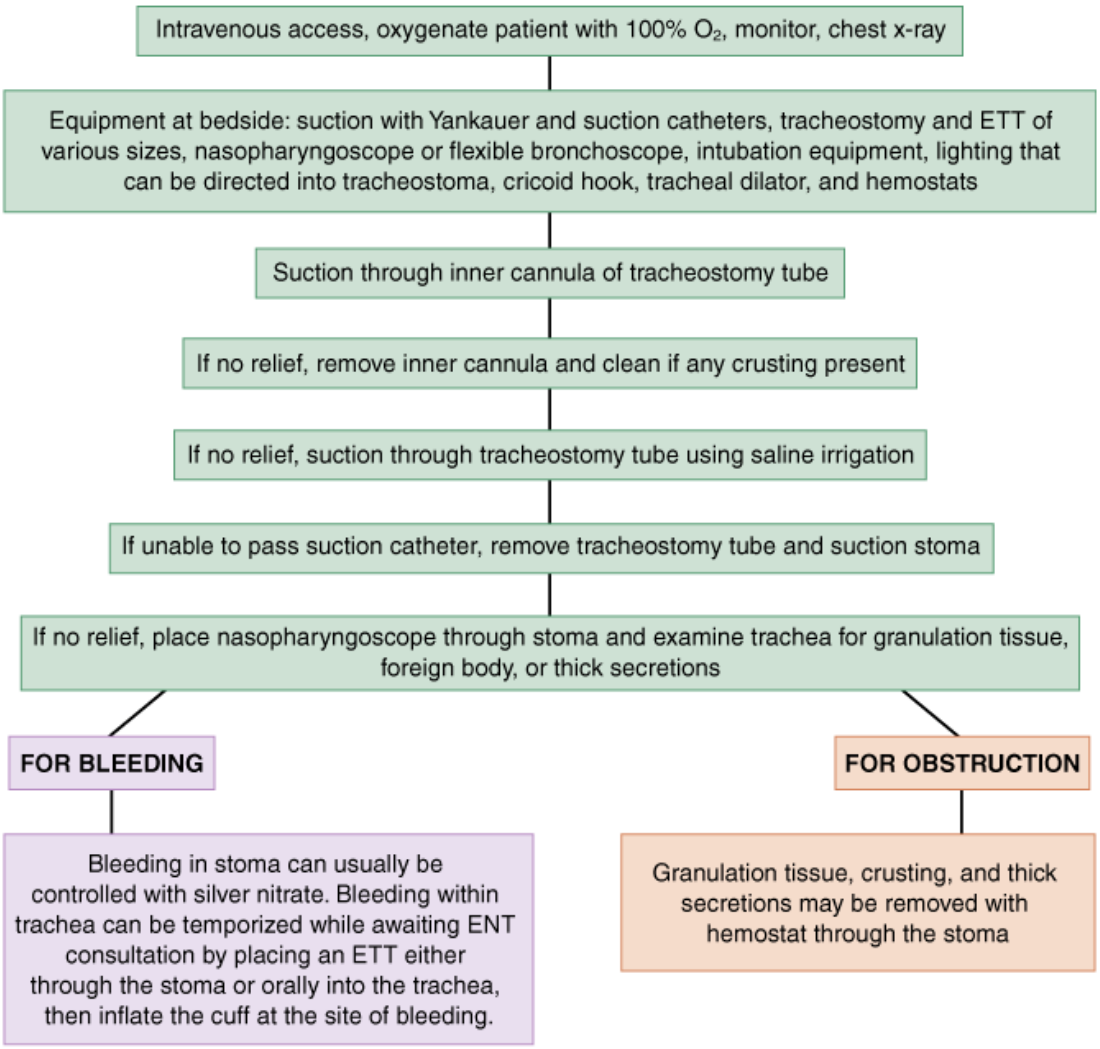
COMPLICATIONS OF AIRWAY DEVICES

COMPLICATIONS OF ENDOTRACHEAL TUBES:

- Range from minor to catastrophic
- MINOR COMPLICATIONS:
    - Lip lacerations
    - Corneal abrasions
    - Dental fractures
    - Tongue injuries
        - All should be avoidable with good technique
- MORE SERIOUS COMPLICATIONS:
    - Damage to the soft tissues of the larynx or pharynx
    - Dislocation of the arytenoid cartilage
        - Repetitive or blind intubation attempts are more likely to result in this type of injury
    - Mucosal tears may present early with immediate bleeding and subcutaneous emphysemia or LATE WITH SEPTIC SHOCK
    - Tracheal injuries ➔ more common in women because of the use of improperly large tubes
    - If the ETT is placed in the soft tissue of the neck through a mucosal tear, bag ventilation will be very difficult and will cause subcutaneous emphysema with pneumothorax
    - The ETT itself may be the source of complications ➔ kinking, biting or blockage by secretions

TRACHEOSTOMY:

- The skin of the neck is frequently sutured to the anterior tracheal wall
- Skills required for management of tracheostomy in ED:
    - Replacement of an uncuffed tracheostomy tube with a cuffed tube
    - Replacement after accidental decannulation
    - Correction of tube obstruction
    - Congrol of bleeding or infection at the site
- Determine if the patient can be orally intubated if needed ➔ if patients have undergone a laryngectomy or who have tumours or scarring, that occlude the upper airway, then THEY CANNOT BE ORALLY INTUBATED
- Algorithm for management is shown below:



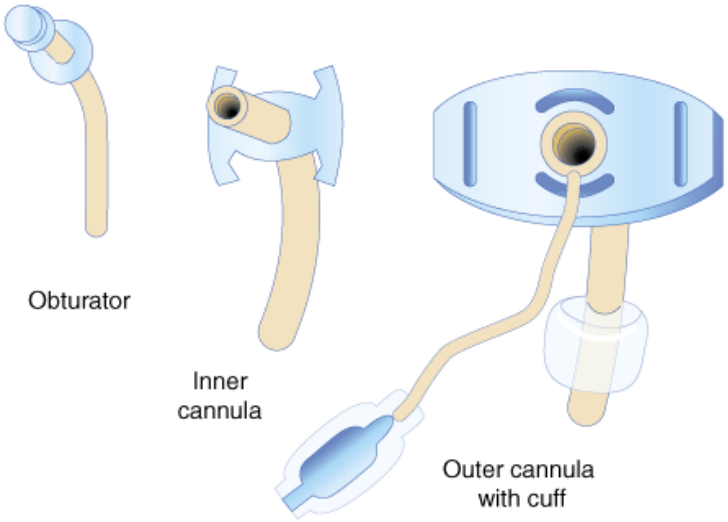
TRACHEOSTOMY TUBES:

- The size is usually defined by the inner diameter (5-100mm in adults)
- Fenestrated tubes have an opening along the dorsal surface that allows passage of air to the vocal cords to the patient can speak
- Most have a removable inner cannula, which allows secretions to be cleared from the lumen without removing the entire tube
- Paediatric tracheostomy tubes NEVER HAVE AN INNER CANNULA BECASE OF THE SMALL INNER DIAMETER, SO THE ENTIRE TUBE MUST BE REMOVED FOR CLEANING

CHANGING A TRACHEOSTOMY TUBE

- If the tracheostomy is <7 days old, the tract will not be mature and manipulation may easily create a false passage within the soft tissue of the neck
- If the patient is obese or has a neck mass, the tract may easily collapse
    - In both cases above, get a surgeon to change the tube
- The spontaneously breathing, stable patient can easily breathe through a patent stoma

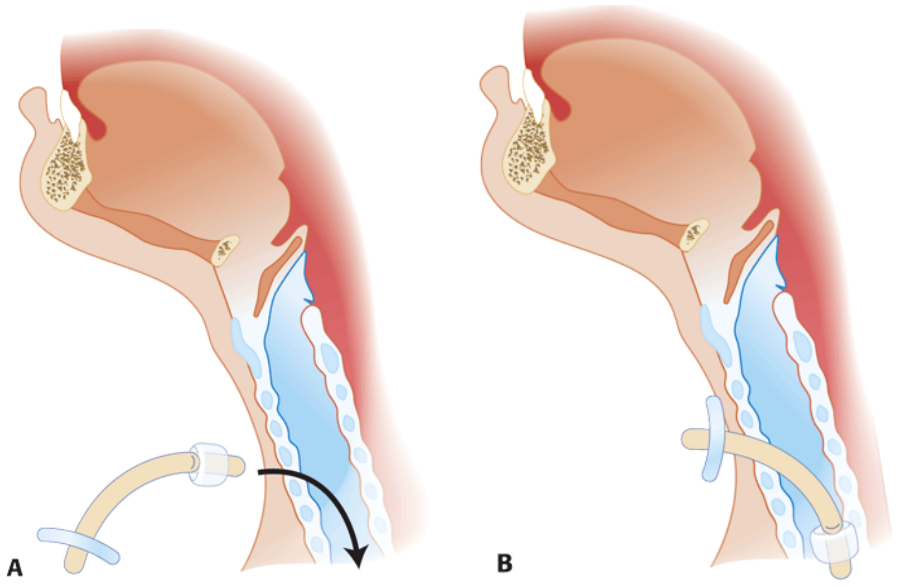
- See below for common components of a tracheostomy tube sets ➔ be careful to remove the obturator soon after placement, as patients cannot breathe through this ➔ replace with inner cannula



- After all the necessary equipment is in place (see below), place the patient supine with a shoulder roll to extend the neck

Table 242-1 Equipment Needed to Change a Tracheostomy Tube
Suction device with both a Yankauer tip and suction catheters that fit inside the tracheostomy tube
Good lighting directed into the tracheostoma
An appropriate size tracheostomy tube with obturator in place
Another tracheostomy tube one size smaller than planned
Tracheostomy tube tie
Cricoid hook and tracheal dilator (if physician is familiar with their use)

  - Remove the old tube and gently suction and examine the stoma
  - Gently direct the fresh tube into the opening, curving it downward into the trachea, the movement should be smooth and gentle
  - Do not force if resistance is met
  - If the tube cannot be placed, consider placing a smaller tube (beware that this will be shorter and may not be long enough for the patient's neck)
  - If the tube has been out for several hours, the stoma may begin to close and dilation may be needed before tube insertion ➔ ENT consult required



TRACHEOSTOMY TUBE OBSTRUCTION:

- Consider other causes of respiratory distress before focusing on the tracheostomy!
- Tube obstruction with mucous plugging is common ➔ secretions may act by a ball-valve mechanism, allowing air in but restricting exhalation
- SUCTIONING MAY RELIEVE OBSTRUCTION ➔ sterile saline injected after preoxygenation. Use of large suction catheters without preoxygenation will cause hypoxaemia
- If mucous plugging cannot be relieved by suctioning, the inner cannula of the tracheostomy and, sometimes, the entire tube may need to be removed and cleaned

MECHANICAL VENTILATION WITH A TRACHEOSTOMY TUBE:

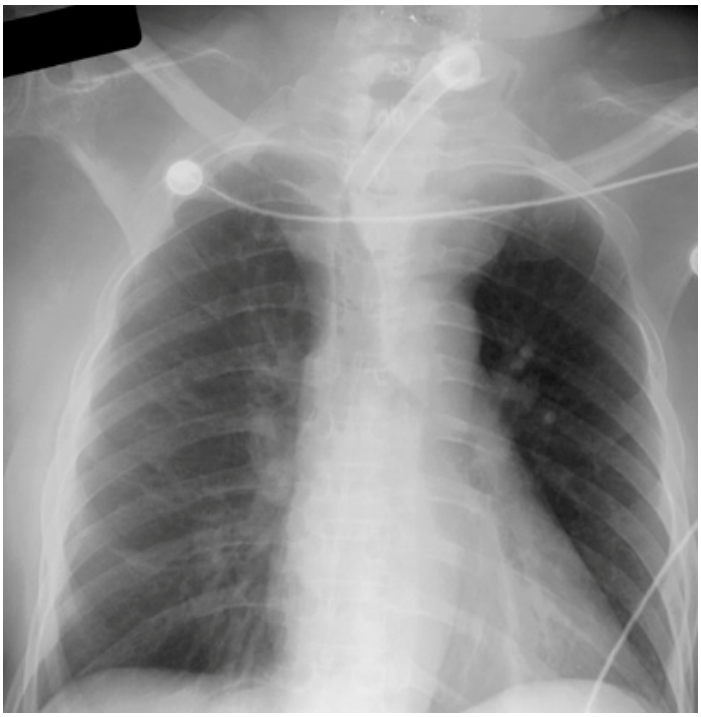
- If the patient requires mechanical ventilation, an uncuffed tracheostomy tube will result in a large air leak ➔ replace with a cuffed tube
- If the stoma cannot be cannulated, the patient may need to be orotracheally intubated to secure the airway

LARYNGECTOMY PATIENTS:

- These patients CANNOT BE ORALLY INTUBATED
    - Can be emergently intubated by simply placing an ETT into the tracheostoma. DO NOT ADVANCE THE TUBE TOO FAR, AS THE CARINA IS CLOSE BY!
- These patients can be distinguished from tracheostomy patients by history/exam and by the fact that laryngectomy patients are unable to vocalize (or breathe!) when the laryngectomy tube is occluded

TRACHEOSTOMY DISLODGEMENT:

- May become dislodged from the trachea, but not from the neck ➔ remove the entire tracheostomy tube immediately as it may compress the trachea (SEE BELOW):



- Consider oral intubation if needed

TRACHEOSTOMY SITE INFECTION:

- These sites are often contaminated with normal and sometimes pathogenic flora
- Stomal skin infection, tracheitis and bronchitis can be a recurring problem
- BROAD-SPECTRUM IV ANTIBIOTICS in the setting of clinical disease

TRACHEOSTOMY SITE BLEEDING:

- Bleeding can occur immediately after a tracheostomy and in the late post-operative period
- Sources of haemorrhage include ➔ granulation tissue in the stoma or trachea, erosion of thyroid vessels of the thyroid itself, the tracheal wall (suction trauma) or the innominate artery.
- Local bleeding can be controlled with silver nitrate → electrocautery done by ENT
- If bleeding is brisk, replace the tracheostomy tube with a cuffed ETT with the cuff below the bleeding site
- TRACHEOINNOMINATE ARTERY FISTULA IS RATE, BUT LIFE-THREATENING ➔ can occur if the cuff is inappropriately overinflated or if the there is direct pressure of the tracheal cannula over the innominate artery
    - Usually presents within the first three weeks post-op (peak in 1st and 2nd week)
    - Approximately 50% patients may present with a SENTINAL ARTERIAL BLEED OR HAEMOPTYSIS ➔ bleeding may be mild to severe and

SHOULD NOT BE TAKEN LIGHLY, because the potential exists for SUDDEN MASSIVE HAEMORRHAGE

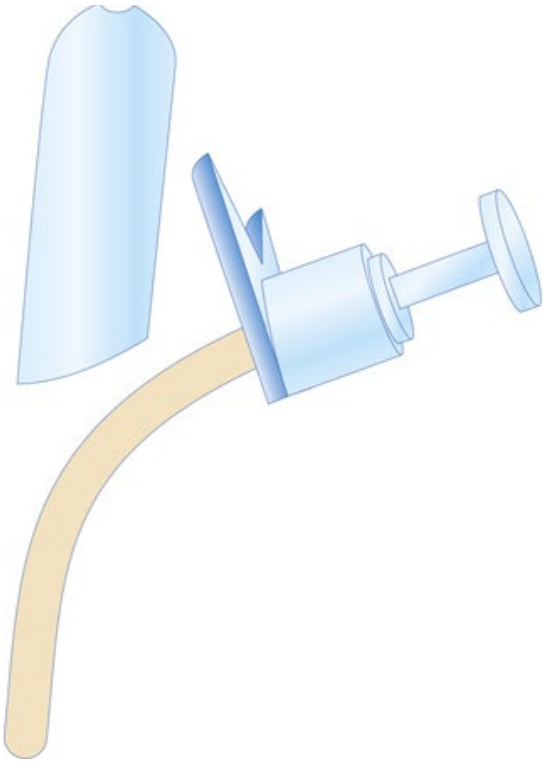
- Operative repair is life-saving
- The first maneouvre to control brisk bleeding while planning operative intervention is to HYPERINFLATE THE CUFF ➔ successful in 85% cases. If bleeding persists, slowly withdraw the tube while exerting pressure against the anterior trachea
- May need to pass an ETT past the tracheoinnominate fistula with direct visualization (nasoendoscope) and an assistant to remove the tracheostomy as the ETT passes
- Stomal haemorrhage is then controlled with DIGITAL PRESSURE OF THE INNOMINATE ARTERY AGAINST THE MANUBRIUM

TRACHEAL STENOSIS:

- Presents week to months after decannulation and results from mucosal necrosis and subsequent scarring
- Signs and symptoms ➔ SOB, stridor and wheeze as well as inability to clear secretions
- Humidified oxygen, nebulised adrenaline and steroids are emergent therapies
- Operative treatment → laser excision of the scar bands and stenting or tracheal reconstruction in more severe cases

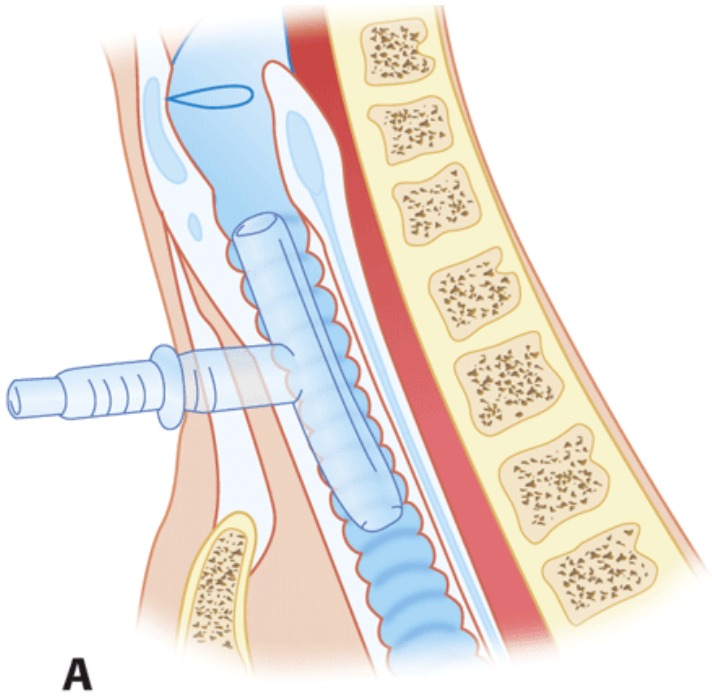
LARYNGEAL STENTS:

- The surgical management of severe laryngotracheal stenosis often employs the insertion of tracheal stents for various periods of time
- Renders a patient tracheostomy-dependent until the stent is removed, because the solid stent blocks the airway at the larynx



RELATION OF THE STENT TO THE TRACHEOSTOMY

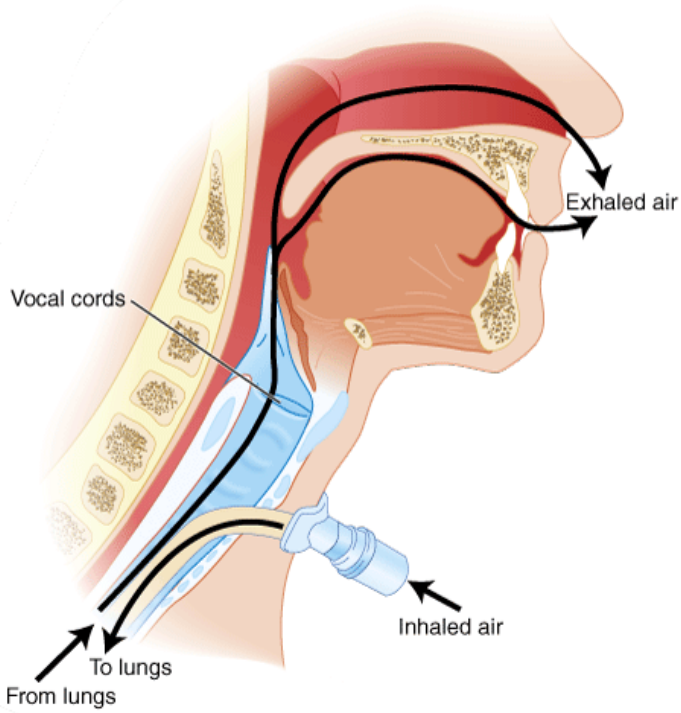
- Should only be removed by surgeons familiar with the devices and their placement
- If a stent becomes dislodged but the tracheostomy tube remains in position, airway security is not usually an issue ➔ notify operating surgeon
- AIRWAY OBSTRUCTION:
    - Montgomery T-tube is commonly used in adult laryngo-tracheal reconstruction



- Should be addressed by first suctioning both the upper and lower limbs
- If suctioning both limbs of the T tube does not relieve obstruction, the T tube can be removed and the trachea cannulated with an appropriately sized tracheostomy or ETT
- Removal of the T-tube requires a strong, steady pull, and should only be attempted if the operating surgeon is not available and the patient is in airway distress

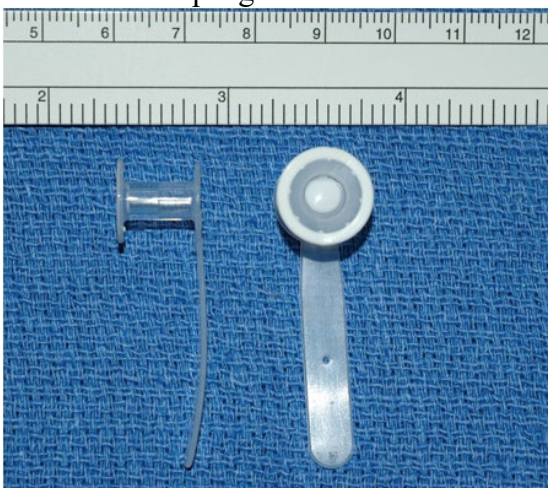
SPEECH DEVICES:

- The PASSY-MUIR valve is a one-way valve that fits directly over the opening of an uncuffed tracheostomy tube and allows the patients hands-free speech



- Because the patient exhales around the tube, a Passy-Muir valve should NEVER BE USED WITH A CUFFED TUBE
- If a patient with a Passy-Muir valve develops signs of airway obstruction or an inability to speak, the speaking device should be removed from the tracheostomy so air can pass freely during both inhalation and exhalation

- Tracheo-oesophageal prosthesis allows speech in postlaryngectomy patients
  - One-way valve that is surgically implanted between the posterior wall of the tracheal storma and anterior wall of the oesophagus, forcing exhaled air into the oesophagus when this is occluded, causing vibration in the oesophagus that results in tone that is audible as speech



  - Most common complication is leakage, either around the valve or through the valve lumen
  - Enlargement of the tracheoesophageal fistula is described in 20-30% of patients

- Leakage puts laryngectomy patients at increased risk for aspiration pneumonia
- Temporary solution is removal of the prosthesis and replacement with a smaller foley catheter ➔ do in conjunction with the surgeon, preferably by the surgeon themselves. DO NOT ATTEMPT IF THE PUNCTURE SITE IS <2 WEEKS OLD, AS A FALSE PASSAGE MAY RESULT
- Another issue is valve aspiration or valve extrusion ➔ persistent cough, SOB with discomfort and even respiratory distress ➔ confirm with CXR