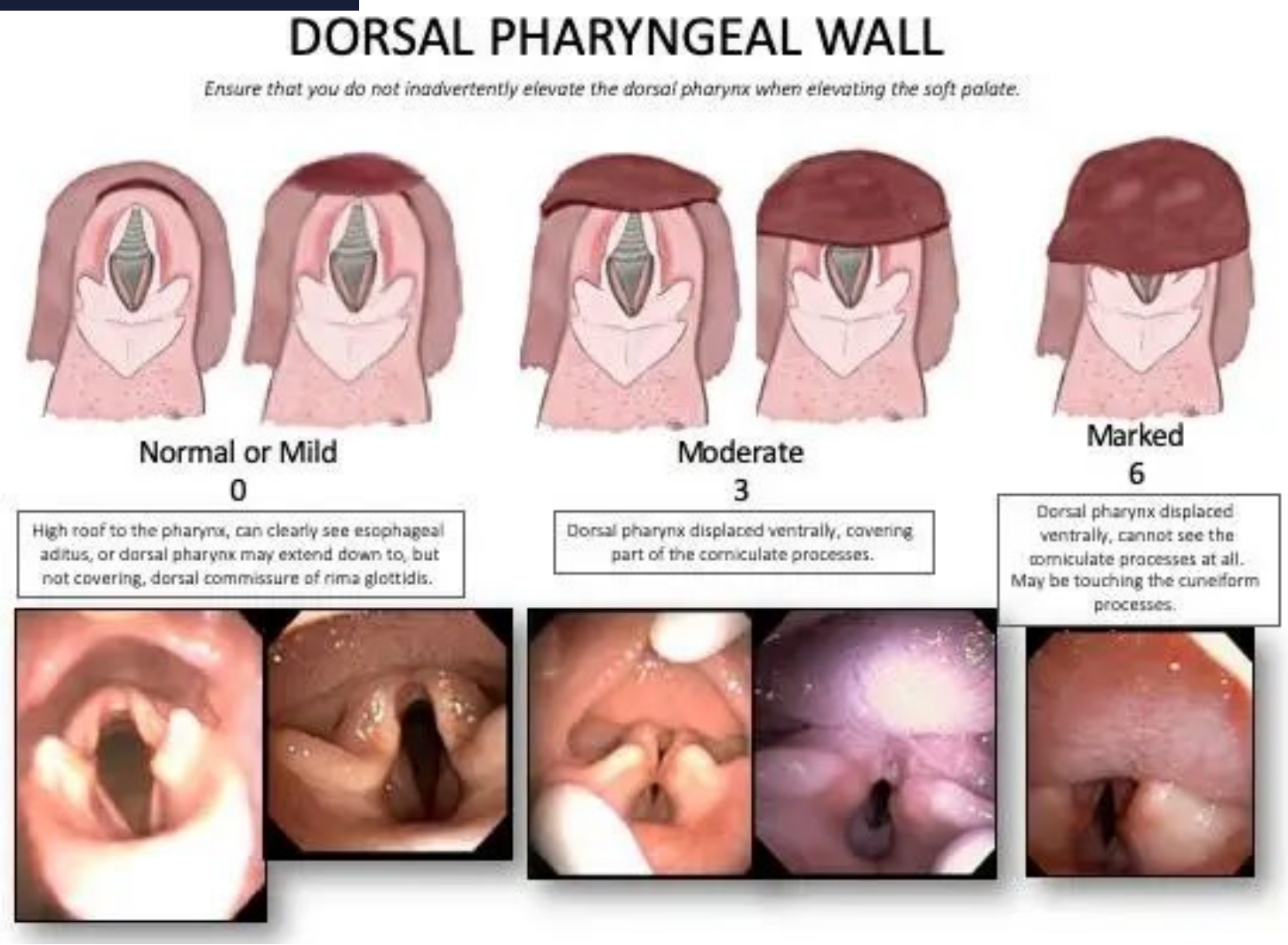


Soft palate elongation

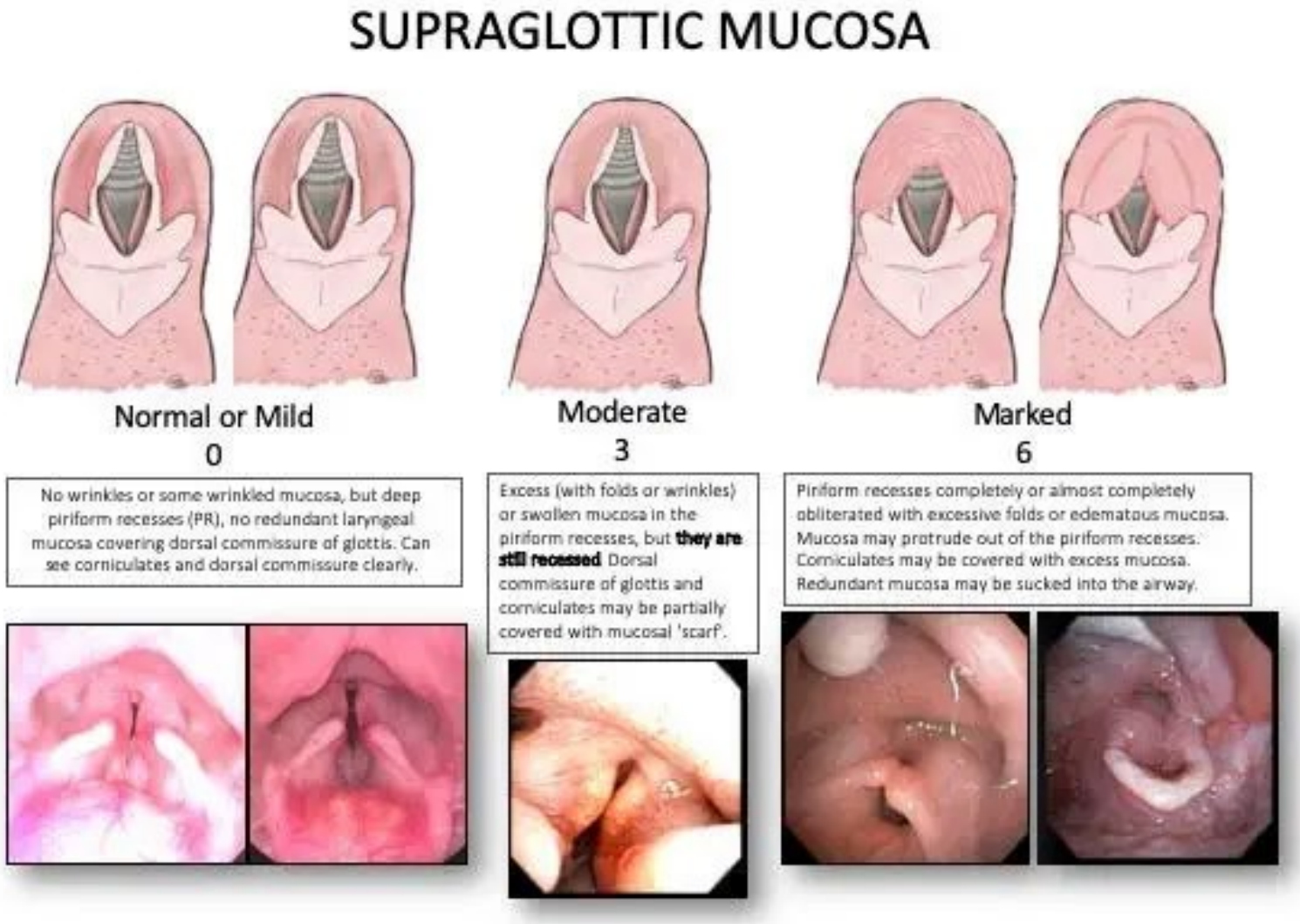




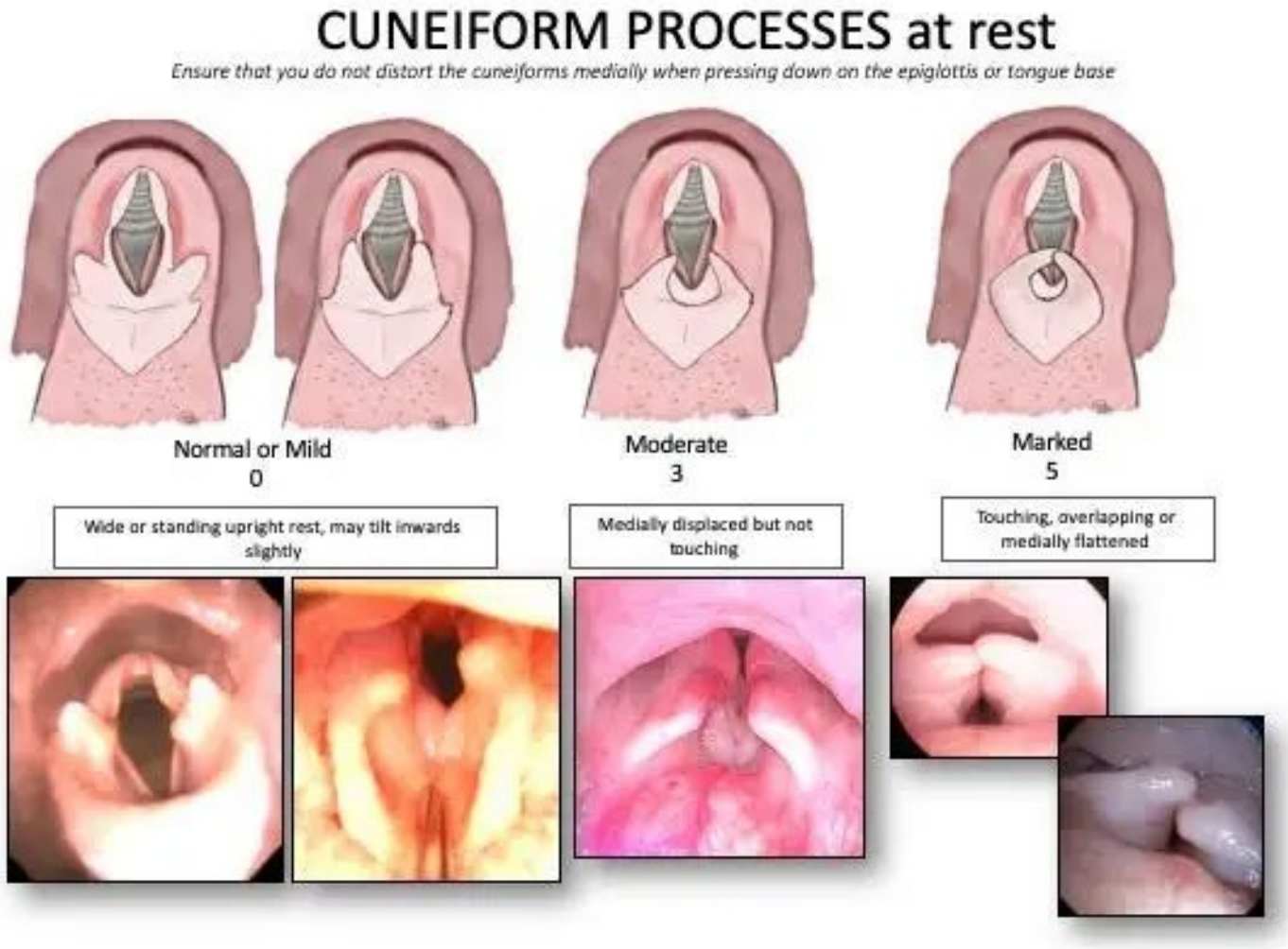
Dorsal pharyngeal wall



Supraglottic mucosa



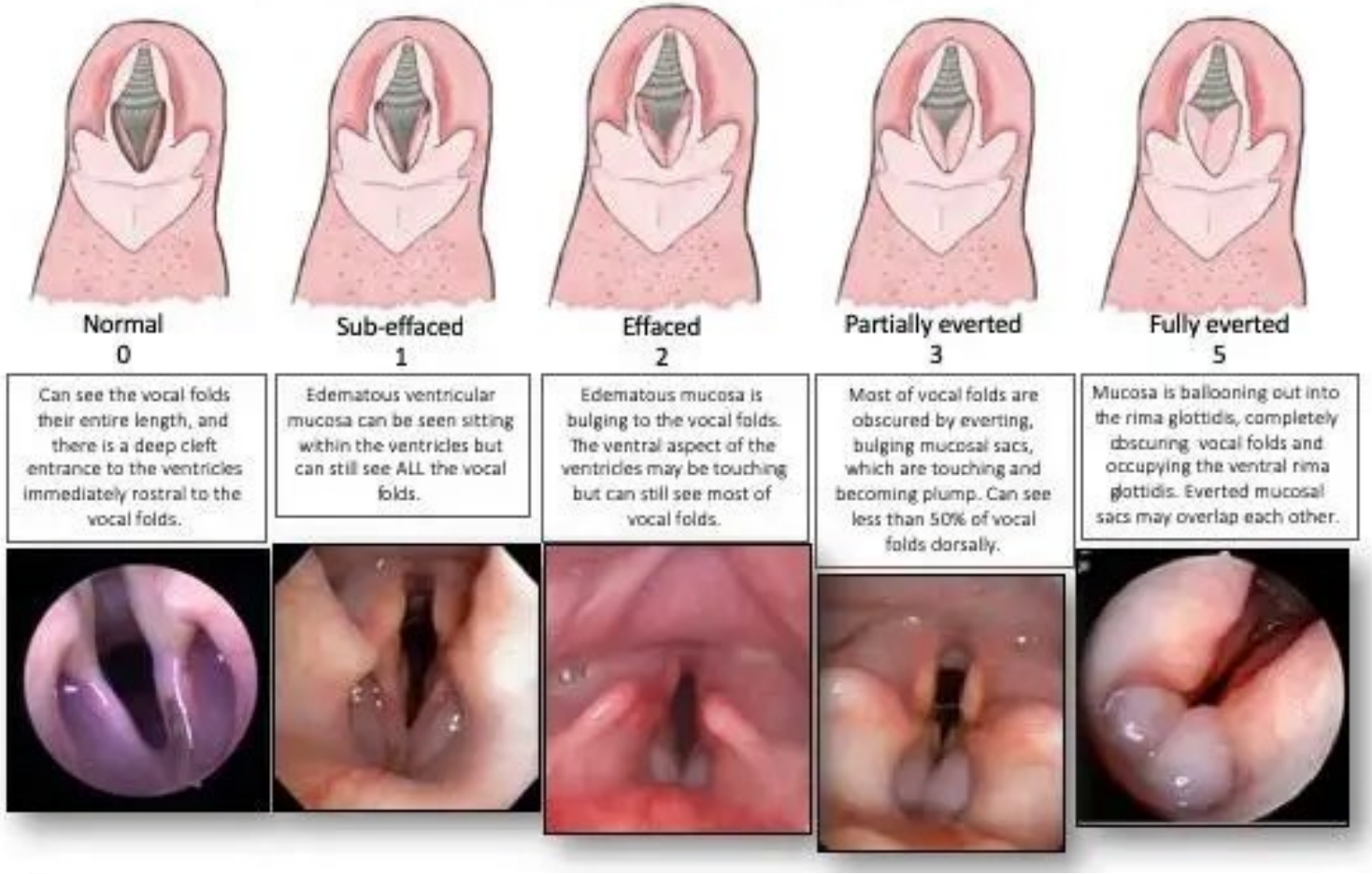
Cuneiform processes



Ventricles

VENTRICLES

Assess the ventricles (also called saccules) at the beginning of the exam, at rest (not abduction). If the everted tissues are asymmetrical, grade on the more severely affected side.



Anesthetic protocol for laryngeal examination

- **No induction agent with premedication agent:**
  1) Dexmedetomidine 15 *μg*/kg IV
  2) Butorphanol 0.3 mg/kg IV + Dexmedetomidine 7 *μg*/kg IV
  3) Hydromorphone 0.1 mg/kg IV + Dexmedetomidine 5 *μg*/kg IV
- **Induction agent with premedication agent**
  1) Butorphanol 0.5 mg/kg IV + Thiopental / Propofol
- **Induction agent:**
  1) Propofol 3.0 mg/kg IV + Doxapram 2.5 mg/kg IV

Laryngeal function:

Normal laryngeal motion

Review

The Influence of Anaesthetic Drugs on the Laryngeal Motion in Dogs: A Systematic Review

Elisabeth Ranninger [1,*], Marta Kantyka [2] and Rima Nadine Bektas [1]

[1] Department of Clinical Diagnostics and Services, Section of Anaesthesiology, Vetsuisse Faculty University of Zurich, Winterthurerstrasse 260, 8057 Zurich, Switzerland; rbektas@vetclinics.uzh.ch
[2] Department of Clinical Veterinary Medicine, Section of Anaesthesiology, Vetsuisse Faculty University of Bern, Hochschulstrasse 6, 3012 Bern, Switzerland; marta.e.kantyka@gmail.com
* Correspondence: eranninger@gmail.com

Anesthetic level	Reaction to surgical stimulation	Muscle tone (jaw)	Palpebral reflex	Eye and pupil position	Ventilatory rate	Heart rate
Stage I	+		+		N	N
Stage II	+		+		↑	↑
Stage III Light	±		+		N↑	N↑
Medium	-		-		N↓ Intercostal lag	N↓
Deep	-		-		Abdominal slow shallow	↓↓
Stage IV	Ventilatory and cardiac arrest					

Mouth to snout

To perform mouth-to-snout breathing on a dog:

- Use one hand to hold the dog's mouth closed.
- Keep the dog's head flat on the floor with the neck extended in line with the spine.
- Put your mouth over both nostrils, creating a seal.
- Blow quickly—TWICE into the nostrils.
- Look to make sure the chest rises as you blow in.

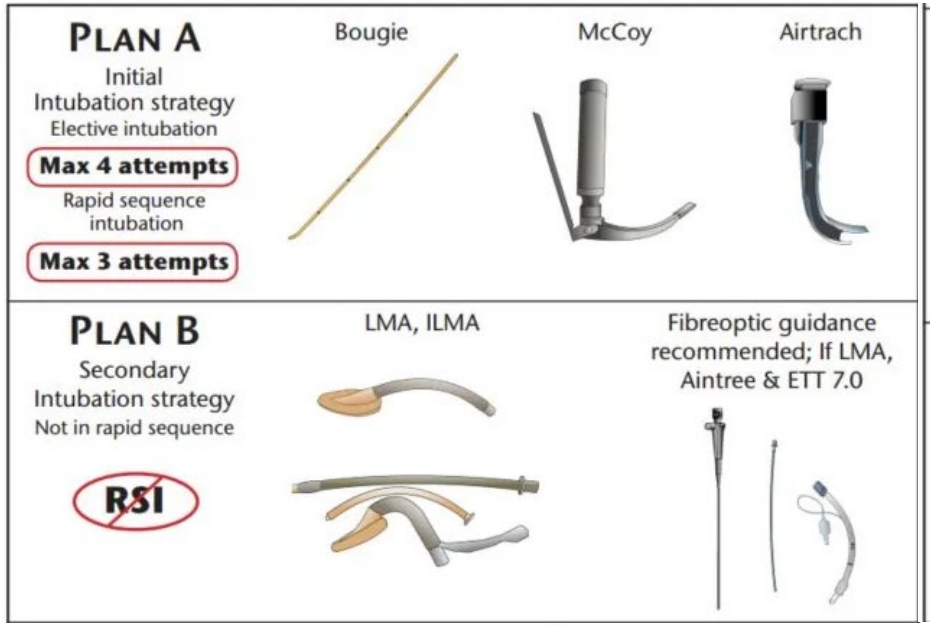
https://www.petmd.com/dog/general-health/how-to-perform-cpr-on-a-dog

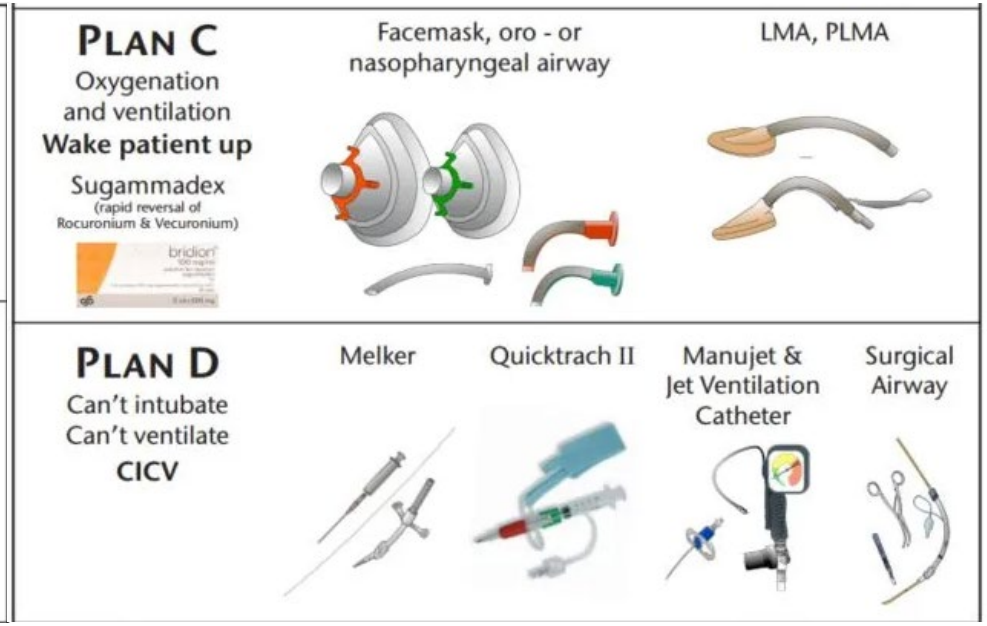
Difficult intubation

- ET tube
- Laryngoscope
- Gauze
- Syringe
- Tie
- Lubricant
- Feeding tube
- Cotton swab

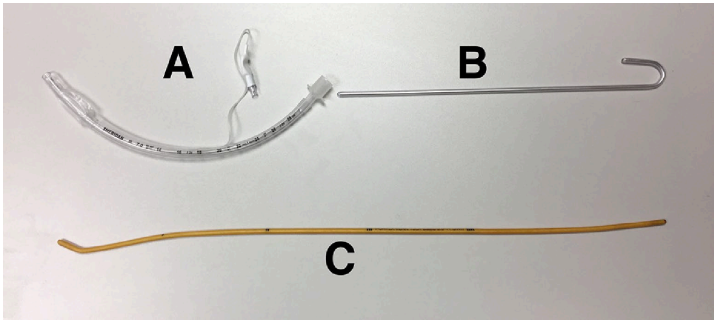
Body weight (kg)	Tube ID (mm)
1 ~ 2.5	2.0 ~ 3.0
2.5 ~ 5	3.5 ~ 4.5
4 ~ 9	5 ~ 6
7 ~ 15	7 ~ 8
15 ~ 25	9 ~ 10
25 ~ 45	11 ~ 12
> 40	14 ~ 16

Difficult intubation





Feeding tube

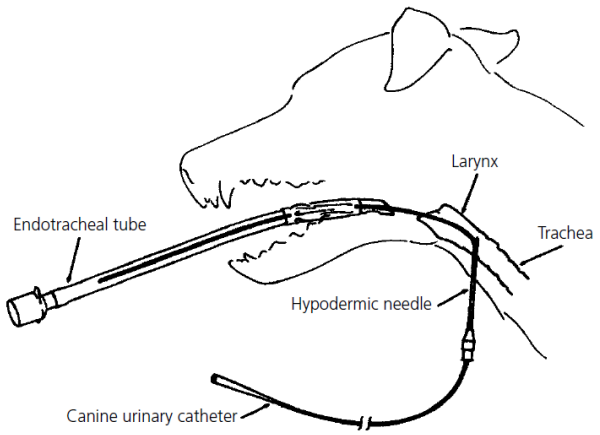


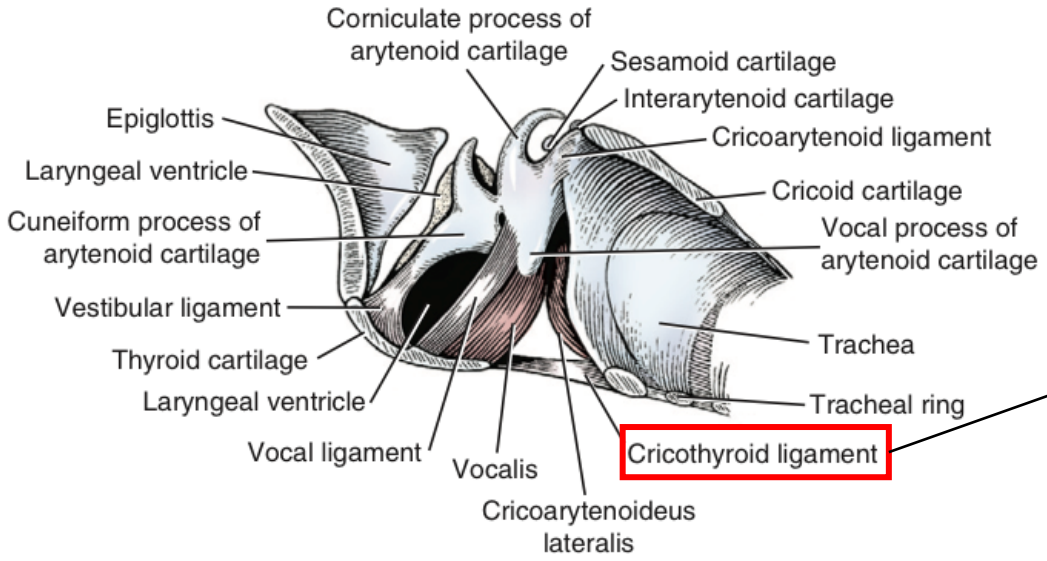
Stylet

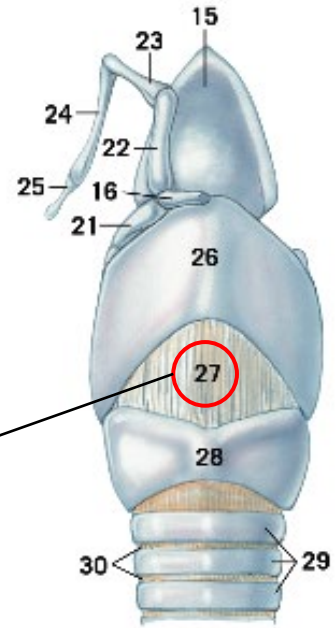
Bougie

https://internetmedicine.com/2013/05/31/the-difficult-airway-app-is-an-essential-tool-for-emergency-physicians/

Retrograde intubation







How to…

1. The needle is passed through the cricothyroid membrane
2. A guide wire is through the needle
3. The ET tube is fed the guidewire
4. The tip of ET tube within the larynx, the needle and the guide remove
5. The ET tube is manipulated into its final position

Tracheostomy

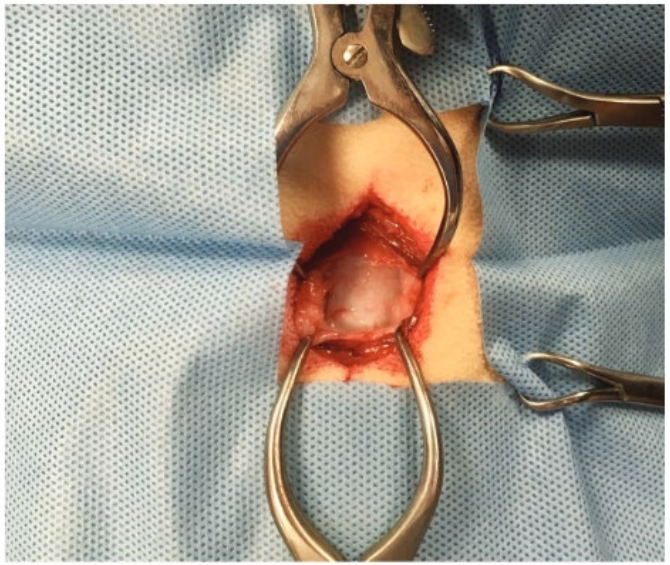


FIG 1. Standard ventral midline approach to the trachea. Note the depth of muscle and skin edges in this English bulldog neck. (Cranial is orientated to the top of the photograph)

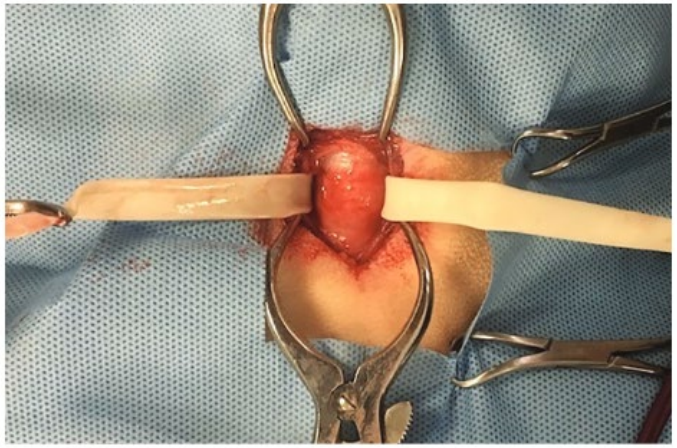


FIG 3. The Penrose drain is passed dorsal to the trachea. (Cranial is orientated to the top of the photograph)

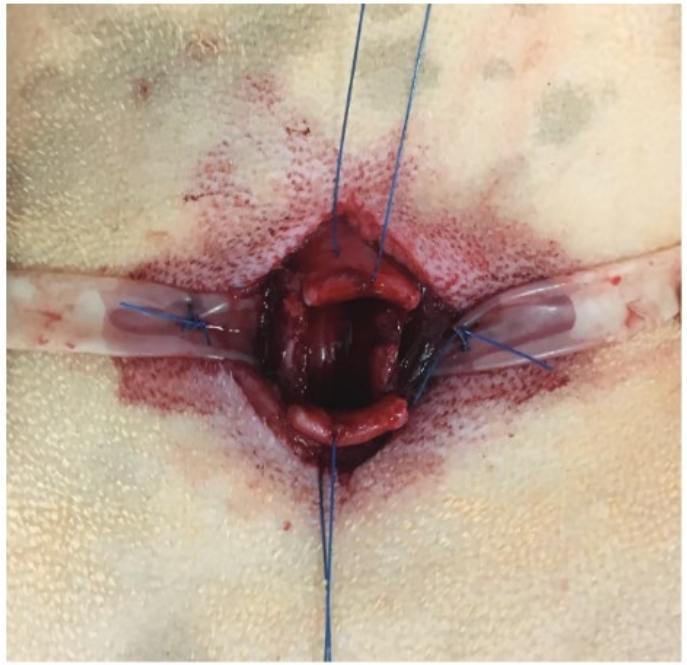
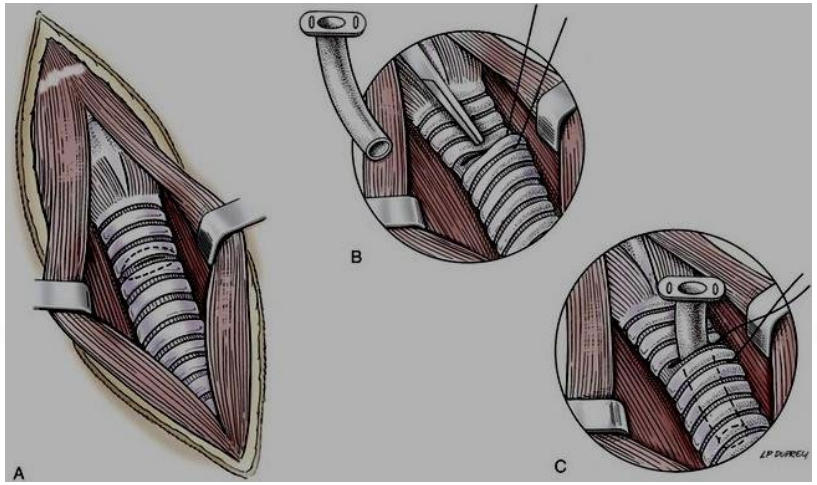


FIG 6. Modified tracheostomy technique with retraction using the encircling sutures to open the hinged proximal and distal flaps to facilitate tracheostomy tube placement. (Cranial is orientated to the top of the photograph)



Tracheostomy

A modified temporary tracheostomy in dogs: outcome and complications in 21 dogs (2012 to 2017)

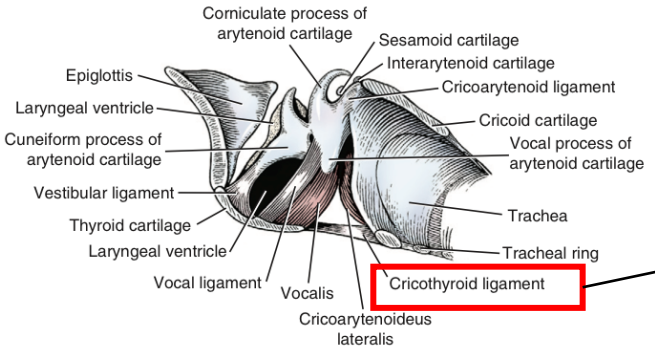
F. G. Bird[1,*], R. Vallefuoco*, G. Dupré† and H. Brissot*

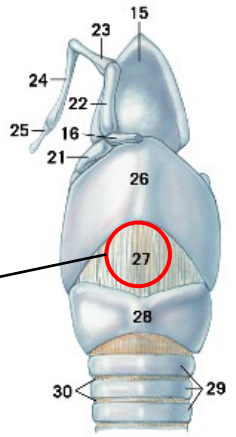
Table 2. Complications – duplicated cases highlighted in table and defined below

Complication	Total, 21 dogs	Brachycephalic, 16 dogs	Non-brachycephalic, five dogs
Displacement	6 (28·6%)	5*,† (31·3%)	1‡ (20%)
Obstruction	1 (4·8%)		1‡ (20%)
Subcutaneous emphysema/pneumomediastinum	1 (4·8%)	1† (6·3%)	
Non-obstructive stomal stenosis	1 (4·8%)	1 (6·3%)	
Excessive stomal discharge	2 (9·5%)	1* (6·3%)	1 (20%)
Total	8 (38·1%)	6 (37·5%)	2 (40%)

*Case with displacement and excessive stomal discharge
†Case with displacement and subcutaneous emphysema
‡Case with displacement and obstruction

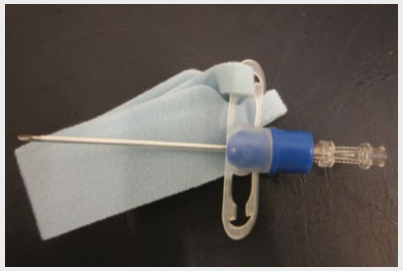
Cricothyroidotomy

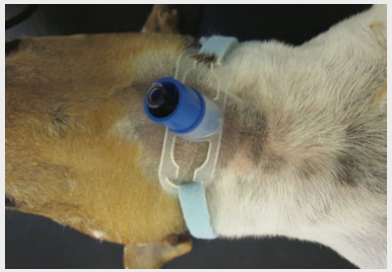




[1] Needle CTT

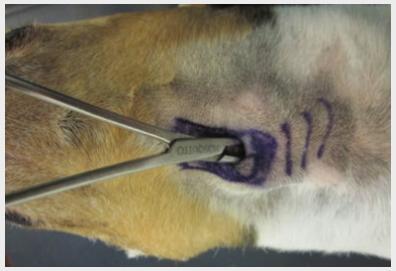
- Small diameter uncuffed CTT tube
- Fast procedure
- Method to confirm the intratracheal position





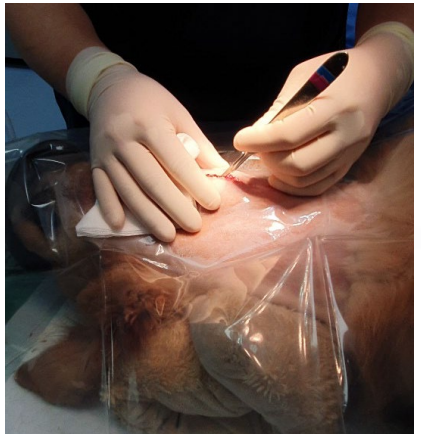
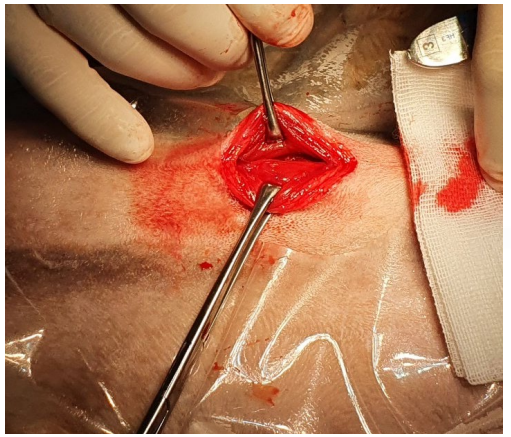
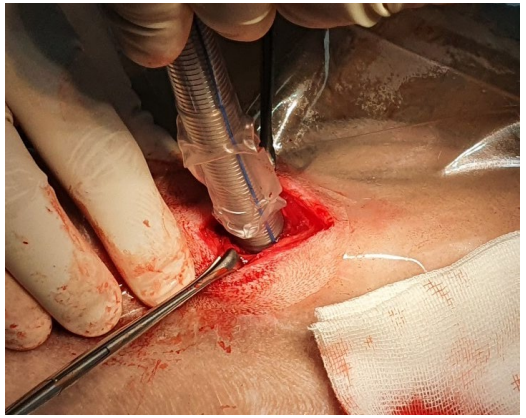
[2] Surgical CTT

- Larger diameter CTT tube or regular ET tube ; **Half** the size for endotracheal intubation
- Slightly longer



Cricothyroidotomy





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