

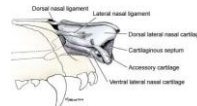
UPPER AIRWAY TRAUMA AND OBSTRUCTION

CAMILLA IFWARSON
SKALPELLEN VISBY 2016



UPPER AIRWAY - ANATOMY

Nasal cavity begins at nostrils and ends at the choane



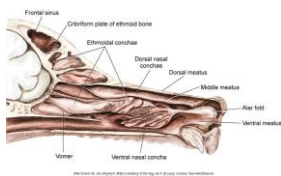
Divided longitudinally by the nasal septum



External nose is supported by a cartilaginous frame

UPPER AIRWAY-ANATOMY

- > The dorsal and the bigger ventral conchae define the air passages
- > Dorsal, middle and ventral meatus
- > Three paranasal sinuses;
 - > Maxillary
 - > Sphenoidal
 - > Frontal



UPPER AIRWAY-ANATOMY

Nasopharynx

- > portion of pharynx dorsal to the hard and soft palate
- > the choane is the rostral meatus

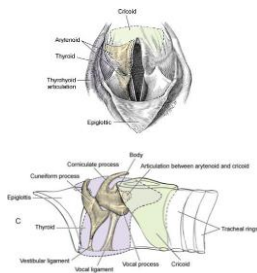


UPPER AIRWAY-ANATOMY

LARYNX

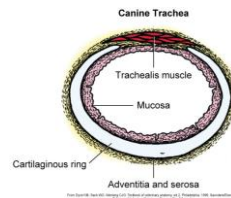
Formed by several cartilages

- > Epiglottis
- > Thyroid
- > Cricoid
- > Sesamoid
- > Interarytenoid
- > Arytenoid



TRACHEA - ANATOMY

- > Trachea starts at the end of the cricoid and ends at the carina.
- > Consists of incomplete hyaline cartilage rings, dorsally connected with the trachealis muscle
- > Between the rings fibrous tissue, annular ligaments



UPPER AIRWAY OBSTRUCTION

Symptoms

- Audible inspiratory noise (stridor, stertor)
- Tachypnoe / open mouth breathing
- Distress
- Panic
- Collapse



UPPER AIRWAY OBSTRUCTION

EMERGENCY MEDICAL MANAGEMENT

- Cool environment
- Oxygen
- If hyperthermia – cold water bath
- Sedation of stressed animals
- Corticosteroides
- Fluid therapy



UPPER AIRWAY OBSTRUCTION

DIAGNOSTICS

Management of respiratory distress involves careful consideration of the history, physical examination, and diagnostic testing.

Urgent procedures, such as intubation or tracheostomy, may be required.

The prognosis is dependent on the underlying disease

UPPER AIRWAY OBSTRUCTION

- Animals in severe respiratory distress need to be evaluated quickly and intubated
- In stable animals, focus on
 - respiration pattern
 - nares
 - auscultation of larynx and thorax
 - palpation of trachea
 - radiographs of neck and thorax

UPPER AIRWAY OBSTRUCTION

DDx

- BOAS (Brachycephalic obstruction airway syndrome)
- Foreign body
- Space occupying lesions (abscess, neoplasia)
- Laryngeal paralysis
- Laryngeal or pharyngeal oedema
- Trauma (stick injuries, bite wounds)



UPPER AIRWAY OBSTRUCTION

DIAGNOSTICS

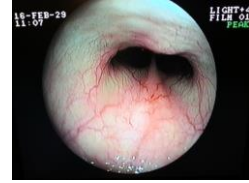
Pharyngoscopy

- Animal placed on its chest
- Before intubation – check with pharyngoscope
- Do NOT pull the tongue forwards.
- Do NOT have something under the throat that presses from the outside
- Evaluate soft palate, swelling, movement of larynx



Rhinoscopy/Endoscopy

- Direct observation and possibility to collect samples (swab, flush, biopsy)
- Stiff endoscope for the rostral part
- Flexible endoscope for examination of the choanae and nasopharynx

**BOAS**

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



<http://www.vet.cam.ac.uk/boas/about-boas/recognition-diagnosis>

**FUNCTIONAL GRADING SYSTEM
(CLINICAL ASSESSMENTS PRE- AND POST- EXERCISE)**

Grade 0 - BOAS free; annual health check is suggested if the dog is under 2 years old.

Grade I - clinically unaffected but with mild respiratory signs, annual health check is suggested if the dog is under 3 years old.

Grade II - BOAS affected with moderate respiratory signs. The dog has a clinically relevant disease and requires medical attention, including weight loss and/or surgical intervention.

Grade III - BOAS affected with severe respiratory signs. The dog should have a thorough veterinary examination with surgical intervention.

Saxat från "Mopsordern"

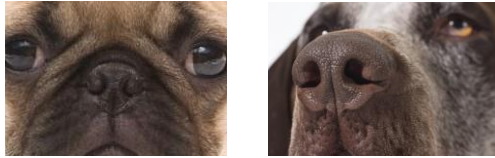
**Hälsa**

Den är en frisk ras med få rasbundna sjukdomar. Vad beträffar skador är det ögonen som är mest utsatta, av naturliga skäl, då den inte har en lång nos. Ögonskador fordrar alltid veterinärvård.

BOAS**Stenotic nares**

- Most common in brachycephalic breeds
- Axial deviation of dorsolateral nasal cartilage
- Significant negative pressure must be created in the lower airways to overcome resistance
- Leads to stress to the larynx and tracheal soft tissue and cartilage

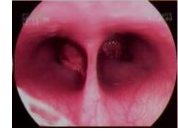




BOAS

Nasopharyngeal turbinates

- > Turbinates are normal **in** the nose
- > Should **not** protrude into the nasopharynx
- > Approx 20% of the dogs and cats with BOAS
- > Important to inspect nasopharynx



Nasopharyngeal turbinates in brachycephalic dogs and cats.

[Ginn JA¹, Kumar MS, McKiernan BC, Powers BE. J Am Anim Hosp Assoc. 2008 Sep-Oct;44\(5\):243-9.](#)

BOAS

Intranasal deformities

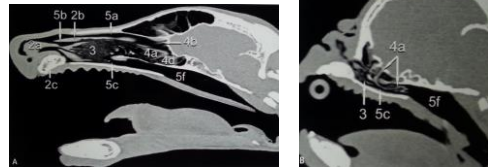
RAT = Rostral Aberrant Turbinates

CAT = Caudal Aberrant Turbinates

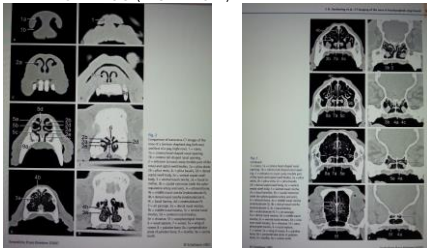
(Computed tomographic imaging of the nose in brachycephalic dog breeds* T. H. Oechtering, G. U. Oechtering, C. Noeller 2007)
(A novel approach to Brachycephalic Syndrome Oechtering et al Vet Surg 2016)

COMPUTED TOMOGRAPHIC IMAGING OF THE NOSE IN BRACHYCEPHALIC DOG BREEDS*

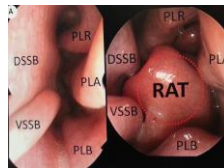
T. H. OECHTERING, G. U. OECHTERING, C. NOELLER



COMPARISON OF TRANSVERSE CT IMAGES OF THE NOSE OF A GERMAN SHEPHERD DOG (LEFT ROW) AND THAT OF A PUG (RIGHT ROW).



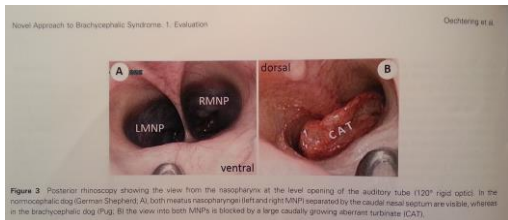
RAT



German Shepherd French Bulldog

- > 132 brachycephalic dogs
- > All dogs abnormal conchal growth
- > RAT common in Pugs (>90%)
- > Intra- and interconchal contact
- > Conclusion: Failure of addressing intranasal obstruction may be an explanation for lack of therapeutic success

CAT



BOAS

Elongated soft palate

- Part of the brachycephalic airway syndrome
- The overlong palate projects into the larynx
- Palate gets "trapped"
- Causes stridor and respiratory distress
- Severe cases can present acute with cyanosis and collapse

BOAS

Elongated soft palate

- Inspiratory dyspnea
- Snoring
- Coughing
- Exercise intolerance
- Cyanosis
- Vomiting and regurgitation



BOAS

Everted laryngeal ventricles

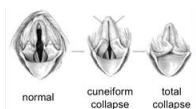
- Not only brachycephalic dogs
- Prolapse of mucosa from laryngeal crypt
- Also called
 - Laryngeal sacculle eversion
 - Laryngeal ventricle eversion
 - Stage 1 laryngeal collapse



BOAS

Laryngeal collapse

- Grade 1: Everted ventricles
- Grade 2: Coracoid processes comes together
- Grade 3: Cuneiform processes overlapping



LARYNGEAL PARALYSIS

- Damage to the vagus nerve, it's branches (recurrens) or the nucleus ambiguus
- Affects older, medium to large breed dogs. Labrador, Golden Retriever, St Bernhard, Irish Setter
- Can be congenital in Bouvier, Bullterrier, Dalmatians, Huskies, Rottweiler, Pyrenean
- Has been reported in cats



LARYNGEAL PARALYSIS



- Onset can be acute or chronic
- Symptoms are gagging, coughing, voice change, exercise intolerance, stridor
- Can be accompanied with dysphagia and megaesophagus
- Look for concurrent disease (x-rays of thorax, hypothyreosis, proprioceptive loss)

LARYNGEAL PARALYSIS



LARYNGEAL PARALYSIS

- Recent study show that it may also be a concurrent cranial laryngeal nerve dysfunction

Evaluation of Pharyngeal Function before and after unilateral arytenoid lateralisation by Andrade, University of Georgia. Vet surg 8/2015

- Surgical correction positively associated with survival time
- Dogs with concurrent neurological deficits at higher risk developing post op complications after surgery of ILP
- Idiopathic Canine Laryngeal Paralysis as one sign of a Diffuse Polyneuropathy, Bookbinder Vet Surg 2 2016

LARYNGEAL PARALYSIS

- Premed with Acepromazine
- Position on chest and straight
- No hands under larynx
- Do not pull the tongue
- Laryngoscope, endoscope
- Look long enough!
- Doxapram

LARYNGEAL PARALYSIS

Evaluate:

- Arytenoid cartilage movement
- Secondary changes (edema, secretions, swelling)
- Other changes/disease (everted saccula, neoplasia)

- Need of Surgery?

OBSTRUCTIVE NEOPLASIA

- Acute upper airway obstruction can occur in cases with inflammation, edema and accumulation of fluid/airway secretions

- Neoplastic tonsils can be obstructive

- Most laryngeal tumors are locally invasive with potential to metastasize



Vet Radiol Ultrasound, 2013 May-Jun;54(3):231-6. doi: 10.1111/rvu.12019. Epub 2013 Feb 27.

Computed tomography of nonanesthetized cats with upper airway obstruction.

Stadler K, O'Brien R.

Author Information

Abstract

Upper airway obstruction is a potentially life-threatening problem in cats and for which a noninvasive, sensitive method rapid diagnosis is needed. The purposes of this prospective study were to describe a computed tomography (CT) technique for nonanesthetized cats with upper airway obstruction, CT characteristics of obstructive diseases, and comparisons between CT findings and findings from other diagnostic tests. Ten cats with clinical signs of upper airway obstruction were recruited for the study. Four cats with no clinical signs of upper airway obstruction were recruited as controls. All cats underwent computed tomography imaging without sedation or anesthesia, using a 16-slice helical CT scanner and a previously described transparent positional device. Three-dimensional (3D) internal volume rendering was performed on all CT image sets and 3D external volume rendering was also performed on cats with evidence of mass lesions. Confirmation of upper airway obstruction was based on visual laryngeal examination, endoscopy, fine-needle aspirate, biopsy, or microscopy. Seven cats were diagnosed with intraluminal upper airway masses, two with laryngotracheitis, and one with laryngeal paralysis. The CT and 3D volume-rendered images identified lesions consistent with upper airway disease in all cats. In cats with mass lesions, CT accurately identified the mass and location. Findings from this study supported the use of CT imaging as an effective technique for diagnosing upper airway obstruction in nonanesthetized cats.

BOAS

Tracheal hypoplasia

- Higher risk in brachycephalic breed
- Contributes to respiratory distress in BOAS
- English Bulldog
- No surgery available

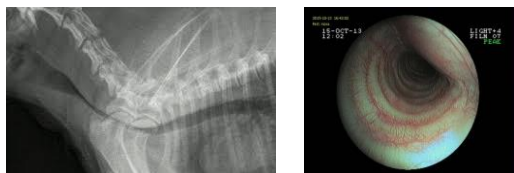


- Radiologic diagnosis
- $TT/3R = \text{diameter of thoracic trachea} / \text{width of proximal } 1/3 \text{ of the } 3^{\text{rd}} \text{ rib}$ should be < 2
- $TD/TI = \text{Tracheal diameter} / \text{diameter of thoracic inlet}$ $< 0,11 - < 0,144$
- Endoscopy confirms diagnosis

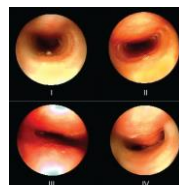
TRACHEAL COLLAPSE

- Progressive irreversible condition
- Laxity of trachealis muscle
- Weakness of tracheal rings
- Dorsoventral collapse
- Toy and small breed dogs

TRACHEAL COLLAPSE



TRACHEAL COLLAPSE



Four grades of collapse

- I) Weakening of dorsal ligament
- II) Loss of cartilage rigidity and further collapse of tracheal membrane
- III) Flattening of tracheal cartilages resulting in 75% luminal collapse
- IV) Collapse and 100% loss of luminal integrity

FOREIGN BODY

- Nose/nasopharynx: Grass and inhaled grass seeds are frequently found
- Laryngeal foreign bodies are not so frequent
- Tracheobronchial foreign bodies are rare.



[J Small Anim Pract. 2014 Nov;55\(11\):579-84. doi: 10.1111/jvap.12278. Epub 2014 Oct 7.](#)

Computed tomographic findings in 44 dogs and 10 cats with grass seed foreign bodies.

[Vansteenkiste DP, Lee KC, Lamb CR.](#)

[Author information](#)

Abstract

OBJECTIVE:

To supplement recent reports of computed tomographic (CT) findings in dogs and cats with grass seed foreign bodies.

METHODS:

Retrospective review of cases that had CT scan and subsequent retrieval of a grass seed during the same period of hospitalisation from a site included in the scan.

RESULTS:

Records of 44 dogs and 10 cats were reviewed. Most were presented in the months July to December. Median duration of clinical signs was 4 weeks (range 2 days to 2 years). The most frequent clinical signs were soft tissue swelling (55% cases), coughing (23%), sneezing (23%) and discharge (26%). Grass seeds were retrieved from the thorax (33% cases), nasal cavity (11%), ear (7%), other sites in the head and neck (22%), salivarium muscles (2%), pelvic limb (2%). A grass seed was visible in CT images in 19 (15%) cases. Secondary lesions were visible in CT images of 32 (80%) cases, including collection of exudate (31%), abscess (4%), enlarged lymph nodes (22%) and pulmonary consolidation (20%). CT images appeared normal in 4% animals.

CLINICAL SIGNIFICANCE:

Grass seeds within the respiratory tract are frequently visible in CT images, but in general CT appears to be more useful for localisation of secondary lesions than as a method of definite diagnosis.



STICK INJURY

- Typically middle aged, medium to large breed dog
- Owner may have seen blood from the mouth
- Initially may be no signs, but within 30 minutes often pain -> shock
- Ptyalism, often with blood
- Gagging, swallowing
- May develop swelling or crepitus in neck



STICK INJURY

- The pharynx - a rather common site for perforating stick injuries
- Pharyngeal stick injuries causes significant morbidity and even mortality.
- Typically the stick penetrates the pharynx close to the tonsillar crypt
- The tear may not be obvious



STICK INJURY



STICK INJURY

- Plain radiographs important
- Foreign body rarely identified
- Critical finding is presence of free air in soft tissue
- Free air → surgical investigation
- Thoracic x-ray if oesophageal injury



STICK INJURY

- Examination is done under general anesthesia
- Endoscopy
- Cervical exploration indicated in lacerations in pharynx or oesophagus
- Cervical exploration
 - Midline
 - identify laceration
 - explore tract, retrieve foreign body if present
 - lavage tissue
 - close mucosa
 - drainage

BITEWOUNDS

Cervical bite wounds are associated with significant injury to vital structures.

[Vet Comp Orthop Traumatol](#). 2013;26(2):89-93. doi: 10.3415/Vcot-12-01-0013. Epub 2012 Dec 13.

Airway injury associated with cervical bite wounds in dogs and cats: 56 cases.

[Jordan CJ¹](#), [Halfacree ZJ](#), [Tivers MS](#).



BITEWOUNDS

- Animals with severe traumatic wounds may need acute intubation/tracheostomy
- Injury of larynx/trachea may lead to laryngeal paralysis or stenosis



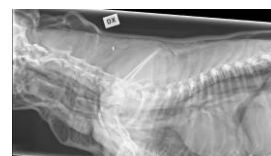
OTHER TRAUMA

- Choke collars
- Fracture of hyoidbone
- Gunshot
- Blunt trauma
- Traumatic intubation



RUPTURE OF TRACHEA

- iatrogenic rupture
 - After intubation
 - Especially after dental procedures
 - Overinflating the cuff
- Traumatic rupture
 - Bitewounds
 - Avulsion



RUPTURE/AVULSION OF TRACHEA

Clinical signs

- Dyspnea
- Anorexia
- Lethargy
- Coughing
- Stridor
- Subcutaneous emphysema!

PHARYNGAL MUCOCELE

- Can present as acute respiratory distress
- Swelling caudodorsal or lateral pharynx just rostral to epiglottis
- Most of the time not together with ranula or cervical sialoceles
- Incision is advisable
- Origin of sialoceles is normally sublingual and mandibular salivary gland



TACK FÖR MIG!

