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Topical Review

Temporary Tracheostomy

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Upper airway obstruction can be due to a variety of causes in small animal patients and is often life threatening if left untreated. Placement of a temporary tracheostomy tube may be necessary in the most severe cases of upper airway obstruction until definitive therapy can be implemented. This paper discusses the indications, technique for placement, maintenance, and complications associated with temporary tracheostomy in dogs and cats.

Upper airway obstruction is a fairly common and potentially life-threatening condition that can present as an emergency to the small animal practitioner. Although definitive stabilization and therapy require treatment for the primary underlying condition that causes the airway obstruction, in some cases, rapid intubation to bypass the airway obstruction and placement of a temporary tracheostomy tube may be necessary.

Indications

Causes of airway obstruction are numerous, and can include the components of brachycephalic airway disease (elongated soft palate, epiglottic entrapment, everted laryngeal saccules, and laryngeal collapse), inflammation,[1] neuropathies such as laryngeal paralysis, abscess, hematoma,[2] foreign bodies, trauma,[3] and neoplasia.[4] Animals with severe upper airway obstruction often demonstrate severe orthopnea with extension of the head and neck, can have a frantic or anxious appearance, have cyanotic mucous membranes, and have audible inspiratory stridor. During the initial management of these patients, cautious use of an anxiolytic drug such as acepromazine (0.01-0.1 mg/kg intramuscular or intravenous [IV]) may be helpful. In some dogs, however, sedation can potentially worsen the respiratory compromise associated with an upper airway obstruction.

Contraindications

Contraindications to performing a temporary tracheostomy include coagulopathies, such as those induced by vitamin K antagonist rodenticide, a mass or tracheal obstruction distal to the site of tracheostomy, and tracheal collapse distal to the site of tracheostomy or previous tracheal stent placement.

Preparation

Preparation for airway obstruction and tracheostomy is necessary in any veterinary emergency room. In the crash cart or ready area, several items should be present at all times. First, varying sized endotracheal (ET) tubes with a laryngoscope should be available, remembering that many dogs and cats with brachycephalic airway syndrome have smaller tracheas than other similar-sized animals. Second, rigid polypropylene catheters of various sizes can be used for blind intubation when the larynx cannot be visualized. Third, a needle, attached to a length of IV extension tubing, attached to a 1- or 3-milliliter syringe should be prepared and gas sterilized for immediate cricothyroidotomy if intubation cannot be performed (Fig 1). Finally, a surgical kit to perform a temporary tracheostomy should be available to be used in the emergent patient (Table 1).

Blind Intubation

In cases of laryngeal swelling, mass lesions, and lack of visualization of the larynx, blind intubation may be necessary before performing a temporary tracheostomy. Following the placement of an IV catheter and administration of an anesthetic induction agent, the operator's hand or fingers can be used to palpate caudad to the mass or swelling, in the area of the arytenoid cartilages. Once a finger is inserted in between the arytenoid cartilages, a rigid polypropylene catheter can be inserted through the oral cavity into the trachea. An ET tube is then inserted over the polypropylene catheter, into the trachea for ET intubation. Once the patient is anesthetized and intubated, a temporary tracheostomy can be placed without urgency.

Cricothyroidotomy[5,6]

Needle cricothyroidotomy involves placing a needle directly into the cricothyroid cartilage or cervical trachea, and provision of

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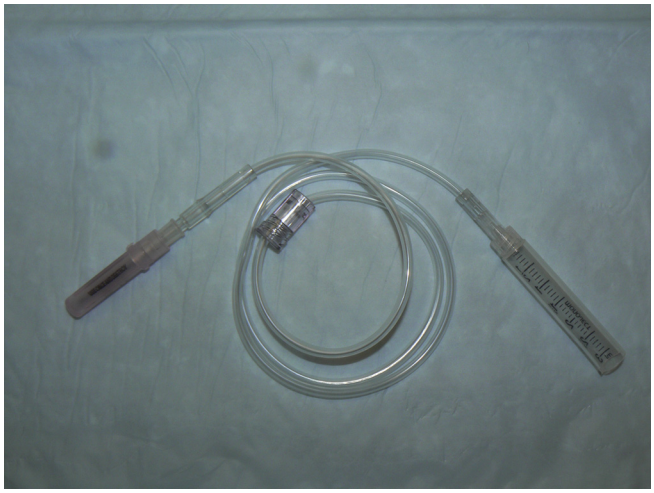

Fig. 1. Setup of a 20-gauge needle, length of intravenous extension tubing, and 3-mL syringe with the end cut off. The cut end can be fitted into the oxygen tubing, whereas the needle is inserted into the trachea distal to upper airway obstruction.

high-flow humidified oxygen to patients where intubation is not possible because of upper airway swelling or hematoma, mass lesions or foreign bodies, or trauma. The operator palpates the cervical trachea ventral to the thyroid cartilages and inserts a needle perpendicularly through the skin and sternohyoid muscles and into the trachea. The needle and associated extension tubing and syringe are then attached to an oxygen source, with flow rates of 150-200 mL/kg/min. A handler must remain with the patient and hold the needle in place while the surgical team prepares for anesthesia and temporary tracheostomy.

Tracheostomy Tubes

Commercially available tracheostomy tubes can be purchased from a number of sources for both human and veterinary needs. The ideal tracheostomy tube contains an inner and outer cannula, a cuff for insufflation when positive pressure ventilation is necessary, and side holes through which umbilical tape can be attached to secure the tube in place. The advantage of having an inner cannula is apparent when the tracheostomy tube becomes occluded with mucus or bloody debris and must be cleaned. The inner cannula can be removed without the need for removal of the entire tracheostomy tube. In smaller patients, tracheostomy tubes are available without an inner cannula (Fig 2). All patients with a tracheostomy must be monitored at all times, in the event of rapid tube occlusion that can be potentially fatal.

When commercially available tubes are not procurable, a tracheostomy tube can be prepared using an ET tube. This is sometimes necessary in very thick-necked dogs, such as English Bulldogs, with severe brachycephalic airway disease.

Table 1
List of Supplies Required in Surgical Tracheostomy Pack

Sterile drape
Gauze 4- × 4-in squares
Scalpel handle
Number 10 or 11 scalpel blade
Thumb forceps
Needle holder
Curved hemostat forceps (2)
Metzenbaum scissors
Small Gelpi retractors (2)
Nonabsorbable suture
Umbilical tape

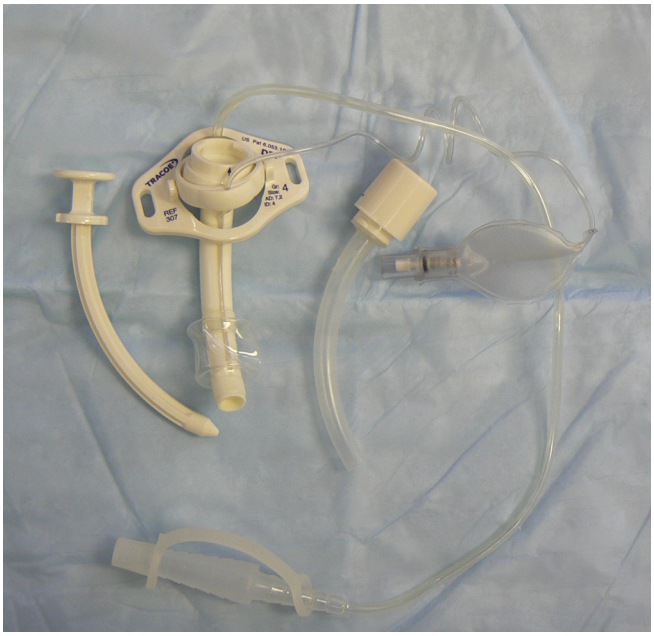

Fig. 2. Temporary tracheostomy tube setup with internal obturator used for introduction into the trachea at left, outer cannula in the middle, and internal cannula at right. The inner cannula can be removed and cleaned as needed, while the outer cannula remains within the trachea.

Commercially available tracheostomy tubes are not long enough to span the gap of skin and underlying musculature into the patient's trachea. To prepare a tracheostomy tube from an ET tube, first, remove the connection between the tube and the oxygen source. Cut the tube vertically on both sides, to create flaps (Fig 3). Take care to avoid cutting the tube to insufflate the cuff. Make small holes on either flap through which an umbilical tape can be attached to secure the tube in place.

Temporary Tracheostomy Surgical Technique[7-9]

Following induction of general anesthesia, place the patient in a dorsal recumbent position. In many instances, use of folded towels or a v-trough may be necessary to prevent the patient from tilting from side to side. In very deep-necked dogs, a folded towel can be placed under the patient's neck, or the patient's head and

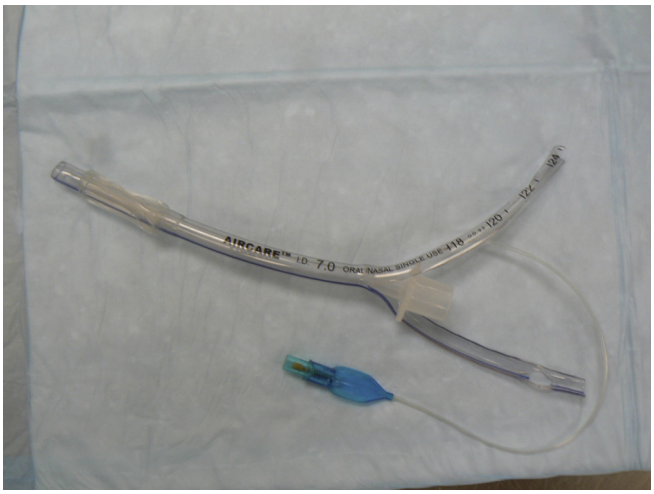

Fig. 3. Tracheostomy tube made from cutting the end of an endotracheal tube vertically such that 2 flaps are created.