Tracheostomy Tubes: Managing Communication and Swallowing Issues

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Objectives
- Describe changes in physiology after tracheotomy regarding speech, swallowing and respiration
- Differentiate between various communication options for trach and vent dependent patients
- Determine the most appropriate swallowing evaluation and treatment techniques for trach and vent dependent patients
- Describe how the Passy-Muir Speaking Valve works and explain the physiologic benefits of the valve
Topics
- Trach overview
- Communication Options
- Passy-Muir Speaking Valves
- Mechanical Ventilation
- Dysphagia Management
- Conclusion / Hands-on time

Tracheostomy Overview
- Tracheostomy Tubes
- Physiologic Changes after Tracheotomy

Tracheotomy
Indications for tracheotomy
- Prolonged intubation
- Need for long term mechanical ventilation
- Need for permanent tracheostomy tube
- Upper airway obstruction / edema
Trach Tube Components

Tracheostomy Tube Diagram

Tracheostomy Tube
Inflated Cuff

Tracheostomy Tube
Deflated Cuff
Tracheostomy Tube
Over-inflated cuff

Trach Tubes - Shiley

Trach Tubes - Bivona
Physiologic Changes after Tracheotomy
Physiologic Changes after Tracheotomy

- **Respiration** – breathing in and out through trach tube
- **Speech** – inability to produce phonation due to lack of airflow through vocal folds

Physiologic Changes after Tracheotomy

- **Smell/taste** – decreased sense of smell and taste due to lack of airflow into upper airway
- **Secretion management** – inability to mobilize secretions effectively due to decreased cough effort

Physiologic Changes after Tracheotomy

**Swallowing** – many research studies regarding trach tubes and swallowing report a negative impact on swallowing efficiency

- Aspiration
- Pressure Differences
- Airflow Differences
- Cuff issues
- Laryngeal Sensitivity
Aspiration

- An association b/t aspiration and trachs has been well documented
  - Trach associated with increased risk of aspiration and pneumonia (Muz et al, 1987)
  - Delayed laryngeal vestibule closure which was associated with tracheal aspiration (Abraham and Wolf, 2000)
  - Disruption of vocal fold aspiration (Nash 1988, Shaker, 2000)

Pressure Differences

- Aerodigestive tract is a set of tubes and valves (Logemann, 1988); swallowing is a pressure driven event
- There is an inability to build up adequate pressure to propel the bolus through the pharynx with an open trach (Eibling and Gross, 1996)
- When subglottic pressure is altered with a trach, neuroregulation of pharyngeal swallow physiology is likewise altered (Gross, et al, 2003)

Airflow differences

- The loss of expiratory airflow through the upper airway for normal respiration has been linked to increased pooling of secretions within the larynx and pharynx (Siebens, et al, 1993)
Cuff issues

- Reduced laryngeal elevation and silent aspiration were significantly higher in cuff inflated vs. cuff deflated condition (Logemann, 2005)
- The cuff DOES NOT prevent aspiration (Ross & White, 2003); it is not "watertight"

Laryngeal sensitivity

- Normal laryngeal sensitivity = Cough
- Trach tubes result in reduced pharyngeal / laryngeal sensation (Tippet et al, 1991)

VFSS - aspiration
Communication Options

- Non-Verbal: writing, AAC, communication board, mouthing
- Verbal
  - Leak speech
  - Finger occlusion
  - Talking trach
  - Speaking valves
  - Plugging / capping

Leak Speech

- Ability to produce voice with airflow “leaking” around a trach tube into upper airway
- Occurs most often with cuffless tubes, deflated cuffs or fenestrated trachs
- Airflow takes path of least resistance through trach tube typically making speech breathy and weak

Finger Occlusion

- Placing finger over the hub of the trach tube to allow for increased airflow into the upper airway for phonation
Talking Trach Tube

- Used primarily for ventilator dependent patients with adequate oral motor function who cannot tolerate cuff deflation.
- Description - Cuffed trach tube with an additional tube that connects to an air source. Air travels through this tube and flows out of an opening above level of cuff.
Capping / Plugging

- Capping – placing a “cap” or “plug” on the trach to seal off airflow

Passy-Muir Valves

- Valve opens during inhalation with less than normal inspiratory pressure
- Closes at the end of inhalation
- Allows airflow to pass through vocal folds for phonation
Passy-Muir Valve

- Remains in closed position except when patient inhales
- No leakage of air through valve
- Restoration of a closed system
- Restoration of subglottic pressure

Passy-Muir Valve

- Use on and off ventilator
- FDA indicated for use in communication and swallowing treatment
- Medicare/Medicaid reimbursable
- Supported by research as providing the best speech quality as compared with other speaking valves (Leder, 1994)

Passy-Muir Valves
Passy-Muir Patient Care Kit

Patient Criteria
- Awake and alert
- Medically stable
- Able to tolerate cuff deflation

Patient Assessment
- Can the patient exhale around the trach into their upper airway?
- How to establish upper airway patency:
  - Deflate the cuff
  - Finger occlude the trach
  - Listen for exhalation and/or phonation

Listen for exhalation and/or phonation
Upper Airway Patency Issues

- Sizing of trach tube - the #1 Issue
  - Often requires downsizing trach
- Other possibilities
  - Upper airway edema / obstruction
  - Granulation tissue
  - Foam filled cuff
  - Partially inflated cuff
  - Secretions

Valve Placement

- Educate patient and family
- Obtain baseline measurements
  - Oxygen saturation (O2 sats)
  - RR
  - HR
  - Color
  - WOB
  - Responsiveness

Team involvement is key to successful use of valve!
Valve Placement
- Suction (if needed)
- Deflate cuff
- Suction again (if needed)
- Place valve

Placement of Speaking Valve

Placement
- Allow patient to adjust to airflow change
- Continue education and reassurance
- Establish phonation
- Continue to monitor for any changes from baseline measurements
- Remove valve if any significant changes occur
Troubleshooting

- Decreased O2 with cuff deflation – may need to increase FI02 (must check with RT)
- Inadequate exhalation/phonation
  - Check for:
    - Complete cuff deflation
    - Trach tube size
    - Suctioning needs
    - Need for MD assessment
    - Patient position
    - Trach position

Session Wrap-up

- Wear times vary
- Confer with medical staff as needed
- Post warning labels
- Storage
- Care and Cleaning

Physiologic Benefits of the Passy-Muir Valve

- Improved voice
- Improved cough
- Improved secretion management
- Improved swallowing
- Quicker decannulation

* Can result in improved quality of life!
Mechanical Ventilation

Communication Options for Ventilator Patients
- Non-verbal
- Verbal
  - Leak speech
  - Talking trach
  - Passy-Muir Speaking Valve

Leak Speech for Ventilator Dependent Patients
- Need MD order for cuff deflation trials
- Suction if needed
- Slowly deflate cuff (may only need partial cuff deflation)
- Ventilator adjustments by respiratory therapist (FiO2, tidal volume, alarms)
- Encourage vocalization
- Monitor vital signs throughout trial
- Establish plan of care for continued leak speech trials
Passy-Muir Mechanical Ventilation Video

Passy-Muir Valve Placement In-Line With Ventilator
- Respiratory therapist should be present
- Deflate cuff gradually
- Suction if needed
- Place valve with appropriate adapter

Passy-Muir Adapters for in-line use
Ventilator Adjustments

Respiratory therapist must be present to make vent adjustments

- Volume compensation during cuff deflation
- Alarms
- PEEP
- Humidification

Transitioning/Troubleshooting

- Initially may have shorter sessions
- Adjustment period to sensation of airflow through upper airway
- Anxiety
- Airway patency

Removal of Speaking Valve After In-line Placement

- Replace original circuit set-up
- Return ventilator settings and alarms to pre-speaking valve parameters
- Re-inflate cuff
Specifics on Cuff Inflation and Deflation

Inflation - An over-inflated cuff can result in damage to the tracheal wall. Recommended cuff pressure is approximately 20 – 25 mmHg.

Deflation - To make sure the cuff is fully deflated, continue to remove air until resistance is met.

Dysphagia Management

- Assessment
- Treatment

Dysphagia Assessment

- Clinical bedside assessment with or without blue dye
- FEES
- VFSS
Blue Dye Test

- No set standards; varies from facility to facility
- Involves use of blue food coloring to dye secretions, liquids or foods
- Tracheal secretions that are either coughed or suctioned from trach are monitored for signs of aspiration

Clinical Bedside Swallowing Assessment

- Diagnosis
- Physical, medical and nutritional status
- Underlying pulmonary disease
- Ability to manage secretions
- H/o dysphagia
- Type of trach tube
- Mechanical ventilation
- H/o endotracheal intubation
  - How long?
  - How many times?

Clinical Bedside Swallowing Assessment

- Deflate cuff (if cannot deflate cuff, must proceed with instrumental assessment)
- Suction as needed
- Place speaking valve if present
- Oral mech exam
Clinical Bedside Swallowing Assessment

- Begin po trials with or without blue dye
- Observe for s/s of aspiration
  - Vocal quality
  - Cough
- Evidence of aspiration in tracheal secretions (immediate and delayed assessment)

The Blue Dye Dilemma

- False negatives
- Availability
- Potential systemic effects
- Limitations
- Use results cautiously

VFSS/FEES

- Objective results
- Can be performed on vent and non-vent patients
- Identifies etiology of aspiration (not just presence of aspiration)
- Can implement therapeutic maneuvers and strategies
**Eating while on the vent**

66% of patients swallowed successfully; no aspiration. Of the patients that did aspirate (33%), 80% was silent aspiration (Leder, 2002)

This indicates:
- MANY patients can eat even when on the vent
- Need for instrumental assessment for our vent dependent patients

**Treatment**

- Oral hygiene program
- Traditional swallow therapy
- Compensatory strategies
- Diet modifications
- Restoration of a closed system

**Oral hygiene**

- Considerable evidence exists to support a relationship between poor oral health, the oral microflora and bacterial pneumonia, especially ventilator-associated pneumonia in institutionalized patients
- A number of studies have shown that the mouth can be colonized by respiratory pathogens and serve as a reservoir for these organisms. Other studies have demonstrated that oral interventions aimed at controlling or reducing oral biofilms can reduce the risk of pneumonia in high-risk populations. Taken together, the evidence is substantial that improved oral hygiene may prevent pneumonia in vulnerable patients.
Traditional Swallow Therapy

General tips:
- Most traditional swallow exercises and adjunctive rehabilitative therapy such as use of the IOPI and/or sEMG biofeedback are fine.
- Probably should not do Shaker with this population.
  - Mendelson - don’t do it if it causes pain.
  - Breath holding techniques like the supraglottic won’t work with open trach.

Compensatory Strategies and Diet Modifications

- Same as non-trach / non vent dependent patients
  - Compensatory strategies such as head turns, chin tucks, reduce bolus size, multiple swallows, etc
  - Diet modifications such as texture changes, thicken liquids, etc

Restoration of a closed system

- Decannulation
- Plug
- Passy-Muir Valve
Restoration of a closed system

- Open trach vs closed trach
  - Maz et al (1994)
  - Stachler et al (1996)

  All report improved swallow function with a closed trach

Use of Passy-Muir to aid swallowing function

- Airflow over the baroreceptors allows the vocal cords to move into a closed position
- Improved sensation in the oropharynx allows the patient to sense pooled secretions
- Restored subglottic pressure results in a safer more efficient swallow
- Cuff issues negated due to always having cuff down with PMSV

Treatment

“The predisposition to aspirate with an open tracheostomy tube is now well recognized. Decannulation is known to benefit many of these patients by reducing or eliminating aspiration. Moreover, we have now shown that the use of a one-way speaking valve will also result in improvement.” (Gross, 1996)
Speech Pathologists play a key role in intervention with the tracheostomized and ventilator dependent population.

Quality of Life

Ventilator dependent patients’ feelings of anxiety, fear, panic and insecurity caused by inability to talk and communicate.

“Assessment of Patients’ Experience of Discomforts During Respirator Therapy” (Bergbom-Engberg, Haljamaa, 1989)

SLP Intervention

- Improved communication
- Improved swallowing
- Improved cough and secretion management
- Improved ability to participate in decision making
- Improved quality of life
Thank You!

Additional Educational Opportunities

- Self-study webinars available on demand
  - Getting Started
  - Ventilator Application
  - Swallowing
  - Pediatric
  - Special Populations
- Live group webinars
- [www.passy-muir.com](http://www.passy-muir.com)
- Passy-Muir Inc. is an approved provider of continuing education through ASHA, AARC, CMSA and California Board of Nursing Credit