

Cuff management

It is usual that the initial tracheostomy tube to be inserted will be a cuffed tube. The cuff provides a sealed airway. A cuffed tube is usually a temporary measure until a patient is weaned from a ventilator and the patient can control their own secretions, but may be required long term if the underlying condition does not improve sufficiently. Examples include:

- Patient requires long term ventilation, either continually or intermittently (e.g. overnight).
- Patient has a reduced conscious level or neuromuscular or mechanical problems affecting the pharynx. The airway is at risk of aspiration of GI contents and a cuffed tube can provide a degree of protection against this.
- Patient has excessive oral secretions that cannot be managed by the patient's own efforts.

Management of the cuffed tracheostomy tube focuses on the appropriate management of the distal cuff. Tracheal capillary pressure lies between 20-30mmHg and an impairment of this blood flow will be caused by an obstruction between 22-37mm Hg. The complications from the continued use of an over inflated cuff include:

- Tracheal stenosis (scarring and narrowing of the trachea)
- Tracheomalacia (the cartilaginous structure of the trachea becomes weakened and the trachea is prone to collapse)
- Tracheo-oesophageal fistula (an un-planned communication between the rear wall of the trachea and the oesophagus which lies behind. This can lead to GI contents contaminating the airway).
- Tracheo-inominate artery fistula – An artery near the trachea can get damaged due to prolonged pressure.

In addition a patient with an inflated cuff may experience de-sensitisation of the larynx, a reduced cough reflex and loss of voice or sound production.

Too low a cuff pressure will cause an air leak and lead to ineffective positive pressure ventilation. The cuff will develop longitudinal folds which permit micro-aspiration of secretions which have collected above the cuff. This subsequently increases the risk of nosocomial pneumonia. The accepted pressure is the minimum pressure required to prevent a leak but which must not exceed 35cmH₂O. Recommendations suggest that the cuff

pressure should be kept between 15-25cmH₂O (10-18mm Hg). Regular cuff pressure checks are carried out every 8 hour shift.

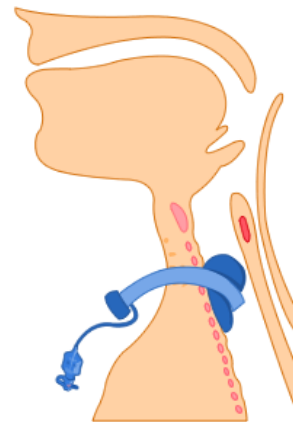
Cuff leaks

A cuff leak can vary in its significance from being irritating to staff and the patient owing to ventilator alarms, through to life threatening complications from aspiration or ventilation failure. The leak can come from a number of sources and importantly, may be associated with a partially displaced tube.

Sources of leaks include:

- Defective or damaged cuff (sometimes occur on insertion of the tube)
- Cuff not adequately inflated (see above)
- Patient is requiring high ventilator pressures and/or PEEP/CPAP which exceed the sealing capacity of the cuff
- Tube does not fit the airway
 - Simply too small
 - Positional changes cause a leak
 - Tracheomalacia or wound breakdown

Simply adding more air to a cuff or precariously positioning the tube or patient is not a solution to an intermittent cuff leak. Sometimes the weight of an attached ventilator circuit may contribute to partial displacement of a tube and when assessing the patient to locate the source of the cuff leak, remember to think about problems that may not be directly associated with the tube. A fiberoptic inspection of the tube, stoma or trachea may be indicated if clinical assessment cannot determine the source of the problem. A trial of a different or a larger tube may be indicated. If the patient is receiving high levels of respiratory support or oxygen, the decision to change a tube is balanced against the risks of leaving a potentially unsecured airway device in situ.



Patient assessment: cuff deflation

The decision to trial cuff deflation should be made by appropriate members of the multidisciplinary team and carried out and monitored by appropriately trained and skilled staff. Patients who may require cuff deflation include:

- Prior to tube removal
- Prior to assessment of patients ability to manage oral secretions

- Prior to eating or drink (where swallowing is assessed as safe)
- A patient using a speaking valve or occlusion (decannulation) cap
- As part of a structured weaning programme

Patients who have extremely limited respiratory reserve may not tolerate cuff deflation well, despite sometime having been free from ventilator support for some time. The patient will start to move gas through their mouth, nose and upper airways once the cuff is deflated. These are simply conduction airways and do not contribute to gas exchange. It takes an extra effort to shift the gas through this 'dead space' once the cuff is deflated. Also, inspired air via the mouth will dilute any oxygen given via the tracheostomy and may lead to a drop in the oxygen concentration reaching the lungs, contributing to hypoxia. Finally, the tube in the trachea offers resistance to airflow which requires respiratory effort to overcome when the patient breathes past this partial obstruction via the upper airways. The consequence is that cuff deflation is not always a benign process and patients must be adequately monitored.

Procedure: cuff deflation

It is recommended that two people are required for this procedure. Any secretions that may have collected above the cuff of the old tube need to be removed prior to cuff deflation. This reduces the risk of contamination of the airway. In the sedated patient, this will involve oral, pharyngeal and subglottic suction with a soft catheter. Awake patients will find this uncomfortable, but it is important to remove secretions from above the cuff if possible. Tubes with specific sub-glottic suction channels allow some of the secretions to be cleared more easily. Any remaining secretions can be removed by timing cuff deflation (prior to tube removal) with expiration. The patient is asked to take a breath in and exhale strongly or cough as the cuff is deflated. If the patient is ventilated, then deflation is timed with the expiratory phase.

The cuff is deflated with simultaneous suctioning, to remove any material that may have accumulated above the cuff and remains, despite the subglottic suctioning.

Documentation

Document cuff pressure checks at least once per shift, or in accordance with local guidelines. Ensure handover of all appropriate information reporting any problems in measuring cuff pressures.

Summary

The table below summarises key actions related to cuff management and their rationales (adapted from NPSA expert working group)

| Action | Rationale |
|---|--|
| Explain and discuss procedure with the patient as appropriate. Explaining that they can expect to experience the movement of air and secretions within the upper airway and may be able to make audible sounds. | Allay patient anxieties where possible |
| Suction via tracheostomy and/or mouth (where necessary) | To remove secretions prior to cuff deflation |
| Deflate the cuff slowly using a clean syringe to aspirate air from the cuff via the pilot balloon | To deflate cuff |
| Perform tracheal suction as necessary whilst deflating cuff | To exclude the risk of aspiration of secretions |
| Assess patient comfort, respiratory rate and oxygen saturation throughout the procedure | To identify significant changes in respiratory pattern which may indicate cuff re-inflation. |
| Assess the need for re-inflation and re-inflate if required | To alleviate respiratory distress experienced with cuff deflation |

