

## **Effect of a tracheostomy speaking valve on secretions, arterial oxygenation, and olfaction: a quantitative evaluation.**

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### **Abstract:**

Tracheostomy speaking valves consist of a one-way valve that closes upon exhalation, causing a redirection of exhaled gas into the upper airway, thus allowing for the primary benefit of speech. The present study was undertaken to test various hypotheses concerning the secondary benefits of speaking valves. We hypothesized that use of a speaking valve will result in a decrease in accumulated secretions, an increase in arterial oxygenation and an improvement in olfactory function. A total of 8 tracheotomized patients met the following inclusion criteria: age > 18; ability to tolerate wearing a speaking valve for at least 3 hours; no unstable medical conditions; no use of thrombolytic agents. While using the speaking valve patients accumulated fewer secretions (74.3 +/- 63.6 vs. 122.8 +/- 44.6 ml/day,  $p = 0.004$ ,  $n = 7$ ) and had improved olfactory function (accuracy = 28.4 +/- 5.2 vs 8.1 +/- 2.9%,  $p = 0.02$ ; and percent correct = 64.2 +/- 2.6 vs 50.0 +/- 3.9%,  $p = 0.03$ ,  $n = 6$ ) than when off the speaking valve. No significant differences were found in 24-hour arterial oxygen saturation (pulse oximetry and ABG analysis respectively,  $n = 7$ ), arterial PO<sub>2</sub>, pH, PCO<sub>2</sub>, HCO<sub>3</sub>, or 24-hour heart rate ( $n = 7$ ). Thus, the present study found a significant decrease in secretions and improvements in olfaction when tracheotomized patients wore a speaking valve, but no difference in arterial oxygenation.

## **Perspectives on the Pediatric Larynx with Tracheotomy**

Suzanne S. Abraham

In *The Larynx* 2009 by Marvin P. Fried, Alfio Ferlito, Alessandra Rinaldo

### **Excerpt:**

Abraham reported on 50 patients ages 2 months to 4 years 9 months (Mdn = 19 months) with open tracheostomy tubes. She found that all 50 presented with secretion management issues and 49 (98%) of the 50 had abnormal airway protection baselines on their initial outpatient visit. In the presence of audible, accumulated tracheal secretions, 22 (44%) did not elicit a reflexive cough to clear, 18 (36%) had a delayed cough to clear, and 9 (18%) coughed only when their cannulas were suctioned. Abraham utilized a comprehensive protocol for determining candidacy for Passy-Muir placement including preplacement assessment, initial wear time trial, increasing wear time and tolerance, and home programming. Given treatment and consistent carryover in the home, Abraham<sup>29</sup> found that 24 (49%) of 49 tracheotomized infants and young children achieved tolerance for Passy-Muir placement on a daily, consistent, full-time basis with removal only for sleep. Once full time wear time was in place, these children displayed laryngotracheal secretion management within normal limits in an average time frame of 2 weeks.

## **Secretions, occlusion status, and swallowing in patients with a tracheotomy tube: a descriptive study.**

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### **Abstract:**

We conducted a prospective, descriptive study of 400 tracheotomized patients to investigate the relationships between (1) levels of accumulated oropharyngeal secretions and laryngeal penetration/aspiration status, (2) secretion levels and tube-occlusion status, and (3) tube-occlusion status and aspiration status. Assessments of secretion status were quantified with the use of a 5-point rating scale. All evaluations were made by fiberoptic endoscopic evaluation of swallowing. We found that patients with higher secretion levels were more likely to aspirate than were patients with lower secretion levels. Also, patients who tolerated placement of a tube cap had the lowest mean secretion level, and those who tolerated only light finger occlusion had the highest; likewise, most patients with normal secretion levels tolerated a capped tube, and a plurality of patients with profound secretion levels tolerated only light finger occlusion. Finally, no significant differences were observed with respect to occlusion status and aspiration rates.

# The Effect of Tracheostomy Speaking Valve use on Disordered Swallowing

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## **Purpose:**

Tracheostomy tubes have been suggested to cause diminished laryngeal elevation, loss of subglottic pressure, decreased sensation, and mechanical obstruction. Speaking Valves (SV) allow for improved communication and improvement in subglottic pressure. The precise effect of SV use on swallowing function is uncertain.

## **Method(s):**

Patients with a tracheostomy tube who presented with dysphagia between 01/10/07 and 11/20/10 were prospectively evaluated. All patients were naive to previous SV use. Participants were randomized to a SV or inner cannula control group. Patients underwent 4 days of identical swallowing therapy. The case group wore the SV for 45 minutes/day and during therapy. All patients were evaluated with endoscopic swallowing evaluation on Day 1 and Day 4. The treatment group had a SV placed during testing. The primary outcome measure was penetration aspiration scale (PAS). Secretion rating was utilized as a secondary measure. All outcomes were assessed from blinded digital recordings.

## **Result(s):**

Twenty-one patients were enrolled (11 SV/10 controls). The mean age of the entire cohort was 54 (+/- SD) yrs and 30% was female. There were no age or gender differences between groups ( $p > 0.05$ ). No differences were noted in PAS or secretion rating between days 1 and 4 for the control group ( $p > 0.05$ ). The PAS for the SV group improved from 3.67 to 1.75 ( $p < 0.001$ ) and the secretion rating improved from 2.91 to 1.55 ( $p < 0.001$ ).

## **Conclusion:**

A tracheostomy speaking valve may positively impact swallowing function and rehabilitation.