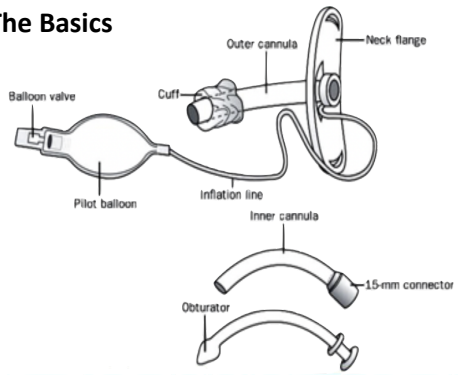
Tracheostomies: Basics & Emergencies

The Basics



Taking a Comprehensive History

- Type/Brand (ie: Jackson, Shiley, Lorae, Lary tube)
- Reason: upper airway obstruction, chronic ventilatory support, improved airway clearance
- Timeline: date of initial placement, most recent replacement
- Size: located on flange, should have ½ smaller at bedside
- Cuffed vs. uncuffed: cuffed allow for mechanical ventilation, while uncuffed supports phonation regardless of fenestration status
- Fenestrated vs. non-fenestrated: fenestrated are more likely to get granulation tissue but allow for phonation and respiration if cuff is inflated
- MRI-compatibility
- Ventilator use
- Associated pieces: Passy Muir valve [speaking], HME [humidifying filter]



Suctioning:

- *When:* Mucous not cleared with coughing, bubbles at trach site, frightened look, flared nostrils, restlessness, cyanosis, diaphoresis, tachypnea, dry-whistling sound, O2 desaturation
- *How*: Must wear gloves. Ideal size of suction catheter is 1⁄2-2/3 opening of trach tube. Saline can be instilled if secretions thick or blood-tinged. Suction only to recommended depth (determined by length of trach - do not go beyond length of trach to prevent trauma to airway). Over 5 seconds, pull catheter out using rolling motion between thumb and forefinger, while simultaneously covering suction opening.

MEDICAL EMERGENCIES

Approach to Respiratory Distress: In addition to the standard approach, think **DOPE.**

- **D**isplacement of tube
- **O**bstruction of tube [secretions, blood, mucous, emesis]
- **P**ulmonary [pneumonia, pneumothorax, pulmonary embolism, pulmonary edema, atelectasis, bronchospasm]
- **E**quipment [kinked tubing, ventilator problems, empty O2 supply]

Who do I call?

Suctioning, trach care, equipment issue → **RT**

Decannulation, hemorrhage, mechanical problem, concern for tracheal obstruction/poor ventilation, emergent intubation → **ENT**

Lower airway issues→ **Pulm**

DECANNULATION (complete tube displacement)

Predisposing factors: loose ties, excessive coughing, airway edema, agitation, downward traction by vent circuit weight

- Replace trach tube (ok to use old one until new one available). If unable to replace, try backup trach one size smaller.
- If unsuccessful, oxygenate/ventilate through mouth or using a pediatric mask over the stoma while awaiting arrival of airway team (who may intubate).

Some patients are 100% dependent on their stoma for airway management and CANNOT be intubated from above, so will require intubation of stoma. This is often due to anatomic upper airway obstruction (obstructive laryngeal tumor, complete subglottic stenosis) or post-surgical state preventing access to airway from above (s/p total laryngectomy as means of resecting laryngeal cancer or managing chronic aspiration, or s/p laryngotracheal (LT) separation for chronic aspiration).

MUCOUS PLUGGING (tube obstruction)

*Partial occlusion commonly leads to inability to wean O2 or respiratory distress.

- Replace trach tube if you suspect complete plugging
- Ventilator may alarm, falling O2 saturations, respiratory distress, may have difficulty passing suction catheter
- Even a trach that was changed 1-2 days ago may be plugging again. *When in doubt, change it out!*

HEMORRHAGE (VIGOROUS bleeding from tracheostomy site)

Most concerning cause of hemorrhage is tracheoinnominate artery fistula (due to pressure necrosis from cuffs with high pressures, improper placement of cannula tip, low placement of tube, hyperextension of head, steroid use).

- * GET ENT TO BEDSIDE ASAP*
- Oxygenate patient, over-inflate cuff to tamponade bleeding, translaryngeal intubation with direct compression, surgical repair

Adapted from the Cincinnati Children's Complex Care Team Resource Guide, UpToDate

Tracheostomies: Other Complications

COMMON CHIEF COMPLAINTS		
Complaint	**DDx**	**Management**
Increased Secretions/O2 Requirement	URI, tracheobronchitis, bacterial tracheitis, aspiration pneumonitis LRI/pneumonia	- Increased airway clearance as appropriate - Infectious workup (CBC w/ diff, CXR, gram stain and culture of tracheal aspirate, RVP of aspirate if chronic trach) *[suspect aspirate colonization not infection if no symptoms, polymicrobial growth, low levels of growth (<10^4 cfu/mL), growth of non-pathogenic bacteria]*
Non-Vigorous Bleeding	Vigorous suctioning/trauma, infection, dry airway, foreign body [if >24 hours, may be tracheitis or airway irritation/ulceration]	- Double check suctioning length and use saline to suction - Consider calling ENT for bedside airway evaluation.
Skin Irritation	Skin breakdown 2/2 friction (poorly-fitting trach/trach ties), mild cellulitis, tracheitis	- Ensure that trach ties fit well and provide wound care - Mild cellulitis or tracheitis usually resolve with regular stoma cleaning, suctioning, daily dressing changes, don't require ABx
Mechanical Problem	Fracture of flange or shaft, poorly-fitting inner cannula, balloon leak, balloon rupture	- Exchange trach (can do at bedside if mature stoma, must call ENT if immature stoma or first replacement)
OTHER EARLY COMPLICATIONS (<7-10 Days Post-Op)		
Complication	**Features**	**Management**
Subcutaneous Emphysema & Pneumothorax	- Acute onset dyspnea, chest pain (often pleuritic, unilateral) - Occurs 2/2 creation of false tract anterior to trachea or accidental perforation of posterior tracheal wall	- Obtain CXR - Place chest tube if indicated - Call ENT
OTHER LATE COMPLICATIONS (>/=7-10 Days Post-Op)		
Tracheal Stenosis	- Most commonly subglottic and more common with fenestrated tubes - Risk factors: cuff overinflation (causing tracheal injury or ischemia), surgical site infection, obesity, hypotension - Typically develop symptoms w/ >50% stenosis - Inability to tolerate speech valves or capping, dyspnea, dysphonia, wheezing, +/or stridor after decannulation	- Diagnose using direct inspection of upper airway and inspection of tracheostomy if patient can tolerate brief partial decannulation - Rarely requires treatment - Temporary treatment: small-diameter tube thorough stoma - Symptom alleviation: bronchoscopic dilation and/or stent - Definitive treatment: tracheal dissection and reanastomosis
Stomal Stenosis	- Due to trauma from tube insertion, excessive movement at entry site, unsupported tubing weight	- Stomal dilation, silver nitrate stick cautery, rarely surgery
Tracheomalacia	- Dyspnea, barking cough with severe paroxysms of coughing sometimes interrupting daily activities, episodic choking, recurrent pulmonary infections, and syncope w/ forced exhalation or cough (signs can sometimes be elicited by forced expiration, Valsalva, and certain positions, ie: recumbency)	- Diagnose using dynamic flexible bronchoscopy (DFB, considered gold standard) and dynamic airway computed tomography (DACT) *[PFTs can support dx but are not diagnostic]* - If asymptomatic *OR* symptoms controlled, no intervention - If persistently symptomatic, assess baseline functional status (PFTs, 6MWT, QOL) and call ENT for possible stenting trial
Tracheo-esophageal Fistula	- Usually 2/2 excessive pressure on posterior tracheal wall from over-inflated cuff or posterior trach orientation - Risk factors: NG tube, cuffed tube, high cuff/airway pressures, excessive movement, steroid use, DM, poor nutrition, GERD - Can cause recurrent aspiration PNA/hypoxemic respiratory events, enteral feed in aspirate, air leak, gastric distension	- Esophagram with water-soluble contrast, CT, esophagoscopy, and/or bronchoscopy - Almost always requires surgical correction, but until then provide supportive care: position ETT cuff distal to fistula, elevate HOB, frequent suctioning, bowel rest + TPN or JT for feeds/GT for suction

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