



Tracheostomy: Postoperative Recovery

by *Lois Dixon, MSN, RN*

An important nursing responsibility is the assessment and management of respiratory function. Besides assessing information about airway clearance and gas exchange, nurses encourage patients with altered respiratory function to improve their respiratory efforts. This support extends to the management of patients with artificial airways, such as tracheostomy tubes.

A tracheostomy tube is an artificial airway consisting of a plastic or metal tube, which is surgically implanted just below the larynx in the trachea, bypassing the mouth and upper airway. The surgical procedure that creates this artificial airway is called a tracheotomy. The artificial airway is called a tracheostomy. This procedure is usually a temporary measure. With a tracheostomy, it is easier to stabilize the patient, suction and attach respiratory equipment than with other artificial airways, such as nasopharyngeal or oropharyngeal tubes.

Reasons for a tracheostomy

An individual needs a tracheostomy to maintain an open, functional airway. A tracheostomy is often used to bypass an airway obstruction. In such cases, oral or nasal intubation is not feasible. Airways may be obstructed by tumors or a foreign body, larynx or tracheal injury, or soft tissue swelling.¹⁻³ When obstructions cannot be relieved through

less invasive means, temporary or permanent tracheostomies are used to maintain oxygenation.

Another reason for a tracheostomy is to remove secretions from the distal tracheobronchial tree.^{2,3} Oropharyngeal suctioning clears the airway of patients with a poor cough effort. These people may be unable to effectively expectorate increased amounts of sputum or thick secretions. When oropharyngeal suctioning is inadequate to maintain a patent airway, a tracheostomy may be indicated.

Patients with severe pulmonary disease or pulmonary depression resulting in hypoxia or hypercapnia need supplemental oxygen instilled into the tracheobronchial tree.³ As exhausted accessory muscles gradually lose effectiveness in respiration, the body can no longer maintain an adequate gas exchange. A tracheotomy may be necessary to improve lung ventilation.

Tracheostomy tubes may be inserted following oropharyngeal or prolonged intubation, when needed for mechanical ventilation, obstructive sleep apnea resistant to conventional therapy, and upper airway bleeding.^{1,2} The anticipated duration of need for the tracheostomy will indicate which type of tube is selected by the physician.

Trouble Shooting Tracheostomies

Problem	Cause	Prevention	Nursing Intervention
Decreased SaO ₂	Increased secretions may be blocking the airway and affecting ventilation	Increase fluids to 2000 mL daily unless contraindicated Increase humidification Maintain SaO ₂ > 90%	Suction Trach care to remove dried and crusted secretions from inner cannula
Continuous bleeding from trachea	Incomplete ligation of blood vessel during surgery, rupture of innominate artery	N/A	Contact physician Apply pressure to site with petroleum gauze in and around tracheal opening Prepare patient for surgery if indicated Monitor vital signs
Tube dislodgement	Excessive manipulation of tube by vigorous suctioning or coughing; trach ties improperly secured	Suction only when necessary Secure tracheal tube ties to allow only one finger between neck and tie Keep obturator at bedside	Replace trach tube using obturator If unable to replace trach tube, call physician and resuscitation team as needed
Infection	Ineffective cough effort may cause retained secretions which promote bronchopulmonary infections; soiled tracheostomy dressings may incubate infection at the tracheal stoma	Frequent hand washing Maintain sterile technique when suctioning Frequent tracheal care to cleanse tracheal stoma Replace tracheal dressings when soiled	Assess sputum for color consistency, odor Assess tracheal stoma for cardinal signs of infection, redness, edema, pain drainage Administer antibiotics as ordered by physician

Table 2

Complications and Nursing Implications

During the immediate postoperative period, the nurse's major responsibility is airway management. This task involves ensuring that the airway remains patent, listening for bilateral breath sounds, and assessing the patient for postoperative complications. After tracheostomy, frequent assessment is necessary, including:

- monitoring of vital signs
- assessing the amount, color, and consistency of secretions

- watching for complications, such as signs and symptoms of respiratory insufficiency, hemorrhage, shock, or other problems related to surgery or the patient's condition (Table 2).

Many complications can be avoided by careful assessment and appropriate intervention.

Types and Uses of Tracheostomy Tubes

Type	Description & Use
Universal	Also called the double-lumen or double-cannula tube, this is the most common type of tracheostomy tube. It has three parts: <ul style="list-style-type: none"> • outer cannula with cuff and pilot tube • inner cannula • obturator <p>The outer cannula keeps the airway open, while the inner cannula has a universal adaptor for use with a ventilator and other respiratory equipment. Some inner cannulas are disposable; others must be removed, cleaned, and reinserted.</p>
Single cannula	Slightly longer than the universal tube, it is used for patients who have long or thick necks. This tube usually requires additional humidification to prevent the accumulation of secretions.
Fenestrated	These tubes have an opening on the posterior wall of the outer cannula, which allows air to flow through the upper airway and tracheostomy opening. This air movement allows the patient to speak and produce a more effective cough. The fenestrated tube is often used during weaning to ensure that patients can tolerate breathing through the natural airway before tube removal.
Tracheostomy button	This short, straight tube fits into the tracheostomy stoma but does not enter the tracheal lumen. It is often used during weaning, because it creates less airway resistance than a standard tracheostomy, making breathing easier.
Cuffed tube	When inflated, this tube seals the airway and prevents the aspiration of oral or gastric secretions. The cuff directs air through but not around the tube. It is commonly used when mechanical ventilation is required.
Cuffless tube	Usually double-lumen tubes, cuffless tubes are used for the long-term management of patients. The patient must have effective cough and gag reflexes to protect themselves from aspiration. Cuffless tubes are rarely used in acute care.

Table 1

Types of Tracheostomy Tubes

A variety of tracheostomy tubes are available. Which tube is selected by the physician depends on the patient's specific needs. Tracheostomy tubes vary in size, composition, number of parts, and shape. They are disposable or reusable.⁴ Table 1 describes the types and uses of various tubes.

Universal

Also called the double-lumen or double-cannula tube, this is the most common type of tracheostomy tube. It has three parts:

- outer cannula with cuff and pilot tube
- inner cannula
- obturator

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Single cannula

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Troubleshooting Tracheostomies

Abnormal bleeding

A small amount of bleeding from the tracheostomy stoma is not unusual for the first few days after surgery. It usually lessens within 24 to 48 hours. Bright, frank bleeding is significant and should be reported to the physician. Constant oozing is unexpected and may signal that a bleeding vessel needs surgical intervention. Contact the physician who may direct the nurse to wind petroleum gauze around the tube then pack it into the wound

to apply pressure to help stop the bleeding.¹ Massive bleeding suggests rupture of the innominate artery, which is life-threatening. Contact the physician immediately.

Tube dislodgement

A tracheostomy tube may be accidentally dislodged by excessive manipulation or suctioning, which may produce vigorous coughing that displaces the tube from the stoma. Dislodgement within 48 hours after surgery is a medical emergency, because the tracheostomy tract is not fully formed and may close.^{1,2} To prevent accidental decanulation, the nurse can use twill ties or a Velcro device to secure the tube properly. A nurse can reinsert a dislodged tube in an obturator, which is kept at the bedside. If the nurse is unable to reinsert the tracheostomy tube within one minute, the resuscitation team is called.

Obstructed airway

Often, the accumulation of secretions obstructs the tracheostomy tube, reducing air flow. Without adequate airway care, the tube may become occluded with dried or excessive bronchial secretions.² The nurse carefully monitors the patient's respiratory status during the postoperative period. Indications of problems with airway clearance and impaired gas exchange include^{1,2}:

- dyspnea
- restlessness
- crackles or ronchi
- difficulty in inserting the suction catheter
- increased pulse or respiratory rates (SaO₂)
- increased peak airway pressures on the ventilator
- pulse oximetry readings less than 90%

Humidification of inspired air, suctioning, and helping the patient to cough effectively and breathe deeply will promote a patent airway. Nurses perform tracheostomy care according the established standards of nursing care usually every shift and as needed to maintain a patent airway. Suctioning to clear the airway of excessive secretions optimizes the amount of oxygen that patients breathe and limits the risk of infection from retained secretions.

To thin secretions and promote adequate hydration, fluid intake is increased to 1500-2000 mL/day, if no contra indications are present.⁵ Oral fluids can be supplemented by the parenteral route, if needed. Hydration status is maintained by increasing the humidity of room air or by administering humidified oxygen through a tracheostomy collar or T-piece.²

Subcutaneous emphysema

Air may escape into the fresh tracheotomy incision, causing subcutaneous emphysema. Usually of no clinical consequence, subcutaneous emphysema may be alarming to the patient and family. The nurse inspects and palpates the neck and upper chest for edema and crepitus. A crackling sensation upon palpations is the hallmark sign of subcutaneous emphysema.^{1,3} The patient and family are reassured, as needed.

Infection

The patient with a tracheostomy is at risk of infection within the pulmonary tree and at the surgical site. Bronchopulmonary infections may occur, because the tracheostomy bypasses protective upper airway mechanisms that filter, warm, and humidify inhaled air. Secretions, retained due to decreased mucociliary action and an ineffective or absent cough reflex, are an excellent medium for bacterial growth. A careful, sterile, and mechanical suctioning technique reduces mucosal trauma, which can lead to tracheal infection, and prevents introduction of bacteria into the trachea. Soiled, moist, tracheostomy dressings contribute to infection at the tracheal stoma by providing a moist environment for bacterial growth.

The nurse carefully assesses the stoma for the cardinal signs of infection: redness, drainage, swelling, and pain. Soiled tracheostomy dressings are changed regularly. Because the lower airway is considered sterile, strict technique must be maintained during suctioning and tracheostomy care.¹⁻³ Should infection develop, appropriate cultures and antibiotics are ordered by the physician and administered by the nurse.

Delayed complications

Tissue damage can occur from mechanical causes, such as suctioning, increased intratracheal pressure, and scar formation. These complications may develop within several days or years after intubation.

Tracheoesophageal fistula

Tracheoesophageal fistula, also known as tracheal wall necrosis, results when the inflated cuff of a tracheostomy tube increases pressure on the tracheal mucosa. As pressure increases, ischemia occurs, leading to necrosis and fistula formation. The fistula allows air to escape into the stomach, which may cause the aspiration of gastric contents. The presence of a nasogastric feeding tube in conjunction with a cuffed tracheostomy tube enhances the risk of tracheal fistula formation. The use of small bore feeding tubes reduces the risk of fistula formation.²

The nurse may suspect a tracheoesophageal fistula if the patient coughs or chokes while eating and food particles are seen in tracheal secretions.¹ The nurse may also note that an increased amount of air is needed to maintain an adequate seal or that the patient does not receive the set tidal volume on the ventilator.¹

The maintenance of proper cuff pressures will prevent damage of the tracheal mucosa. The minimal leak technique maintains the proper pressure in cuffs without a pressure relief valve, while the occlusive technique is used in cuffs with pressure relief valves. The objective is to inflate the cuff enough to achieve an adequate seal between it and the trachea, while creating the least amount of pressure.¹ Assessment and maintenance of appropriate cuff pressures on each nursing shift will minimize local airway damage.

Tracheal stenosis

Characterized by the narrowing of the tracheal lumen, tracheal stenosis is a result of scar formation due to cuff-induced irritation of the tracheal mucosa.

Tracheal stenosis is usually assessed only after the cuff is deflated or the tracheostomy tube is removed. The nurse may observe increased coughing episodes, inability to expectorate secretions, or difficulty in breathing or talking.¹

The nurse can reduce the risk by maintaining proper cuff pressures and preventing infections. Restricting tube movement and securing the tube in a midline position reduces irritation of the tracheal mucosa.^{1,2} Tracheostomy ties should be taut enough to prevent accidental dislodgement but loose enough to avoid choking or pressure on the jugular veins.⁵ With a properly secured tie, only one or two fingers can slide comfortably underneath the tie. Devices like the Dale Tracheostomy Tube Holder use Velcro tabs to allow the nurse to reposition and stabilize the tracheostomy tube easily and quickly. These devices incorporate a panel of stretch material that flexes the device during coughing, accommodates edema, and ensures a snug fit.

Conclusion

Based on continual patient assessment, nurses can introduce measures that help to promote effective airway clearance and adequate gas exchange to maintain a patent airway. With careful attention to airway management and infection and trauma control, nursing practices can prevent many common complications and ensure positive patient outcomes.

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