Avoiding unexpected difficulties during induction

Georgina Self RVN Dip. AVN (Surgical) provides practical advice for safe and uneventful induction of anaesthesia patients

Complacency about anaesthetising apparently healthy patients, lack of preparation for unexpected difficulties and poor pre-assessment can lead to simple problems escalating into emergency situations. Preparation of induction equipment, treatment of regurgitation, and required equipment and patient prep for tracheostomy will be discussed.

PRE–ASSESSMENT

Pre-assessment of the patient should enable potential difficulties at intubation to be identified and should be used to decide on a suitable anaesthetic protocol by the veterinary surgeon. Choice of pre-medication, induction and maintenance agents can contribute to respiratory depression and regurgitation. The veterinary nurse should also make an assessment of the potential anticipated difficulties at induction to prepare a range of suitable equipment for supply of oxygen, for intubation and intermittent positive pressure ventilation.

POTENTIAL PROBLEMS ASSOCIATED WITH INDUCTION AND INTUBATION

During induction we are aware of the potential dangers of respiratory depression, cardiovascular depression and hypoxia. However, the process of intubation itself may be problematic. Incorrect use of a laryngoscope blade may traumatise the epiglottis and the ET (endotracheal) tube may be placed inadvertently into the oesophagus. Long tubes can be advanced too far into the trachea, entering a bronchus. In this situation, only the lung aerated via that bronchus will be ventilated and the opposite lung may collapse. Once the tube is correctly placed difficulties may continue if the cuff is over-inflated, causing tracheal trauma, or under-inflated, allowing the patient to breathe around the tube and not protecting the trachea from aspiration of fluid during regurgitation. Certain patients pose a higher risk for difficulties at intubation. This can include otherwise healthy brachycephalic breeds. While patients with head or neck trauma offer more obvious problems with overt anatomical changes, patients showing stertor (snoring sounds) and stridor (wheezy sounds) can have undiagnosed airway problems such as laryngeal paralysis, tracheal collapse or masses and swellings in the laryngeal area. A history of vomiting may increase the risk of regurgitation, as may the use of drugs with emetic side effects, such as morphine.

Fig 1. Bougie

INDUCTION

It is important to have all equipment checked, prior to induction of anaesthesia.

- A selection of appropriate ET tubes should be prepared. Choose the size you think will be needed plus a size smaller and larger. The cuff should be checked for leaks and the tubes should be clean and patent. Pre-measure the desired length of the ET tube against the patient from muzzle tip to proximal border of the scapula in order to avoid bronchial intubation. Do not press the tube against the patient as this introduces pathogens onto the tube exterior. Shorten the tube if necessary to reduce 'dead space'. PVC or silicone tubes are recommended as they mould to the patients anatomy

when warmed, causing less trauma to the trachea. As they are clear, it is easy to see obstructions or fluid within the lumen of the tube and the PVC tubes are less likely to kink during hyperflexion of the patient's neck.

- Petroleum jelly based lubricant: Sterile, or solely used for intubation, (not previously used on thermometers) to avoid introducing unwanted pathogens into the trachea.
- Laryngoscope and suitable blade: long enough to depress the base of the tongue but not to be used on the epiglottis itself.
- Bandage tie to hold maxilla during intubation and secure the tube when placed. Holding the mouth open with a bandage prevents the assistant from being bitten and prevents fingers obscuring the anaesthetist's field of vision. The tube should be tied securely as at the breathing system connector if it is the correct length, or the author prefers to tie at the level of the commissures of the lips and then secure with a bow behind the occipital process.
- Cuff inflator syringe to inflate cuff.
- Extra induction agent.
- The anaesthetic machine and a suitable circuit, both pre checked and ready to use.

For anticipated difficult inductions, make a plan of what steps you will follow and ensure everyone knows the order of action. It may be necessary to cease induction and allow the patient to recover.

- Pre-oxygenate using a tight fitting face mask.
- Pre-attach monitoring aids (where possible) or have an assistant to monitor pulse and respiration.
- Set up suction in case of regurgitation
- If the initial tube selections cannot be passed through the larynx due to constricted or obstructed airway, try a smaller ET tube .
- Lidocaine is useful for de-sensitising the larynx in both cats and dogs.
- Use a Bougie: these are used frequently in human anaesthesia as a method of 'piggy-

backing' an ET tube into the trachea. Paediatric human bouges are useful for medium to large dogs and urinary dog catheters can be similarly utilised as a guide wire for cats and small dogs. In some instances a small endoscope can be used in the same way, allowing easier visualisation

- Be prepared to carry out an emergency tracheostomy and have the equipment ready.
- As always have access to a crash kit - with doses pre calculated. Where assistance is limited, draw the doses up into syringes.

TRACHEOSTOMY

Select a tracheostomy tube approximately two thirds the size of the ET tube you would have anticipated using. Non-cuffed tubes are generally less traumatic to the trachea. While this procedure needs to be carried out quickly, it is also important to maintain sterility. A sterile basic instrument kit should be used, plus small gelpis, scalpel blade and non absorbable suture material. While the nurse positions, clips and cleans the surgical site, the vet will need to scrub and glove, so have all the necessary equipment available.

The patient should be placed in dorsal recumbency with the neck extended and supported by a rolled towel. The forelimbs should be extended caudally. It is important the patient is totally straight.

The surgical site should extend from the caudal border of the mandible to the thoracic inlet with sufficient lateral borders. For expediency, the clip and prep should be minimal and done prior to any attempted induction.

Once placed, the breathing circuit can be attached to the tracheostomy tube for gaseous anaesthesia.

REGURGITATION

Regurgitation is the passive expulsion of stomach contents without retching where the oesophagus lacks peristaltic activity due to disease or commonly under anaesthesia. It is especially dangerous during the induction of and recovery from anaesthesia as the trachea is not protected by a cough or swallowing reflex and regurgitated stomach contents may be inhaled causing aspiration pneumonia.

Fig 2 . Tracheal suction tube

If regurgitation is expected, the patient should be induced in sternal recumbency with the head and neck elevated until the endotracheal tube is placed. In this instance, inflate the cuff immediately to protect the airway, then carry out the leak test as described.

If the patient regurgitates at intubation or during the procedure, use a tracheal suction tube (or your fingers for solid matter) to remove fluid from the oral cavity and larynx. Tracheal suction tubes are easy to use as suction can be turned on and off merely by occluding the hole on the tube wall at the base. They come in a variety of sizes from 6fg to 18fg.

To minimise the risk of gastric acid damaging the oesophageal mucosa once regurgitation has stopped or to remove further stomach contents, oespohageal lavage can be performed using a stomach tube, warm water and the suction tube.

Drugs such as Omeprazole reduce gastric acidity and resulting esophagitis. They may also be given at the vet's direction.

REFERENCE:

Johnson, Craig (2009) Breathing systems and airway management', Anaesthesia for Veterinary Nurses, Second Edition. Ed. Liz Welsh. Wiley Blackwell, Chichester

METHOD FOR CORRECT INFLATION OF THE ENDOTRACHEAL TUBE 'CUFF':

- **Place the largest endotracheal tube possible.**
- **Connect the breathing circuit and supply oxygen to the reservoir bag.**
- **The assistant squeezes the rebreathing bag to inflate the lungs. The adjustable pressure limiting valve should be semi-closed to allow 20mm of Hg of pressure to read on the sphygnomanometer where available. Don't use the oxygen flush because the delivered pressure is too high.**
- **The anaesthetist places their ear next to the patient's mouth and listens for sounds of air leaking around the ET tube and inflates the cuff until these can no longer be heard. Do not over inflate the cuff as this may cause damage to the trachea.**