

EXPERIENCE PAPER

Shiley™ Flexible Evac Tracheostomy Tubes

Medtronic

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Bio: Dr. Khanna is a board-certified anesthesiologist and critical care physician who is affiliated with the Cleveland Clinic and Cleveland Clinic hospitals in Cleveland, Ohio. For over 16 years, he has worked with patients in the ICU and specifically patients with a tracheostomy.

INTRODUCTION

Overview

Ventilator-associated pneumonia (VAP) is a global problem. The aspiration of subglottic secretions can lead to the development of VAP¹⁻³, but, draining subglottic secretions before they can be aspirated can help. Prevention bundles — including subglottic secretion drainage — offer valuable ways to help reduce the rate of VAP.⁴ And, the Shiley™ evac endotracheal tube with TaperGuard™ cuff technology has been demonstrated to be a successful solution.

Context: the clinical situation

Researchers estimate ventilator-associated pneumonia (VAP) occurs in between nine percent and 27 percent of ICU patients with an airway device.⁵ This makes it the second most common nosocomial infection in the U. S. occurring in the ICU.⁵ The most obvious consequence of VAP are prolonged stays in the ICU by up to 22 days and hospital stays up to 25 days.⁶ Also, VAP may increase in-hospital mortality by as much as six to 15 percent.⁶

Prolonged mechanical ventilation and silent aspiration of oral and/or gastric secretions are the biggest reasons people develop VAP. Bacteria enters the lungs through collected secretions just above the endotracheal tube or the tracheostomy tube cuff — also known as subglottic secretions.⁵ Other independent predictors of VAP include⁷:

- burns
- trauma
- central nervous system disease
- respiratory disease
- cardiac disease
- mechanical ventilation in the previous 24 hours
- witnessed aspiration
- paralytic agents

Several measures have been employed and incorporated into modern day VAP prevention bundles. Subglottic secretions are central to the development of VAP. To that end, VAP prevention guidelines also incorporate mechanisms for subglottic secretions removal. This guideline has been endorsed by the American Thoracic Society (ATS, Level I recommendation) and the American Association of Critical Care Nurses (AACN). The AACN recommends that subglottic secretion suction be incorporated into standard nursing care. The Society for Healthcare Epidemiology of America (SHEA), the Center for Disease Control and Prevention (CDC, Level II), and the Agency for Healthcare Quality and Research (AHRQ) also recommend using subglottic secretion drainage.

The problem of subglottic secretions and VAP

The details above show subglottic secretions and aspiration processes create the perfect environment for VAP. There's evidence to indicate these secretions make it below traditional high-volume, low pressure cuffs through longitudinal folds that are setup within these cuffs, or underinflated cuffs themselves.⁸ The content of the oral cavity is always heavy in anaerobes and gram-negative flora. That's also the case with gastric juices that may be aspirated. Aspiration and micro aspiration around endotracheal and tracheostomy tube cuffs appear to be central to VAP pathways.⁷

Current practices of clearance of secretions and associated problems

Standard practice for the clearance of subglottic secretions at the Cleveland Clinic requires the procedure be performed every four hours and documented in the patient's chart. Most patients in the ICU are intubated with endotracheal tubes that come equipped with subglottic suction ports. But the same cannot be said of those who are ventilated, or who have a secure airway via a tracheostomy.

This problem is certainly not trivial. More than half of surgical and medical patients — and an even larger percentage of the Cleveland Clinic neurosurgical ICU patients — are ventilated with tracheostomy tubes. Some on a chronic, long-term basis. In my experience, it remains nearly impossible to clear the built-up secretions above and around the tracheostomy tube cuff for some patients. Current Cleveland Clinic practices entail using a handheld suction catheter from the suction kit, or red rubber catheter. They gently apply suction to the oropharynx extending to above tracheostomy tube cuff for five to 10 seconds to clear secretions.

However, in my experience it is often impossible to reach the precise depth at or around the cuff. Also, the procedure is essentially performed blind with an increased risk of trauma, bleeding, and repeated maneuvers precipitating a bronchospasm and or a vagal response. I have found the biggest problem is that secretions may get thick or congealed and become largely impossible to remove.

In order to circumvent this problem, if a patient is awake we can briefly deflate the cuff. This action often triggers a strong coughing response which loosens and dislodges secretions into the upper oropharynx and in the back of the oral cavity for easy removal using the suction catheter. However, this action is certainly not without its own risks. With repeated cuff deflations, some secretions may descend deeper into the airways. In chronically ventilated patients with a tracheostomy, secretions are often heavy on their bacterial load, and create the perfect breeding ground for a future VAP.⁷

Subglottic secretion drainage

Subglottic secretions drainage (SSD), performed intermittently or continuously, removes oral and/or gastric secretions from above the endotracheal tube or tracheostomy tube cuff before aspiration.⁹ SSD must be done using a specialized endotracheal tube or tracheostomy tube with an integrated suction lumen. In many cases, the clinicians confirmed that the new emphasis — working both reliably and as a coordinated care team — helped decrease VAP rates. In general, care bundles are part of best practices designed to offer a standard approach to delivering care. When applied together, these bundles may result in greater improvement and better patient outcomes.⁴

The Shiley™ endotracheal tube with a subglottic secretion drainage device is known as the Shiley™ evac endotracheal tube with TaperGuard™ cuff technology. A clinical evaluation of this product has shown it helps decrease the incidence of micro aspiration, which could lead to postoperative pneumonia.¹⁰ Many patients come to the ICU from other hospital locations with a standard endotracheal tube in place. There is no access to this subglottic space. The Shiley™ flexible evac tracheostomy tube with TaperGuard™ cuff technology can potentially help demonstrate benefits and improved outcomes for our critically ill patients on mechanical ventilation. For patients who'll need mechanical ventilation for extended time periods, using a tracheostomy tube with subglottic access for secretion drainage may reduce VAP.¹¹

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