Robert Murray

B. Sc (Hons) Biomed, DVM (Hons), MRCVS

Complex Small Animal Surgery
Orthopaedic and Soft Tissue

- Complex Surgery
- Cruciate Disease
- Patellar Luxation
- Fracture Repair
- BOAS / TECA-LBO

BOAS Patient Protocol for Practice Team

This protocol is for the safe peri-operative management of canine BOAS surgery patients. The main priorities are low-stress handling, rapid airway control, reflux and aspiration prevention, careful surgical preparation, controlled extubation and intensive recovery monitoring.

BOAS surgery is strictly a morning only procedure. The patient must be fasted 12 hours prior to the procedure.

Pre-admission medication

- Trazodone 10 mg/kg orally the night before and morning of surgery.
- Gabapentin 10 to 20 mg/kg orally the night before and morning of surgery.
- Use for anxious patients where clinically appropriate.

Admission

- The patient should be admitted directly with the surgeon or an experienced nurse if the estimate, consent and owner discussion have already been completed recently.
- Stress must be kept to an absolute minimum from arrival until induction. Avoid unnecessary handling, restraint, noise, excitement, overheating, prolonged waiting or repeated kennel transfers.
- Check the clinical notes before handling. Confirm the following:
- Patient name.
- Current body weight.
- Body condition.
- Breed.
- BOAS clinical history and severity.
- History of cyanosis, collapse, regurgitation, vomiting, aspiration pneumonia, sleep-disordered breathing or heat intolerance.
- Current medications.
- Whether pre-operative omeprazole has been given.
- Owner consent.
- Estimate approval.
- Record baseline temperature, heart rate, respiratory rate, respiratory effort, mucous membrane colour and capillary refill time.

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- Place an intravenous catheter if this can be performed calmly and without significant stress. If catheter placement causes excessive stress, delay until sedation has taken effect.
- Once sedated, the patient must not be returned to a kennel unattended. The patient should remain under direct observation with oxygen available.

Pre-Medication

- Use the BOAS calculator to calculate and draw up all medication doses.
- Methadone 0.3 mg/kg intramuscular.
- Medetomidine 0.004 mg/kg intramuscular.
- Acepromazine may be used as part of the protocol to provide a smoother and calmer recovery. Dose to be calculated according to patient temperament, cardiovascular status and respiratory effort.
- Provide mask oxygen or flow-by oxygen as soon as tolerated.
- Do not force mask oxygen if this causes struggling or distress.

Emergency Airway Preparation Before Induction

- Before induction, the following must be ready, checked and positioned immediately beside the patient:
- Oxygen source.
- Laryngoscope with working light.
- Multiple cuffed endotracheal tubes, including tubes 1.0 to 1.5 sizes smaller than expected.
- Endotracheal tube ties.
- Lidocaine spray for laryngeal desensitisation if required.
- Urinary catheter or airway exchange catheter in case intubation is difficult.
- Suction unit switched on and checked.
- Long suction catheter.
- Pulse oximeter.
- Capnograph.
- Injectable induction agent available for top-up or re-induction.
- Atipamezole available.
- Naloxone available.
- Emergency tracheostomy kit open and checked.
- Multiple cuffed tracheostomy tubes available, approximately 5.0 mm to 7.0 mm - (Rob will provide these).

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- Sterile gloves.
- Scalpel blade.
- Artery forceps.
- Stay suture material.
- Suction available for emergency tracheostomy.

Pre-Oxygenation

- Pre-oxygenate with 100% oxygen for 5 minutes if tolerated.
- Use the least stressful method possible.
- Flow-by oxygen is preferable to tight mask oxygen if the patient resists the mask.

Induction

- Induction protocol:
- Alfaxalone 1 mg/kg intravenous, titrated slowly to effect.
- Administer the induction agents slowly in small increments, alternating as needed, until the patient is sufficiently anaesthetised for airway inspection and intubation.
- Provide flow-by oxygen during airway inspection.
- Inspect the airway before intubation where possible. Assess the soft palate, tonsils, laryngeal saccules and laryngeal function.
- Secure the airway promptly after inspection.
- Confirm endotracheal tube placement with capnography.
- Attach pulse oximetry and capnography as soon as possible.
- Record oxygen saturation, end-tidal carbon dioxide, heart rate and respiratory pattern immediately after intubation.

Maintenance

- Maintain anaesthesia with sevoflurane in oxygen.
- Use Hartmann's solution at 4 ml/kg/hour during anaesthesia.
- Reduce Hartmann's solution to approximately 3 ml/kg/hour during recovery unless further fluid support is clinically indicated.
- Monitor with multiparameter monitoring throughout anaesthesia.
- Minimum monitoring should include:
- Pulse oximetry.

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- Capnography.
- Electrocardiography.
- Blood pressure.
- Temperature.
- Respiratory rate and pattern.
- Anaesthetic depth.
- Avoid overheating. Temperature should be monitored from admission through recovery.

Radiographs

- Radiographs should be performed once the airway is secure.
- Obtain views required to assess the thorax, cervical trachea and thoracic inlet.
- Thoracic radiographs should include the diaphragm.
- Ensure the trachea and thoracic inlet are clearly visible so that the trachea-to-thoracic-inlet ratio can be calculated.
- Suggested views:
- Right lateral thorax.
- Left lateral thorax.
- Dorsoventral or ventrodorsal thorax.
- Lateral cervical/tracheal view including the thoracic inlet.

Peri-Operative Medication

- Administer the following unless contraindicated:
- Cefuroxime 20 mg/kg slow intravenous, ideally 30 to 60 minutes before procedure
- Paracetamol 10 mg/kg slow intravenous.
- Omeprazole 1 mg/kg slow intravenous.
- Metoclopramide 0.5 mg/kg slow intravenous.
- Maropitant 1 mg/kg intravenous or subcutaneous.
- Do not administer both meloxicam and dexamethasone.
- If a non-steroidal anti-inflammatory drug is selected:
- Meloxicam 0.2 mg/kg subcutaneous.
- If a steroid is selected:
- Dexamethasone 0.1 mg/kg intravenous.

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Local Anaesthesia and Nasal Preparation

- Prepare lidocaine and adrenaline for nasal infiltration:
- 0.9 ml lidocaine.
- 0.1 ml adrenaline.
- Total volume 1.0 ml.
- Administer approximately 0.4 ml into each nostril.
- Do not exceed the safe total lidocaine dose for the patient.
- Apply topical xylometazoline drops to each nostril.
- Perform bilateral mental nerve blocks.
- Clean the nose and external nostrils with dilute iodine.
- Clean inside the nostrils gently with dilute iodine.
- Remove visible phlegm or saliva from the caudal oral cavity.
- Wipe visible oral mucosal surfaces with dilute iodine.

Positioning

- Position in sternal recumbency.
- Use BOAS mouth gag.
- Maintain access to the endotracheal tube and airway at all times.
- Avoid excessive neck flexion.
- Ensure the head and neck position allows good surgical access and safe ventilation.

Reflux Preparation

- Have suction and lavage available throughout the procedure.
- Prepare:
- Suction unit.
- Long suction catheter.
- 20 ml sterile saline.
- Swabs.
- If reflux occurs, suction material immediately from the pharynx and around the endotracheal tube. Lavage only if appropriate and avoid pushing fluid or reflux material towards the airway.

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Surgical Plan

- Oral phase first.
- Perform visual laryngeal examination after induction.
- Assess for:
- Elongated soft palate.
- Everted laryngeal saccules.
- Tonsillar enlargement or eversion.
- Dynamic laryngeal collapse.
- Pharyngeal crowding.
- Perform staphylectomy using the harmonic scalpel.
- Perform additional indicated oral or laryngeal procedures as required.
- Nasal phase second.
- Perform punch biopsy resection of stenotic nares.
- Close the nares primarily with suture.
- Confirm both nares are patent at the end of surgery.
- Remove blood, saliva and mucus from the pharynx before recovery.

Recovery Preparation Before Extubation

- Recovery is the highest-risk phase.
- Before extubation, the following must be at the recovery station:
- Oxygen.
- Laryngoscope.
- Multiple endotracheal tube sizes.
- Suction.
- Long suction catheter.
- Emergency tracheostomy kit.
- Multiple tracheostomy tube sizes.
- Injectable induction agent for re-induction if required.
- Pulse oximeter.
- Adrenaline nebulisation prepared. - Nebuliser will be provided.
- The patient must be recovered under direct continuous observation.

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Recovery Positioning

- Recover in strict sternal recumbency.
- Keep the head and neck extended.
- Support the head and neck on a rolled towel.
- Gently pull the tongue forward until the patient is fully conscious.
- Keep the patient calm, cool and quiet.
- Avoid overheating.
- Avoid excessive stimulation.
- Avoid leaving the patient unattended while sedated

Extubation Criteria

- Leave the endotracheal tube in place for as long as safely tolerated.
- Do not extubate early.
- Extubate only when the patient is sufficiently conscious to:
- Maintain sternal recumbency.
- Swallow repeatedly.
- Protect the airway.
- Ventilate calmly.
- Maintain acceptable mucous membrane colour.
- Maintain acceptable oxygen saturation if pulse oximetry is tolerated.
- Show no significant airway obstruction while lightly stimulated.
- After extubation, continue direct observation.
- Be prepared to re-intubate immediately if there is increasing respiratory effort, cyanosis, severe stertor, severe stridor, collapse, poor oxygen saturation or inability to maintain the airway.

Post-Operative Nebulisation

- Nebulise after surgery using adrenaline and sterile saline.
- Suggested preparation:
- 1 ml adrenaline 1 mg/ml.
- Dilute in 5 ml sterile saline or sterile water.
- Nebulise until the patient is breathing comfortably or as clinically appropriate.
- Monitor closely during and after nebulisation.

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Post-Operative Monitoring

- Monitor continuously during early recovery for:
- Increased respiratory effort.
- Cyanosis.
- Excessive stertor or stridor.
- Agitation.
- Hyperthermia.
- Regurgitation.
- Vomiting.
- Aspiration risk.
- Bleeding from the nares.
- Airway obstruction.
- Oxygen desaturation.
- Use pulse oximetry if tolerated.
- Keep oxygen available at all times.
- Keep endotracheal tubes, laryngoscope, suction and emergency tracheostomy kit with the patient until fully recovered.

Hospitalisation

- Plan for 24 hours of hospitalisation and monitoring.
- Continue hospitalisation if the patient remains calm and stable in the hospital environment.
- If kennel stress worsens respiratory effort, agitation or hyperthermia, reassess whether continued hospitalisation or earlier discharge with strict practice-approved instructions is safer.

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Discharge Readiness for Clinical Team

- Before discharge from hospital care, confirm:
- Respiratory effort is stable.
- Mucous membrane colour is normal.
- No cyanosis is present.
- The patient is calm and able to rest.
- There is no significant post-operative bleeding.
- The patient can maintain the airway without assistance.
- Temperature is stable.
- No concerning regurgitation, vomiting or aspiration signs are present.
- The practice team has completed the agreed discharge medication plan.
- The practice team has provided the owner with written post-operative instructions.

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