TRACHEOSTOMY

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What is "Tracheotomy"

The word "tracheotomy" is derived from the Latin "trachea" and "tomein" (to make an opening).
Tracheostomy is an operative procedure that creates a surgical airway in the cervical trachea.

WHAT IS A TRACHEOSTOMY?

- A tracheostomy is a surgical opening in the anterior wall of the trachea just below the larynx.
- It provides an alternative airway, bypassing the upper passages.

INDICATIONS FOR TRACHEOSTOMY

ICU Patients

- Prolonged intubation
- Facilitation of ventilation support (Assisted Prolonged/ positive pressure ventilation)
- **To decreases the work of breathing** and increase volume of air entering the lungs.
- Inability of patient to manage secretions (Pulmonary Toilet)
- To improve patient comfort
- Wean from ITU setting
- Upper airway obstruction
 - Inability to intubate

- Adjunct to major head and neck surgery
- Adjunct to management of major head and neck trauma

Tracheotomy Indications

To bypass obstruction

- Tumors (of oropharynx, larynx, upper trachea)
- Infections (epiglottitis, severe tracheobronchitis)
- Bilateral Vocal Cord Paralysis
- Trauma (laryngeal, maxillofacial fractures)
- Edema (tongue, laryngopharynx)
- Intubation failure

- Foreign body obstruction
- Subglottic or tracheal stenosis

Tracheotomy Indications miscellaneous

- Congenital abnormalities (tracheomalatia, subglottic or glottic stenosis, craniofacial abnormalities (Pierre Robin, Triecher Collins syndromes)
- Obstructive Sleep Apnea Syndrome

- Aspirations related to muscle or sensory problems
- Prophylaxis (as preparation for extensive H&N procedures, before radiotherapy for H&N CA)
- Cervical spinal cord injuries with respiratory muscles paralysis

TYPES OF TRACHEOSTOMY

- Temporary
- Permanent
- Emergency
- Surgical/ Elective
- Percutaneous
- Minitracheostomy
- Cricothyroidotomy

Surgical techniques Open procedure

Percutaneous procedure

Surgical techniques open procedure







Incision 1 cm below the cricoid or halfway between the cricoid and the sternal notch.

Tracheal Ring 1

Tracheal Ring 2

Tracheal Ring 3

Tracheal Ring

Retractors are placed, the skin is retracted, and the strap muscles are visualized in the midline. The muscles are divided along the raphe, then retracted laterally The thyroid isthmus lies in the field of the dissection. Typically, the isthmus is 5 to 10 mm in its vertical dimension, mobilize it away from the trachea and retract it, then place the tracheal incision in the second or third tracheal interspace



Surgical Techniques - *The tracheotomy* Window cut in anterior tracheal wall

- Vertical or Horizontal slit opening
- Biork Flap
- Inferior margin sutured to skin
- Superior margin sutured to skin
- Tracheal Retrieval or "stay" sutures

TYPES OF TRACHEOSTOMY TUBES

Cuffed Tubes

- Allows ventilation and prevents aspiration
- High cuff pressure can be damaging
- Check pilot cuff
- DO NOT BLOCK THIS TUBE



Un-cuffed Tubes

- Maintains airway once aspiration risk has passed
- Increase airflow to the larynx
- Which patients:
 - Long term tracheostomy pts
 - Patients who do not require a seal
 - Paediatrics



Trach tubes (cont.)

Shiley

- Plastic with white face plate
- Can be cuffed or cuffless
- 1 obturator
- 2 inner cannula





Trach tubes (cont.)

- Fenestrated trachs
 - Designed to allow communication when on vent
 - Problematic due to malpositioning of fenestrates
 - Rarely used



Trach tubes

- Jackson (metal)
 - Used for non-vent patients
 - Cuffless model only



POST- OPERATIVE CARE

- SAFETY FIRST: Secure 'new' airway!
- CARE OF THE STOMA

- COMMUNICATION & PSYCHOLOGICAL CARE
 NUTRITION
- PREVENTION OF COMPLICATIONS
- NOTE: Post tracheostomy care requires High Dependency Nursing or ICU for 24-72 Hrs

Secure airway

- Secure position of tracheostomy tube to avoid displacement.
- Ensure patency of tube.
- Ensure safe change of tube when indicated

TRACHEOSTOMY TUBES

- A tracheostomy tube is:-
 - Inserted through the tracheostomy to maintain a patent airway
 - Secured in place by tapes tied around the neck



TRACHEOSTOMY TUBE CARE

- Securing tracheostomy around patient's neck. Done in flexion and not too tight.
- Occasionally stitched in selected cases





Post-operative Tracheostomy care

- Do not adjust or replace trachy tapes unless airway problem
- Do not remove sutures securing tube flange to skin
- Do not remove and tracheal rescue sutures (stuck to chest)
- Let cuff down at 24 hrs unless needed for IPPV/bleeding/chronic aspiration

1st Tube change is at the 4th to 7th day unless airway problem

Tracheotomy care

Tube position

 Avoid displacement
 To prevent decubitus of trachea may lead to tracheal stenosis or ulceration
 Not to cover with blanket!

Pay attention on patient's beard and chin position!

Tracheotomy care

Humidificatio " "Artificial nose" n

Reduces secretion and crusting. Reduces coughing

TRACHEOSTOMY TUBE CARE

Humidification of the inspired gas is a standard of care for tracheostomized patients.





Thermovent

Suctioning PRN!

Indications for Suctioning

- Secretions in the trach
- Suspected aspiration of gastric or upper airway secretions
- Increase in peak airway pressures when on ventilator
- Increase in respirations or sustained cough or both
- Gradual or sudden decrease in ABG
- Sudden onset of respiratory distress when airway patency is questioned

CLEARANCE OF SECRETIONS

 Insert the catheter the proper distance into the trach tube (usually the length of the trach tube plus 1/4 inch.)

> Apply suction by putting your thumb over the hole in the catheter while you gently pull the catheter back out. Gently roll the catheter between your thumb and forefinger as you pull the catheter out.

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Tracheotomy care

Not aggressive and not too Suctioning much deep To prevent irritation and Skin care secondary inflammation due to discharge Inner tube Once or more daily remove care and clean. Attention on crusts

CARE OF THE STOMA / INFECTION CONTROL



- THE STOMA HAS TO BE CARED FOR CAREFULLY
- IT NEEDS TO BE CLEANED AND INSPECTED 2-3 TIMES A DAY
- IT SHOULD BE CLEANED USING ASEPTIC TECHNIQUE AND APPROPRIATE DRESSINGS APPLIED TO AID HEALING
 ONCE TUBE IS REMOVED
- THE STOMA WILL CLOSE SPONTANEOUSLY OVER A FEW DAYS

TRACHEOSTOMY TUBE CARE: CUFF

- Tracheostomy tube cuff pressures in a range of 20 to 25 mm Hg.
- The cuff prevent aspiration of blood, secretions or gastric contents.
- Overly low cuff pressures < 18 mm Hg, may cause the cuff to develop longitudinal folds, promote microaspiration of secretions collected above the cuff, and increase the risk for nosocomial pneumonia.</p>
- Excessively high cuff pressures above 25 to 35 mm Hg exceed capillary perfusion pressure and can result in compression of mucosal capillaries, which promotes mucosal ischemia and tracheal stenosis.
- Ideally, Cuff pressure should be measured with calibrated devices and recorded at least once every nursing shift and after every manipulation of the tracheostomy tube.

TRACHEOSTOMY TUBE CARE

Chest Xray: cuff has a width greater than the caliber of the trachea, which suggests the presence of a hyperinflated cuff and tracheal overdistention



Heffner, Hess.Clinics in Chest Medicine 22, 2001.

Deflating the Cuff

Usually done after 24 hours Why?

- To assess the patient's ability to maintain their own airway.
- To assess the patient's ability to cope with their secretions.
- Follow tracheostomy guidelines ie. Cuff down 24 hours prior to decannulation
- Blue dye test can be performed at this stage to assess swallow.

Who?

Doctor, nurse or physio, who are competent

TRACHEOSTOMY TUBE CARE Tube change

- The tract exists 4-5 days after the operation (Suggest change on the 4th day onwards)
- Rate of exchange depends on clinical situation of the specific patient – type of discharge, type of tube, medical status, age, ward care.
- Suggested daily change subsequently if patient out of ICU or if tracheostomy has no inner tube.
- Should be done by experienced staff.

First change done by the surgeon while subsequent changes done by trained staff.

Tube change-difficult situations

- When the patient is obese or short thick neck
- If the tube must be placed quickly in an emergency
- If it is a new or recent tracheotomy <72 hours</p>
- If the person performing the change is not well-trained

Tube exchange-difficult situations

- When the stoma is scarred, calcified, distorted or obscured by granulation tissue
- When the trachea is deviated or rotated
- When the trachea is narrowed or smaller than normal

When the patient is a child
How to change a Tracheostomy Tube

- Neck Extension good lighting
- Shallow Suction
- Calm Patient, breathing advice
- Remove old tube and quickly replace new one using introducer inside tube. (90 ° rotation helps)
- Immediately remove introducer and insert inner tube
- Blow up cuff if needed
- Assistant holds tube in place while you secure it with tapes/velcro band

The "Blocked" Tracheostomy tube – Possible Reasons

- Tube lumen is obstructed (blood/ secretions/crusts)
- The Tube is in the trachea but the tip is abutting tracheal wall (positioning/length/shape problem)
- Tube tip granuloma
- More distal airway obstruction/malacia
- Tracheal Fistula/laceration/TOF

The tube has become displaced – out of the trachea/in neck tissues/a false passage

Emergency Care – The "Blocked" tracheostomy Tube

Is there a partial airway ? Time to assess

Is there effectively no ventilation ? Need for *immediate* action!

Partially Obstructed Ventilation

- Observe patency with a cotton wisp
- Change inner tube or suction
- Ensure tube secure & not riding out
- Use flexible "intubating" endoscope through tube lumen to diagnose
- Replace whole tracheostomy tube

Totally Obstructed Ventilation!

- No effective Ventilation! DIRE EMERGENCY!
- Quick test with cotton wisp

- Quick Pass suction catheter/Change Inner tube
- Change whole tube
- Open wound Get good direct vision of tracheal opening, assistant retract tracheal rescue sutures or use a tracheal dilator
- In absence of stay suture or trachael dilator consider "railroading" over guide-wire/bougie
- Is the tube in ? Chest Expansion, (CO_2 trace).
- Consider Inserting ET tube via Tracheostome if necessary

Totally Obstructed Ventilation!

No Ventilation & Rescue Measures failed

Can you ventilate from above ? Mask & Airway / LMA/ ET tube

Needle Jet Ventilation directly into trachea

Disaster Scenario

- Tube Obstruction, accidental displacement
- Tube removal
- Replacement into false passage

Aggressive attempt to ventilate;

- Pneuomediastinum
- Pneumothorax
- Bypoxia

Cardio-respiratory arrest

TAKE HOME MESSAGE SAFETY FIRST WHEN CARING FOR A PATIENT WITH A TRACHEOSTOMY YOU MUST ENSURE THAT:-



- THERE ARE SPARE TRACHEOSTOMIES AVAILABLE CLOSE BY THE SAME SIZE AND THE OTHER A SIZE SMALLER
- A TRACHEAL DILATATION KIT IS CLOSE BY
 SUCTION EQUIPMENT IS AVAILABLE
- DIFFERENT SIZE SUCTION CATHETERS AVAILABLE
- **OXYGEN IS AVAILABLE**
- EMERGENCY EQUIPMENT IS AVAILABLE INCLUDING A RESUSCITATION BAG AND MASK AND DEFIBRILLATOR AND EMERGENCY DRUGS

Contents Bedside Post tracheostomy Tray

- Suction catheters and accesories
- Spare tracheostomy tube (correct size!)
- Tracheal dilator and/or wire guide
- Cotton
- Clean gauze for dressing and clean tracheostomy tape.
- Scissors

THANK YOU FOR YOUR ATTENTION

MURAKOZE

Post tracheostomy communication

- Immediate Post op communication alternatives should be offered to the patients.
- Noted pad/pen if literate and a bell/alarm for emergencies.
- Speaking tubes considered later.

Nature of the problem





Diversion of airflow away from larynx
 Inadequate subglottic pressure to cause vocal fold vibration

The solution

- Re-establish airflow through the larynx
- Substitute

 alternative vibration
 source if larynx is
 not accessible



Speech with tracheotomy

- Spontaneous breathers
- Tolerate cuffless mech. ventilation
- Conscious patient



Speaking Valve Function

- Patient can continue to breath in through the trach tube
- Exhalation is then redirected up through the trachea creating a closed system
- Promotes a more "normal" respiratory pattern for breathing and expelling secretions



Speech with tracheotomy (Passy-Muir valves)

P For mechanically dependent patients that may tolerate cuff deflation For unable to close the tube outlet with finger (quadriplegia)



Contraindications to speaking valves

- Thick Copious Secretions
- Severe Salivary Aspiration

Severe Airway Obstruction above tracheostomy level.

Speech with tracheotomy

 It`s possible to speak with tracheotomy, also for mechanically ventilated patients and for spontaneous breathers.



Speech with tracheotomy

- Mechanically ventilated patient that can not tolerate balloon deflation (severe COPD)
- The air comes from additional external source via small tube above the balloon



Talking trach tubes

- Made by both Bivona and Portex
- Allows for phonation by presentation of nonpulmonary air between the cuff and the vocal folds.
- Does not require cuff deflation and will not impact ventilation of the patient.

Talking trach tubes

- Requires:
 - Intact or relatively unimpaired articulators
 - Functional vocal fold mobility
 - Relatively patent upper airway
- Contraindications:
 - No major contraindications

Assessment for talking trach tube

- Once a patient is identified as a candidate, trach can be changed by ENT.
- Once the trach is changed, humidified air line should be established for the talking trach.
- The talking trach line is attached via oxygen tubing to the humidified air source and the flow should be set initially at 7L/min.
- Digitally occlude the port on the talking trach line to administer airflow to the upper airway and ask pt to phonate.

CARING FOR THE PATIENT

- Having a tracheostomy can be very traumatic and many patients find it difficult to adjust.
- Patients with a new tracheostomy will need lots of support, reassurance and education

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PSYCHOLOGICAL / COMMUNICATION

- PATIENTS AND FAMILY REQUIRE REASSURANCE AND SUPPORT
- ALTERNATIVE METHODS OF COMMUNICATION SHOULD BE SOUGHT
- CONTACT S.A.L.T FOR ADVICE ON COMMUNICATION
- PROVIDE STIMULATION IN THE FORM OF TELEVISION, RADIO, NEWSPAPERS, ETC



Eating with tracheotomy





NUTRITION

- Tracheostomy tube prevents normal upward movement of the larynx during swallowing and hinders glottic closure.
- Between 20% and 70% of patients with a chronic tracheostomy experience at least one episode of aspiration every 48 hours
- Evaluation by speech therapist
- Keep head elevated to 45° during periods of tube feeding

Heffner, Hess.Clinics in Chest Medicine 22, 2001.

NUTRITION

- CHECK LOCAL POLICY ON EATING AND DRINKING WITH TRACHEOSTOMIES
- USUAL WAYS OF FEEDING INCLUDE ORAL, NASOGASTRIC OR PARENTERAL.

Removing the Tracheostomy Tube

- When?
- Joint decision with doctor, nurses + physio.
 Following tracheostomy guidelines:
- (1) able to expectorate independently.
- (2) minimum of 1 deep suction per shift.
- (3) no sign of chest infection.
- (4) FiO2 of less than 60%.

(5) Deflation of cuff for more than 24 hours.

Decanulation when?

- Resolution of pathology that necessitated the tracheotomy (upper airway obstruction, pneumonia)
- Normal protective laryngeal mechanisms (no aspirations during normal swallowing, good coughing)
- No planed further interventions (radiotherapy, H&N operations)
- No mechanical ventilation

Removing the Tracheostomy Tube

Who?

- Doctor, Nurse or Physio who are competent. How?
- Ensure cuff fully deflated
- Explanation to patient (or parent for baby/child) about the process and emergency measures.
- Equipment dressing, gauze, O2 mask, stitch cutter.
- Oximeter

Conditions;

Patients should demonstrate stability for 24 to 48 hours after discontinuation of mechanical ventilation.

Tracheostomy stomas can narrow markedly or close within 48 to 72 hours after tube removal.

WEANING FROM TRACHEOSTOMY

Ward Decannulation Procedure

- Downsize Tube
- Uncuffed & fenestrated tube
- Cork off tube for short period
- Work up to 12 hours blocked without suction then go to 24 hours
- First done during day under observation of day shift then both day and night monitored by both shifts.
- Finally remove tube and make an air tight seal over tracheotomy using occlusive neck dressing
- Observetor a few more days discharge

WEANING FROM TRACHEOTOMY

- The ability to breath and clear airway secretions around a small, capped tube signifies readiness for decannulation
- Patients who fail breathing trials with capped tracheostomy tubes should be evaluated by flexible fiberoptic endoscopy for evidence of airway lesions and adequacy of airway function.



Common Reasons for Ward Decannulation Failure

- Inadequate Dynamic Airway
- Supra-or infra-stomal granuloma
- Suprastomal collapse
- Tracheal Stenosis

- Vocal cord palsy or Cryco-arytenoid joint fixation
- Bigher Upper airway Obstruction
- Excessive Airway secretions in Neurologically impaired
- Intercurrent (respiratory) infection

Complications of Tracheostomy

- Complications 5-40%
- Mortality <2%</p>
- Complications are more frequent in emergency situations, severely ill patients and small children.

Mortality in Tracheostomy

- Higher for Paediatric than Adult
- Tube related mortality in paeds < 2 %</p>
- Adult Operative mortality 0.3 %

- Tube displacement in 1st 24 hours 25 % MORTALITY
- Adult in-hospital ICU tracheostomised mortality 37 % mainland Europe Adult UK ICU tracheostomy patients have mortality of 20.1 %

Risk factors for Complications Age: infants and adults over 75

- Obesity
- Smoking
- Poor nutrition
- Recent illness, especially an upperrespiratory infection
- Alcoholism
- Chronic illness
- Diabetes
PERI-OPERATIVE COMPLICATIONS OF TRACHEOSTOMY

- **1. HAEMORRHAGE**
- 2. SURGICAL EMPHYSEMA
- 3. **PNEUMOTHORAX**
- 4. AIR EMBOLISM
- 5. CRICOID CARTILAGE DAMAGE
- 6. NERVE DAMAGE



Hemorrhage

Acutely Bleeding Tracheostomy Ensure Cuff fully inflated

- B Head Up
- Check clotting status Vit K, ffp, platelets, tranexamic acid
- Usually Venous bleeds around thyroid gland or Thyroidae ima if present.
- Recall Surgical Team to formally explore wound

Late Bleed

Innominate artery erosion – Late - too late)

COMPLICATIONS ASSOCIATED WITH TRACHEOSTOMY TUBE PLACEMENT

- TRACHEAL STENOSIS, ULCERATION, FIBROSIS, TRACHEOMALACIA
 LOSS OF NORMAL HUMIDIFYING AND
 - WARMING MECHANISMS
- LOSS OF PHYSIOLOGICAL PEEP
- INCREASED RISK OF NOSOCOMIAL PNEUMONIA



Early Complications of Tracheostomy

- Large leak Difficult PPV in pre-term (NICU)
- Bleeding
- Accidental Decannulation
- Tube Obstruction
- False Passage
- Pneumomediastinum
- Surgical Emphysema
- Pneumothorax
- Wound Infection
- Chest Infections

Respiratory Arrest/Apnoea

Complications late

- Bleeding tracheoinnominate fistula
- Tracheo- and laryngomalatia
- Tracheal Stenosis
- Tracheoesophageal fistula
- Tracheocutaneous fistula
- Granulation formation
- Scarring
- Failure to decannulate

Complications of Tracheostomy

- Stoma
 - Stoma site infection
 - Stomal hemorrhage
 - Poor stoma healing after decannulation with scar, keloid, or tracheocutaneous fistula



CARE OF THE STOMA / INFECTION CONTROL



- THE STOMA HAS TO BE CARED FOR CAREFULLY
- IT NEEDS TO BE CLEANED AND INSPECTED 2-3 TIMES A DAY
- IT SHOULD BE CLEANED USING ASEPTIC TECHNIQUE AND APPROPRIATE DRESSINGS APPLIED TO AID HEALING
 ONCE TUBE IS REMOVED
- THE STOMA WILL CLOSE SPONTANEOUSLY OVER A FEW DAYS

Complications of Tracheostomy

• Trachea

Granuloma

Tracheoesophageal fistula

fewer than 1% of patients as a result of pressure necrosis of the tracheal and esophageal mucosa from the tube cuff

risks: high cuff pressures, presence of a nasogastric tube, excessive tube movement, and underlying diabetes mellitus

Complications late



cheostomy Tube causing Tracheomalacia

Complications of Tracheostomy

• Tracheoinnominate fistula:

0.4% with mortality rate of 85% to 90%.

Major airway hemorrhage may occur first within several days or as long as 7 months after performance of a tracheostomy.

Risk factors : excessive tube movement, low placement of the tracheostomy, sepsis, poor nutritional status, and corticosteroid therapy

• Tracheal stenosis:

can develop from 1 to 6 months after decannulation risk for tracheal stenosis ranges between 0% and 16%

Tracheomalacia

Dealing with Tracheal Stenosis/Malacia

- Laryngotracheal Reconstruction
- Montgomery T Tubes

Endotracheal Stent

Tracheal resection or CTR & End-to-end anatomisis

Single Stage LTR



CONCLUSION

- The most common indications for tracheostomy is mechanical ventilation with prolonged tracheal intubation.
- Tracheostomy: emergency and elective, improve quality of life.
- Meticulous surgical technique.
- Appropriate postoperative tracheostomy care to reduce complications.

MURAKOZE!