

percutaneous tracheostomy
[created by Paul Young 21/12/07]

surgical vs percutaneous tracheostomy

- 1999 Dulgerov et al Crit Care Medicine
 - open vs perc., PDT is heterogenous group, concl.:
 - (i) Giaglia+Bronch lowest complic among PDT,
 - (ii) PDT lower post-op but higher periop complication
- 2000 Cheng et al Ann Otol Rhinol Laryngol
 - open vs PDT, incl. 4 RCTs, concl.:
 - (i) PDT lower risk of bleeding and infection,
 - (ii) PDT+ Bronch as safe as open tracheostomy
- 2000 Freeman et al Chest
 - open vs PDT, ICU patients, Indication prolonged ventilation, well defined inclusion/exclusion criteria, incl 5RCTs (236 pat.), concl.:
 - (i) no overall difference in mortality rate,
 - (ii) advantages of PDT shorter duration (9mins),
 - (iii) lower overall postop complications,
 - (iv) lower bleeding rate
- 2006 Delaney et al Crit Care Med
 - PDT vs open, extensive search, validity assessment for RCTs,
 - inclusion/exclusion criteria well defined, largest metaanalysis, 17studies,1212pat, concl.:
 - (i) PDT lower wound infection,
 - (ii) no difference in bleeding and complication rates,
 - (iii) PDT seems to be the choice for an elective ICU tracheostomy
- 2007 Higgins et al Laryngoscope
 - PDT vs open, 15 studies(973 pat.),well defined incl/excl criteria, concl.:
 - (i) PDT higher risc of accidental decanulation,
 - (ii) lower risc of infection or unfavorable scarring,
 - (iii) trend towards lower overall complication rate (OR=0.75,CI=0.56-1.0),
 - (iv) no difference in reg of bleeding, subglottic stenosis, death;
 - (v) PDT is faster (4.6 mins);
 - (vi) PDT is cheaper (456 USD/pat),
 - (vii) low conversion rate (7.7%)

contraindications

- Absolute**
 - (i) Emergency
 - (ii) Pediatric patient (<15 years)
 - (iii) Midline neck mass
- Relative**
 - (i) PEEP > 20
 - (ii) Uncorrected Coagulopathy
 - (iii) Obesity (obese or short neck)
 - (iv) Neck distortion (previous tracheostomy, scarring, haematoma, tumor, thyromegaly)
 - (v) Tracheomalacia
 - (vi) C-spine immobilisation (cervical fusion, rheumatoid arthritis, cervical instability)
 - (vii) Infection in the soft tissues of the neck

complications

- Immediate**
 - Procedural complications
 - Haemorrhage
 - Surgical emphysema, pneumothorax, air embolism
 - Cricoid cartilage damage
 - Misplacement in pretracheal tissues or right main bronchus
 - Compression of tube lumen by cuff herniation
 - Occlusion of the tip against the carina or tracheal wall
- Delayed**
 - Blockage with secretions
 - Infection of the tracheostomy site, tracheobronchial tree, and larynx
 - Pressure on tracheal wall from the tracheostomy tube or cuff
 - Mucosal ulceration and perforation
 - Deep erosion into the innominate artery
 - Tracheo-oesophageal fistula
- Late**
 - Granulomata of the trachea
 - Tracheal and laryngeal stenosis
 - Persistent sinus at tracheostomy site
 - Tracheomalacia and tracheal dilatation

removal

- removal can be considered when:
 - (i) there is an absence of upper airway obstruction (eg tracheal stenosis or granulation tissue)
 - (ii) suctioning is becoming less frequent (2-4 hourly)
 - (iii) the patient is co-operative & has a good cough
 - (iv) the patient can protect their upper airway from aspiration
 - (v) the oxygen requirement has decreased and the patient does not require invasive ventilation

indications

- (i) Prolonged mechanical ventilation
- (ii) 50-70% of tracheostomies in intensive care patients
- (iii) Airway obstruction
- (iv) Pulmonary toilet
- (v) Prophylaxis (prior to head or neck resections)

patient selection

- The ideal patient:
 - (i) Haemodynamically „stable“
 - (ii) FiO2 < 0.6
 - (iii) PEEP < 10
 - (iv) Uncomplicated endotracheal intubation
 - (v) Lean patient with supple neck and prominent cervical landmarks (Palpable cricoid cartilage > 3 cm above sternal notch)

techniques

- PDT – Ciaglia Technique**
 - Developed 1985
 - Dilational
 - Seldinger Technique
 - „Blind“ insertion (air bubbles in syringe to verify tracheal placement)
 - Insertion in between cricoid and first tracheal ring
- Modified Ciaglia technique**
 - Insertion site more distal away from cricoid to prevent cartilage stenosis
 - Bronchoscopic assistance (reduces complications from a total of 16.8% to 8.3%)
 - Single dilator instead of multiple dilators
 - Currently standard of care
 - Kost et al: prospective randomized trial of 500 patients showed overall complication rate of 9.2%, most commonly oxygen desaturation (2.8%) and bleeding (2.4%); decanulation (1%) (80% on pt. with BMI>30), infection (0.8%)
 - advantage: confirm correct needle placement, prevent posterior tracheal wall injury, prevent accidental extubation
 - Disadvantage: impaired ventilation and oxygenation, additional personel, increased cost and time
- Rapitrach**
 - Developed by Schachner et al 1989
 - Utilizes Seldinger Technique
 - Blades of Dilating Tracheotome are slid over wire to dilate
 - Increased risk of posterior tracheal wall injury
 - Faster then Ciaglia
 - Significantly more complications then Ciaglia technique
- Griggs Technique**
 - Developed 1990
 - Uses Seldinger Technique
 - Blunt forceps to dilate
 - Faster then Ciaglia
 - Significantly more complications then Ciaglia technique
- Translaryngeal Tracheostomy**
 - Described by Fanconi et al 1993
 - Technique: the tracheostomy is passed through the larynx and upward trough the anterior wall of the larynx
 - Advantage: prevents pressure and damage to posterior wall
 - Disadvantage: procedure more complicated (technique and airway management)
- Percu Twist (2002)**
 - Single step screw dilator
 - Seldinger Technique
 - Does not compress anterior tracheal wall
 - Decreased risk for posterior wall injury

