TEMPORARY TRACHEOSTOMY
Howard B Seim III, DVM, Diplomate ACVS
College of Veterinary Medicine
Colorado State University
Fort Collins, CO

DEFINITIONS
Tracheostomy is creation of a temporary or permanent opening into the trachea to facilitate airflow.

PREOPERATIVE CONSIDERATIONS
Upper airway procedures are performed to remove, repair, or bypass areas of obstruction, injury, or disease. Affected animals may show signs of mild to severe respiratory distress. Mild or moderately dyspneic patients initially should be examined from a distance to avoid exacerbating the condition. Open-mouth breathing, abducted forelimbs, labored breathing, and restlessness indicate moderate to severe respiratory distress that may require emergency therapy. Minimal restraint should be used with severely dyspneic patients, and they should be allowed to maintain the position in which they feel most comfortable. Supplemental oxygen may be given by means of nasal insufflation, tracheostomy tube or catheter, endotracheal intubation, mask, or cage. Corticosteroids, sedation, or cooling (or all of these) may relieve distress. Sedation may be beneficial for anxious patients with moderate to severe respiratory distress.

Diagnosis of upper respiratory disease is based on the history and clinical signs, physical examination findings, hematologic and serum biochemical parameters, radiographs, endoscopy, cytologic studies, culture, or biopsy, or all of these. The history and clinical signs may include abnormal respiratory noises (e.g., cough, inspiratory stridor, wheeze), exercise intolerance, hyperthermia, tachypnea, dyspnea, cyanosis, restlessness, and/or collapse. Gagging and regurgitation of secretions are common with nasopharyngeal, laryngeal, and some tracheal abnormalities. Mucopurulent or bloody discharges are common with obstructive or infectious nasal disease. Voice change may occur with laryngeal paralysis, and dysphagia may be noted with supraglottic obstructions. Subcutaneous emphysema occurs with penetrating laryngotraheal or nasal injuries. Clinical signs may intensify or may be precipitated by excitement, stress, eating, drinking, or high ambient temperatures. Laboratory data should be evaluated to detect any underlying metabolic disease and to determine the advisability of general anesthesia. Tidal breathing flow volume loops are helpful in classifying obstructions as fixed or nonfixed. Pulmonary function tests, electromyography, and nerve conduction studies are ancillary tests that may indicate pulmonary or neuromuscular disease.

ANESTHETIC CONSIDERATIONS
Patients with upper respiratory obstruction or disruption are extreme anesthetic risks. The periods of greatest danger are during induction of anesthesia and recovery. For laryngeal examination, care should be taken to avoid drugs that inhibit laryngeal function. If the animal has already been sedated an anticholinergic drug should be given. An opioid (oxymorphone, butorphanol, or buprenorphine) may also be administered to unsedated animals. Propofol may be used for induction because it is noncumulative and may be given in small, incremental doses that maintain laryngeal function. A combination of diazepam and ketamine is also useful for induction because these drugs maintain laryngeal function. Induction doses of thiobarbiturates may impair laryngeal function, making diagnosis of laryngeal paralysis difficult. Oxygen should be supplemented during the examination, and oxygen saturation should be monitored with pulse oximetry (preferable) or by observation of mucous membrane color. The patient should be intubated and anesthesia maintained with inhalant drugs after the examination for further diagnostics or surgery.

General anesthesia is preferred for most upper respiratory procedures because it ensures a patent airway, allows controlled ventilation, facilitates asepsis, and is less stressful for patients. Local anesthesia may allow placement of a tracheostomy tube when the patient is comatose or cannot tolerate general anesthesia. Dyspneic patients should be preoxygenated with a face mask if possible. Affected animals being anesthetized (see above for laryngeal examination) may be premedicated with an opioid, but continuous monitoring is necessary. Anticholinergics are indicated for bradycardia. Induction should be rapid (e.g., propofol, thiobarbiturate, or ketamine plus diazepam), and oxygen should be administered immediately. Mask induction is not recommended. Anesthesia should be maintained with inhalant drugs. Laryngeal or tracheal procedures may require temporary retraction of the endotracheal tube from the surgical site, placing an endotracheal tube distal to the surgical site through a tracheotomy, or using injectable drugs. During surgery the animal should be sashed frequently to renew surfactant. Oxygen saturation or blood gases (or both) should be monitored from induction until recovery and until abnormalities have been corrected.

SURGICAL TECHNIQUE
Surgical techniques for the management of animals with acute severe upper respiratory disease include tracheotomy and tracheostomy.

Tracheostomy
Tracheostomy allows air to enter the trachea distal to the nose, mouth, nasopharynx, and larynx. A tracheostomy is performed, and either a tube is inserted (temporary tracheostomy) or a stoma is created (permanent tracheostomy) to facilitate airflow. A nonreactive tube that is no longer than one half the size of the trachea should be selected. Cuffed or cannulated autoclavable silicone, silver, or nylon tubes are recommended. Polyvinyl chloride and red rubber tubes are irritating and should be avoided. If the animal is to be placed on a respirator, a cuffed tube is necessary.
Temporary tracheostomy. A temporary tracheostomy is most commonly performed to provide an alternate airflow route during surgery or as an emergency procedure in severely dyspneic patients. Tube tracheostomies usually are maintained for a short time.

Make a ventral midline incision from the cricoid cartilage extending 2 to 3 cm caudally. Separate the sternohyoid muscles and make a horizontal (transverse) tracheotomy through the annular ligament between the third and fourth or fourth and fifth tracheal cartilages. Do not extend the incision around more than half the circumference of the trachea. Suction blood and mucus from the lumen, widen the incision, and insert the tracheostomy tube. Facilitate tube placement by encircling the cartilage distal to the incision and encircling the cartilage cranial to the incision with long stay sutures. Place tension on these sutures to open the incision. Appose the sternohyoid muscles, subcutaneous tissue, and skin cranial and caudal to the tube. Secure the tube by suturing it to the skin or tying it to gauze that is tied around the neck.

The loop sutures around the cranial and caudal cartilage rings provide a 'safety net' when it is time to test the patients respiratory function without the tracheostomy tube. When tube removal is considered, the patient is placed on an exam table near an oxygen source. The loops of suture exposed for easy access. Sutures holding the temporary tracheostomy tube in place are cut and the tube gently removed. The neck muscles, subcutaneous tissue and skin fall over the tracheostomy site and the patient is examined for his/her ability to breath. If the patient becomes oxygen deficient due to premature removal of the tracheostomy tube, the veterinarian grasps the cranial and caudal loop sutures, places gentle traction on them to bring the tracheostoma out through the skin incision and allows the patient to breath. The tracheostomy tube can easily be replaced.

POSTOPERATIVE CARE AND ASSESSMENT

Intensive postoperative care is required after tube tracheostomy. The animal must be observed closely to prevent asphyxiation secondary to tube obstruction or dislodgment. Mucus clearance is inhibited in these animals, and mucosal irritation leads to increased mucus production. Tube cleaning may be required every 15 minutes if the trachea is irritated. Sterile technique (i.e., gloves, instruments) should be used to clean tracheostomy tubes. Secretions may be removed by inserting a sterile suctioning cannula into the tube’s lumen and distal trachea. When cannulated tubes are used, the inner cannula may be removed and cleaned while the outer tube is suctioned. Injecting sterile saline (1 ml) into the tube a few minutes before suctioning helps loosen secretions. A new tube should be used if these techniques do not adequately remove secretions. Tracheostomy tubes may be removed when an adequate airway and spontaneous ventilation have been established. Occasionally, the tube should be occluded and the patient observed while breathing around the tube to determine if the tube can be removed. This should not be done in animals with cuffed tubes or those that have large tubes that fill the tracheal lumen. After removal of the tube, the tracheostomy site should be allowed to heal by second intention.