



# 비엔 마취 세미나

: Laryngeal examination & secure the airway

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# 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

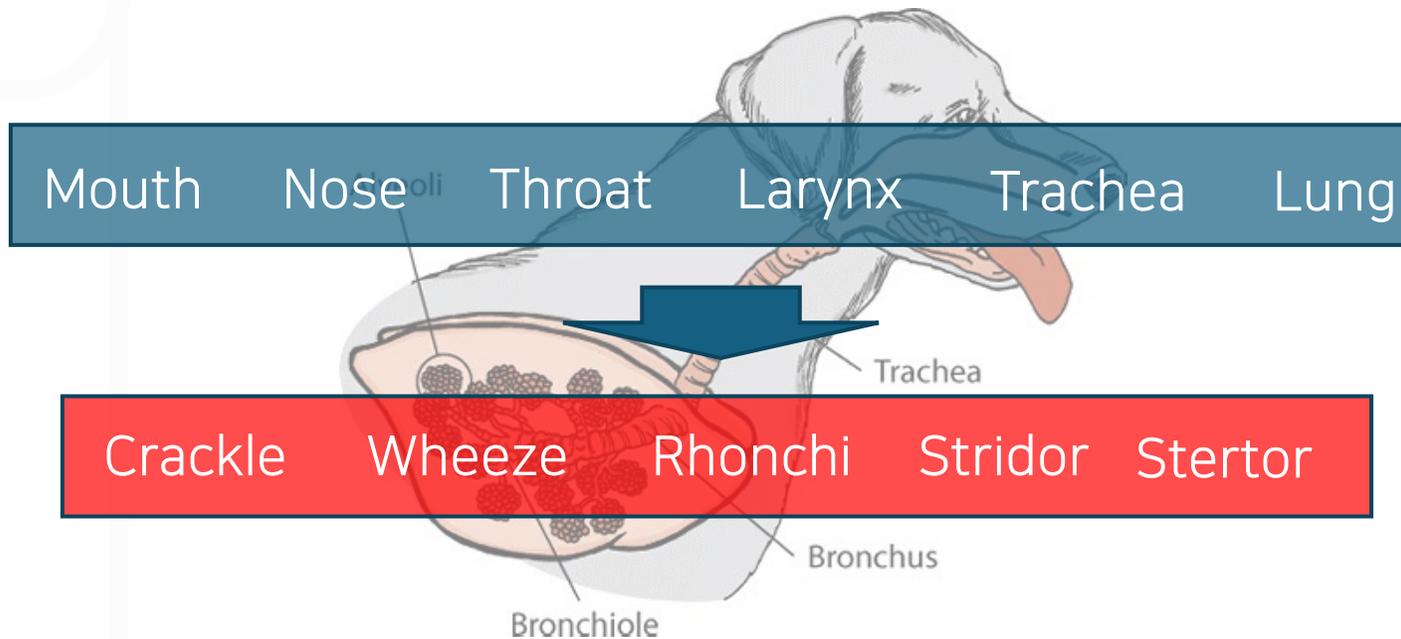
- Mouth to snout
- Difficult intubation
- Retrograde intubation
- Tracheostomy
- Cricothyroidotomy

# Noisy breathing



## Noisy Breathing

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



# Wheeze

## Wheeze

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

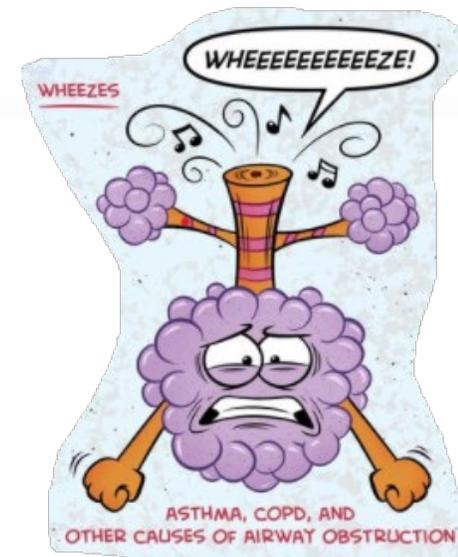
- Usually on **exhalation** but may occur during inhalation or both.
- Long duration (>80 msec), high pitch (>1,000 Hz), sinusoidal (**musical**) sound.

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

Respiratory physiology

**Wheezes, crackles and rhonchi: simplifying description of lung sounds increases the agreement on their classification: a study of 12 physicians' classification of lung sounds from video recordings**

Hasse Melbye,<sup>1</sup> Luis Garcia-Marcos,<sup>2,3</sup> Paul Brand,<sup>4,5</sup> Mark Everard,<sup>6</sup> Kostas Piflis,<sup>7</sup> Hans Pasterkamp,<sup>8</sup> The ERS task force for lung sounds



# Rhonchi

## Rhonchi

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

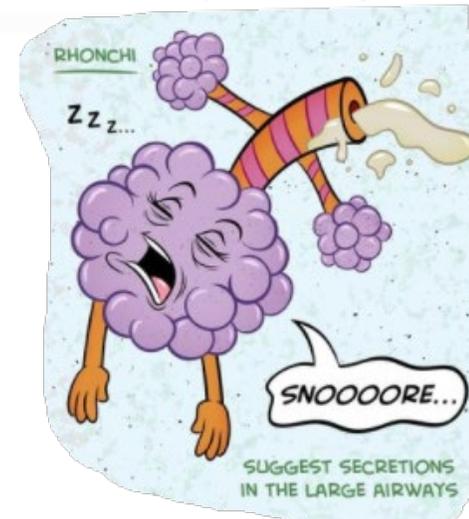
- Inspiration, expiration both
- Longer duration (>100 msec), low pitch (<2-300 Hz), loud

Bronchitis

Respiratory physiology

**Wheezes, crackles and rhonchi: simplifying description of lung sounds increases the agreement on their classification: a study of 12 physicians' classification of lung sounds from video recordings**

Hasse Melbye,<sup>1</sup> Luis Garcia-Marcos,<sup>2,3</sup> Paul Brand,<sup>4,5</sup> Mark Everard,<sup>6</sup> Kostas Prilis,<sup>7</sup> Hans Pasterkamp,<sup>8</sup> The ERS task force for lung sounds



# Stridor

## 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

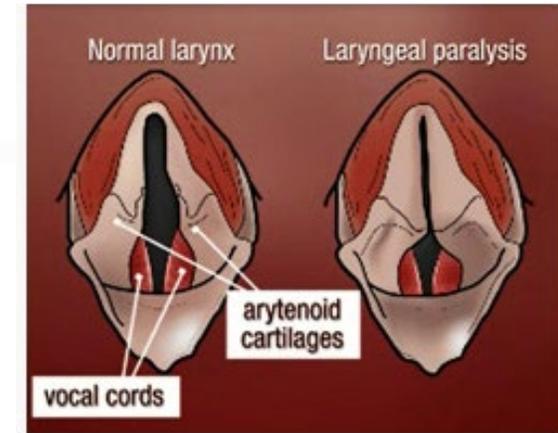
Tracheal collapse, laryngeal paralysis.

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*



# 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

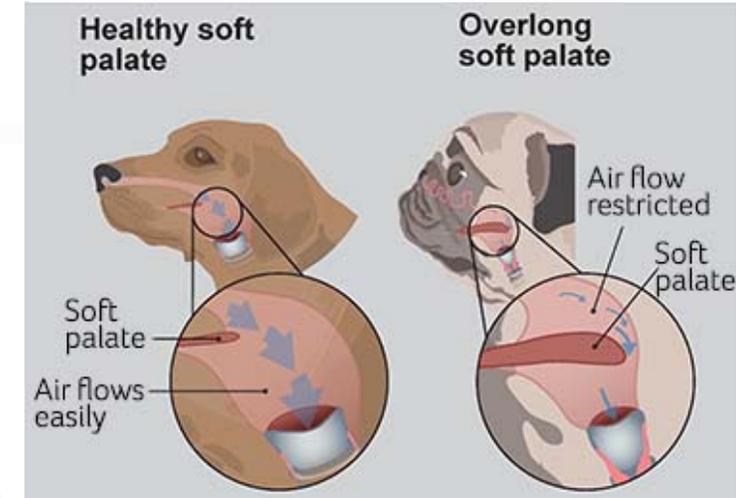
→ Low pitch, Loud

**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.†*



# 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

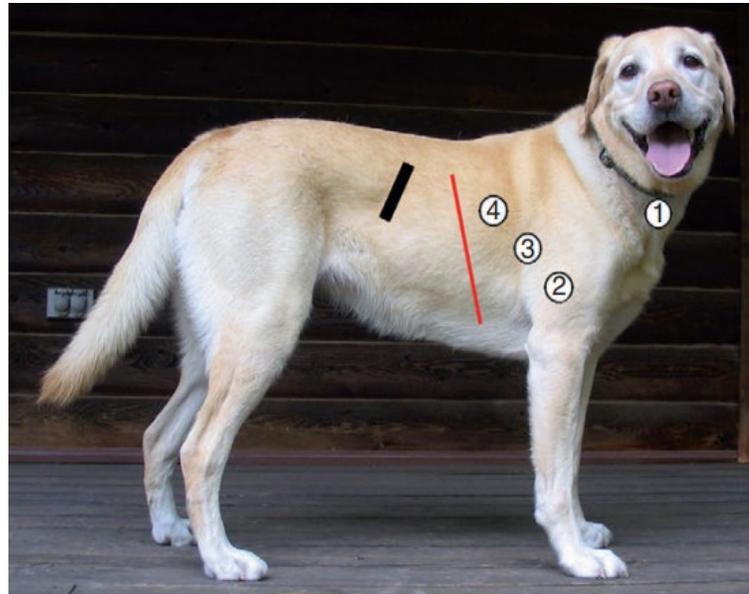
Figure 2. Lung sound classification after the American Thoracic Society.

	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

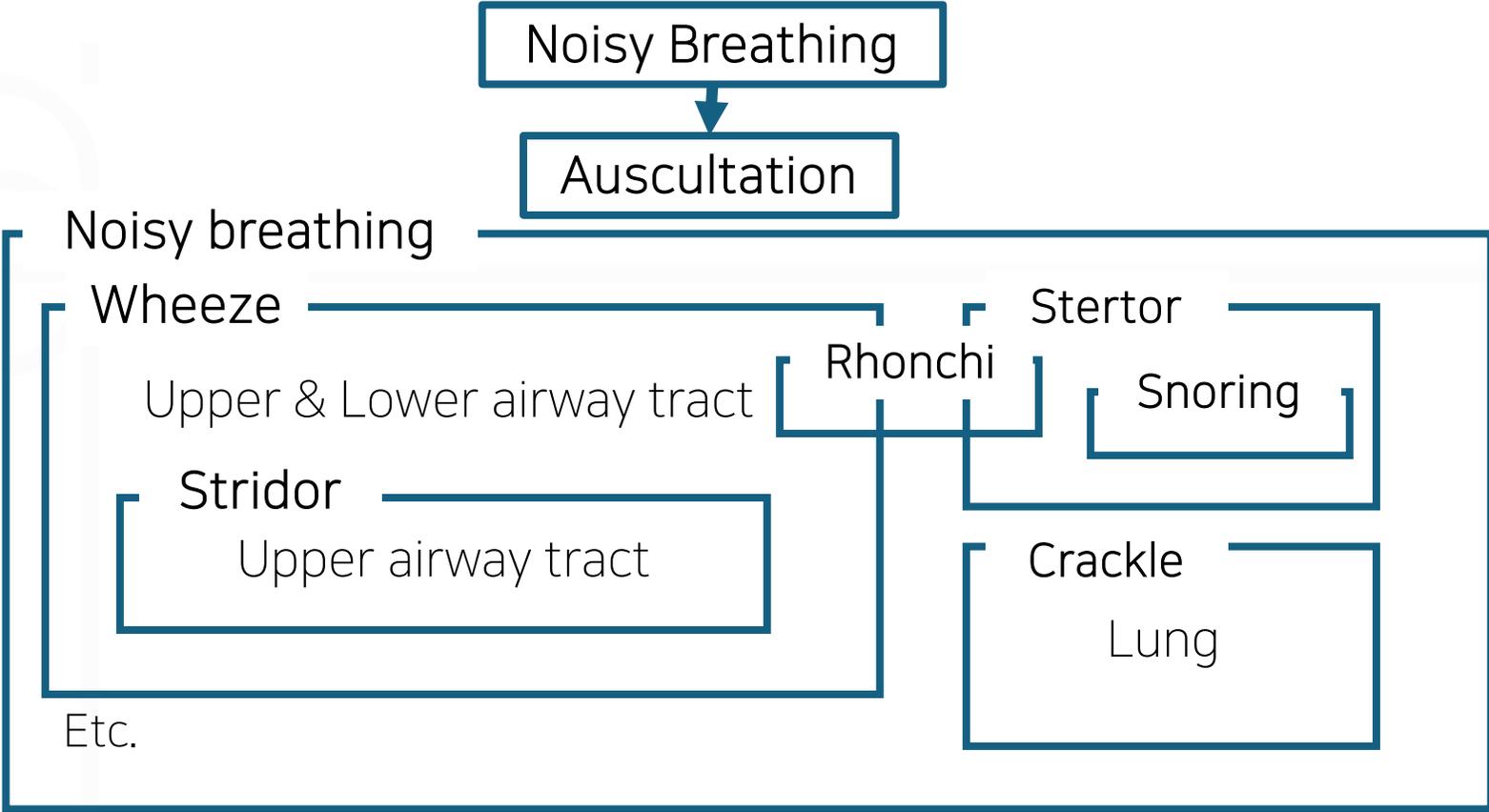
1. Respiratory pattern, respiratory rate
2. Upper airway auscultation (Nasopharynx – Principal bronchi)
3. Lung fields auscultation (Lt. & Rt., cranial, caudal)



### Breath sounds

VESICULAR SOUNDS		Normal - heard over periphery Gentle rustling sound Fades on expiration
BRONCHIAL SOUNDS		Normal - heard over substernal notch LOUDER - Expiratory lasts longer Silent internal
BRONCHOVESICULAR		Normal - heard 1st & 2nd intercostal space anteriorly and between scapulae posteriorly Intermediate intensity
FINE CRACKLES		Abnormal - discontinuous High pitched Popping quality
COARSE CRACKLES		Abnormal - discontinuous Low pitched Louder & Longer
WHEEZE		Abnormal - continuous High pitched Musical quality
RHONCHI		Abnormal - continuous Low pitched Gurgling quality

INSPIRATION      EXPIRATION



# Brachycephalic obstructive airway syndrome

## BOAS component

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

TABLE 10.2

Lesion Sites for Brachycephalic Obstructive Airway Syndrome

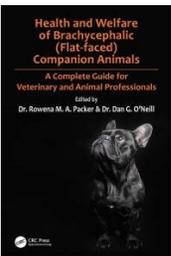
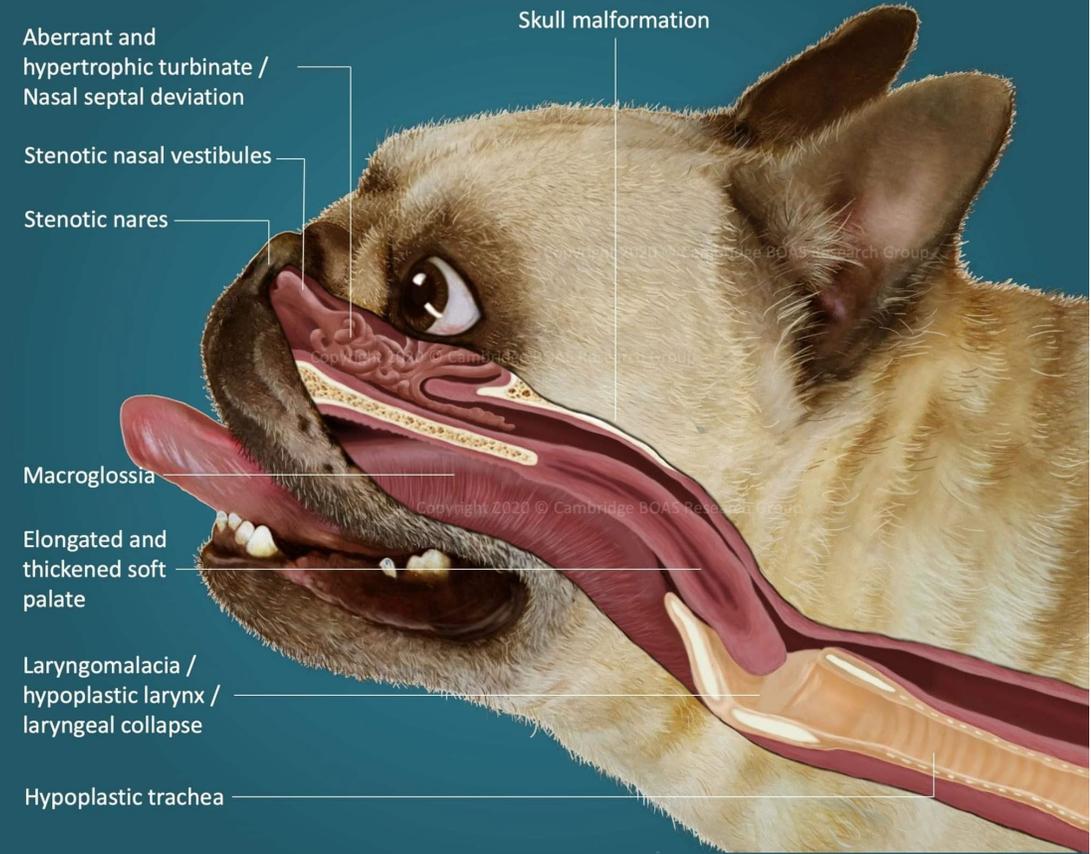
### Primary

- Stenotic nostrils
- Elongated and thickened soft palate
- Nasal turbinate hypertrophy and malposition
- Nasopharyngeal restriction
- Macroglossia
- Tracheal hypoplasia
- Laryngeal hypoplasia

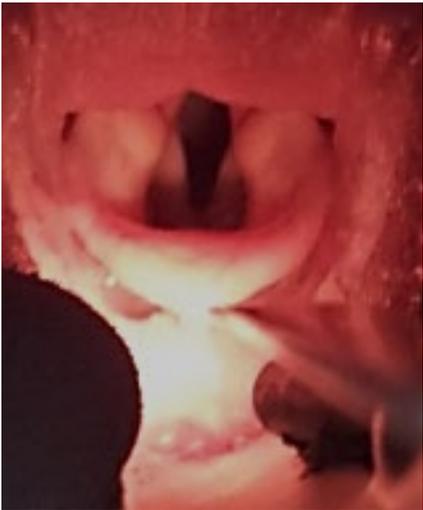
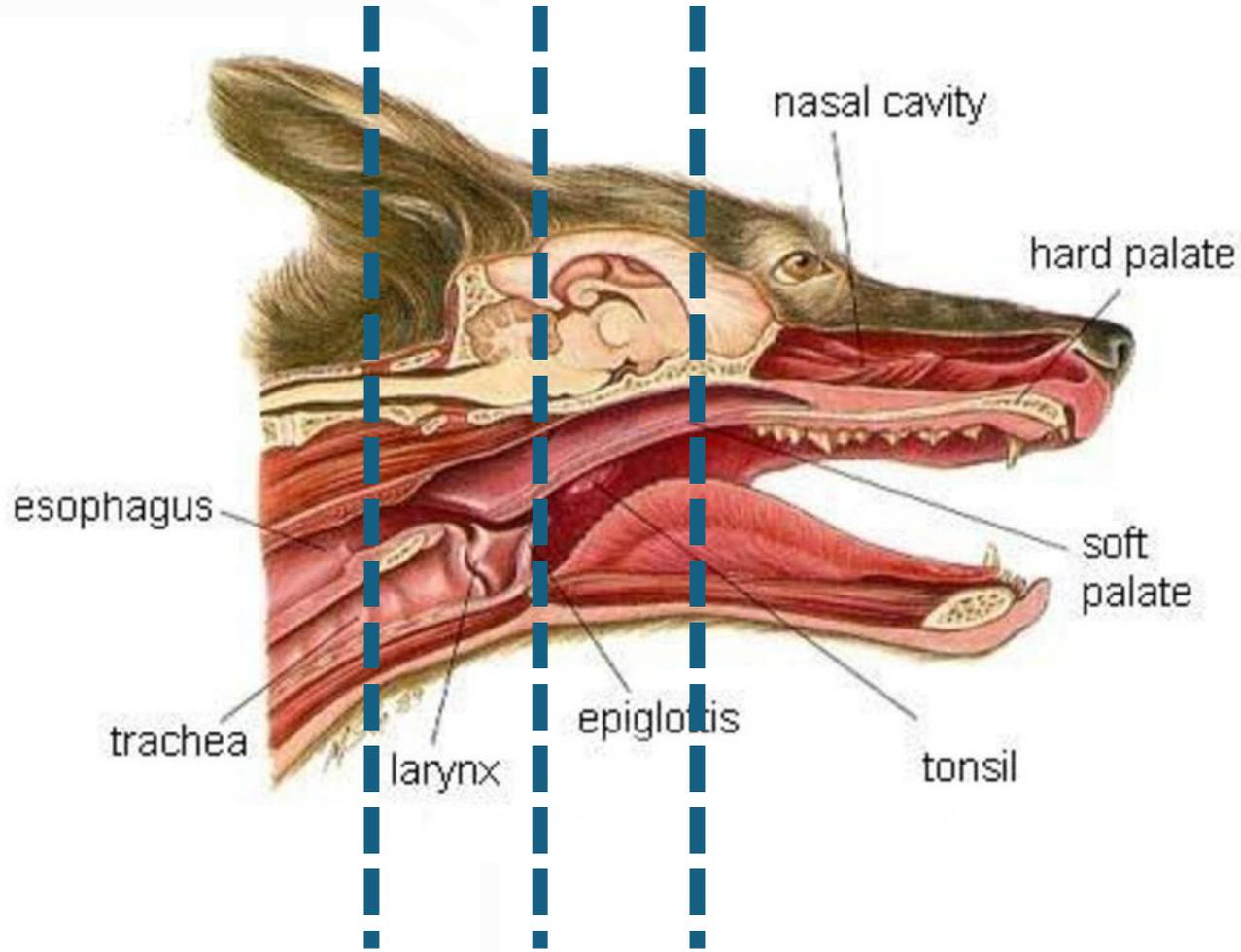
### Secondary

- Thickened soft palate
- Nasopharyngeal collapse
- Tonsillar eversion and hypertrophy
- Laryngeal collapse
- Bronchial collapse
- Gastrointestinal reflux with oesophagitis
- Hiatal hernia

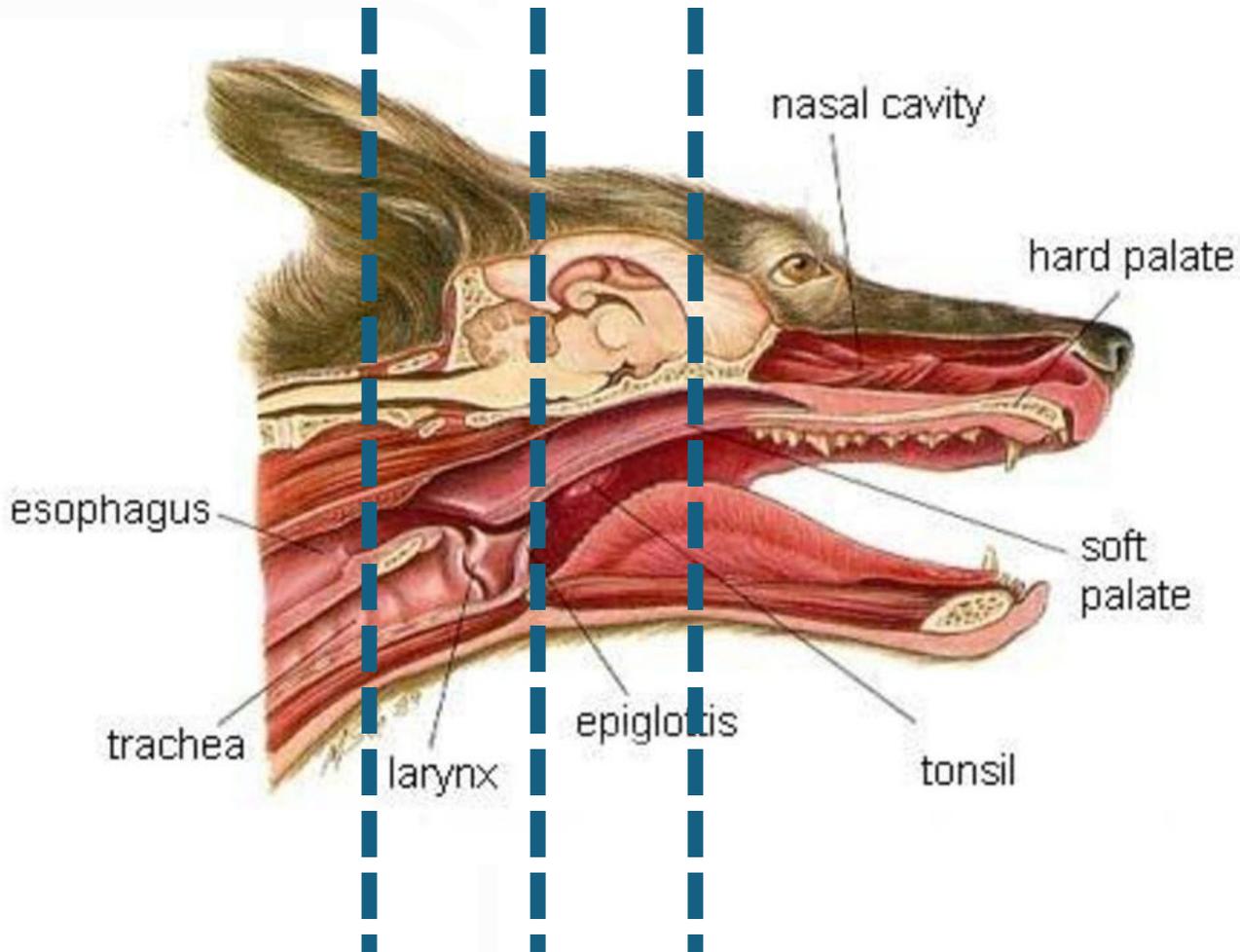
### Anatomical lesions of BOAS



# Laryngeal exam

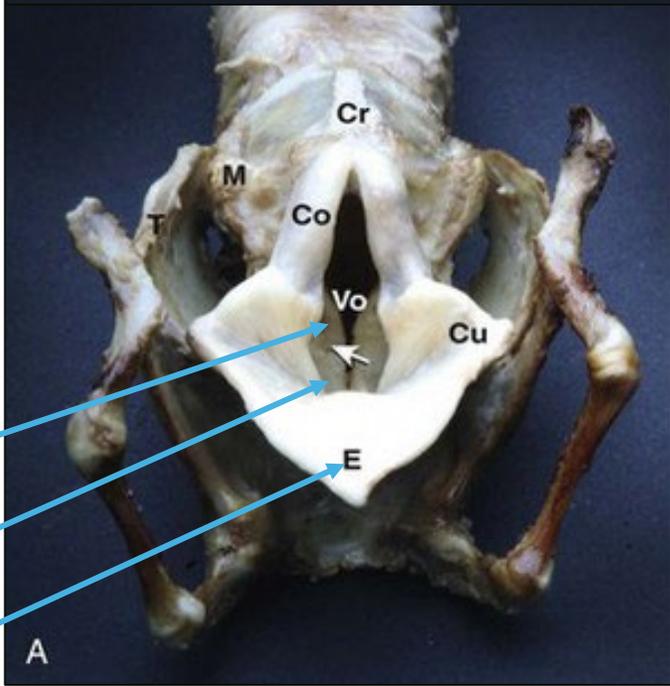


# Laryngeal exam



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 (sacculle)

Vocal fold  
 Vestibular fold  
 Epiglottis



# Morphological changes

Normal larynx



Swelling of vocal fold



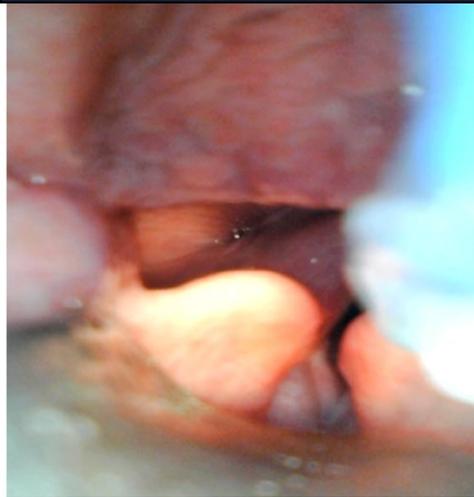
Swelling of vestibular fold



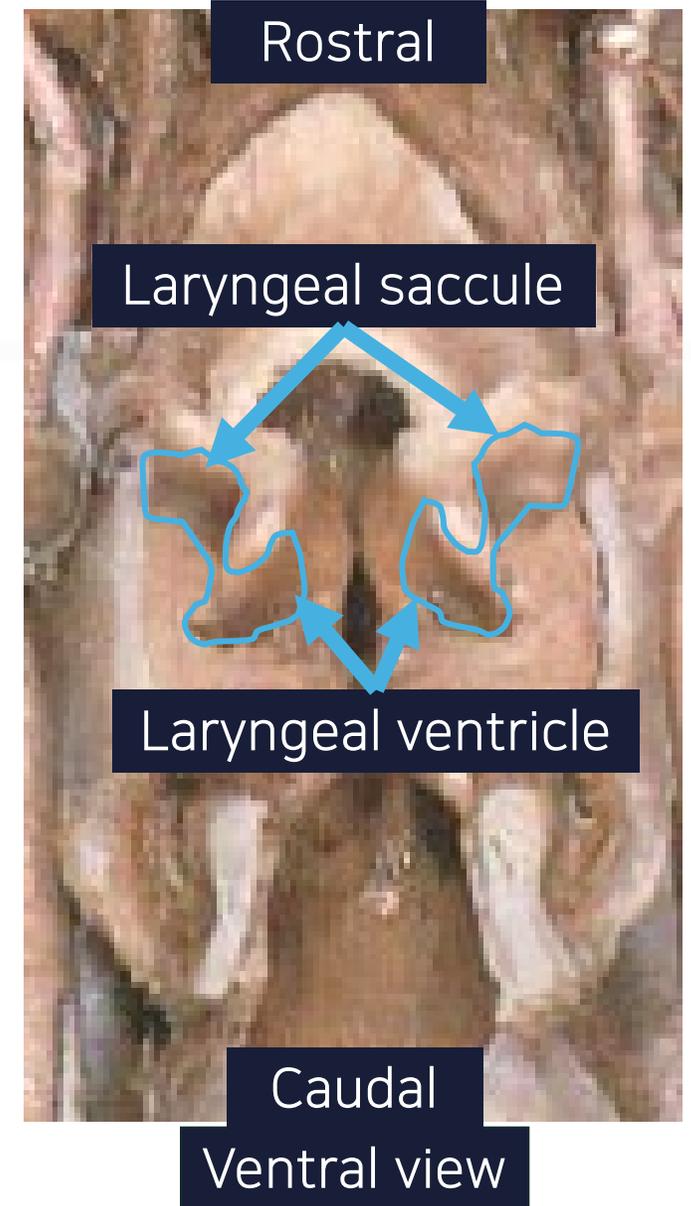
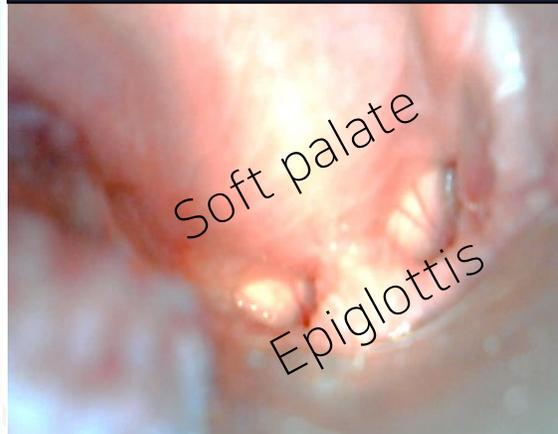
Subglottic edema



Everted saccule



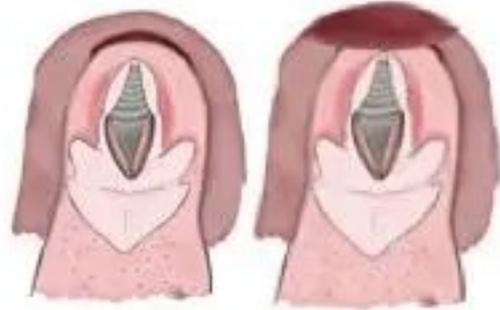
Soft palate elongation



# Dorsal pharyngeal wall

## DORSAL PHARYNGEAL WALL

Ensure that you do not inadvertently elevate the dorsal pharynx when elevating the soft palate.



Normal or Mild  
0

High roof to the pharynx, can clearly see esophageal aditus, or dorsal pharynx may extend down to, but not covering, dorsal commissure of rima glottidis.



Moderate  
3

Dorsal pharynx displaced ventrally, covering part of the corniculate processes.



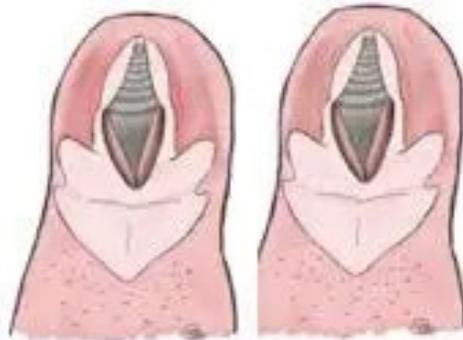
Marked  
6

Dorsal pharynx displaced ventrally, cannot see the corniculate processes at all. May be touching the cuneiform processes.



# Supraglottic mucosa

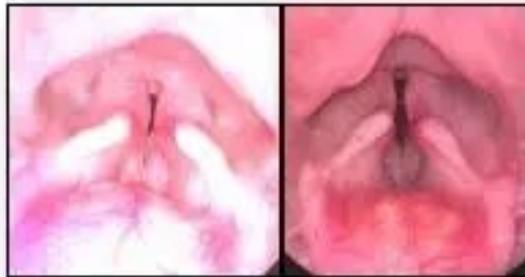
## SUPRAGLOTTIC MUCOSA



Normal or Mild

0

No wrinkles or some wrinkled mucosa, but deep piriform recesses (PR), no redundant laryngeal mucosa covering dorsal commissure of glottis. Can see corniculates and dorsal commissure clearly.



Moderate

3

Excess (with folds or wrinkles) or swollen mucosa in the piriform recesses, but **they are still recessed**. Dorsal commissure of glottis and corniculates may be partially covered with mucosal 'scarf'.



Marked

6

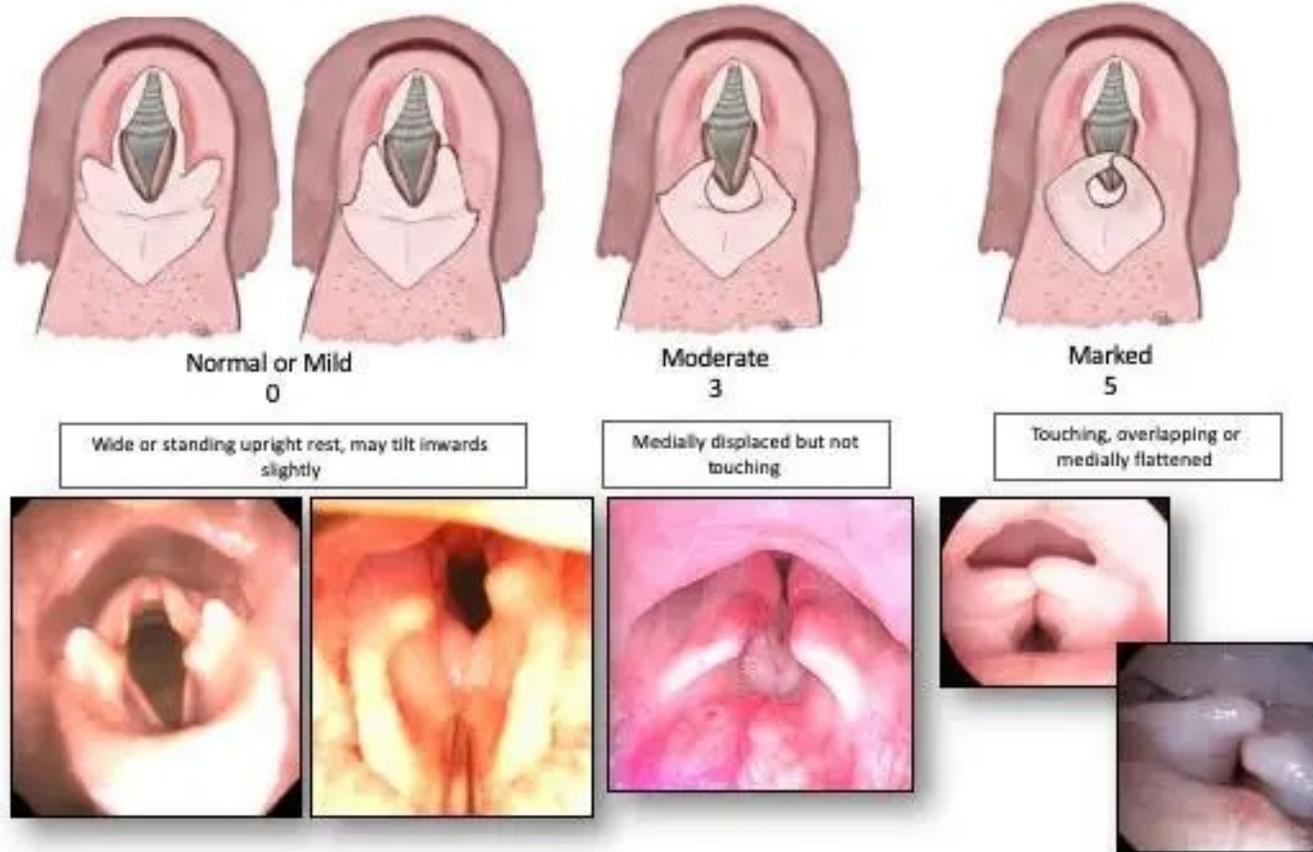
Piriform recesses completely or almost completely obliterated with excessive folds or edematous mucosa. Mucosa may protrude out of the piriform recesses. Corniculates may be covered with excess mucosa. Redundant mucosa may be sucked into the airway.



# Cuneiform processes

## CUNEIFORM PROCESSES at rest

*Ensure that you do not distort the cuneiforms medially when pressing down on the epiglottis or tongue base*



# Ventricles

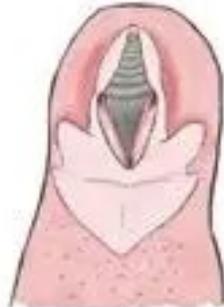
## VENTRICLES

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.



Normal  
0

Can see the vocal folds their entire length, and there is a deep cleft entrance to the ventricles immediately rostral to the vocal folds.



Sub-effaced  
1

Edematous ventricular mucosa can be seen sitting within the ventricles but can still see ALL the vocal folds.



Effaced  
2

Edematous mucosa is bulging to the vocal folds. The ventral aspect of the ventricles may be touching but can still see most of vocal folds.



Partially everted  
3

Most of vocal folds are obscured by everting, bulging mucosal sacs, which are touching and becoming plump. Can see less than 50% of vocal folds dorsally.



Fully everted  
5

Mucosa is ballooning out into the rima glottidis, completely obscuring vocal folds and occupying the ventral rima glottidis. Everted mucosal sacs may overlap each other.



# 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*

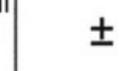
## The Influence of Anaesthetic Drugs on the Laryngeal Motion in Dogs: A Systematic Review

Elisabeth Ranninger <sup>1,\*</sup>, Marta Kantyka <sup>2</sup> and Rima Nadine Bektas <sup>1</sup>

<sup>1</sup> Department of Clinical Diagnostics and Services, Section of Anaesthesiology, Vetsuisse Faculty University of Zurich, Winterthurerstrasse 260, 8057 Zurich, Switzerland; rbektas@vetclinics.uzh.ch

<sup>2</sup> 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.



# Difficult intubation



ET tube

Laryngoscope

Gauze

Syringe

Tie

Lubricant



Feeding tube

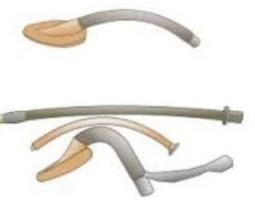
Cotton swab



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

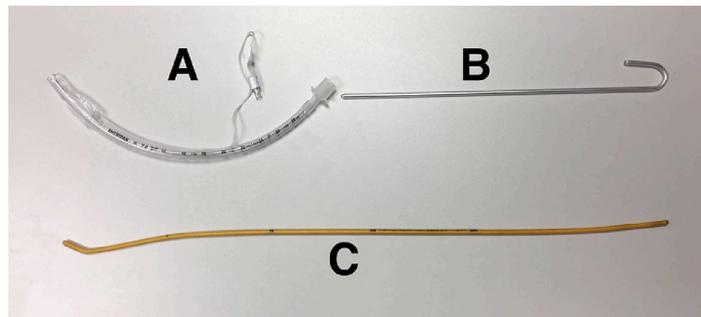
Veterinary Anesthesiology, College of Veterinary Medicine, Seoul National University

# Difficult intubation

<p><b>PLAN A</b> Initial Intubation strategy Elective intubation <b>Max 4 attempts</b> Rapid sequence intubation <b>Max 3 attempts</b></p>	<p>Bougie</p> 	<p>McCoy</p> 	<p>Airtrach</p> 	<p><b>PLAN C</b> Oxygenation and ventilation Wake patient up Sugammadex (rapid reversal of Rocuronium &amp; Vecuronium)</p> 	<p>Facemask, oro - or nasopharyngeal airway</p> 	<p>LMA, PLMA</p> 		
<p><b>PLAN B</b> Secondary Intubation strategy Not in rapid sequence <b>RSI</b></p>	<p>LMA, ILMA</p> 	<p>Fibreoptic guidance recommended; If LMA, Aintree &amp; ETT 7.0</p> 		<p><b>PLAN D</b> Can't intubate Can't ventilate CICV</p>	<p>Melker</p> 	<p>Quicktrach II</p> 	<p>Manujet &amp; Jet Ventilation Catheter</p> 	<p>Surgical Airway</p> 



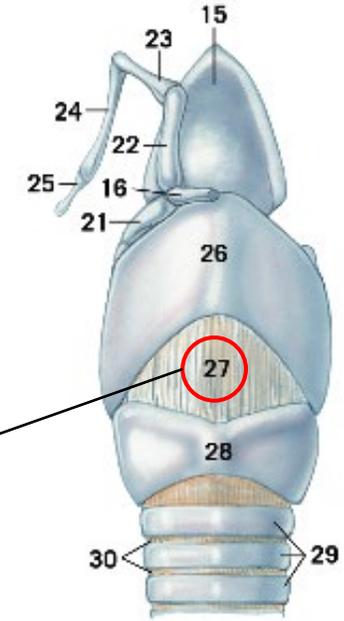
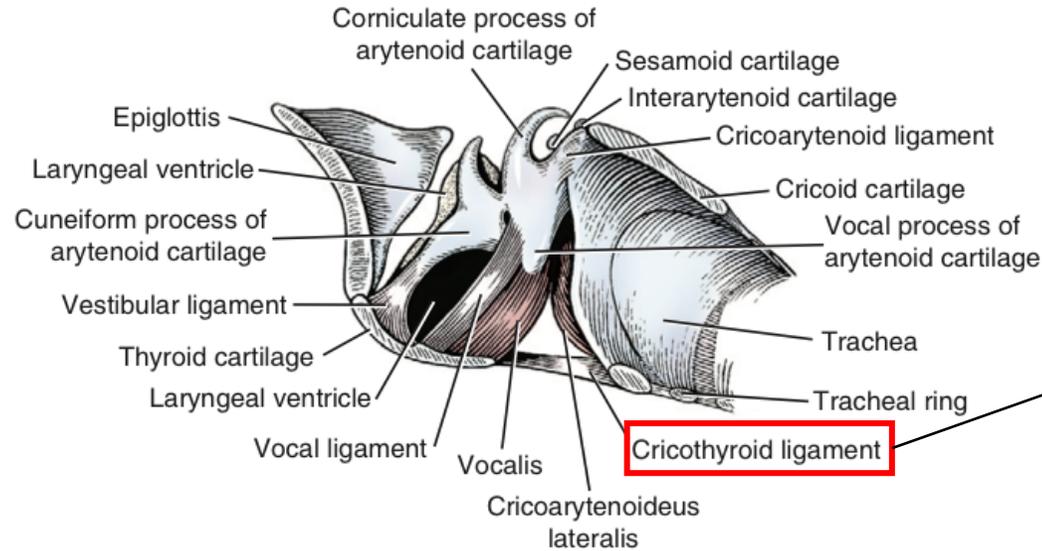
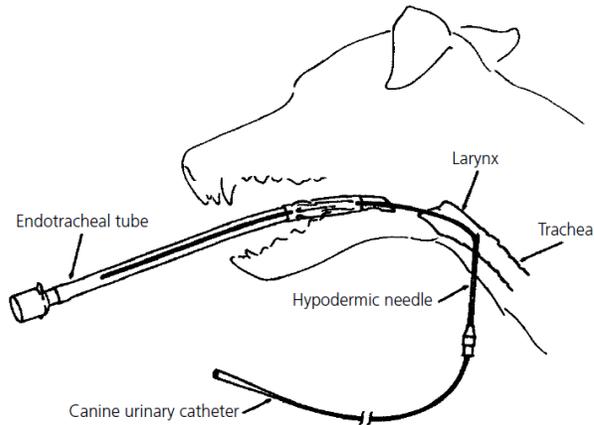
Feeding tube



Stylet

Bougie

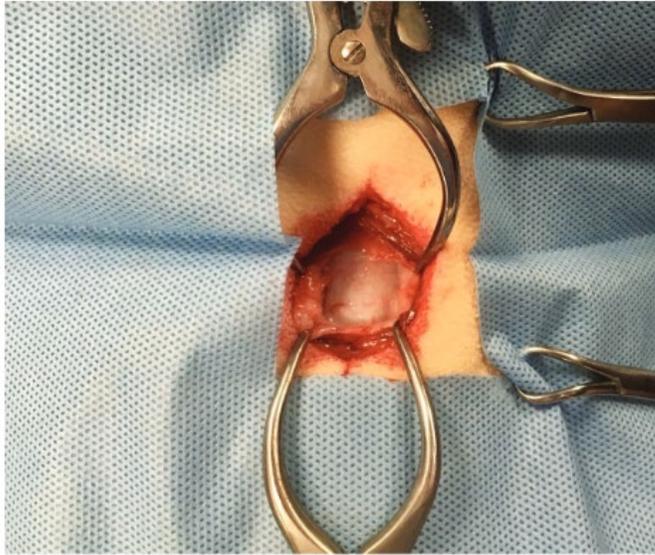
# Retrograde intubation



## 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



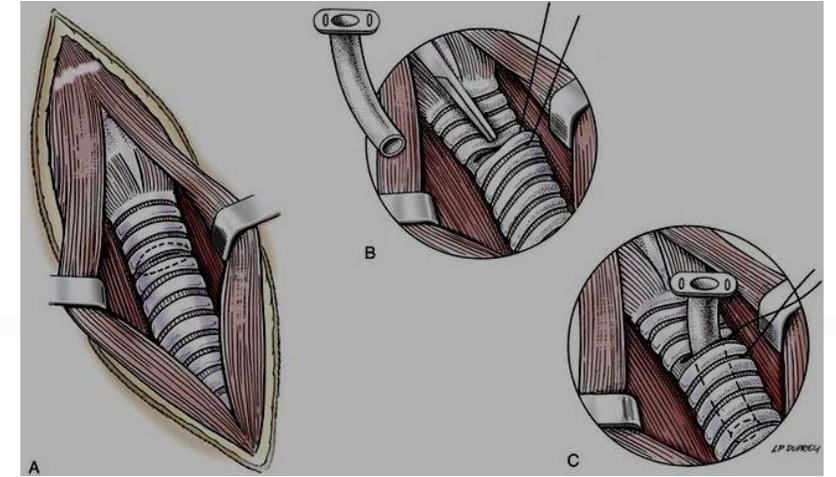
**FIG 1.** Standard ventral midline approach to the trachea. Note the depth of muscle and skin edges in this English bulldog neck. (Cranial is orientated to the top of the photograph)



**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<sup>1\*</sup>, R. VALLEFUOCO<sup>2\*</sup>, G. DUPRÉ<sup>1</sup> AND H. BRISSOT<sup>3</sup>

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

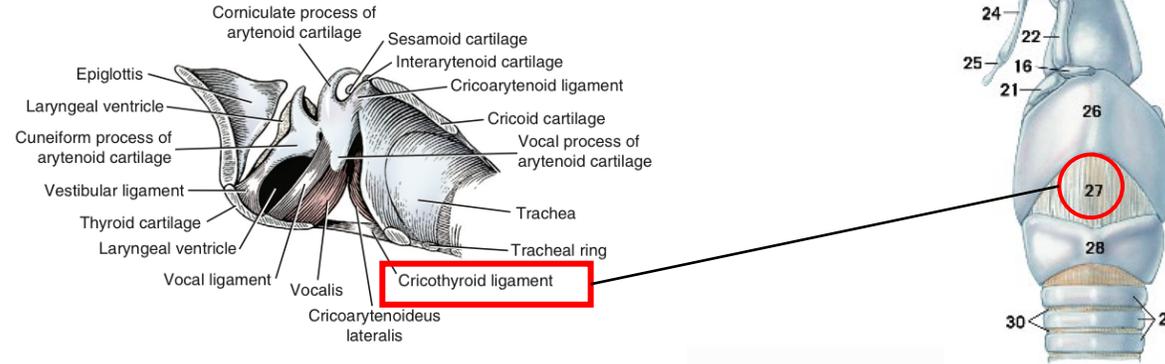
Complication	Total, 21 dogs	Brachycephalic, 16 dogs	Non-brachycephalic, five dogs
Displacement	6 (28.6%)	5 <sup>*†</sup> (31.3%)	1 <sup>†</sup> (20%)
Obstruction	1 (4.8%)		1 <sup>†</sup> (20%)
Subcutaneous emphysema/pneumomediastinum	1 (4.8%)	1 <sup>†</sup> (6.3%)	
Non-obstructive stomal stenosis	1 (4.8%)	1 (6.3%)	
Excessive stomal discharge	2 (9.5%)	1 <sup>*</sup> (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

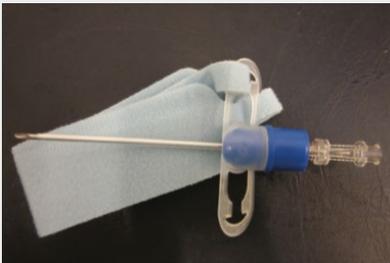
†Case with displacement and obstruction

# Cricothyroidotomy



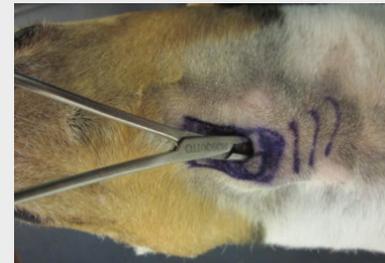
## [1] Needle CTT

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

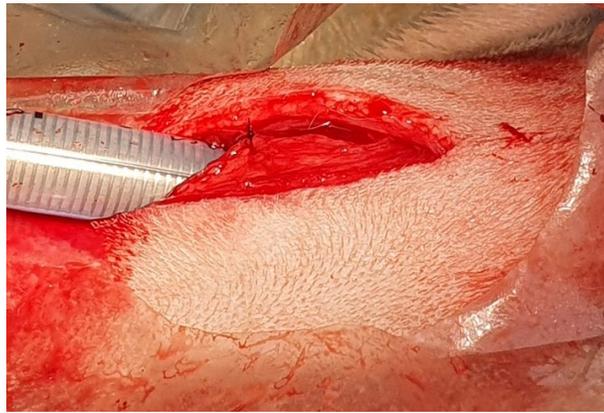


## [2] Surgical CTT

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



# Cricothyroidotomy





**BIEN**  
ANIMAL MEDICAL CENTER