Changing Tracheostomy Tube Material and Utilizing Silicone Dressings Healed This Stoma – A Case Report

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Abstract

Introduction: Tracheostomy tubes are made of a variety of materials such as plastic, silicone or stainless steel. Chronic wound infections and misshapen stomas are a complication of prolonged tracheostomy. Our goal was to see if a change in tracheostomy tube material in conjunction with stabilizing the tube could improve the condition of this stoma.

History: 52 year old male with diagnosis of MS who decompensated, requiring tracheostomy and prolonged mechanical ventilation. A number 6 Shiley tracheostomy tube was inserted. Over time, the stoma enlarged and the site was a constant source of infection. There was obvious red, irritated skin at the stoma site, copious foul smelling secretions, and bad breath. In addition, routine 30 day tube change showed a black moldy substance on the shaft of the tube. Furthermore, the weight and constant movement of the ventilator circuit caused the stoma to become enlarged and misshapen. In fact, the cuff could be seen. The decision was made to place a 6 Shiley XLT tube with increased distal length to better seal the airway for mechanical ventilation. This patient weaned from the ventilator, but remained tracheostomized secondary to his weakened neuromuscular state. The stoma site continued to be a challenging wound, so the decision was made to change tube material and stabilize the tube.

Objective: Our goal was to see if a change in tracheostomy tube material in conjunction with stabilizing the tube could improve the condition of this stoma.

Methods: A #8 Bivona TTS silicone tube was inserted and stabilized with a Sil.Flex TC Pad. This silicone pad was applied under the flange. Nothing else was changed in regards to the patient’s routine trache care or oral care.

Results: Within 3 days, the foul smell was gone, secretions had cleared, and the mucosa became a normal pink color. There was evidence of new healthy skin growth around the stoma. The patient noted less movement of the tube immediately and greater comfort. Other benefits noted were: increased SaO2, skin tone/color and LOC. After one month, routine tube change revealed a remarkably clean shaft of the tube; inside and out.

Conclusion: This single patient case study demonstrated significant improvement in the tracheostomy stoma site when the tube material was changed to silicone and stabilized with the Sil.Flex TC Pad.

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Introduction

According to the Agency for Healthcare Research and Quality Data, cost of care associated with the diagnosis of tracheostomy ranks second in the nation – second only to organ transplant patients.

Large, irregular, misshapen tracheotomy stomas increasingly complicate the clinical course of the tracheostomized patient. Stoma erosion can lead to chronic infection, increased secretions, inability to secure the artificial airway, tracheoinnominate artery leak/rupture, formation of tracheoesophageal fistulas, stenosis, and eventually death.

Tracheostomy tubes are made of a variety of materials: plastic, silicone, sterling silver, and stainless steel. Two types of plastics commonly used are (PVC) polyvinyl chloride (Shiley and Portex) and polyurethane (Tracoe). Shiley tubes contain 30% of their weight in DEHP (di-2-ethyl-hexyl phthalate). This plasticizer is toxic to humans, does not chemically bind with plastic, and readily diffuses into its environment. Prolonged exposure to DEHP is associated with male infertility.1

There are currently no ATS standards regarding frequency of tube changes in the adult patient. Tube manufacturers recommend tubes be changed every 30 days; a tube used over 30 days would be considered an “implanted” device, and would be regulated very differently by the FDA. More frequent tube changes are associated with less granular tissue formation.5

Biofilm formation on tracheostomy tubes is seen as early as 7 days after insertion.2 Routine 30 day tube change inspection has demonstrated surface degradation changes, and biofilm formation.1,2,3,4 These biofilms are intricate networks of bacterial microorganisms that are impervious to ultraviolet radiation, unfazed by bacteriophages, and may actively shed to become antibiotic resistant super infections responsible for recurrent pulmonary infections, septicemia, endocarditis, etc.3

Case Report

This is a single case report of a 52 year old male with a diagnosis of multiple sclerosis who decompensated, and required prolonged mechanical ventilation and subsequent tracheotomy. A standard size 6 Shiley tracheostomy tube was inserted, but in spite of routine care the stoma deteriorated. The weight and constant movement of the ventilator circuit caused the stoma to become so enlarged and misshapen that the cuff on the tracheotomy tube could be seen when looking down upon the insertion site. At this time the decision was made to change the tube to a size 6 Shiley with increased distal length – XLT. Shortly
thereafter the patient was sent home, where his 24 hour per day home care nursing staff continued his routine tracheostomy care, and eventually weaned him from mechanical ventilation.

The stoma site remained a constant source of infection; red irritated skin, copious foul smelling secretions, halitosis, and poor condition of the oral mucosa were a constant battle. When a routine 30 day tube change revealed a black, mold-like substance sticking to the shaft of the plastic tube,1,2,3,4 the decision was made to change tube material to see if the stoma site could begin to heal more normally. Since chronic wound infections and misshapen stomas are a complication of prolonged tracheotomy, our goal was to see if a change in tube material could improve the condition of this stoma.

One goal for this patient was to use a Passy-Muir speaking valve. However, the degree of leak around the stoma made speaking valve use counterproductive to stoma healing, and ineffective in enabling sufficient upper airway airflow for phonation. The decision was made to attempt to seal the stoma with a silicone dressing. We hypothesized that sealing the stoma air leak would allow the patient to utilize his speaking valve.

Methods and materials
Prior to insertion of the new tracheostomy tube, a “donut shaped” silicone dressing was applied over the shaft of the tube using standard sterile procedure.

Unfortunately, the stoma was so large and irregularly shaped that the silicone pad could not completely cover it. Since this particular silicone pad is applied to the tube prior to insertion, we decided to leave it in place and not put the patient through another tube change. Even though it did not meet our original goal to seal the stoma, an immediate benefit of using the silicone pad became greater stabilization of the tracheotomy tube, noted by greater comfort from the patient. The following was hypothesized: Could the silicone pad stabilize the tube to promote wound healing in conjunction with changing tube composition?

The new tube selected was a size 8 Bivona TTS. This tube is made of silicone, and had a comparable outer diameter and length to the previous plastic tube. (Since the patient occasionally required nocturnal ventilation, a tube with a cuff was required.) We changed to silicone to see if tube composition would make a difference in stoma healing by decreasing or eliminating the biofilm buildup we were finding upon routine monthly tube changes. There were no other changes in regards to his routine tracheostomy or oral care.

Results
After only 3 days it was noted the foul smell from the stoma site was eliminated, tracheal and oral secretions had cleared, halitosis was gone, and the oral mucosa had become a normal pink color. There was also evidence of new healthy skin growth around the stoma. The patient noted less movement of the tube and continued greater comfort. Other benefits noted were increased SaO2, skin tone/color, and LOC.

After 30 days, routine tube change revealed a healed stoma site, with reduction in stoma size. A remarkably clean shaft of the tube, inside and out, was noted by the nursing staff and attending physician upon tube change. The decrease in air leak around the stoma allowed the patient to use, and benefit from, his speaking valve.

Conclusion
This single patient case study demonstrated significant improvement in the tracheotomy stoma site when the tracheostomy tube material was changed to silicone, and the tube was stabilized with a silicone pad. It remains unclear if the change in tube material, addition of the silicon pad, or the combination of both can be accredited for this clinical improvement.

References