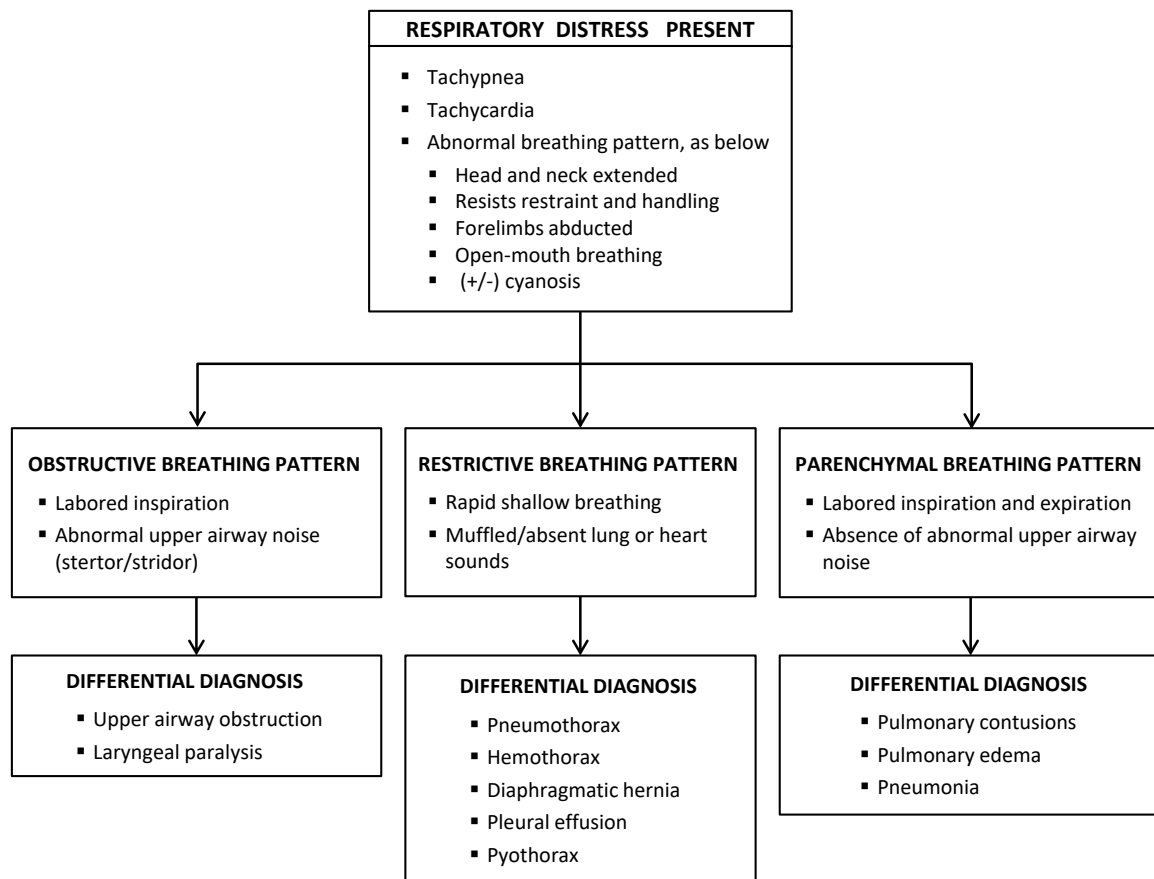


Emergency Airway Management

Respiratory distress develops in deployed MWDs most commonly due to trauma. MWDs in respiratory distress are fighting to get oxygen: they are anxious, usually have obvious labored breathing, usually have their head and neck extended and elbows and upper legs held away from the chest, don't want to lie down, and fight restraint and handling. Cyanosis, if present, is a late finding. MWDs in respiratory distress typically have 1 of 3 characteristic breathing patterns that help localize the problem.

Figure 23 presents a clinical algorithm for differentiating the most likely cause of a patient's distress based on the pattern of breathing.

Figure 23. Clinical Algorithm for Differentiating Causes of Respiratory Arrest Based on Breathing Pattern.¹



Oxygen Supplementation

Oxygen supplementation is essential. Provide 100% oxygen to all trauma patients and any patient that is showing signs of respiratory distress, until proven unnecessary.⁴ Oxygen cages (makeshift or manufactured) and oxygen tents are impractical or not available in the typical HCP situation, so evacuate the MWD to the supporting veterinary facility if long-term oxygen therapy is necessary.

Conscious MWDs: Use face mask or “blow by” technique (hold end of oxygen tubing or circuit as close to nose and mouth as possible or attach to muzzle) using high flow rates of 10-15 L/min.⁵ Use caution; ensure handler has control of the MWD at all times. Agitated, distressed or dyspneic MWDs will bite and can cause serious injury to the HCP or MWD handler. Figure 24 shows simple yet effective techniques to safely provide “blow-by” oxygen supplementation to muzzled MWDs. While not the ideal method, acceptable inspired oxygen concentrations of 40-70% are achieved with this technique,⁵ which may be life-saving.

Unconscious MWDs: Use tracheal insufflation, orotracheal intubation, or tracheostomy (see [Table 4](#), [Table 5](#), and [Table 6](#) for techniques).

Figure 24. Administration of Supplemental Oxygen.⁴

Figure 24 shows techniques for safe administration of supplemental oxygen to conscious or fractious muzzled dogs.

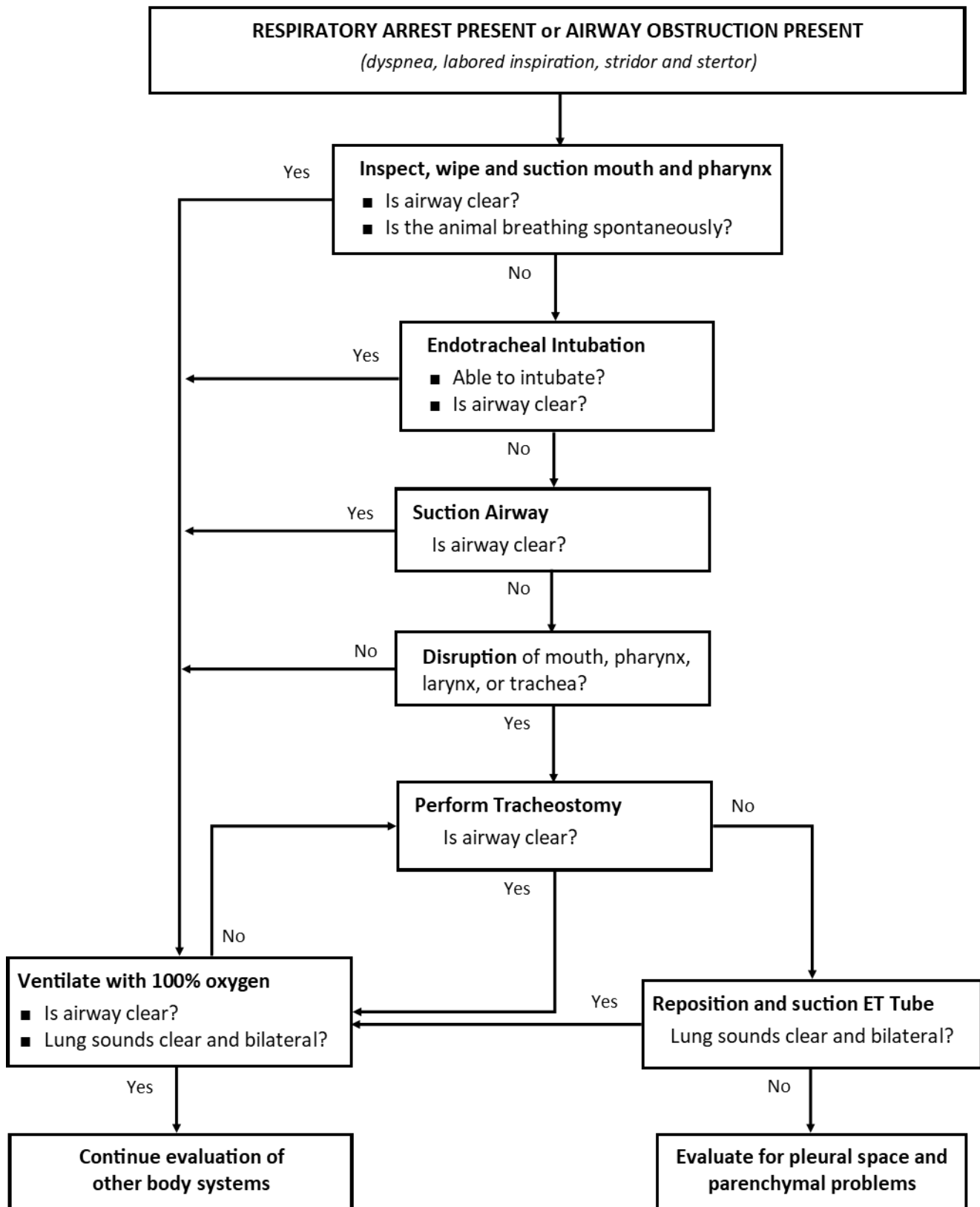


Upper Airway Obstruction with Obstructive Breathing Pattern

A patient with an obstructive breathing pattern typically has respiratory distress characterized by labored inspiration and abnormal upper airway noise such as stridor or stertor (See [Figure 23](#)).

- Common causes in trauma patients are facial and oropharyngeal swelling (jaw fractures, facial trauma), cervical injury (tracheal compression by hemorrhage in neck area, muscle edema), direct tracheal injury, severe snake and insect envenomation, bite wounds, smoke inhalation, electrocution, and foreign objects.
- Diagnosis is usually obvious based on history of trauma and presenting signs. For every trauma patient, carefully ensure the airway is open by physically opening the mouth, examining the oral cavity, and watching the patient breathe. Palpate and examine the face, muzzle, nose, mouth, external laryngeal area, and trachea for deformities, traumatic wounds, or other abnormalities
- If the airway is not patent, immediately takes steps to open the airway (See Figure 25 next page).
 1. Provide oxygen therapy as above.
 2. Bypass the obstruction until the patient is more stable:
 - 1) Attempt to remove the obstruction quickly by sweeping the mouth and pharyngeal area with a finger or gauze, suction the area, or use large forceps to remove objects that may be obstructing the passage.
 - 2) Do not attempt a Heimlich maneuver unless you know the object is smooth (e.g., ball); most trauma patients do not have a smooth foreign body obstruction, and the maneuver can cause significant patient distress and possibly further injury.
- If the obstruction cannot be removed in a few seconds, consider tracheal insufflation with oxygen for immediate oxygen delivery (See [Table 4](#) for technique), and perform an emergency tracheostomy (See [Table 5](#) for technique).
- Patient anxiety is frequently a compounding factor; tranquilize, sedate, or anesthetize if necessary.
- Management of patients with tracheostomy tubes requires 24-hour care and observation. Perform tracheal and pulmonary toilet as for human patients. Perform local wound care at least every 12 hours. Tube dislodgement is a potentially life-threatening complication that must be guarded against and monitored.

Figure 25. Airway Obstruction Management Algorithm for MWDs.



Tracheal Insufflation with Oxygen

TABLE 4. TRACHEAL INSUFFLATION WITH OXYGEN FOR MWD TECHNIQUE⁶

1. Clip hair and surgically prepare a 6 inch X 6 inch area of the ventral neck area just distal to the larynx.
2. For conscious MWDs, sedate and use 20 mg lidocaine locally.
3. Attach a 10 mL syringe to the hub of a 14 or 16 gauge, 6 inch, over-the-needle catheter.
4. Stabilize the trachea with one hand.
5. While holding the catheter-syringe apparatus at a 45° angle, direct the catheter through the skin and annular ring between the 3rd and 4th or 4th and 5th tracheal cartilages, directed ventrally down the trachea. Do not pass through the cricothyroid membrane in dogs.
6. Begin to slowly aspirate with the syringe as you pass the catheter through skin.
7. Once the tip of the needle is through the skin, aspiration of air signifies successful entry into the tracheal lumen.
8. Once the catheter is successfully introduced into the tracheal lumen, stabilize the needle to prevent any further advancement of the needle into the trachea.
9. Advance the catheter OFF the needle, directed down the trachea, until the hub of the catheter is in contact with the skin.
10. Remove the needle from the catheter.
11. Attach oxygen tubing to hub of catheter and provide high-flow oxygen (10-15 L/min).
12. Do not use this method for more than 30-45 minutes, as hypercapnia will develop and lung barotrauma may occur due to high airway pressures. Use tracheal insufflations as a “bridge” to more practical methods (e.g., orotracheal intubation, tracheostomy).

Emergency Tracheostomy





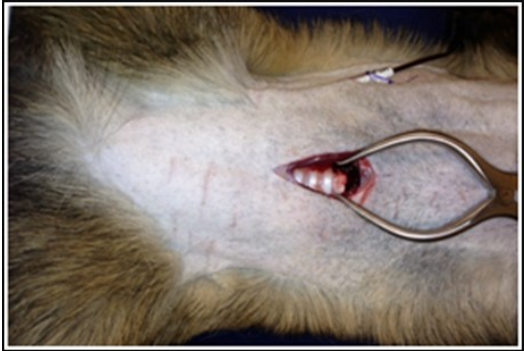
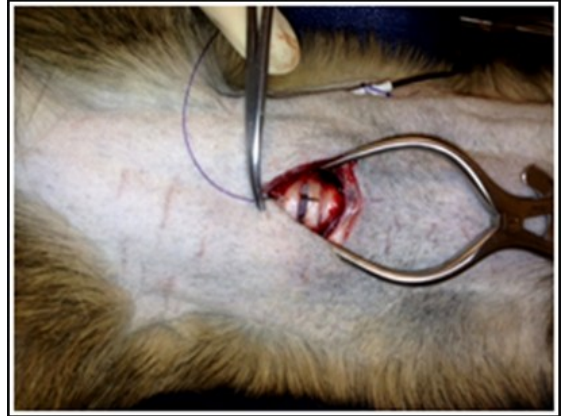
TABLE 5. EMERGENCY TRACHEOSTOMY OF MWD TECHNIQUE ⁶	
1. Position the animal in dorsal recumbency if unconscious, sedated, or anesthetized, extend the neck, and place a rolled towel or sandbag under the neck to force the trachea upwards. In conscious MWDs, position the MWD in sternal recumbency and extend the head upward to expose the ventral neck; sedate the dog and locally anesthetize the incision site with 20 mg lidocaine.	
2. Clip the hair over the center of the ventral neck from the larynx to approximately the center of the neck, and prep the skin with surgical disinfectant.	
3. Make a full-thickness, ventral midline skin incision 2-3 finger widths below the larynx (ideally over the 3rd to 5th cartilage rings) parallel with the long axis of the trachea. Do NOT make a transverse skin incision (perpendicular to the long axis of the trachea), as this increases the risk of injury to adjacent vessels and nerves.	 
4. Separate the muscle bellies overlying the trachea using sharp or blunt dissection. Place a Gelpi or Weitlaner retractor to spread the muscle bellies and allow visualization of the trachea.	 
5. Stabilize the trachea with the non-dominant hand.	

TABLE 5. EMERGENCY TRACHEOSTOMY**(CONTINUED)**

6. Make a transverse incision completely through the annular ligament between the 3rd and 4th or 4th and 5th tracheal cartilages to create the tracheostomy. Do NOT extend the incision more than one-half (50%) of the diameter of the trachea. Do NOT incise at the cricothyroid ligament, as is done in people.



7. Using a cricothyroidotomy hook or stay sutures, retract the lower tracheal ring to open the tracheal lumen.



8. Insert a tracheostomy tube (ideal) or endotracheal tube through the incision and direct the distal opening down the trachea. Use the largest tube that will fit in the trachea; 7-11mm internal diameter tubes are typical.



9. Once the tube has been inserted, place long stay sutures around the cartilage rings above and below the tracheostomy. These allow rapid control of the airway should the tube become dislodged, and facilitates tube maintenance.



10. Secure the tracheostomy tube to the patient using umbilical tape, roll gauze, or similar material tied to the wings of the tube and passed around the neck and tied with a quick release knot. Do NOT suture the tube to the skin, as it cannot be removed rapidly if it obstructs.

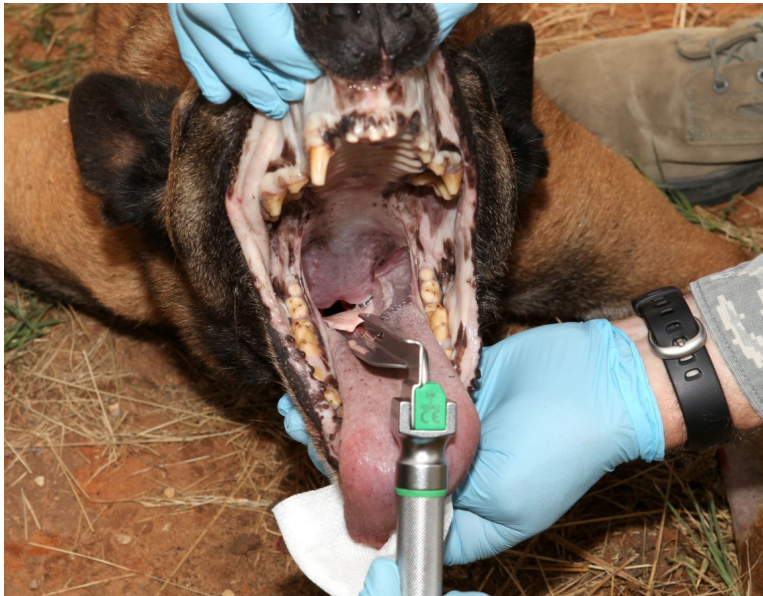
11. Insert the inner cannula (if provided) in the tracheostomy tube (if used) and inflate the cuff of the tracheostomy tube.



Orotracheal Intubation

TABLE 6. OROTRACHEAL INTUBATION OF MWD TECHNIQUE⁶

1. Typical MWD needs a 9-11 mm internal diameter cuffed endotracheal tube.
2. Premeasure intended insertion length by placing the tube alongside the extended head and neck of the dog. Locate the larynx and position the cuff just below it. With the tube still lined up along side of the head and neck and the cuff positioned just below the larynx, apply a piece of tape to the tube opposite the lower canine teeth or incisors as a depth indicator when inserting the tube.
3. Cut and tie an 18 to 24 inch length of roll gauze to the end of the tube with the tape on it.
4. Lightly lubricate the cuffed end of the tube with sterile lubricant.
5. Place the MWD in sternal recumbency.
6. Have the handler lift and extend the dog's neck with one hand holding the upper jaw and the other hand holding the back of the head. Rolling the upper lips away improves visibility.
7. Grasp the animal's tongue with a dry 4X4 gauze sponge and gently pull the tongue out and down between the lower canine teeth.
8. Holding the laryngoscope in the other hand, place the tip of the blade on the base of the animal's tongue near the epiglottis and apply gentle downward pressure on the tip of the laryngoscope blade to visualize the opening to the trachea.



9. Transfer the laryngoscope to the hand holding the animal's tongue.

10. With the free hand, using a slight rotating motion, guide the tube over the epiglottis, between the vocal cords, through the laryngeal opening, into to the trachea.



11. Advance the endotracheal tube into the trachea until the tape marker reaches the landmark.

12. Verify endotracheal tube placement.

- a. Palpate the dog's neck and feel for 1 tube. If 2 tubes are felt, the endotracheal tube is in the esophagus (1 "tube" is the trachea and the other is the endotracheal tube in the esophagus). Remove the tube and attempt intubation again if 2 tubes are felt.
- b. Place the base of the laryngoscope at a 90 degree angle next to the end of the endotracheal tube and look for fogging of the base caused by the animal exhaling air through the endotracheal tube. If fogging is noted, the tube is likely correctly placed.
- c. Attach a capnometer (if available) to the endotracheal tube and measure $E_T\text{CO}_2$. If $E_T\text{CO}_2$ is measured >10 mmHg, the tube is correctly positioned.

13. Inflate the cuff with the syringe until back pressure is noted in the syringe. Check for leaks and normal lung sounds during assisted ventilation.

14. Secure the tube into place by securing the attached roll gauze behind the canine teeth. Tie the gauze using a bow knot around the upper or lower jaw of the animal.

Emergency Airway Management References

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