Tracheostomy

Description

There are increasing numbers of patients, both in hospital and the community, who have tracheostomy tubes. A tracheostomy provides direct access to the trachea by surgically making an opening in the neck. Once an opening is made it needs to be maintained, which is by tracheostomy tube, of which there are several types.

Tracheostomy is used in two broad types of conditions:

- Acute setting - usually in an emergency to obtain an airway and in ventilated patients who are having difficulty weaning off the ventilator.
- Chronic or elective setting - usually when the patient is to be ventilated for the longer term.

Indications for a tracheostomy

- Obstruction of the upper airway - eg, foreign body, trauma, infection, laryngeal tumour, facial fractures.
- Impaired respiratory function - eg, head trauma leading to unconsciousness, bulbar poliomyelitis.
- To assist weaning from ventilatory support in patients in intensive care.
- To help clear secretions in the upper airway.

Comparison of tracheostomy and endotracheal intubation

<table>
<thead>
<tr>
<th>Tracheostomy</th>
<th>Endotracheal intubation</th>
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<tbody>
<tr>
<td>Reduced need for sedation.</td>
<td>Easier and quicker to perform compared with tracheostomy.</td>
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<td>Reduced damage to glottis.</td>
<td>Tolerated well for short periods.</td>
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<td>Reduced work of breathing (by reducing dead space).</td>
<td>Weaning more difficult after a long period of placement.</td>
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<tr>
<td>Reduced patient discomfort.</td>
<td>Need to be sedated.</td>
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<td>More invasive and complicated compared with endotracheal tube placement.</td>
<td>Prevents aspiration of secretions.</td>
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<td>Scar formation.</td>
<td>Can be used to give certain medications - eg, adrenaline (epinephrine).</td>
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<td>Tracheostomy site can bleed or become infected.</td>
<td>Need to warm and filter gases, as the nose, which would normally provide this function, is bypassed.</td>
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<td>Requires skill to perform the procedure.</td>
<td>Improper placement can occur - eg, oesophageal placement.</td>
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<td>May be associated with long-term complications - eg, swallowing difficulties.</td>
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Some types of tracheostomy tubes

- Plastic or silver - silver tubes do not have an inner tube and need to be changed every 5-7 days (compared with every 30 days with some plastic types).
- Cuffed or uncuffed - cuffed tubes protect the airway and tend to be used in ventilated patients.
- Fenestrated or unfenestrated - these tubes may or may not be cuffed. They have a hole in the outer cannula which means that air can pass from the lungs and up to the vocal cords and also the mouth and nose. Patients can thus breathe normally and cough secretions out of the mouth, and it helps voicing. Fenestrated tubes tend not to be used in children.
Double or single cannula - double cannulae have an inner and an outer tube. The inner tube reduces the lumen of the outer tube meaning that respiratory effort is increased but the outer tube means that the stoma stays open.

Procedure

Tracheostomy can be performed in theatres (open surgical tracheostomy) or at the bedside (percutaneous dilatational tracheostomy), the latter being common on intensive care units (ICUs). A meta-analysis has concluded that percutaneously dilated tracheostomy is the procedure of choice in acute ICU patients. [4]

Surgical tracheostomy[5]
- The patient is supine with head extension and under general anaesthesia.
- Incision is 2-3 cm from the second tracheal ring down.
- Divide the thyroid isthmus if needed.
- Make a hole between the third and fourth tracheal rings, removing the anterior portion of tracheal ring.
- Tracheostomy tube is inserted.

Percutaneous tracheostomy[5]
- Percutaneous placement of a tracheostomy is performed using guide wires and dilators.
- Guidewire is placed between the first and second tracheal ring.
- Gradually, the hole size is increased using dilators of varying sizes which are passed over the guide wire.
- This can be performed blindly in experienced hands but often is aided by the use of a bronchoscope.

There are various other methods also available, both for surgical and for percutaneous dilatational tracheostomy. [5]

A Mini-Trach® is a tracheostomy tube of a smaller diameter that is passed through the cricothyroid membrane. It is usually employed during emergency situations when intubation fails.

Complications[6, 7, 8]

Immediate
- Haemorrhage - eg, from thyroid isthmus.
- Hypoxia.
- Trauma to recurrent laryngeal nerve.
- Damage to the oesophagus.
- Pneumothorax.
- Infection.
- Subcutaneous emphysema.

Early
- Tube obstruction or displacement.
- False passage formation.
- Pooling of secretions, leading to aspiration and lower respiratory tract infection (LRTI).
- Aspiration.
- Bleeding from the tracheostomy site.
- Infection.

Late
- Airway obstruction with aspiration.
- Damage to larynx - eg, stenosis.
- Tracheal stenosis.
- Tracheomalacia.
- Aspiration and pneumonia.
- Fistula formation - eg, tracheo-cutaneous or tracheo-oesophageal.

Care of a patient with either a short- or long-term tracheostomy[2, 3]

Stoma care
- Meticulous care towards hygiene and asepsis is necessary.
- Remember that the skin surrounding the stoma is also prone to irritation.
- There may also be other factors which may alter skin integrity - eg, radiotherapy.
- In double cannulae, the inner cannula will need to be removed to be cleaned (usually just with warm water and then left to air dry).
- The area should be cleaned with normal saline and barrier cream applied to the local skin (cotton wool should be avoided).

Tracheostomy tube care
- Tubes need to be cleaned - as above.
- For cuffed tracheostomy tubes, the pressure should be measured twice daily and maintained between 15-30 cmH₂O (15-25 cmH₂O for children).

### Communication
- Losing one's voice can be very traumatic, both for patients and for carers.
- Speaking valves can be used in the short term and computerised methods can be used for longer-term solutions.
- The involvement of speech and language therapists is vital.

### Swallowing and nutrition
- Problems with swallowing are caused by a number of factors, including the underlying illness, pressure on the oesophagus, lack of cough to remove secretions, etc.
- There is a risk of aspiration if oral feeding takes place; cuff inflation does not necessarily prevent this.
- There should be a multidisciplinary approach to nutrition with the early involvement of dieticians and speech and language therapists.
- Attention to oral hygiene is also needed.

### Suctioning
- Remove fenestrated tubes before suctioning and replace with a plain tube.
- Use the lowest pressure needed (usually <120 mm Hg and definitely not beyond 200 mm Hg). For non-adults the following pressures are recommended: 60-80 mm Hg for neonates, 80-100 mm Hg for children and 80-120 mm Hg for adolescents.
- Suctioning should only be performed for less than 10 seconds at a time in adults and not longer than 5 seconds in non-adults.

### Humidification
- The normal humidification and air filtration system is bypassed if a tracheostomy is in situ.
- Keep patients well hydrated - otherwise secretions will become thicker and are more likely to be retained. This can lead to infection and thus healthcare professionals need to be vigilant to markers of developing infection.

Patients and carers will need to be educated as to the above so that patients who will need the tracheostomy in the community can be safely and effectively managed. This applies both to children and to adult patients.

### Short-term tracheostomy
As the patient improves and becomes less dependent on the ventilator, the tracheostomy can be plugged for longer durations. Similarly, once the cuff can be deflated, the patient can begin to speak if the opening is occluded. Usually this takes time and patients need lots of support.

Eventually, patients can manage without the tracheostomy and it can then be removed. Once a tracheostomy is removed the stoma usually heals over with time, although a scar often remains.

### Future aspects
There is some concern that evaluation of the morbidity and outcomes of patients with a tracheostomy has not, at present, been adequately investigated. Rather, some data suggest that having a tracheostomy, although popularly held to make weaning easier, does not impact on survival of ICU patients and may even be associated with increased mortality post-ICU.\(^9, 10\) Perhaps selection criteria to choose patients who are likely to benefit from tracheostomy need to be established.\(^10\)

### Further reading & references
2. Caring for the Patient with a Tracheostomy - Best Practice Statement; Healthcare Improvement Scotland (March 2007)
3. Caring For The Child/Young Person With A Tracheostomy - Best Practice Statement; Healthcare Improvement Scotland (September 2008)
8. The use of tracheostomy for prolonged ventilation; Anaesthesia UK, May 2007

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