

**THE BRACHYCEPHALIC AIRWAY PATIENT:**

Perioperative Management, Monitoring and Client Expectations

**Synopsis--**

Brachycephalic Airway Syndrome is all too common a malady and getting more common with breed preferences in the general public. The nares get a lot of press because they are up front and center, but the back of the pharynx is my favorite anatomy location to blame. In truth, the whole package is the root of the problem that ends in crisis or death (and the owner must understand all of this)—

- pinched nostrils at the leading edge of pinched nasal passages
- abundant aryepiglottic folds packaged in a small caudal pharynx
- excessively large tongue volume
- overly long soft palate
- negative inspiratory pressures creating everted laryngeal sacculles early in puppyhood (stage I laryngeal collapse)
- small tracheal diameter
- compressed torso creating higher intraabdominal pressures
- negative inspiratory pressures impacting esophageal function and lower esophageal sphincter barrier function
- chronic esophagitis
- gastric outflow dysfunction

Prognosis for smooth sailing through anesthesia in general and upper airway surgery in particular is **worse for older** patients, **overweight/obese** patients, patients with **pre-existing upper GI** signs, and **highly strung/anxious** patients. At least a quarter of our patients will have complications that require our intervention; 5% of our patients will die.

The most common triggers for respiratory crisis for dogs with Brachycephalic Airway Syndrome are excitement/heat and vomiting/regurgitation. Veterinary visits for anesthesia/surgery can be a big trigger! Knowing this, we can plan ahead with the family and prepare for arrival at the clinic; we can also modify our anesthesia management to minimize vomiting/regurgitation. Having a back-up plan when a respiratory crisis does occur makes for a smoother patient management experience for everyone!

The most common times for major postoperative airway complications are **during recovery from anesthesia and 1-3days postop at home**. For this reason, careful and systematic preparations for these periods are beneficial to a successful outcome.

This uptick in risk in-and-around anesthesia is related to several factors—a) anesthetic drugs inhibiting lower esophageal sphincter tone in patients prone to regurgitation/vomiting, b) poorly controlled airway and swallowing after surgical procedures on the upper airway, and c) increased nausea and GI stasis from medications related to anesthesia/surgery. These are all circumstances we can modulate

with specific planning before, during and after upper airway surgery. We have some data to support treatment recommendations and common sense/educated guesswork to direct others.

## Planning Protocol for Brachycephalic Airway Syndrome Patients

Please review the following information and develop a plan you are comfortable implementing for your brachycephalic patients.

### PRE-VISIT

- 1) Prescribe pre-operative mucosal protectants for *14 days pre-op*  
**Systemic antacids** (omeprazole, famotidine)  
**Gastroprotectants** (sucralfate)  
 (WHY? NEGATIVE PLEURAL PRESSURE ALTERS ESOPHAGEAL FUNCTION RESULTING IN GASTROESOPHAGEAL REFLUX DZ (GERD) AND CHRONIC ESOPHAGITIS.)
- 2) Prescribe pre-operative promotility medications for *3-5 days pre-op* (choice of following:)  
**Metaclopramide** 0.5mg/kg q8hr  
**Cisapride** 0.5mg/kg q12  
**Erythromycin** 0.5-1mg/kg q8hr  
**Mosapride** 1mg/kg q12hr  
**Ginger extract** (*Zingiber officinale*) & **Globe Artichoke leaf** (*Cynara scolymus*)  
 (WHY? POOR ESOPHAGEAL FUNCTION, REDUCED LOWER ESOPHAGEAL SPHINCTER TONE AND DELAYED GASTRIC OUTFLOW ALL MAY CONTRIBUTE TO SILENT/OVERT REGURGITATION AND INCREASED RISK OF ASPIRATION; MAINTAINING A STOMACH EMPTY OF FLUID IS IDEAL DURING THE ANESTHETIC EPISODE.)
- 3) Schedule surgery day to include only a **brief pre-op hospital experience and prepare owners for an early discharge** appointment as tolerated by the patient (total hospital time approximately 2 hours).  
 (WHY? ANXIETY AND STRESS ARE COMMON IN THESE PATIENTS AND BOTH SNOWBALL INTO OTHER PATIENT MANAGEMENT PROBLEMS.)
- 4) Consider doing preanesthetic and disease **work up prior** to day of surgery.  
 (WHY? LESS STRESS ASSOCIATED WITH RESTRAINT FOR BLOOD COLLECTION, RADIOGRAPHS, ETC. IS IDEAL. )
- 5) Consider **Trazadone for pre-op travel** (Advise testing a dose before day of surgery).  
 (WHY? TRAVEL IS A BIG TRIGGER FOR A AEROPHAGIA AND BREATHING CRISIS; SOOTHING THE TRAVEL ANXIETY MIGHT PREVENT OR REDUCE THE SEVERITY OF THIS CHALLENGE.)
- 6) **Avoid** the following medications, when possible:  
**Acepromazine**  
 (WHY? PATIENTS TRANQUILIZED WITH ACEPROMAZINE SEEM TO BE AT INCREASED RISK FOR “OVER” OR PROLONGED SEDATION, POOR AIRWAY SELF-MAINTENANCE AND REDUCED MOBILITY IMMEDIATELY POSTOP.)

**Pure Mu agonist narcotics** (hydromorphone, morphine)

(WHY? PREOPERATIVE VOMITING IS TO BE AVOIDED. INTRAOPERATIVE BRADYCARDIA THAT MAY REQUIRE ANTICHOLINERGICS (ATROPINE/GLYCOPYROLATE) IS TO BE AVOIDED; THERE IS AN ASSOCIATION BETWEEN BRADYCARDIA AND/OR ANTICHOLINERGICS AND POSTOP COMPLICATIONS IN BRACHYCEPHALIC ANESTHESIA. JUDICIOUS USE INTRAOP/IV CAN BE UTILIZED FOR MULTIMODAL ANESTHETIC MANAGEMENT.)

**Steroids**

(WHY? MIXED OPINIONS, BUT STEROIDS DECREASE GASTRIC PH, INCREASE PANTING AND ANXIETY, AND CHALLENGE THE IMMUNE SYSTEM; ALL ARE COUNTERPRODUCTIVE IN ROUTINE PERIOPERATIVE PATIENTS. INHALED STEROIDS MAY BE BENEFICIAL TO REDUCE/CONTROL LARYNGEAL EDEMA ASSOCIATED WITH MORE ADVANCED AIRWAY DISEASE, BUT ARE NOT ROUTINELY AVAILABLE.)

**DAY OF SURGERY**

- 1) Low-stress patient handling is absolutely required, utilizing the owner as much as feasible.

**Avoid traditional head and neck restraint.**

(WHY? DOGS WHO CANNOT BREATHE WELL WILL FIGHT HEAD/NECK RESTRAINT, MAKING THEIR BREATHING EFFORTS MORE LABORED. ANXIETY OF SEPARATION WILL MAKE RESTRAINT MORE NECESSARY AND MAKE BREATHING EFFORTS MORE LABORED. THE GOAL IS TO SNEAK THESE PATIENTS INTO ANESTHESIA WITHOUT THEM NOTICING!)

- 2) Schedule **admit appointment no more then 30-45 mins prior** to surgery start time.

(WHY? A LONG WAIT PRIOR TO SURGERY WILL COMPOUND THE PATIENT'S STRESS AND ANXIETY AND INCREASE THE RISK OF AEROPHAGIA AND BREATHING CRISIS.)

- 3) Place **catheter early** for emergency access.

(WHY? INDUCING ANESTHESIA IN AN URGENT MANNER MAY BE NECESSARY AND UNPREDICTABLE.)

- 4) Plan for a **difficult intubation**

- Preoxygenate with minimal restraint and open blow-by methods, 5min immediately prior and during induction.
- Laryngoscope with light and long blades prepared
- Tongue depressors and gauze squares prepared
- 3-5 ET tube sizes w/ stylets prepared
- 10-12F stiff urinary catheter w/ adapter for O2 line prepared

(WHY? YOU NEVER KNOW WHAT YOU WILL FIND AND HOW HARD IT WILL BE TO PASS AN ET TUBE.)

- 5) Plan for **difficult recovery**

- Laryngoscope with light and long blades prepared
- Tongue depressors and gauze squares prepared
- 3-5 ET tube sizes w/ stylets prepared
- 10-12F stiff urinary catheter w/ adapter for O2 line prepared
- Pre-clip fur on ventral cervical region
- Emergency surgery pack available

(WHY? YOU NEVER KNOW HOW RECOVERY WILL UNFOLD OR HOW HARD IT WILL BE TO PASS AN ET TUBE SHOULD THEY NEED IT AGAIN.)

- 6) Administer **Metaclopramide and Famotadine by injection**.  
 (WHY? THE METACLOPRAMIDE WILL KEEP FLUIDS MOVING OUT OF THE STOMACH TO PREVENT SILENT REGURGITATION. FAMOTADINE WILL REDUCE THE ACID LOAD OF STOMACH CONTENTS SUCH THAT IF REGURGITATED AND ASPIRATED, THE RESULTANT PNEUMONITIS/PNEUMONIA WILL NOT BE AS SEVERE. )
- 7) **Prepare the following** anesthesia drugs:
- a. Propofol 4mg/kg to effect IV  
 (WHY? RAPID INDUCTION AND RAPID INTUBATION.)
  - b. Dexmedetomidine 0.5 – 2 microgram/kg  
 (WHY? LOW DOSE, INCREMENTAL USE AND INCREMENTAL REVERSAL; MINIMAL EFFECT ON AIRWAY DYNAMICS; OPTIMIZE SMOOTH INDUCTION.)
  - c. Buprenorphine 0.01-0.05mg/kg  
 (WHY? GOOD LOW TO MIDDLE DOSE ANALGESIC TO BE USED AFTER INDUCTION TO ELIMINATE THE PERIOPERATIVE VOMITING CONCERN.)
  - d. NSAIDs by injection  
 (WHY? GOOD ANALGESIA WITHOUT SEDATION.)
- 8) **If the patient is stable**, wait for surgeon to participate in induction if surgery involves larynx.  
 (WHY? IDEALLY, A LIGHT ANESTHESIA UNDER IV PROPOFOL IMMEDIATELY PRIOR TO INTUBATION PROVIDES THE BEST EXAM PARAMETERS FOR DIAGNOSING LARYNGEAL ABNORMALITIES.)
- 9) In case of **emergency respiratory distress upon arrival**, place catheter and administer low doses of sedative. Use increments, as needed. If necessary, secure airway with Propofol induction and maintain until surgery time.
- a. Midazolam 0.05mg/kg + Butorphanol 0.1mg/kg IV slowly  
 OR
  - b. Dexmedetomidine 0.5 microgram/kg IV);
- (WHY? LIGHT IV SEDATION MIGHT BE ENOUGH TO STOP A BREATHING CRISIS; AN INTUBATED/ANESTHETIZED PATIENT CAN WAIT SAFELY FOR SURGICAL INTERVENTION.)
- 10) **Oxygen therapy as tolerated** using blow-by only. No head restraint and no mask delivery.  
 (WHY? MOST PATIENT DYSPNEA IS BEING PHYSIOLOGICALLY DRIVEN BY ELEVATED CO<sub>2</sub> (NOT LOW OXYGEN), SO A “FIGHT” TO PROVIDE OXYGEN BY MASK IS NOT HELPFUL. FOR THOSE BEING PHYSIOLOGICALLY DRIVEN BY LOW OXYGEN LEVELS, THE DISTRESS IS GREAT ENOUGH TO RECOMMEND MOVING TO INDUCTION AND INTUBATION RIGHT AWAY. )
- 11) **No active heating** for procedures less than 45min or not involving a body cavity. Possibly use active cooling in recovery.  
 (WHY? MOST PATIENTS WILL STRUGGLE WITH THE NEED TO PANT MORE THAN THE NEED TO SHIVER. MONITOR TEMPERATURES CLOSELY, AND MAINTAIN ON THE LOWER END OF NORMAL OR SLIGHTLY LESS THAN NORMAL.)

- 12) When moving the anesthetized patient, support the body by the skeletal structures only, i.e. **do not sling them by the abdomen or neck.**

(WHY? REGURGITATION WITH RESULTANT ASPIRATION PNEUMONIA IS THE MOST DANGEROUS COMPLICATION FOR THESE PATIENTS. APPLYING PRESSURE TO THEIR ABDOMEN WILL INCREASE THE CHANCES OF REGURGITATION. APPLYING PRESSURE TO THE NECK INTERFERES WITH VENTILATION.)

- 13) When moving the anesthetized patient, maintain the head at a level higher than the abdomen, i.e. **carry at an incline.**

(WHY? ANOTHER REGURGITATION PREVENTION TECHNIQUE, THIS PREVENTS GRAVITY FROM ACTING ON STOMACH FLUIDS AND MOVING THEM UP THE ESOPHAGUS TO FALL INTO THE TRACHEA. )

## DISCHARGING PATIENT

- 1) Plan for **owner pick up** typically within an hour of surgery, i.e. they are on-call.

(WHY? PATIENT ANXIETY IS TO BE AVOIDED TO PREVENT RESPIRATORY STRESS THE NEED FOR FURTHER SEDATION. WHEN THEY HAVE THEIR FEET UNDER THEM, THEY ARE BETTER MANAGED IN A STRESS-FREE, HOME ENVIRONMENT WHERE THEY CAN BE SAFELY MOBILE.)

- 2) **Go-home meds:**

a. **Gabapentin**

(WHY? USEFUL FOR LIGHT SEDATION POSTOP AND MAYBE SOME PAIN RELIEVING QUALITIES.)

b. **NSAIDs** (low end of maintenance dose)

(WHY? GASTRITIS IS TO BE AVOIDED WITH THE GOAL OF PREVENTING REGURGITATION OR VOMITING; NSAIDS MAY CAUSE GASTRITIS, SO UTILIZE LOWER DOSES.)

c. **Promotility** medication x 2wks (choice of following:)

Metaclopramide 0.5mg/kg q8hr

Cisapride 0.5mg/kg q12

Erythromycin 0.5-1mg/kg q8hr

Mosapride 1mg/kg q12hr

(WHY? GASTRIC MOTILITY DRUGS WILL KEEP THE STOMACH RELATIVELY EMPTY OF GASTRIC FLUIDS AND ENCOURAGE GENERAL GI MOTILITY, BOTH WITH THE GOAL OF REDUCING VOMITING/REGURGITATION.)

d. **Antinausea** medication x 1wk

- 3) Clear instructions and a written plan for owners to seek urgent/emergent care should vomiting or breathing difficulties develop. Owners must be prepared to answer questions about their preferences regarding temporary tracheostomy and CPR.

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