

Management of Brachycephalic Airway Syndrome (BAS)

Jessica Baron, DVM, Diplomate, ACVS-SA

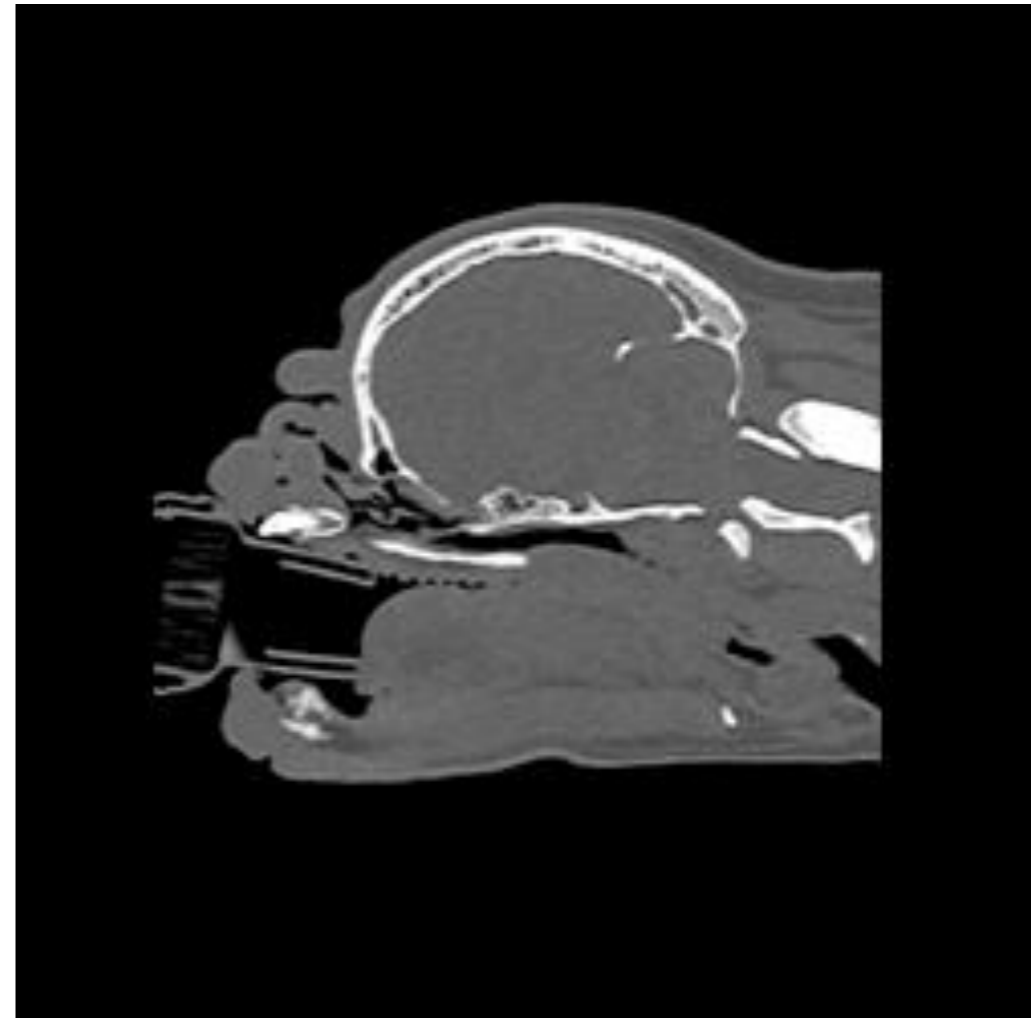
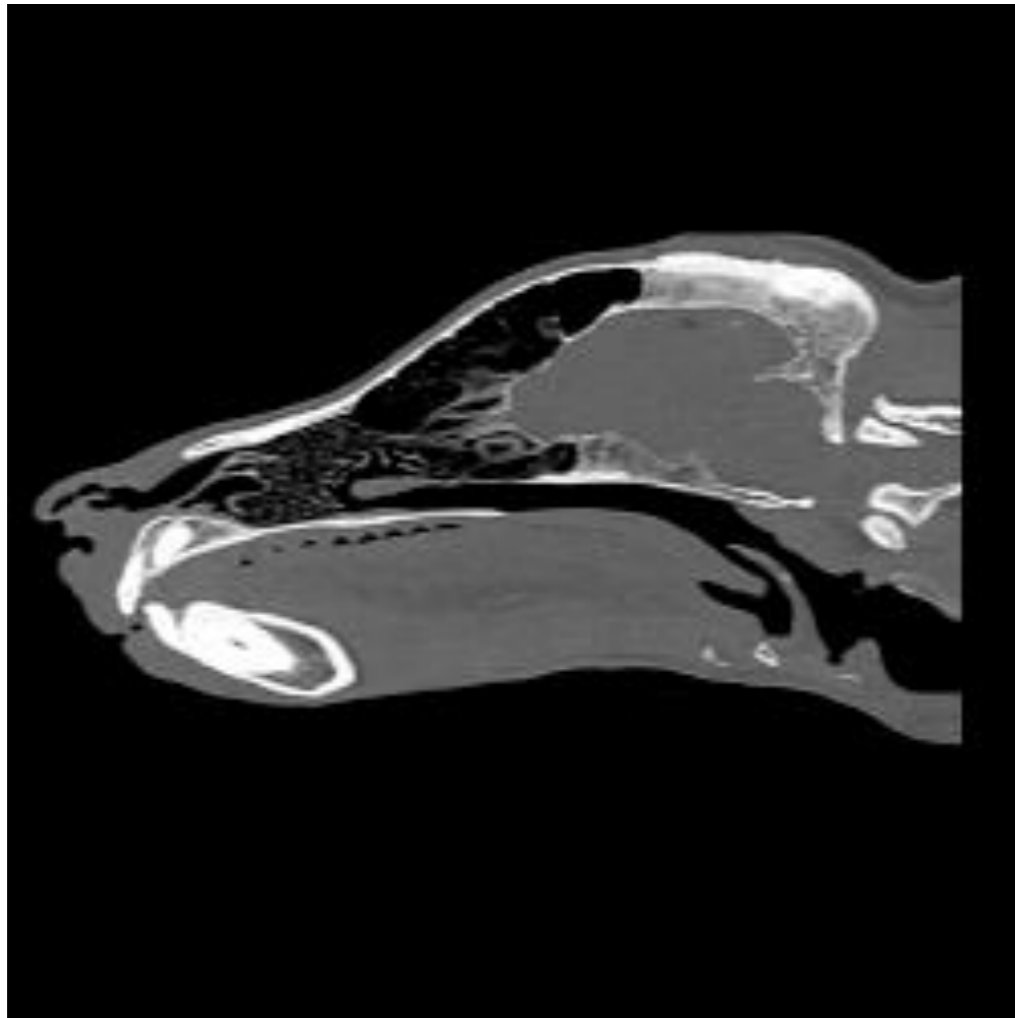


Outline

- Disease Overview
- Anatomy
- Anesthetic Concerns
- Surgical Management
- Medical and Lifestyle Management



Disease overview



www.vet.cam.ac.uk/

Breed Predisposition

- Dogs
 - English Bulldogs
 - French Bulldogs
 - Pugs
 - Boston Terriers
 - Pekingese
 - Shih Tzu
 - Cavalier King Charles Spaniels



Dogster.com

Breed Predisposition

- Cats
 - Persians
 - Himalayans



cattime.com

Components of BAS

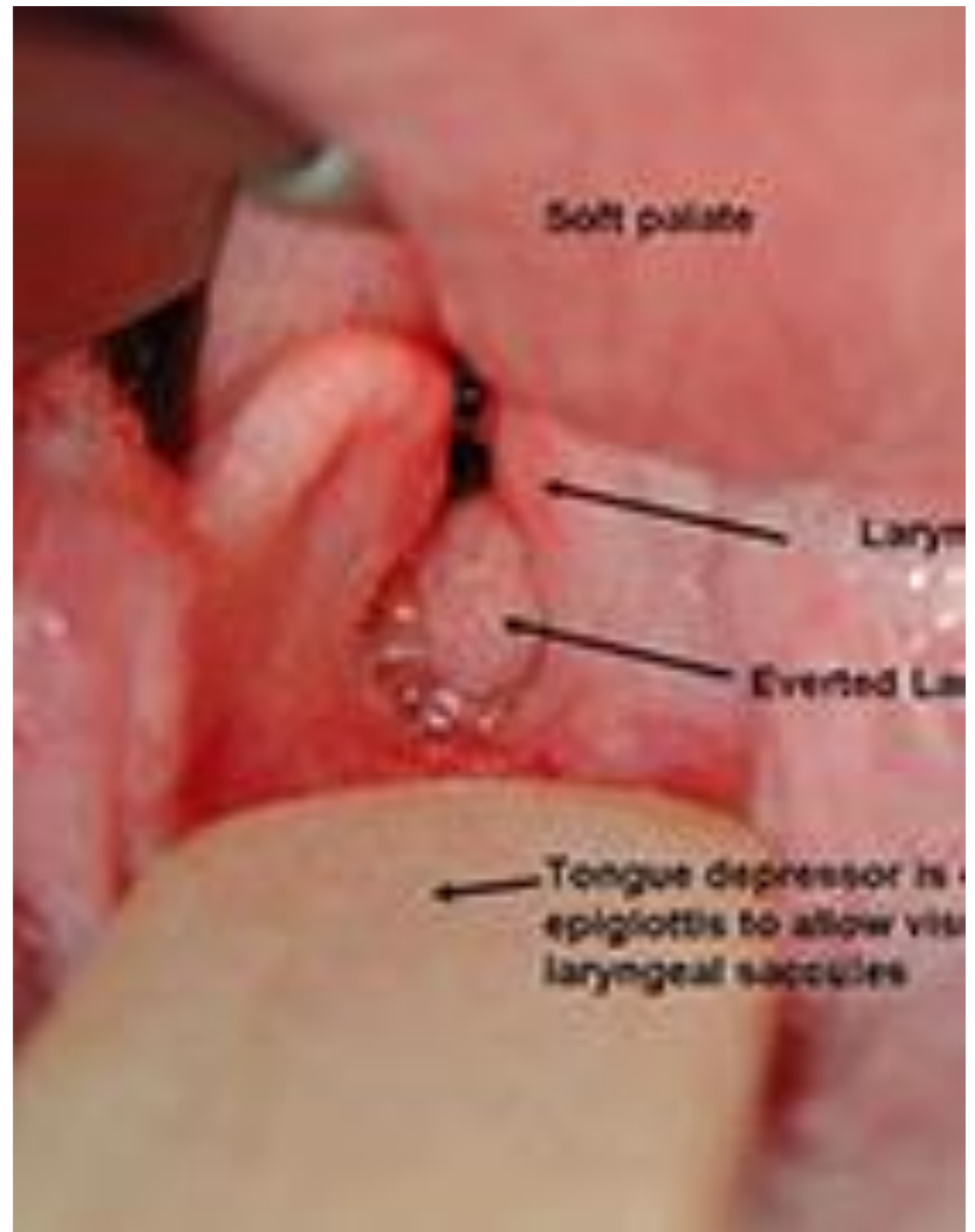
- Primary abnormalities
 - Stenotic nares (43-85%)
 - Elongated soft palate (86-96%)
 - Hypoplastic trachea
 - Aberrant nasal turbinates



www.vet.cam.ac.uk/

Components of BAS Continued

- Secondary Changes
 - Lingual hyperplasia
 - Enlarged tonsils
 - Everted laryngeal sacculles
 - Laryngeal collapse
 - Redundant or hypertrophied pharyngeal folds
 - Fibrosis of pharyngeal dilator muscles
 - Chronic hypoxemia
 - Hyperthermia
 - Gastrointestinal signs
 - Acute upper respiratory obstruction





Clinical Signs

- Decreased nasal airflow —stertor
- Overlong soft palate —stridor
- Longer inspiratory period
- Cyanosis
- Collapse
- Intolerance of heat

Gastrointestinal signs

- Clinical signs: hypersalivation, gagging, retching, regurgitation, vomiting
- Diagnoses: esophageal deviation, gastroesophageal reflux, hiatal hernia, esophagitis, pyloric mucosal hyperplasia
- Histology: Diffuse gastric inflammation
- 10-74% of brachycephalic dogs

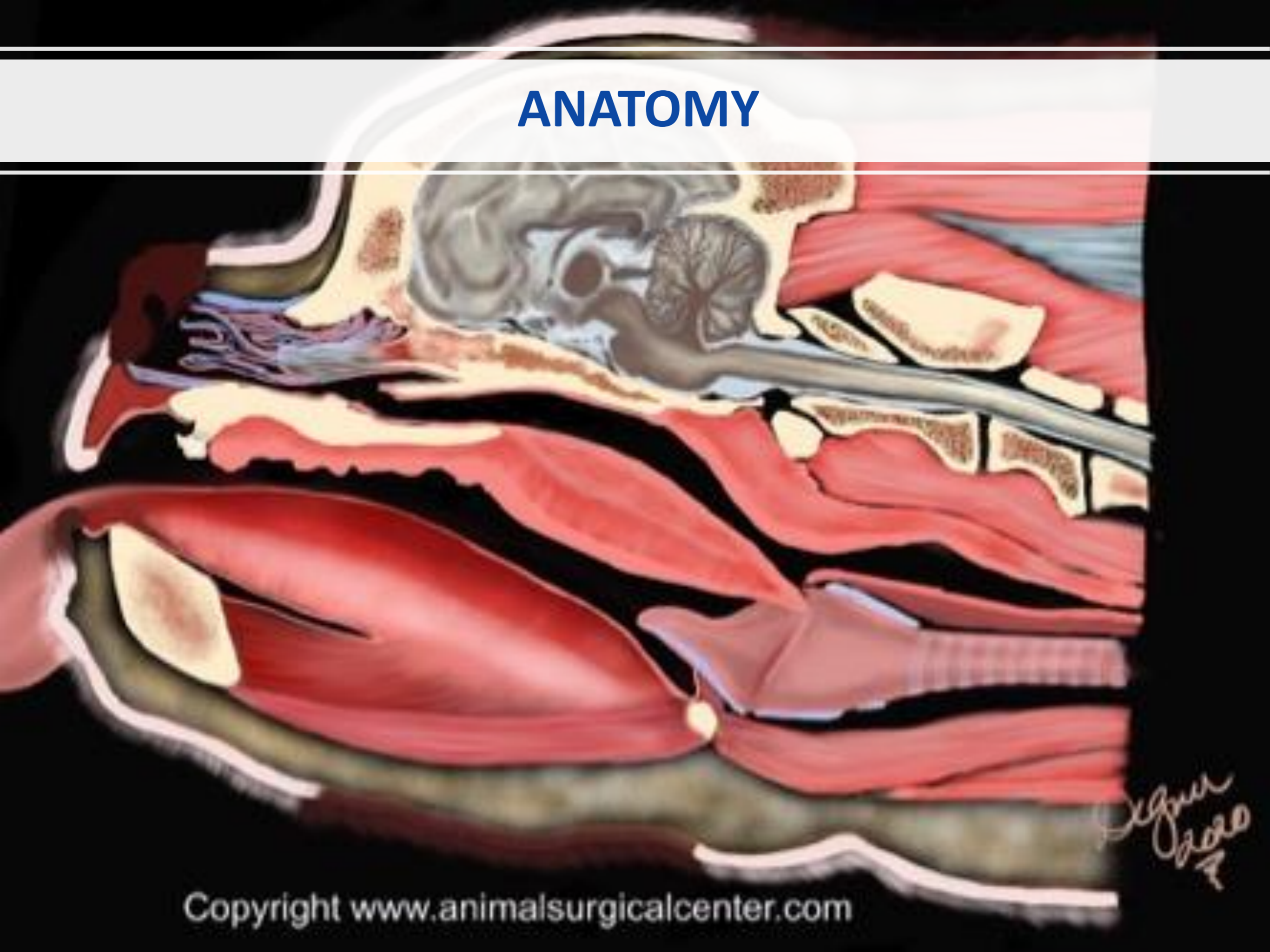


Long-term results of upper respiratory syndrome surgery and gastrointestinal tract medical treatment in 51 brachycephalic dogs

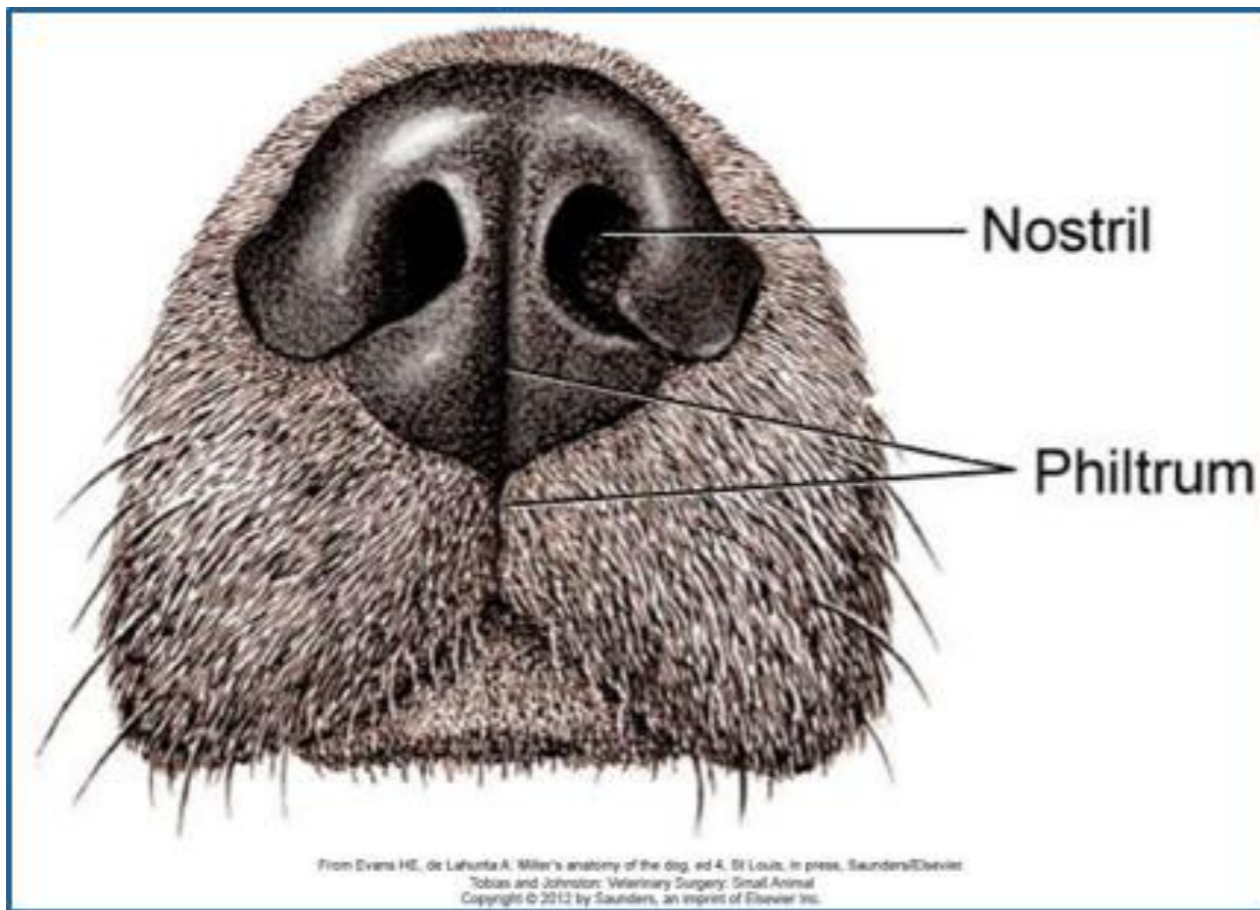
Poncet et al, 2006

- Surgical correction of airway abnormalities
 - Upper GI endoscopy at the time of surgery
- Medical management of GI disease as indicated by endoscopic and histologic findings
- Repeat endoscopy at 6m if no improvement
- 81% showed improvement
 - 68.4% immediately post-op
 - 23.7% within 2w post-op
 - 8% within 6w post-op

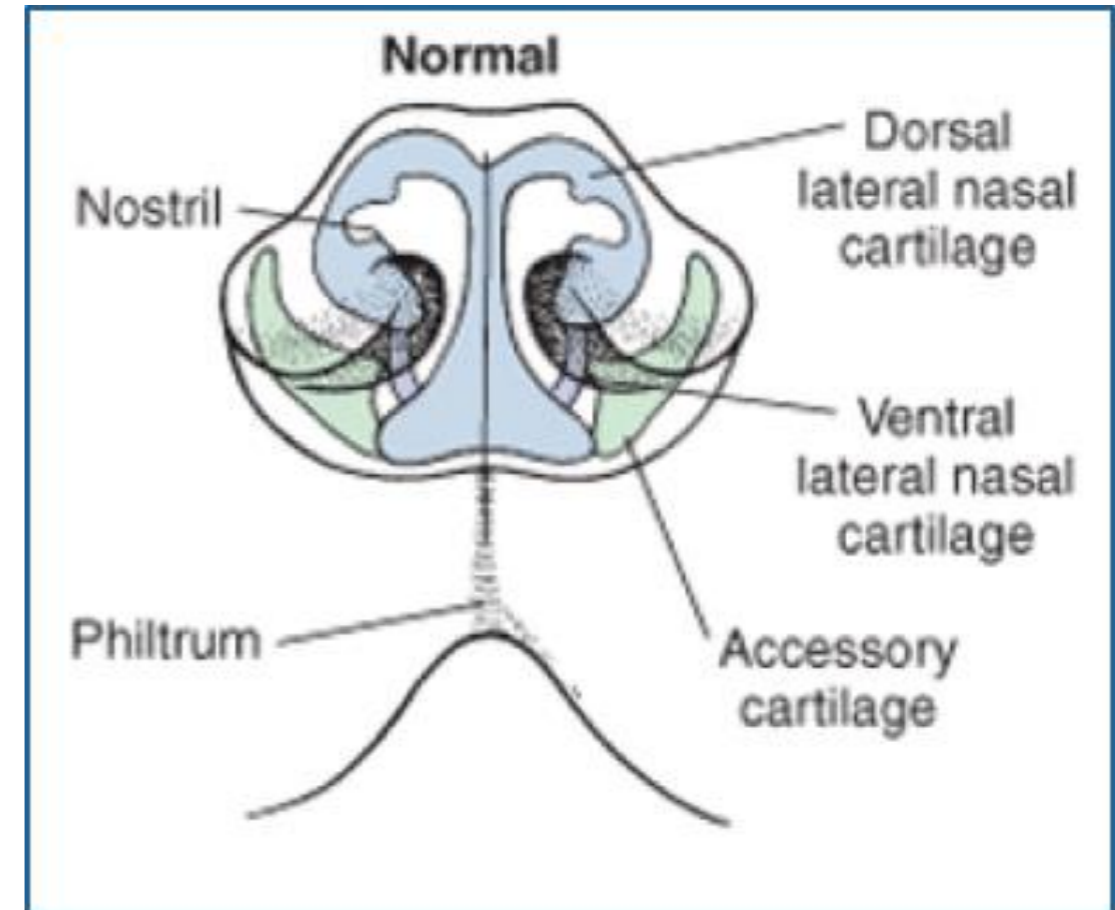
ANATOMY



Anatomy: Nasal Passages



Tobias and Johnston

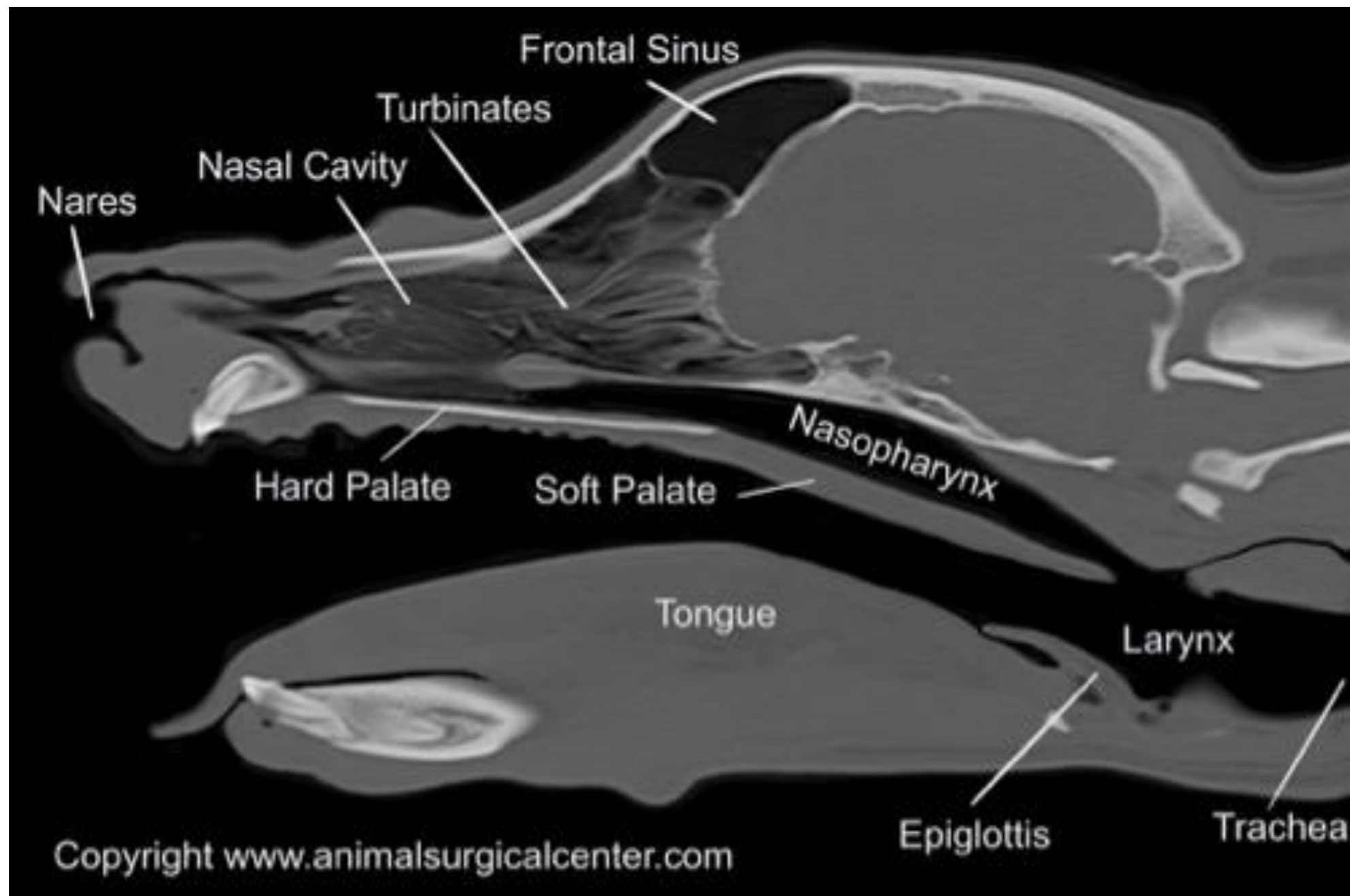


Fossum

Secondary Effects of Stenotic Nares



Anatomy: Nasal passages



Aberrant Turbinates



<https://vetmed.illinois.edu/pet-health-columns/brachycephalic-syndrome-laser-assisted-turbinectomy/>

Crowding of turbinates
(Mucosal contact
points (91.7%))

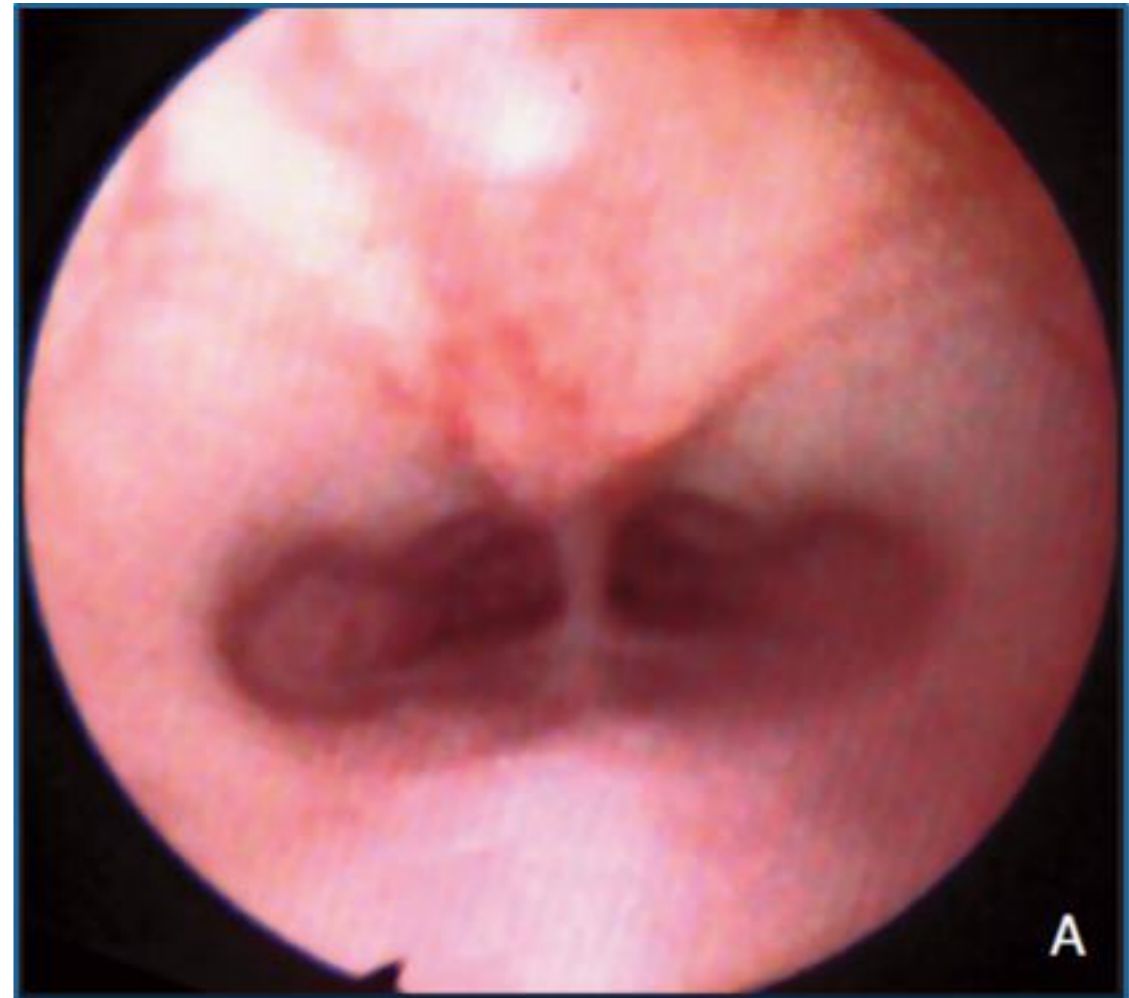
Rostral and caudal
aberrant
turbinates (72%)

Septum Deviation
(55.3%)

Nasopharyngeal Turbinates in Brachycephalic Dogs and Cats

Ginn et al, 2008

- Turbinates protruding caudally from choanae into nasopharynx
- Posterior rhinoscopy



Nasopharyngeal Turbinates in Brachycephalic Dogs and Cats

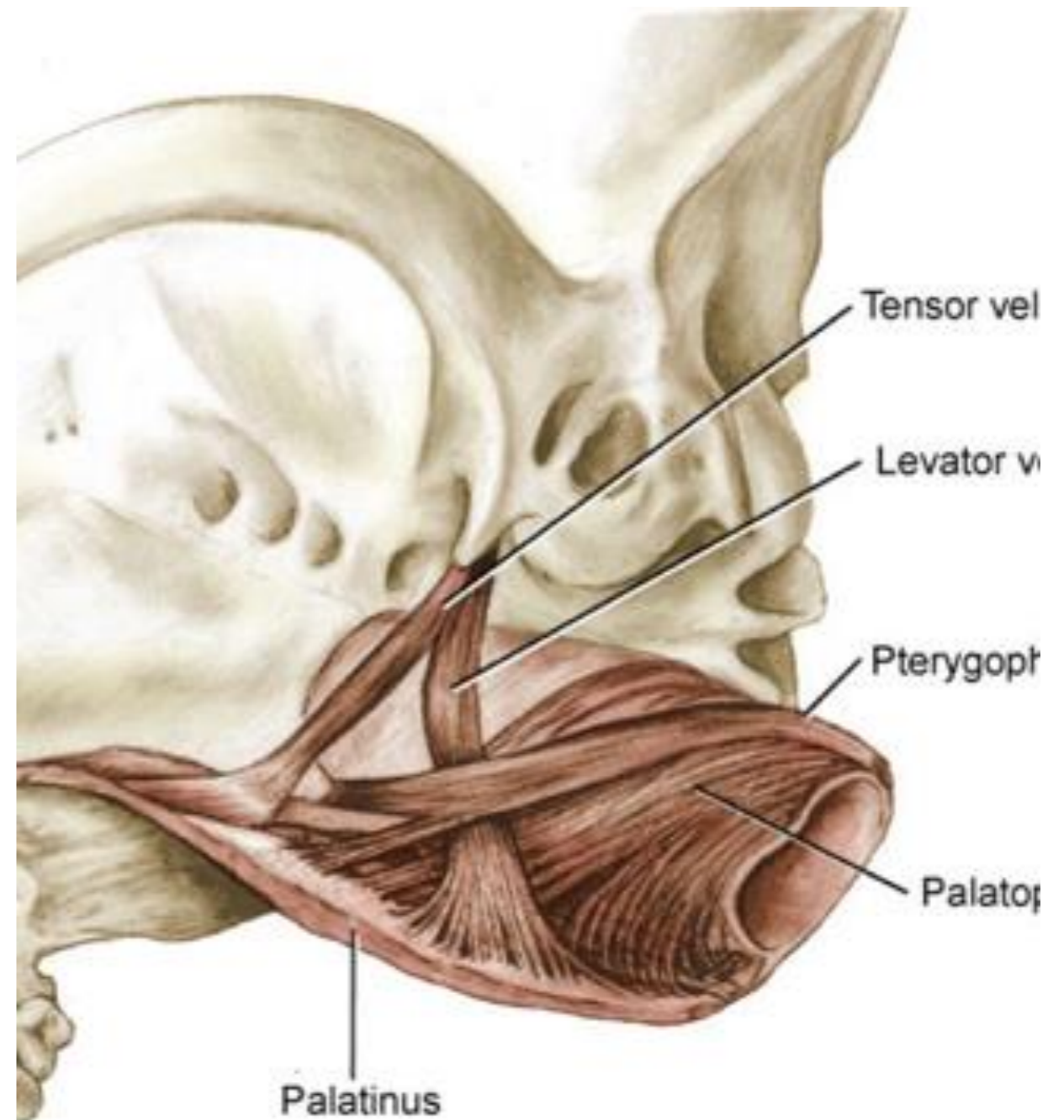
Ginn et al, 2008



- 11/53 brachycephalic dogs had nasopharyngeal turbinates
 - 9/11 were pugs
- 2/10 brachycephalic cats has nasopharyngeal turbinates

Anatomy- Soft Palate

- Functions
 - Stimulation of sensory nn to trigger swallowing
 - Closure of intrapharyngeal opening during swallowing and vomiting to prevent contents from entering the nasopharynx
 - Stiffen the soft palate during periods of increased respiratory activity
 - May play a role in airway partitioning



rs HE, de Lahunta A: Miller's anatomy of the dog, ed 4, St Louis, in press, Saunders/Elsevier
Tobias and Johnston: Veterinary Surgery: Small Animal
Copyright © 2012 by Saunders, an imprint of Elsevier Inc.



Anatomy - Trachea

- Measure tracheal diameter as a percentage of thoracic inlet
 - Mean in non-brachcephalic breeds=20%
 - Mean in English bulldogs=12.7%

Anesthetic Concerns

- Upper airway obstruction
- Aspiration pneumonia



Pre-anesthetic Workup

- Thoracic radiographs
- Bloodwork
 - PCV/TS/BG/lactate
 - CBC/chem/UA



Pre-treatment

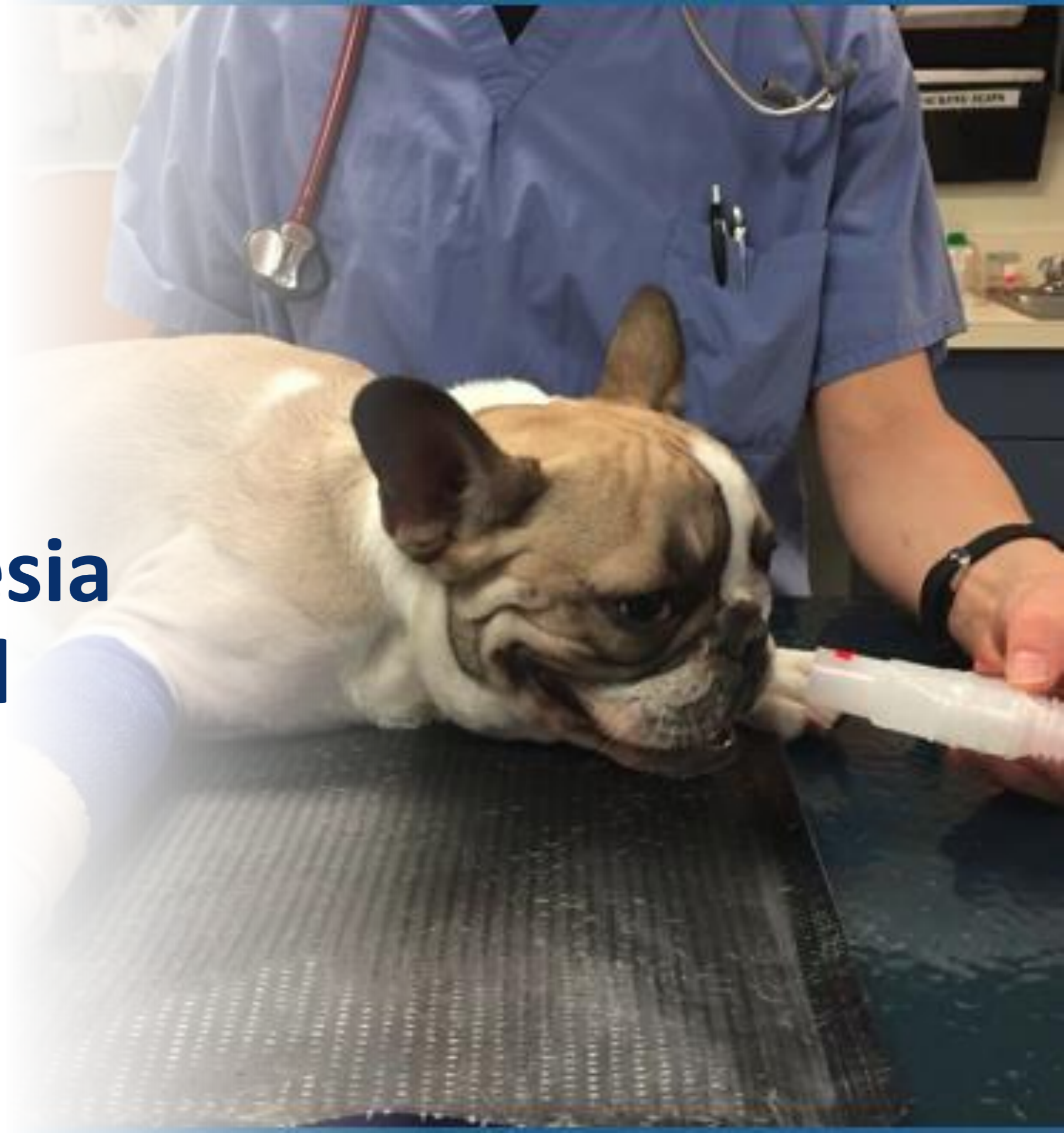
- Prokinetics
- Antacids
- Gastroprotectants
- Aspiration pneumonia



Anesthesia Protocol – Premedication

- All bulldog anesthesia/sedation is performed during regular hours if possible
- Pre-op
 - Famotidine 0.5-1mg/kg IV q12-24hr
 - Omeprazole 1mg/kg IV q24hr
 - Metoclopramide 0.2-0.5mg/kg q8hr
 - Cerenia 1mg/kg IV q24h

Anesthesia Protocol



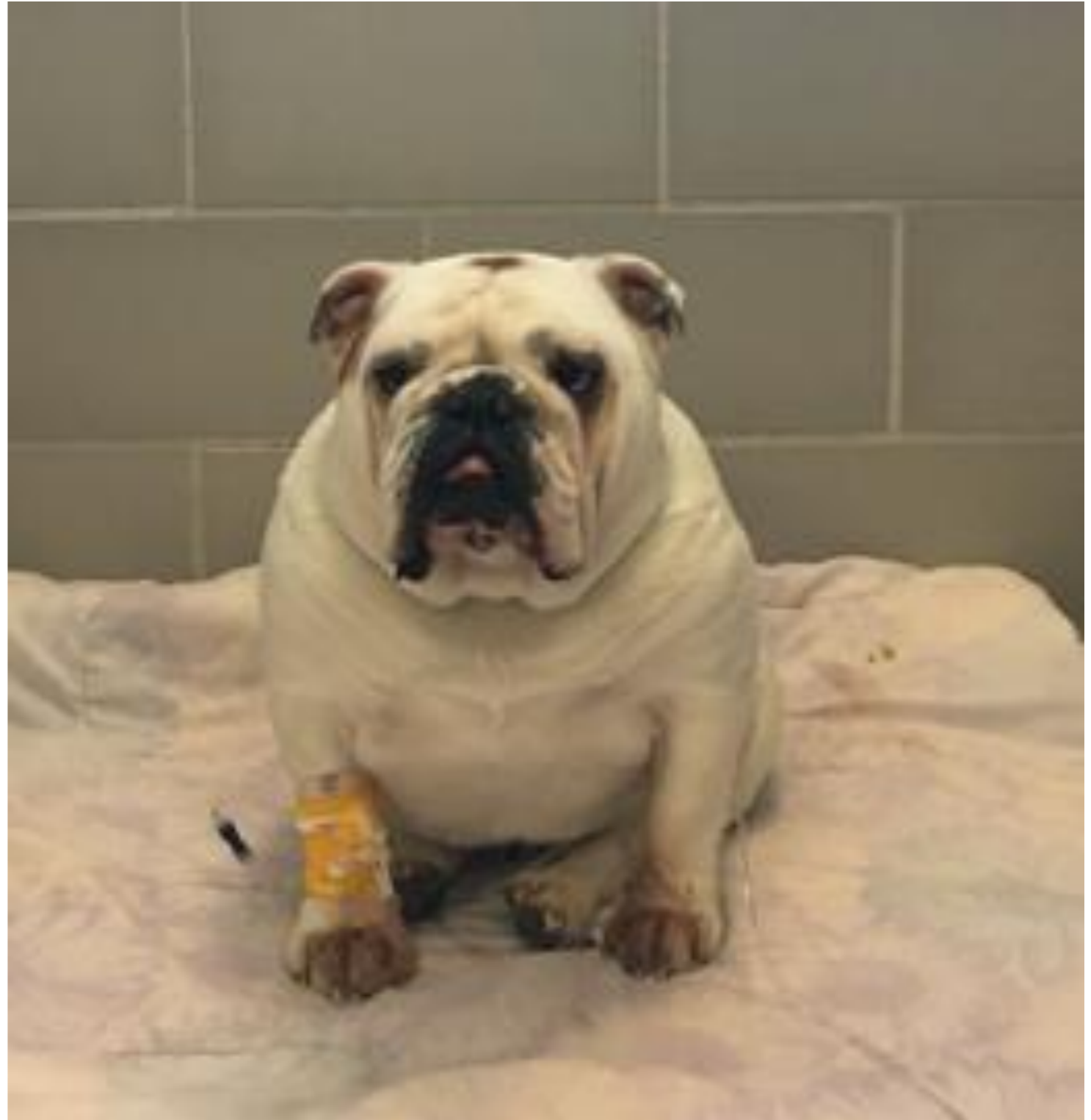
“Brachy Wakey”

- Extubate when awake!
- Partial deflation of cuff
- +/-Recover in oxygen
- Sedate +/-anesthetize and reintubate if necessary
- Be prepared for temporary tracheostomy
- Temperature monitoring
- Post-op
 - Dexamethasone SP: 0.1 - 0.15mg/kg IV



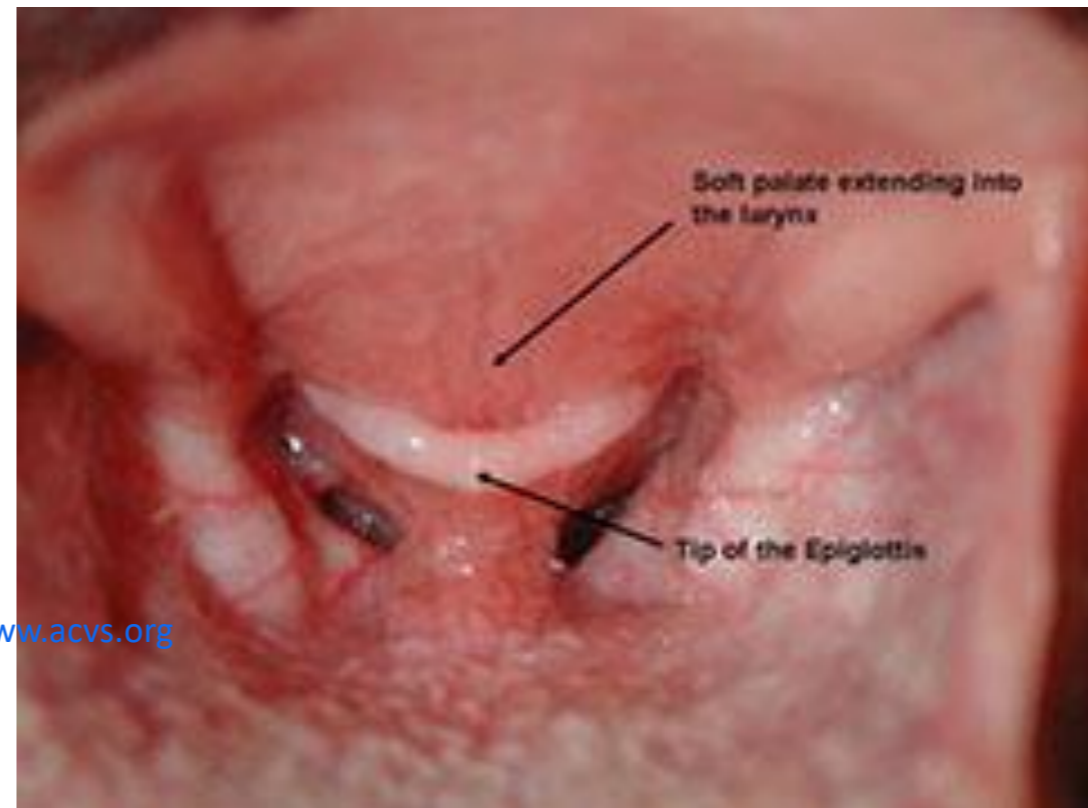
Emergent Treatment

- Sedation
- Dexamethasone 0.05-0.1mg/kg IV
- Cold IVF
- Oxygen supplementation



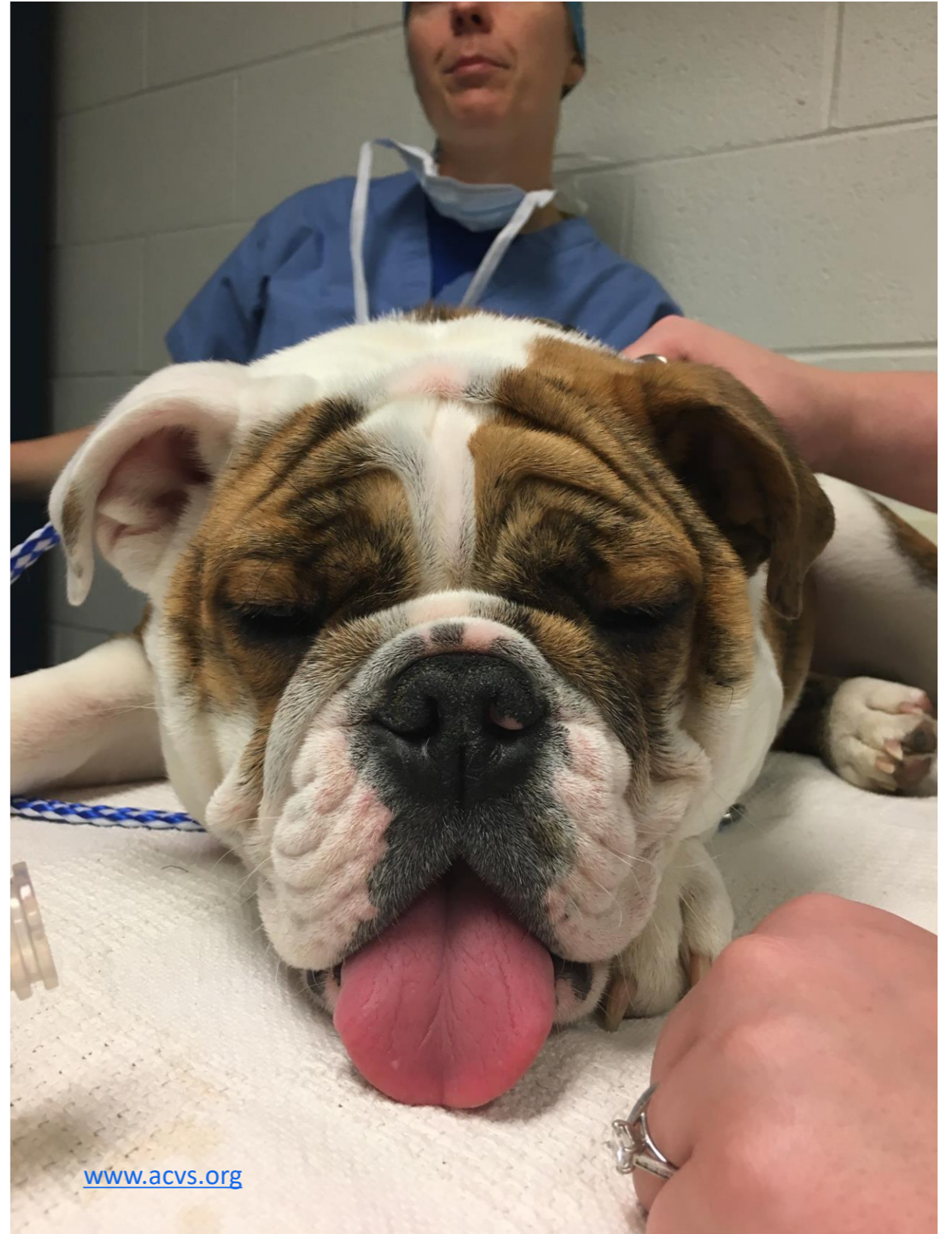
Surgical Management

- Oral exam
- Correct primary components
 - Nares
 - Soft palate
- Correct secondary changes
 - Treat laryngeal collapse
 - Tonsillectomy
- Newer procedures
 - Palatoplasty
 - LATE



Surgery: Stenotic Nares

- Considerations
 - Technique
 - Instruments
 - Scalpel
 - Electrocautery/ laser



Surgery: Stenotic Nares

- Positioning
 - Sternal recumbency
 - Symmetry of nares

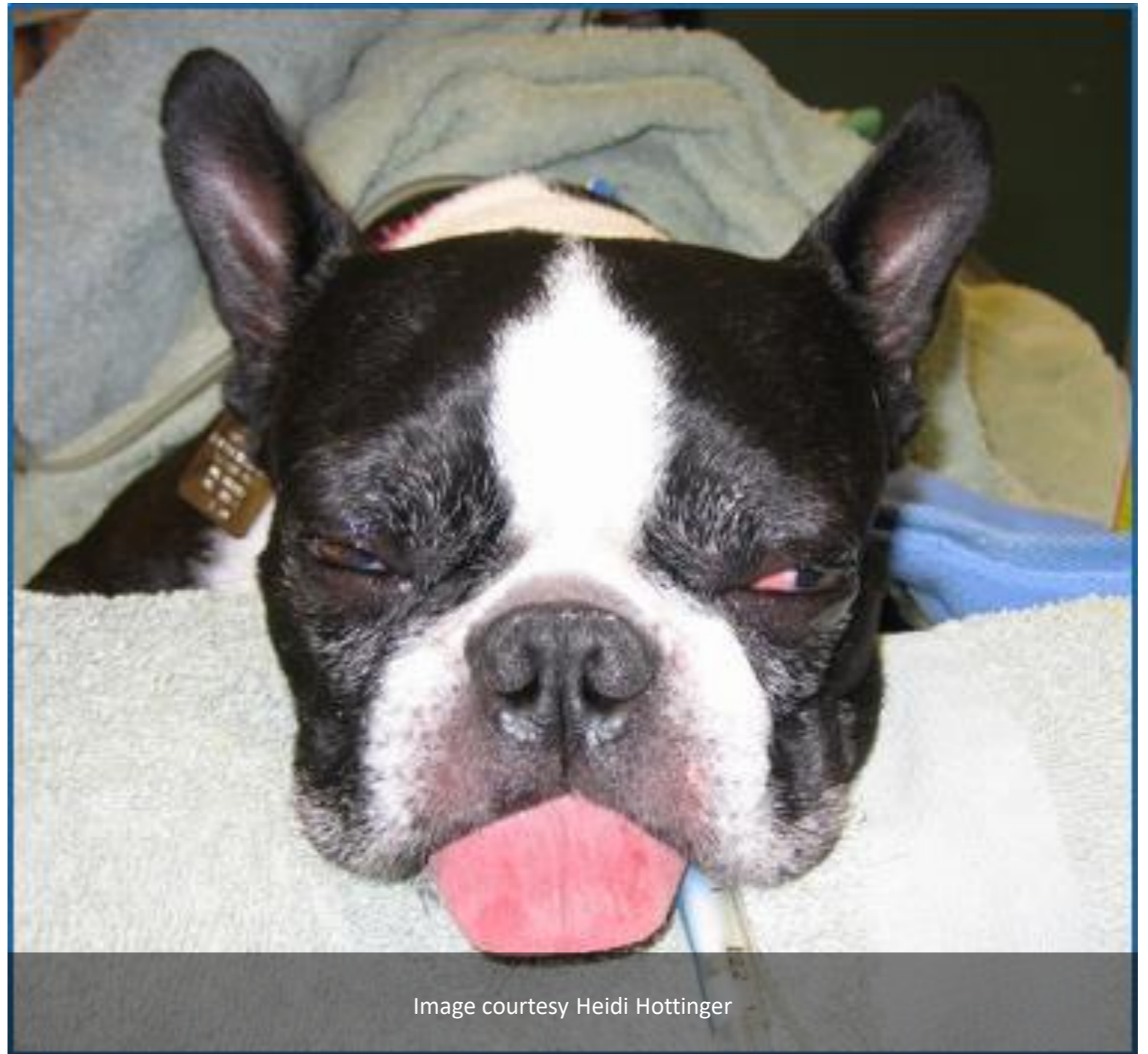
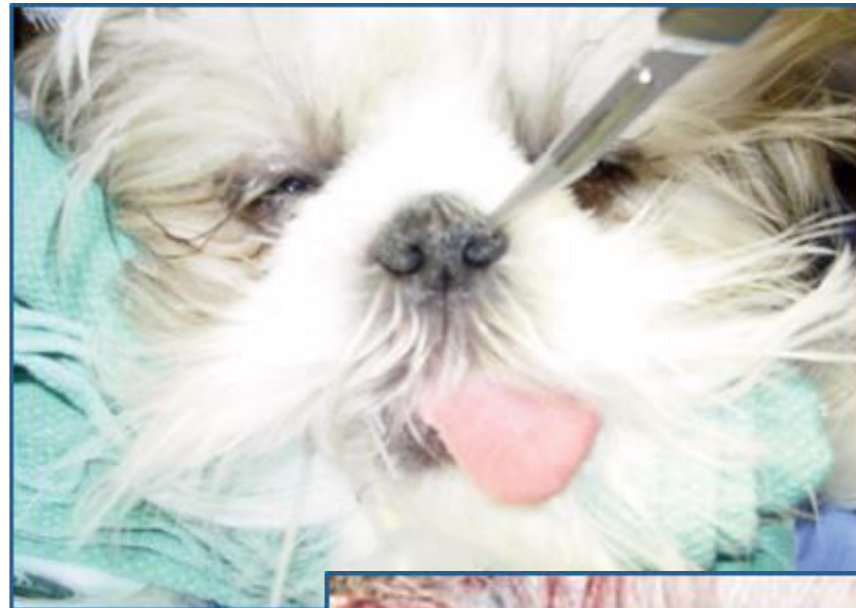


Image courtesy Heidi Hottinger

Surgery: Stenotic Nares

- Trader's technique
 - Angle of blade
 - No suturing
 - Hemostasis
 - Depigmentation



Technique and outcome of nares amputation (Trader's technique) in immature shih tzus
Huck et al, 2008

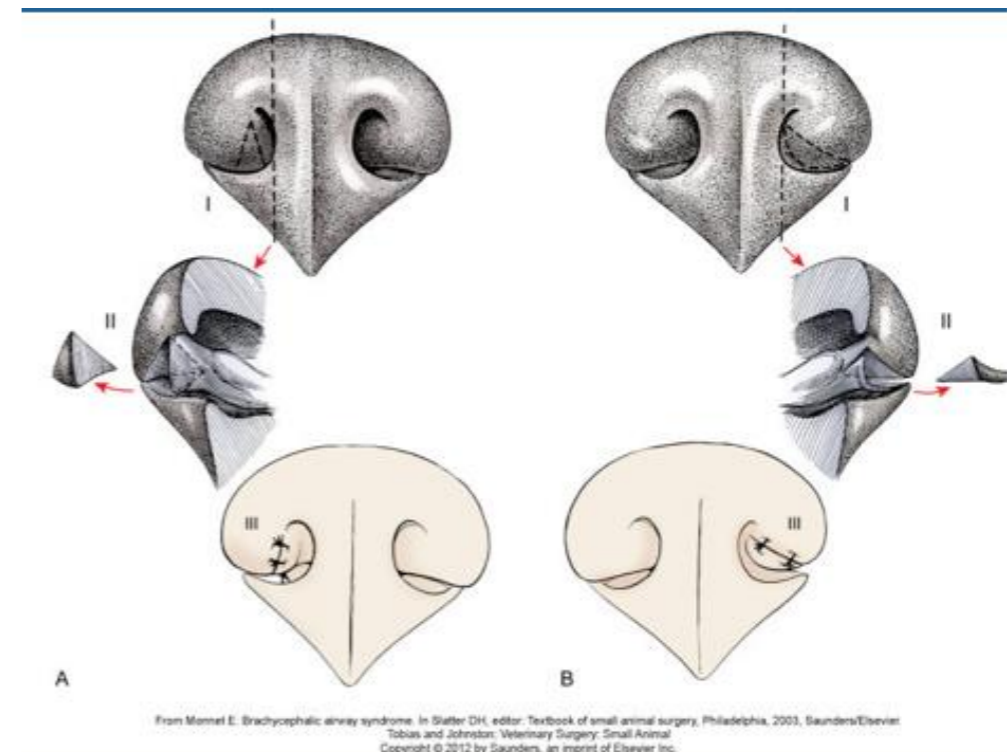
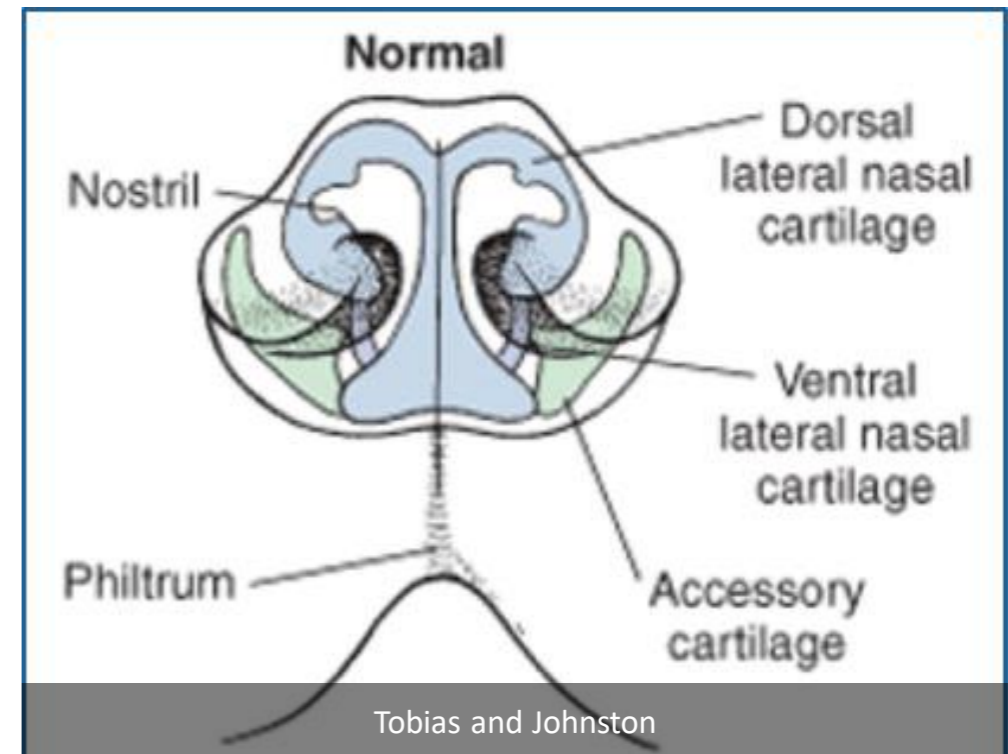
Surgery: Stenotic Nares



Image courtesy Heidi Hottinger

Surgery: Stenotic Nares

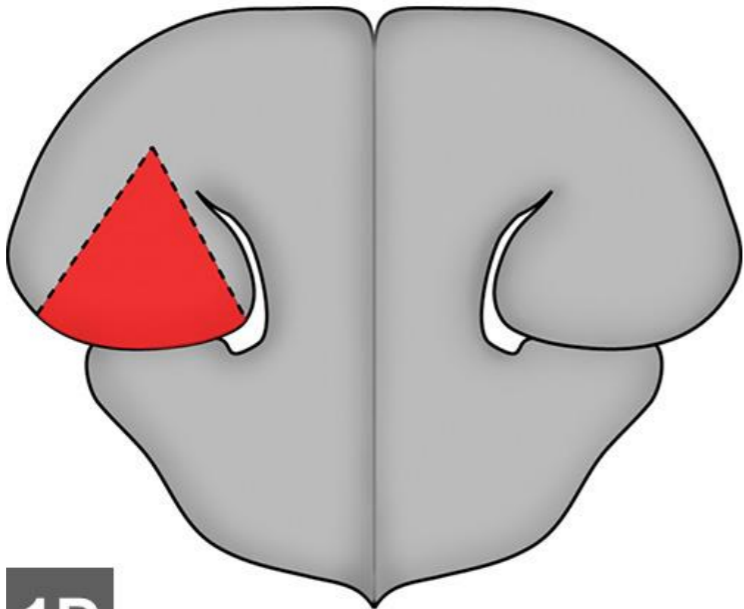
- Wedge Resection
 - Dorsolateral nasal cartilage
- Wedge
 - Lateral
 - Vertical
 - Horizontal
- Closure with suture
- Abaxial movement of wing of the nostril



Surgery: Stenotic Nares Wedge Resection



Wedge Technique



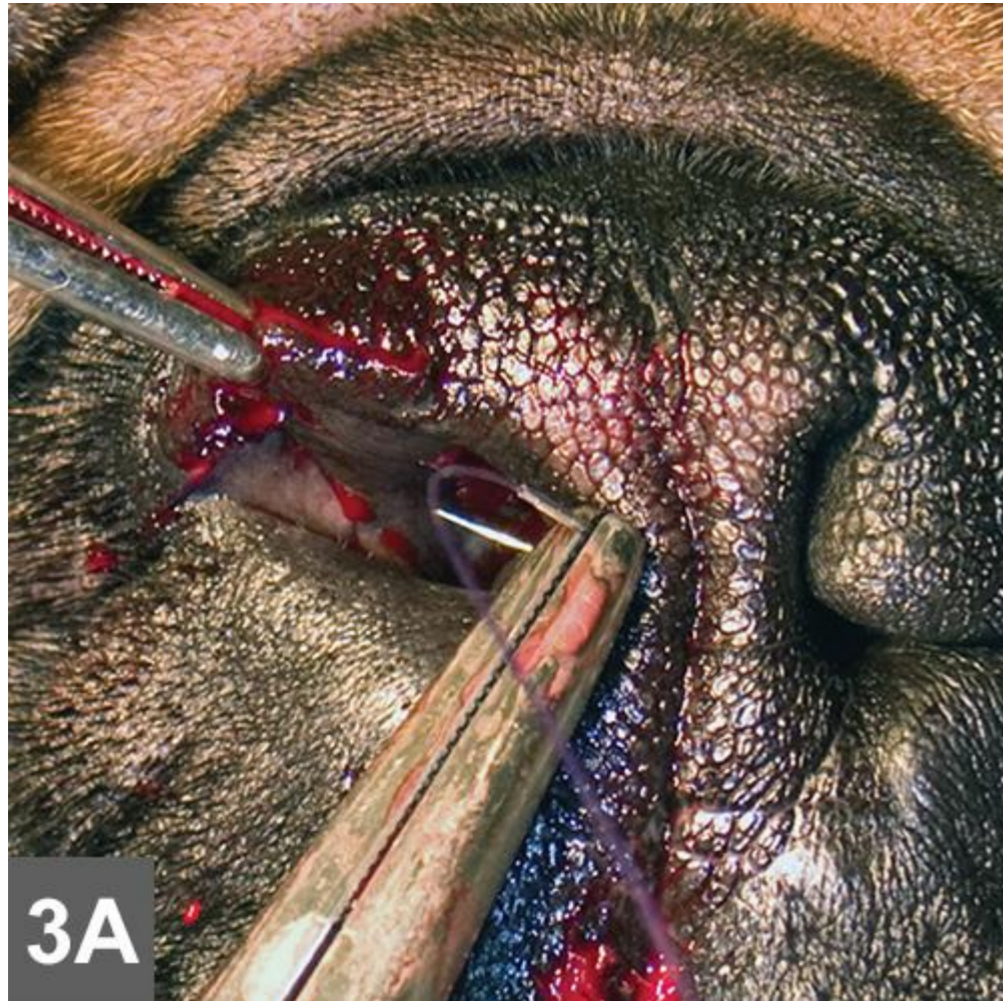
1D



1A

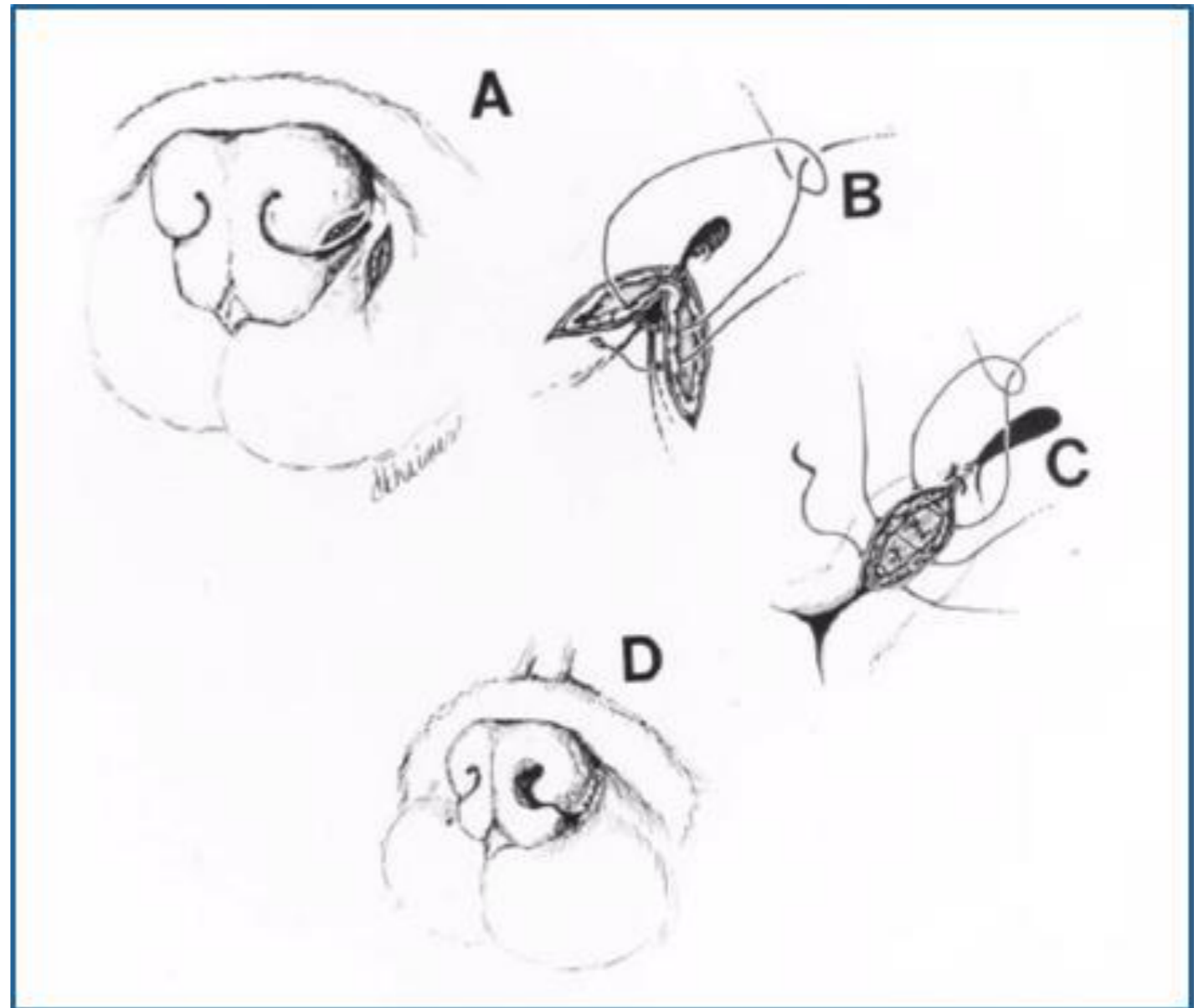
<https://www.cliniciansbrief.com/article/brachycephalic-syndrome-innovative-surgical-techniques>





Surgery: Stenotic Nares

- Alapexy
 - Permanently affix wing of nostril to adjacent skin



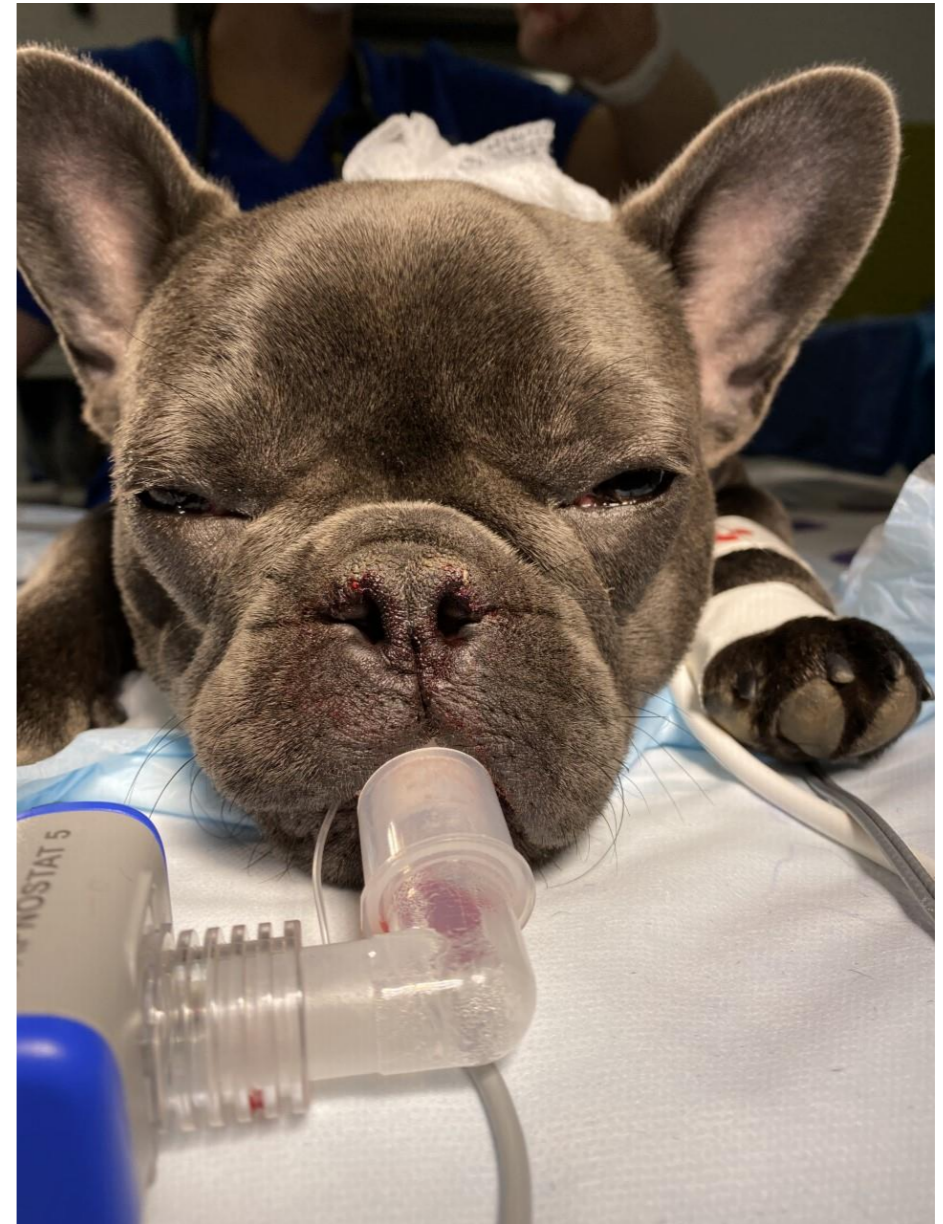
Surgery: Stenotic Nares Alapexy



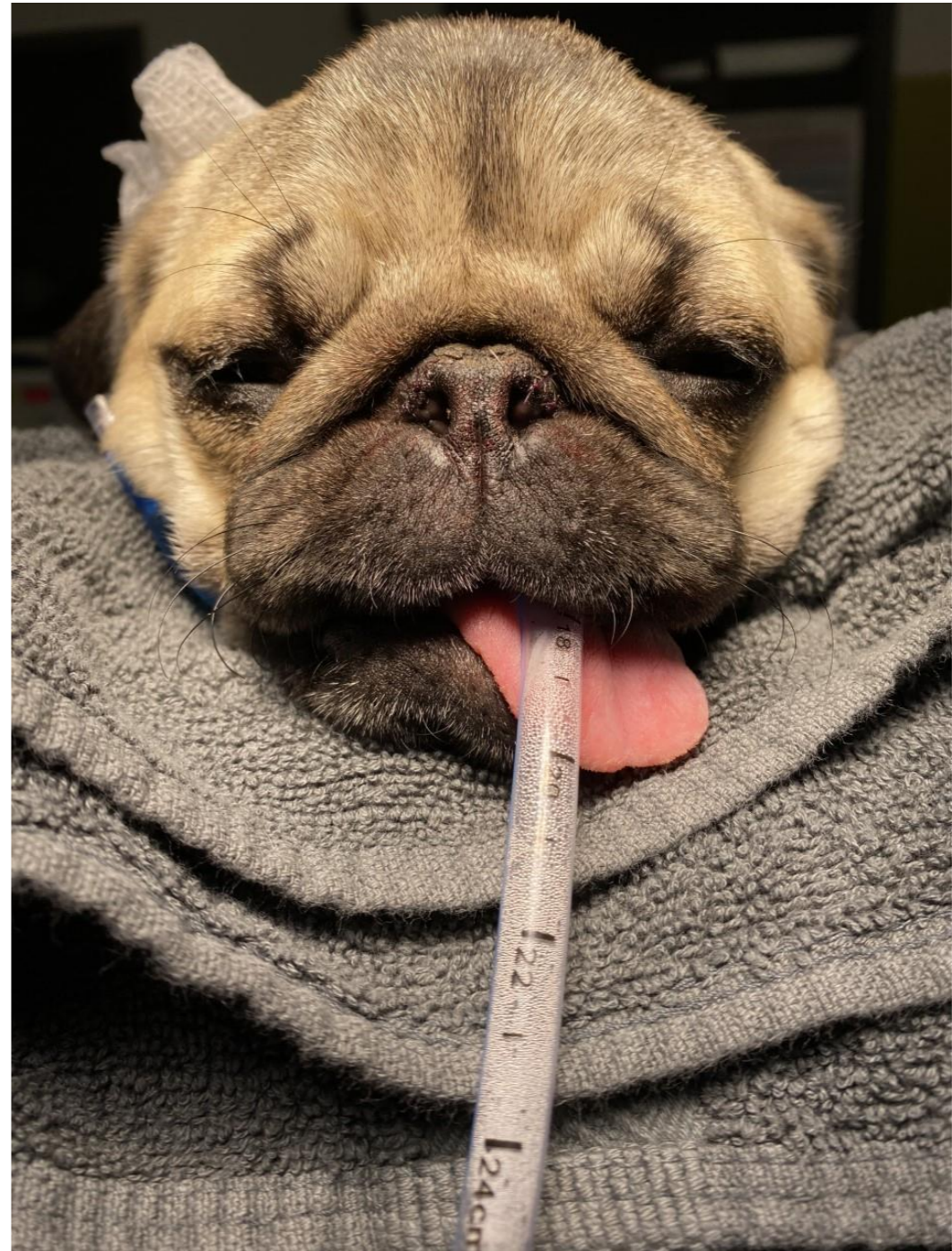
Alapexy: an alternative technique for repair of stenotic nares in dogs

[Ellis, 2004](#)

Recent Case Examples

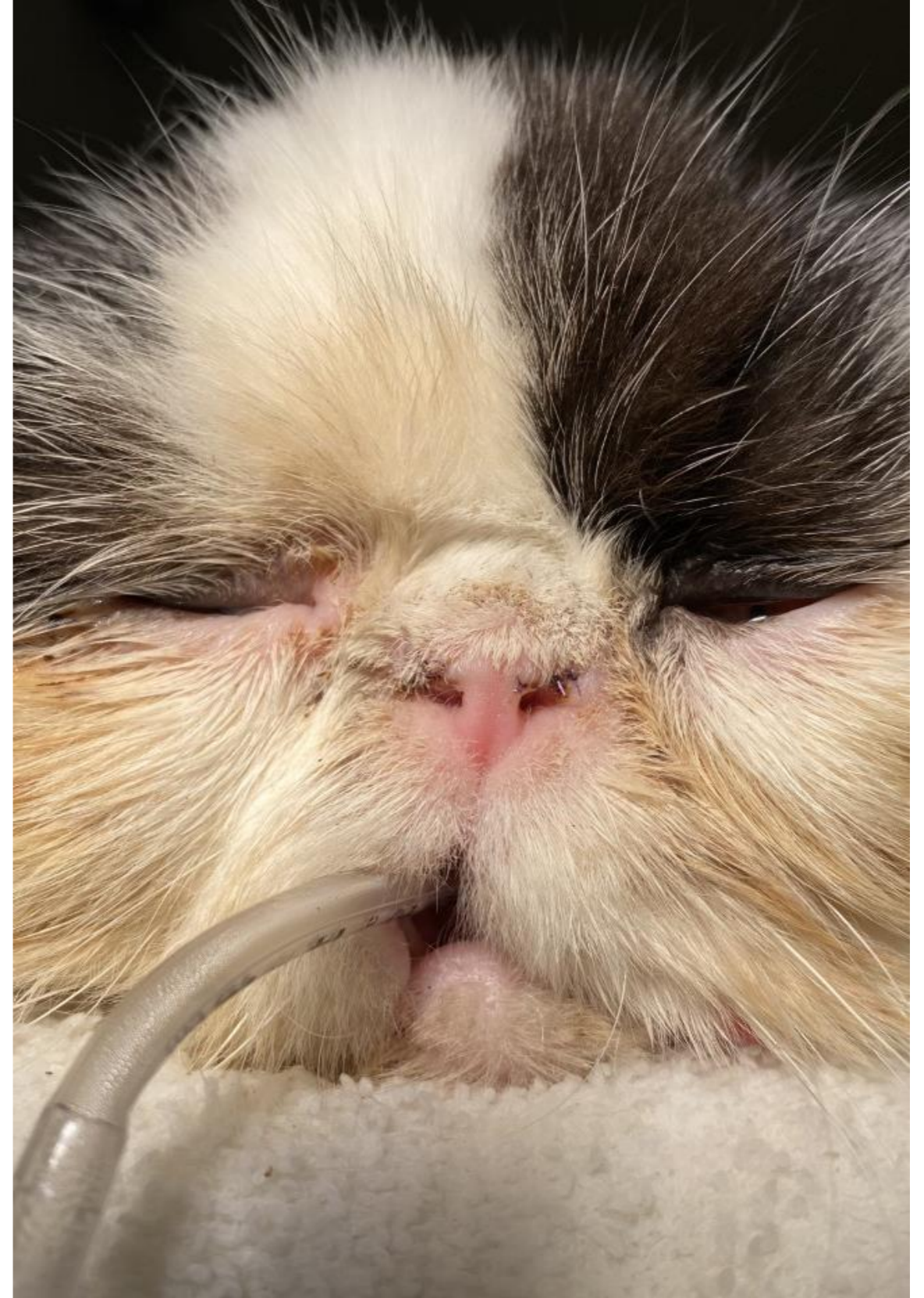


Recent Case Examples





Cats





Surgery: Soft Palate Resection (Staphlectomy)

Resection Options

- Scissors
 - Cut and sew
 - Apposition of oral and nasal epithelial surfaces using 3-0 or 4-0 monofilament
- CO₂ laser
 - Cover caudal pharynx, endotracheal tube with moistened sponges
- Electrothermal bipolar sealing device
 - Dorsal recumbency

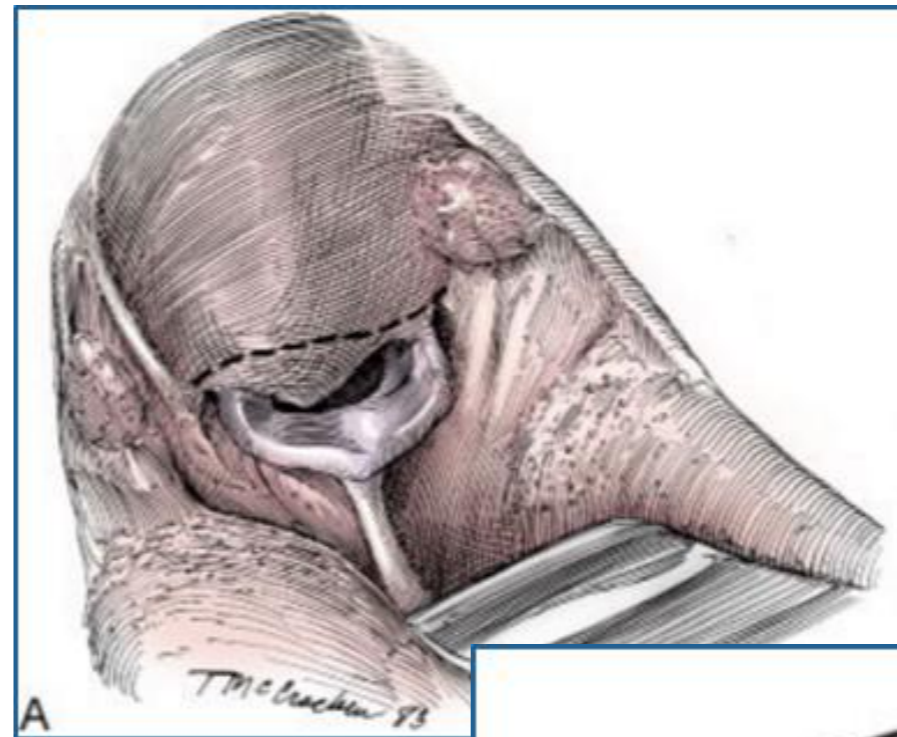
Patient Positioning



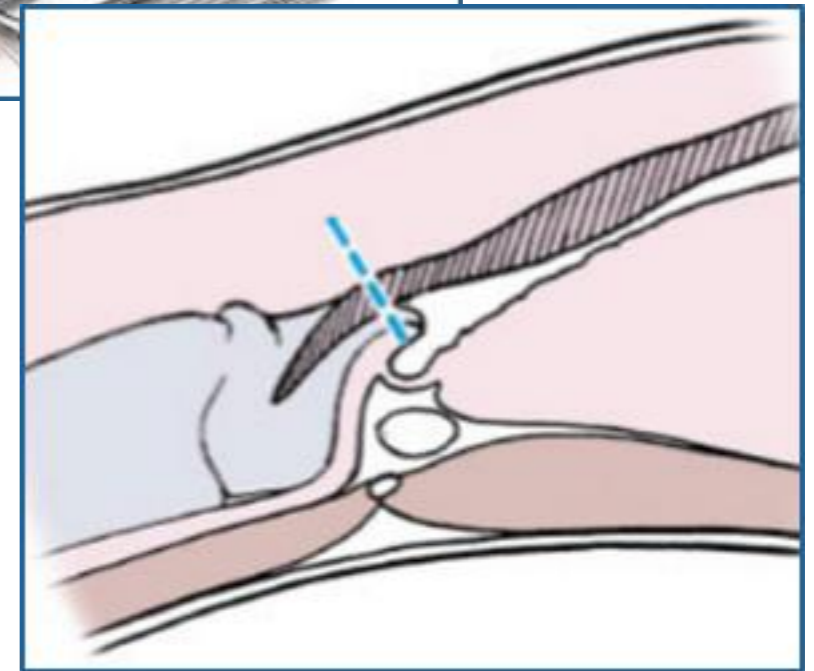
Image Courtesy of Heidi Hottinger

Level of Resection

- Caudal - mid border of tonsil
- Traction on tongue can alter position of palate

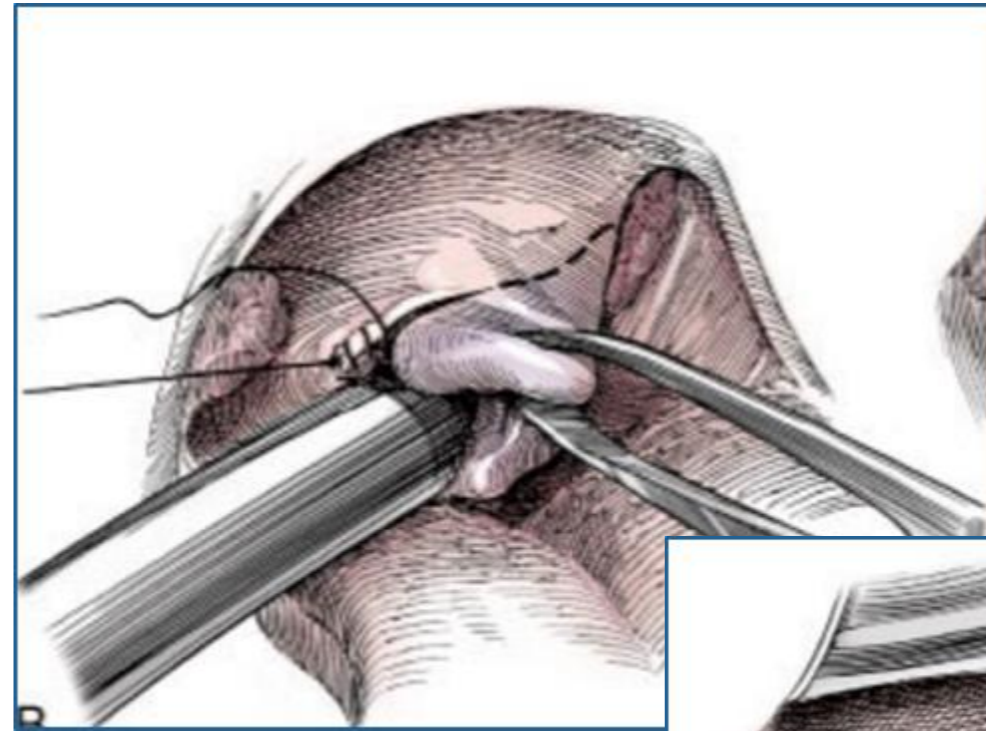


Tobias and Johnston

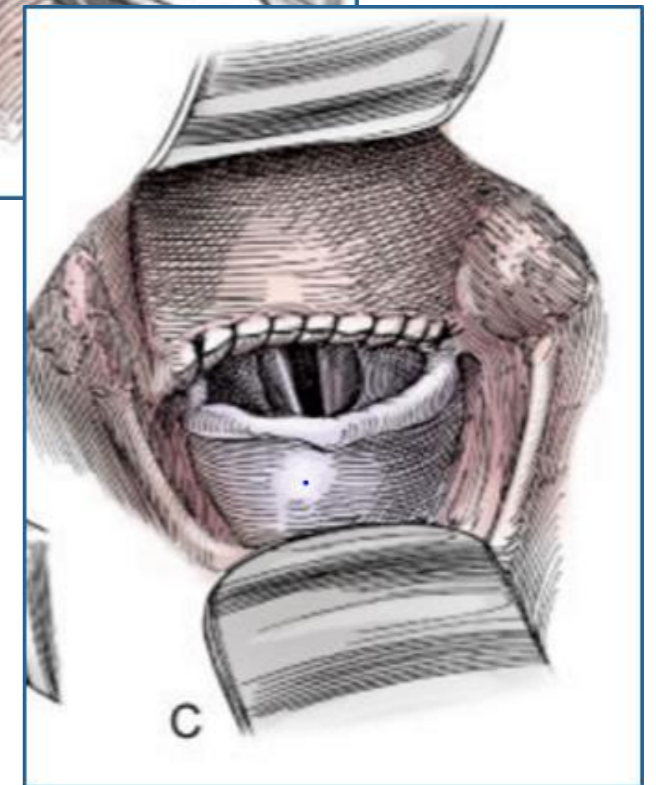


Cut & Sew Technique

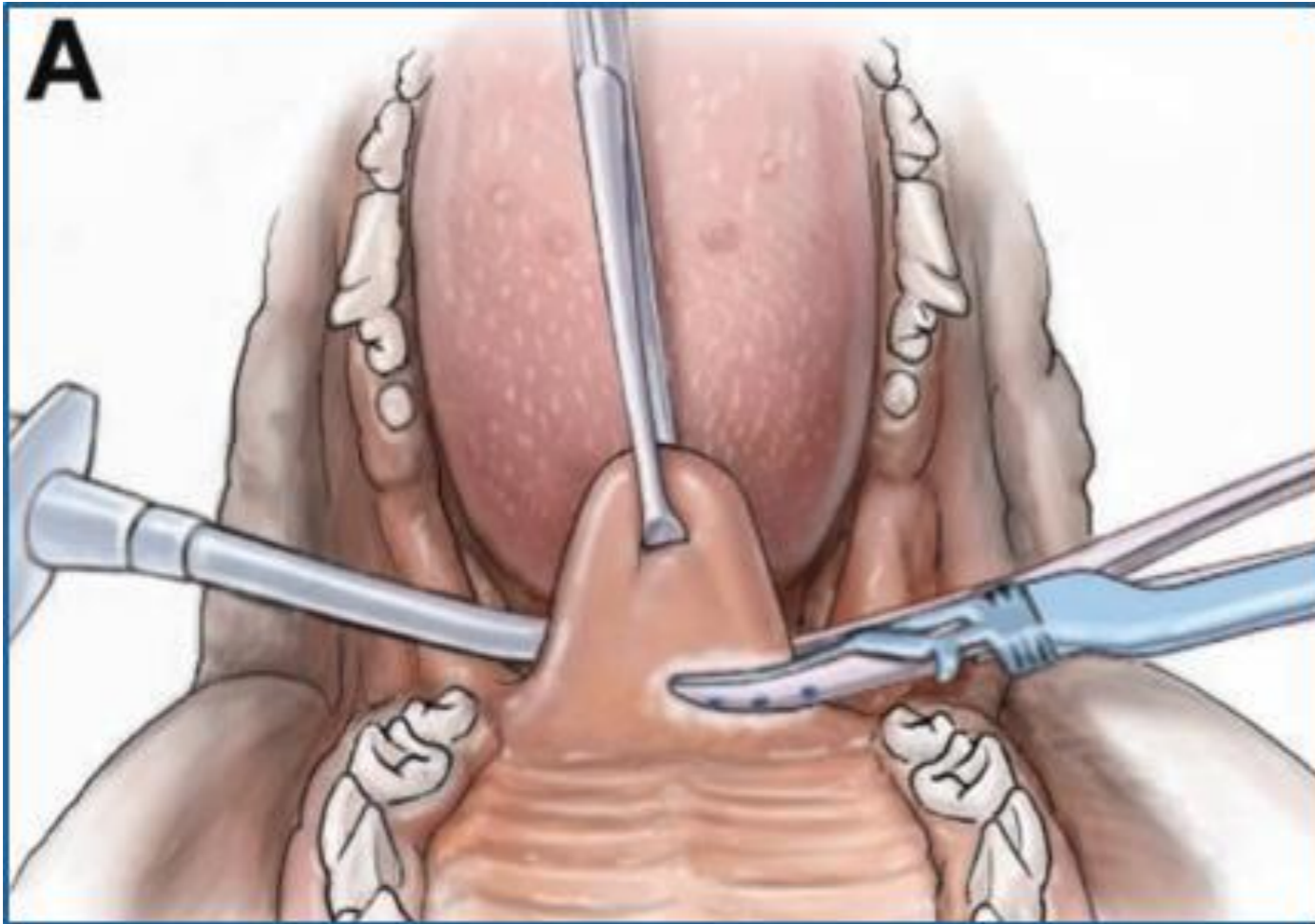
- Soft palate retracted rostrally
 - Stay suture
 - Allis tissue forceps
- Stay sutures placed at lateral corners
- Cut and sew



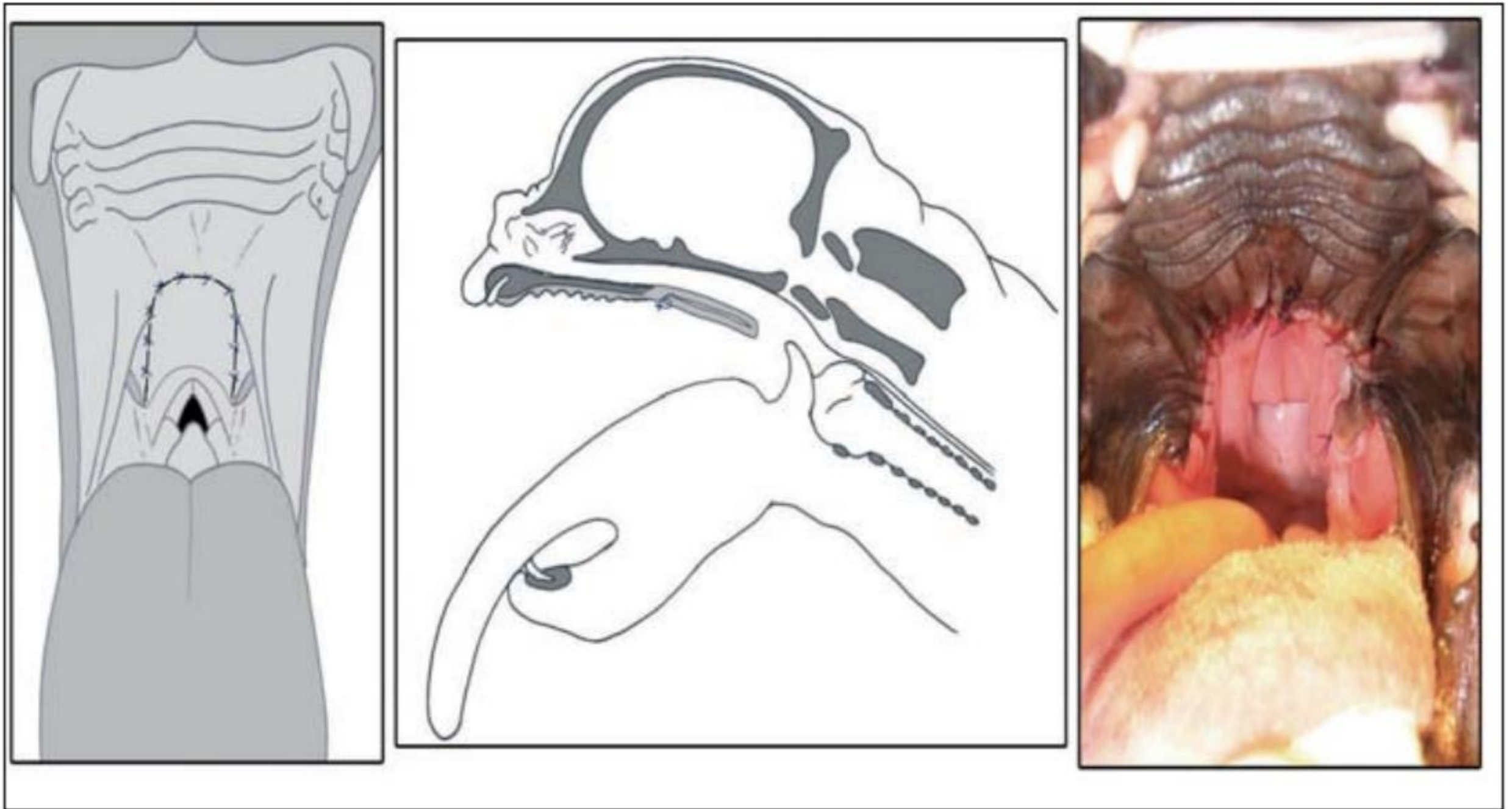
Tobias and Johnston



Other Techniques



Folded Flap Palatoplasty

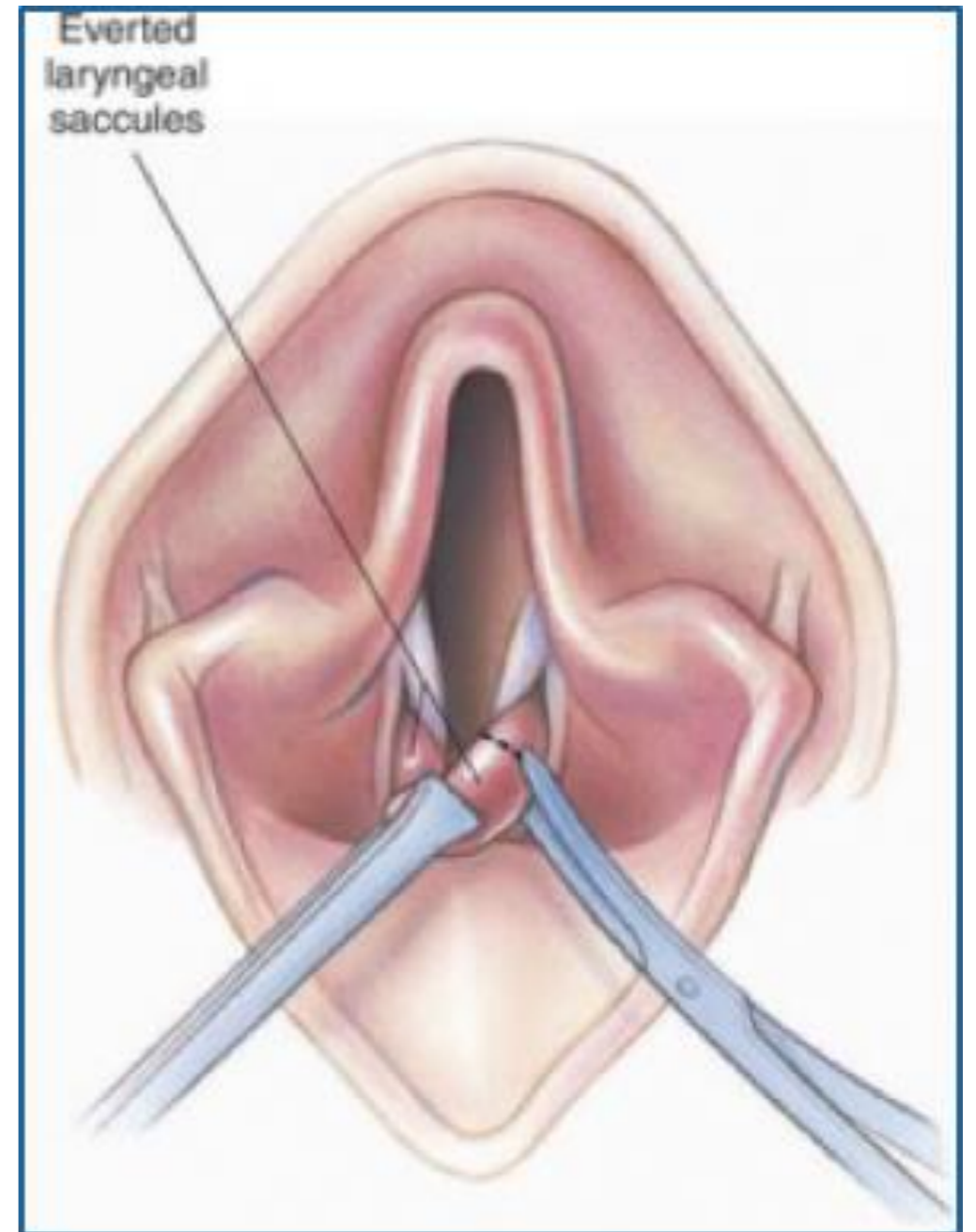


Dupre et al, 2007

Surgery: Everted Laryngeal Sacculae Excision

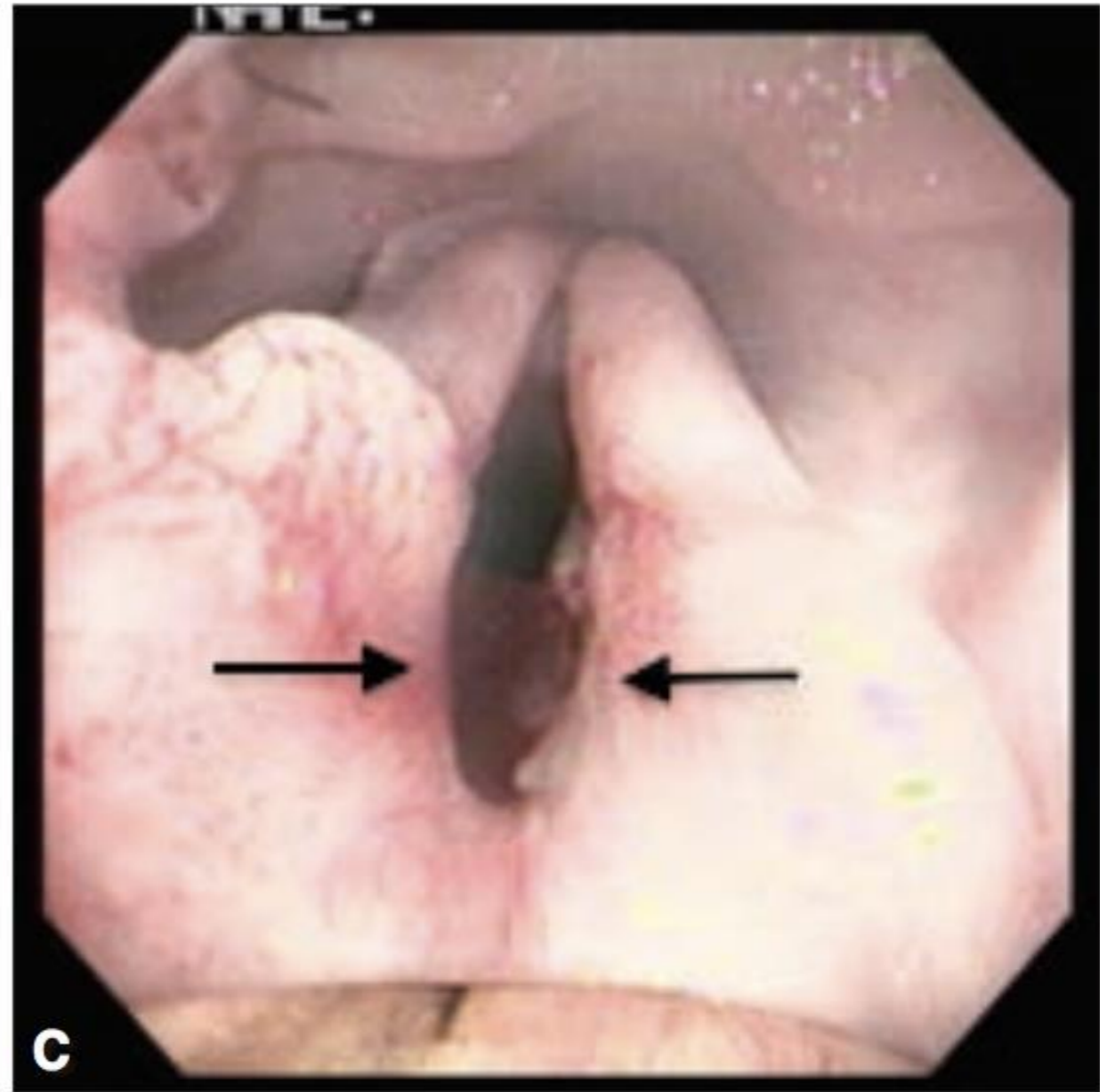
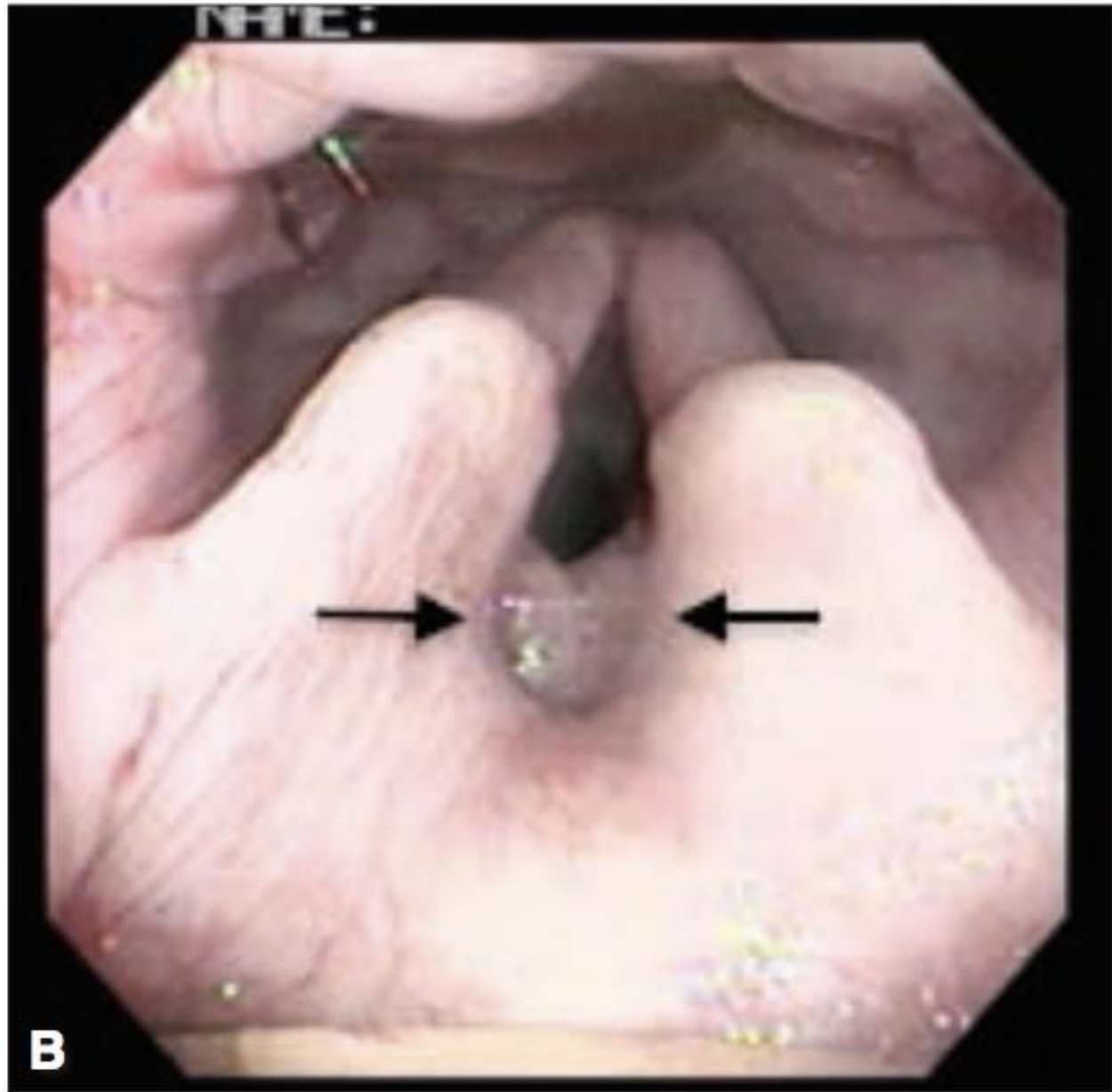
Excision without suturing

Questionable benefit to long term outcome of laryngeal collapse



Fossum

Surgery: Everted Laryngeal Sacculle Excision



Post Operative Care

- Corticosteroid administration
- Brachy-wakey protocol
- Withhold food of 12-24 hours
 - Supervise when giving food and water
 - Soft food
- Use anti-emetics, antacids, and prokinetics as needed!

Complications

Need for temporary
tracheostomy tube

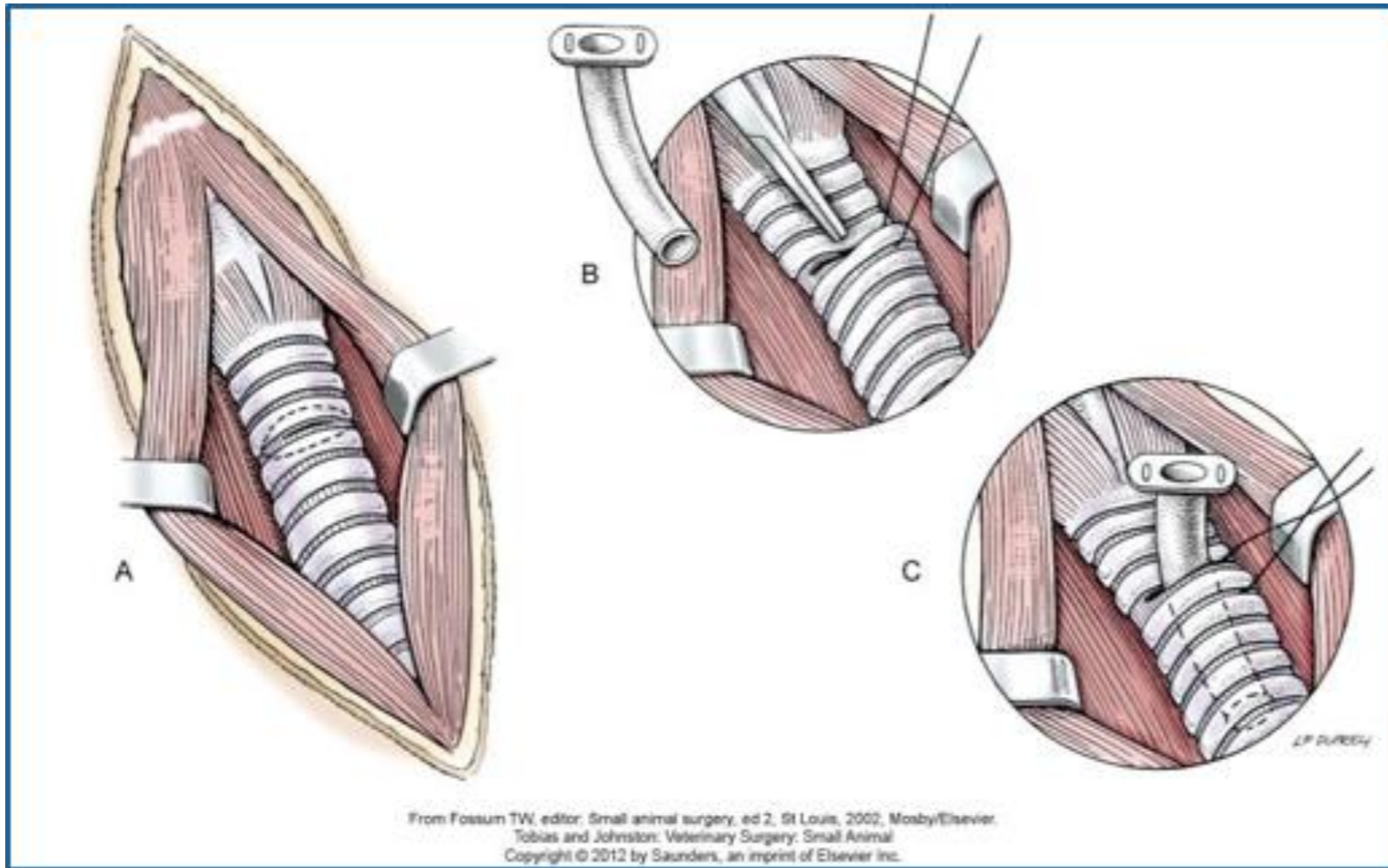
Aspiration pneumonia

Coughing/gagging

Noisy respiration

Death (rare)

Temporary Tracheostomy



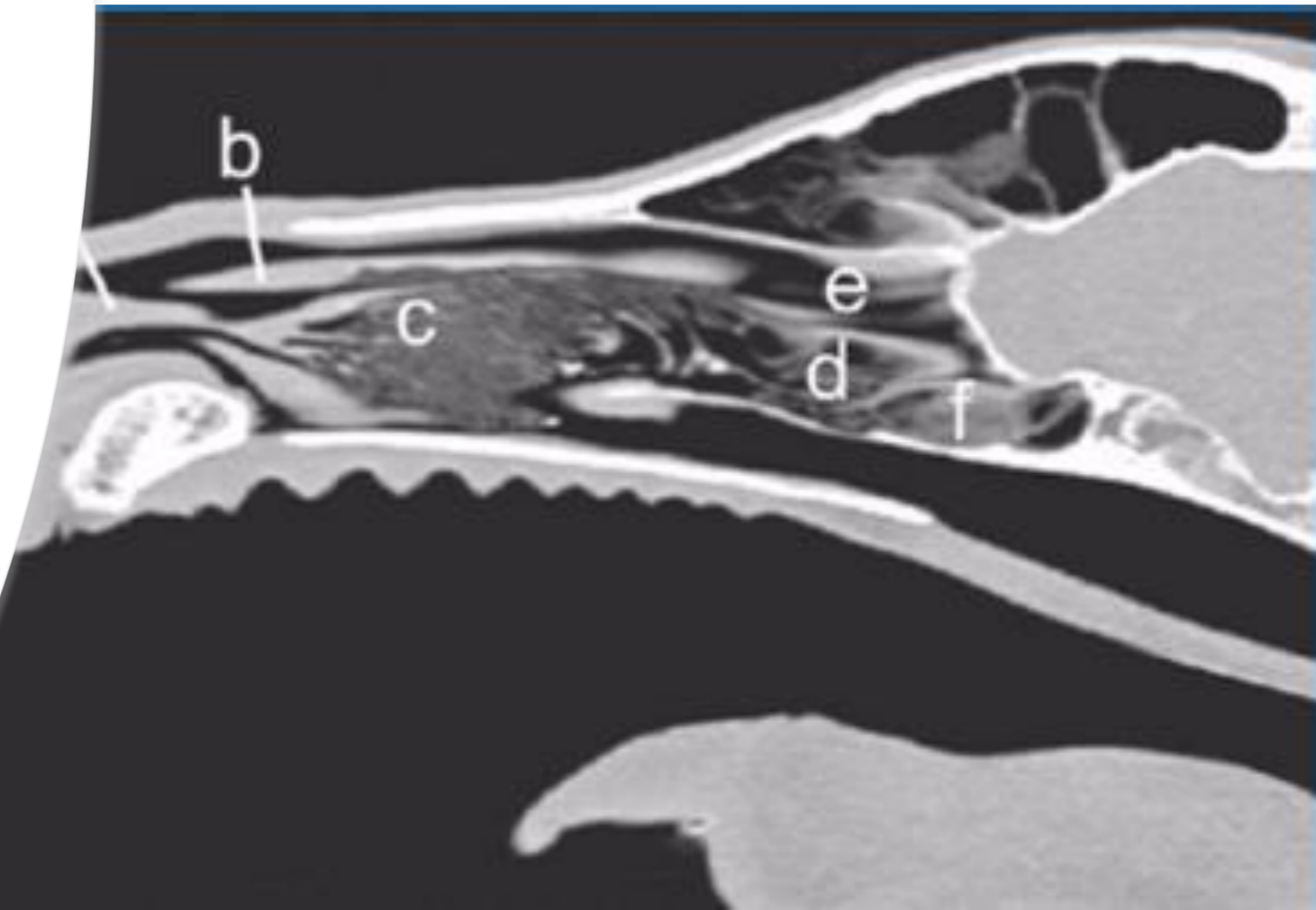
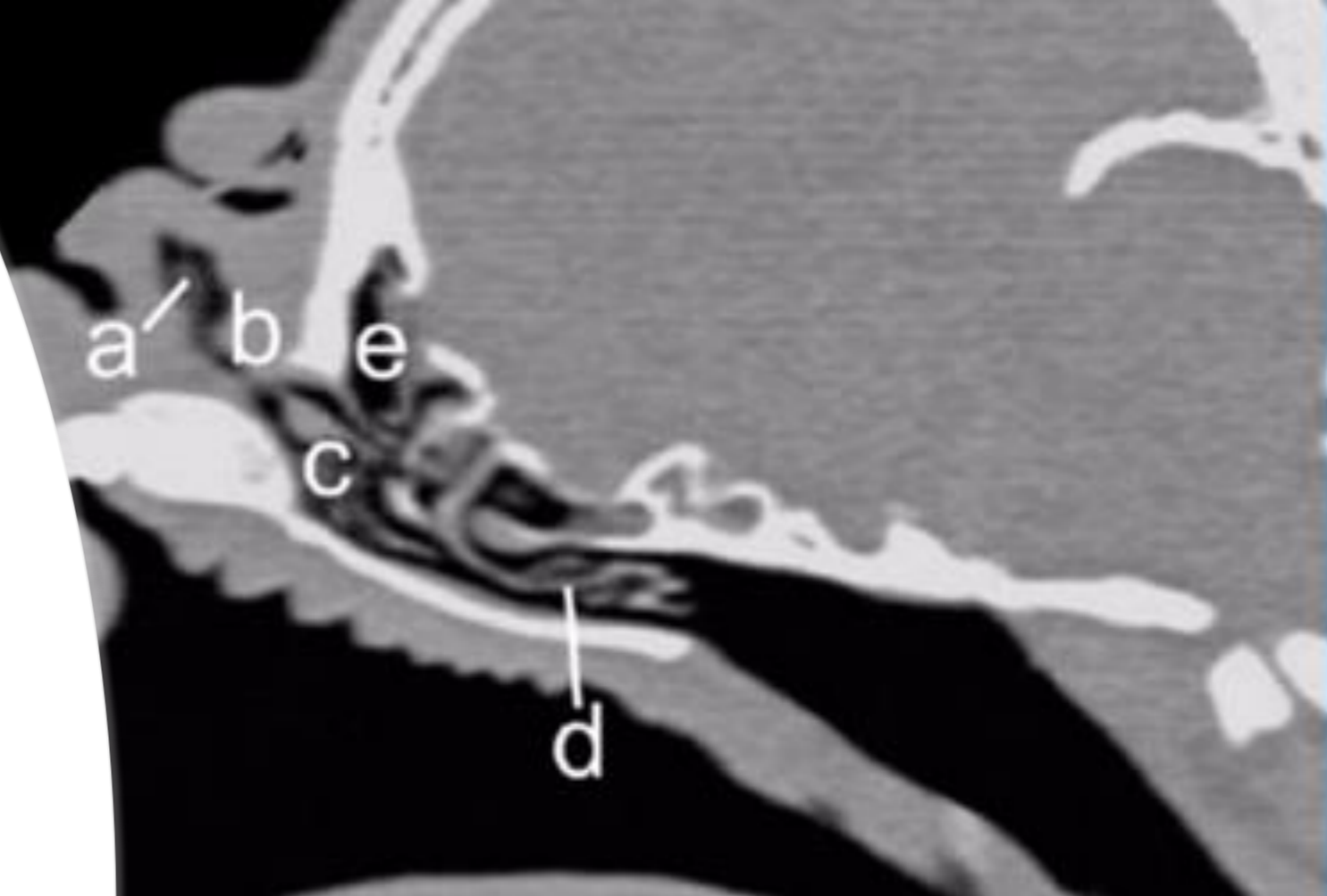
Prognosis

- Good to excellent outcome in 90% of cases
- Some evidence that dogs with everted laryngeal sacculles have poorer prognosis
- Advanced laryngeal collapse



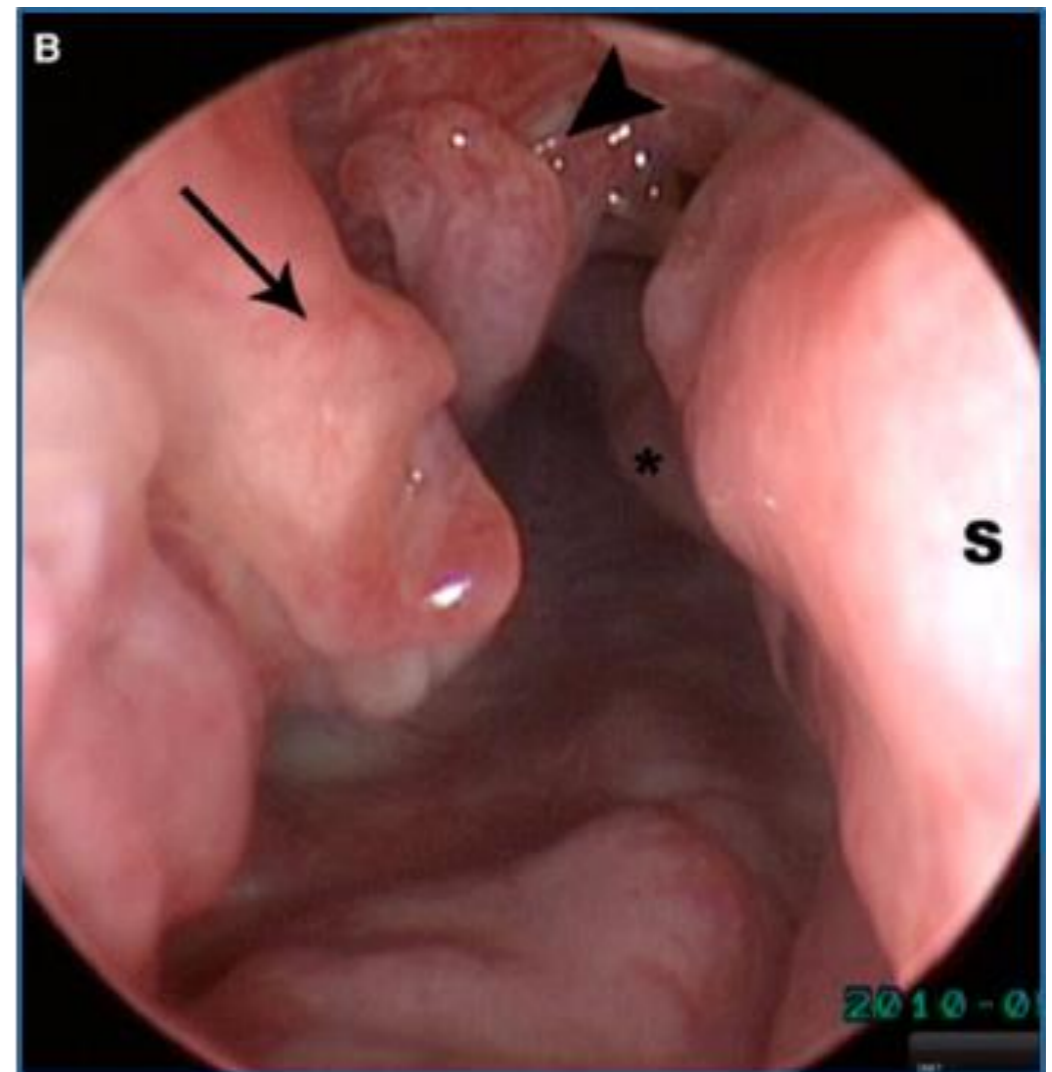
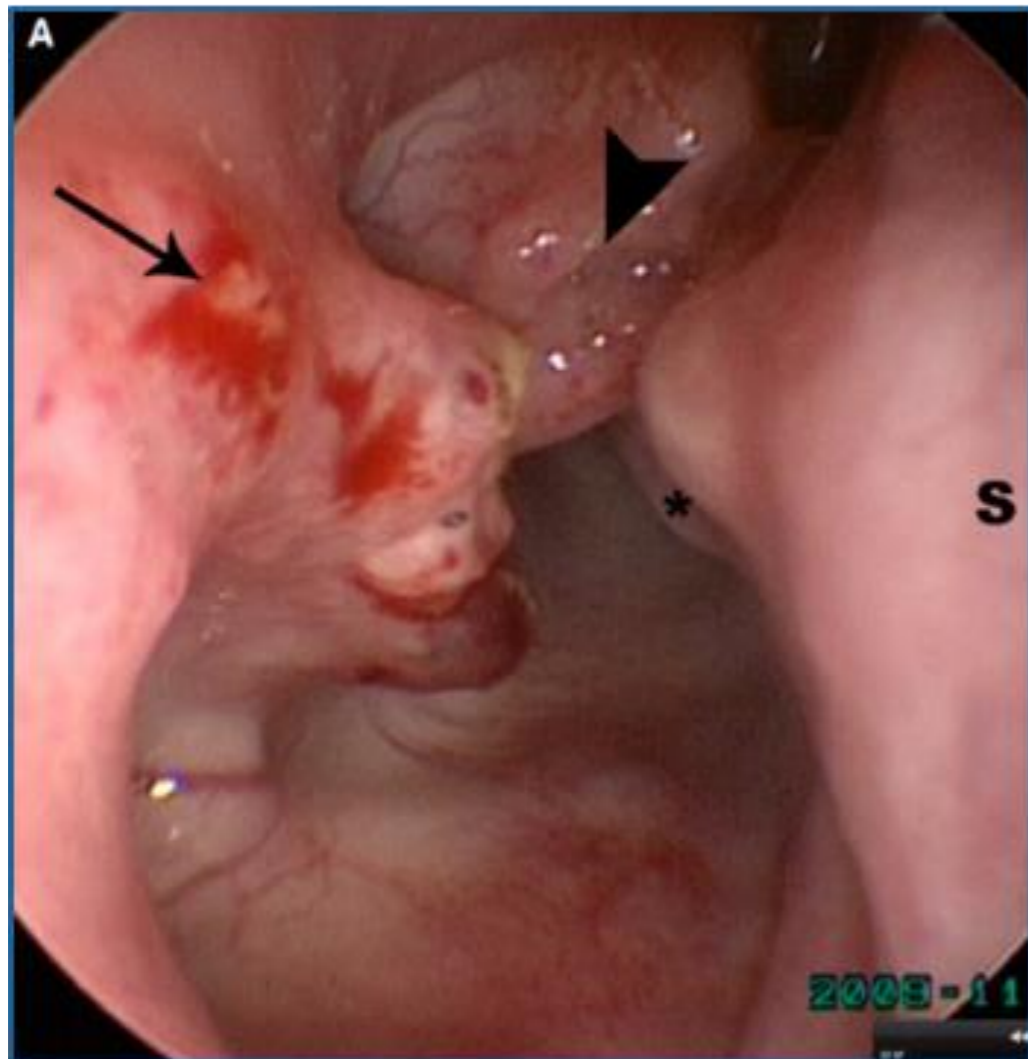
Surgery: Addressing Nasal Turbinates

- LATE
 - Laser assisted
- Ventral nasal turbinates removed (C)
- Rostral aberrant turbinate (medial nasal conchae) also removed if present (D)



Inside the brachycephalic nose: conchal regrowth and mucosal contact points after laser-assisted turbinectomy

Schuenemann and Oechtering, 2014



Lifestyle Changes

- Weight loss
- Avoid over-exertion
- Swimming
- Harness



I don't always Breathe
But when I do, it's w
an ET tube



Emergency Vet Tech Memes

Take Home Points

- Identify and treat early!
- Treat as many components of brachycephalic airway syndrome as possible
- Don't forget the medical and lifestyle management



Questions?

Jessica Baron, DVM, Diplomate, ACVS-SA