Overview:

Airway management in the intensive care unit is highly based on clinical assessment. Patients with prolonged mechanical ventilation and endotracheal intubation are at risk for developing complications such as pneumonia, tracheomalacia, subglottic stenosis. Tracheostomy has been shown to be an excellent option for prolonged airway management, minimizing these complications while providing greater patient comfort and oral hygiene. Bedside percutaneous tracheostomy has been shown to be a safe alternative to open tracheostomy in the operating room, and it obviates patient transport and anesthesia/OR costs.

The protocol in the trauma ICU at VUMC is to perform a cutdown percutaneous tracheostomy at the bedside with assistance of procedure support personnel. While the most to a complication of percutaneous tracheostomy is airway loss, by following the protocol below the incidence of this complication has been held to well under 1% (2 lost Airways/>3000 tracheostomies).

**Purpose:**

- To define the indications and contraindications for tracheostomy
- To describe the accepted safe protocol for the performance of a bedside percutaneous tracheostomy

1. **Recommended indications for percutaneous tracheostomy**
   a. Presence of pathologic conditions resulting in prolonged (>7 days) mechanical ventilation
   b. Inability to protect airway (e.g. altered mental status, anatomical, deconditioning)
   c. High-risk airway
      i. External cervical immobilization (e.g. Halo)
      ii. Need for definitive airway and inability to intubate
      iii. Anatomical considerations
         1. Unresolving airway edema
         2. Facial fractures
         3. Mandibulomaxillary fixation
         4. Cervical spinal cord injury
   d. Consider early (<7 days) for predicted prolonged mechanical ventilation
      i. Severe TBI
      ii. Cervical spinal cord injury ≤C5
      iii. TBI + submaxillary facial fractures
      iv. Laryngotracheal injury

2. **Recommended contraindications for elective bedside tracheostomy**
   a. < 7 days postoperative from anterior cervical ORIF
   b. High ventilator settings
      i. FiO2 >50%
      ii. PEEP> 10
      iii. Intolerant of volume control mode (e.g. APRV/BiVENT, VDR)
   c. Elevated intracranial pressure
d. Hemodynamic instability
e. Predicted early mortality

3. Bedside tracheostomy considerations
   a. follow protocol for sterile precautions, informed consent, sedation, and preoperative timeout as per bedside surgery protocol
   b. High risk patients must be identified preprocedure.
      i. Morbid obesity
      ii. airway edema
      iii. cervical trauma
      iv. extremes of age
      v. other considerations
         1. Mandibulomaxillary fixation
         2. Halo brace
         3. High ventilator settings
            a. FIO2 >50%
            b. PEEP >10
         4. bleeding diathesis
         5. anatomical considerations
c. Consideration should be given to bronchoscopic guidance versus conversion to open procedure either a bedside or in the operating room
d. Proximal XLT tracheostomy should be selected for patients with significant anatomic concern or BMI ≥ 35
e. Withdrawal of endotracheal tube must be performed by experienced personnel with care to avoid inadvertent extubation.

4. Supply and instrument set up
   i. percutaneous tracheostomy trauma car to include
      1. Ciaglia percutaneous tracheostomy kit
      2. one pair scissors
      3. two pair of curved hemostats
      4. one needle-holder
      5. two self-retaining retractors
      6. tracheostomy tubes (#6 and 8 Shiley, 6 and 8 proximal XLT Shiley)
      7. sterile towels gowns and gloves
      8. skin prep solution (chlorhexidine)
      9. 2-0 silk or monofilament suture
      10. intubation set with difficult airway bag
      11. CO2 detector

5. Procedure
   i. induction of IV general anesthesia
      1. see bedside surgery protocol
      2. recommend chemical paralysis in addition to analgesics/anxiolytic
   ii. surgical set up as per bedside surgery protocol
   iii. preoperative timeout
   iv. surgical procedure
      1. skin infiltrated with lidocaine/epinephrine
      2. vertical incision made just below the cricoid cartilage
3. blunt dissection carried down to the level of the trachea in the midline between the strap muscles
4. endotracheal tube tape is cut and procedure list at the head of the bed manipulates the ET tube while the surgeon palpates for its presence within the trachea. Title volume should be closely monitored during this time. The tube is slowly withdrawn until the balloon could be palpated in the subglottic position. The balloon is deflated and the tip of the endotracheal tube is withdrawn to the level of the cricoid cartilage under manual guidance.
5. The percutaneous tracheostomy is completed in the standard fashion using a needle or needle/catheter system to gain access to the trachea, verified by air return.

v. Confirmation of position
   1. CO2 monitor is connected to the tracheostomy tube and color change as well as expiratory tidal volumes are confirmed.
   2. Once the tracheostomy secured, the endotracheal tube may be fully withdrawn.
   3. Tracheostomy secured with suture and neck strap.

vi. Post procedure chest x-ray is recommended.

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