Surgical Management of Brachycephalic Airway Syndrome

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Outline
- Disease overview
- Anesthetic concerns
- Surgical treatment options
- Medical and lifestyle management

Breed Predisposition
- Dogs
  - English bulldogs
  - French bulldogs
  - Pugs
  - Boston terriers
  - Pekingese
  - Shih tzus
  - Cavalier King Charles spaniels

Breed Predisposition
- Cats
  - Persians
  - Himalayans
Clinical Signs
- Decreased nasal airflow → stertor
- Overlong soft palate → stridor
- Longer inspiratory period
- Cyanosis
- Collapse
- Intolerance of heat

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

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

Gastrointestinal Changes
- 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
Gastrointestinal Changes

- Surgical correction of airway abnormalities
  - Upper GI endoscopy at the time of surgery
  - 81% showed improvement
    - 68.4% immediately post-op
    - 23.7% within 2w post-op
    - 8% within 6w post-op

Secondary Effects of Stenotic Nares

- Significant negative pressure is required in lower airways
  - → supraphysiologic stress on laryngeal and tracheal soft tissues and cartilage
  - → tissue edema
  - → laryngeal collapse
Anatomy—Nasal Passages

Vomer

Soft Palate

Anatomy—Nasal Passages

Nasopharyngeal Turbinates

- 11/53 (21%) brachycephalic dogs had nasopharyngeal turbinates
  - 9/11 were pugs
  - 2/10 brachycephalic cats had nasopharyngeal turbinates


Anatomy—Soft Palate

Functions
- Stimulation of sensory nn to trigger swallowing
- Closure of intrapharyngeal opening during swallowing and vomiting
- Stiffen the soft palate during periods of increased respiratory activity
- May play a role in airway partitioning
**Anatomy—Trachea**

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

**Anesthetic Concerns**

- Upper airway obstruction
- Aspiration pneumonia
- Client understanding?

**Pre-Anesthetic Workup**

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

**Thoracic Radiographs**
Pre-Treatment

- Prokinetics
- Antacids
- Gastroprotectants
- Aspiration pneumonia

Brachycephalic Protocol

- Pre-treat
  - PPI or H2 blocker
  - Metoclopramide
  - Cisapride
  - Maropitant and/or ondansetron
- Post-op
  - Anti-inflammatory

Brachycephalic Protocol

- Extubate when awake!
- Partial deflation of cuff
- Oxygen support
- Reintubation
  - Be prepared for temporary tracheostomy
- Temperature monitoring
Emergent Treatment

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

Temporary Tracheostomy

Timing of Intervention

- Stenotic nares correction as early as 3-4m
  - Slows cycle of tissue irritation and mucosal hypertrophy
  - Usually wait until early adulthood (spay/neuter time)
Surgical Considerations

- Scalpel
  - Hemorrhage control with pressure or placement of sutures
  - Monofilament suture
- Electrocautery/Laser
  - Minimal to absent hemorrhage

Surgical Considerations: Electrocautery and CO$_2$ Laser

**Pros**
- Decreased hemorrhage

**Cons**
- Increased damage to surrounding tissue
- Excessive carbonization
  - $\rightarrow$ prolonged wound healing
  - $\rightarrow$ depigmented scar

Positioning for Nares Surgery

- Sternal recumbency
- Symmetry of the nares during resection

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

- Owner follow-up
  - Visit or interview 1-58w post-op
- Clinical signs
  - Significant decrease in nasal discharge/upper airway noise, exercise intolerance
- Aesthetically pleasing
  - No scarring or nasal depigmentation present
  - All owners indicated a favorable aesthetic outcome

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

Wedge Resection

- Wedge taken from the dorsal lateral nasal cartilage
  - Including overlying mucosa and epithelium
**Wedge Resection**

- **Wedge**
  - Lateral
  - Vertical
  - Horizontal
- **Closure**
  - Direct appositional
  - Abaxial movement of the wing of the nostril

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**Wedge Resection**

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**Wedge Resection**

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**Wedge Resection**

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Findji and Duprée, Clinician's Brief 2013
Alapexy

- 5 dogs
  - 4 successful procedures
  - Breathing improved
  - Failure occurred in a 3kg Pekingese that did not have an inner row of sutures placed

Suture Removal

- Sedation!
  - Young, wiggly dogs
  - Prevent damage to surgical site
  - Prevent excitement and exertion
  - Protect staff

http://i.ytimg.com/vi/SorEbqLJShw/hqdefault.jpg
Inside the brachycephalic nose: conchal regrowth and mucosal contact points after laser-assisted turbinectomy
Schuenemann and Oechtering, 2014

Palatal Reduction

- Staphylectomy
  - Cut and sew
  - CO2 laser
  - Fine-tipped electrocautery
  - Ligasure
- Folded flap palatoplasty (FFP)

Positioning

Image Courtesy of Heidi Hottinger
Level of Resection

- Caudal border of tonsils
- Traction on tongue and soft palate can alter position

Staphylectomy

- Soft palate retracted rostrally
  - Stay suture
  - Allis tissue forceps
Folded Flap Palatoplasty

Laryngeal Saccule Excision

- Excision without suturing
- Questionable benefit to long term outcome of laryngeal collapse
Post-operative Care

- Reduce inflammation
- Brachy-wakey protocol
- Keep calm!
- Withhold food for 12-24 hours
  - Supervise when giving food and water
- Use anti-emetics, antacids, and prokinetics as needed!

Complications

- Death
- Need for temporary tracheostomy tube
- Aspiration pneumonia
- Coughing
- Noisy respiration

Prognosis

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

Medical Management

- Especially important with laryngeal collapse!
- Aspiration pneumonia
  - Consider bronchoscopy/BAL
  - Follow radiographically
- Allergic airway disease
- Chronic cough
Lifestyle

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

http://batpigandme.com/

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?

Remember to download the CE certificate in the handouts panel of the webinar control panel.

NOTE: CE certificate not available for watching the recording.

Questions about CE?

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