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Critical Review: Effect of singing training on total laryngectomees wearing a tracheoesophageal voice prosthesis

 Modern rehabilitation of total laryngectomee patients has expanded its critical objectives in restoring speech. In previous years, therapists focused mainly on helping their patients operate and familiarize with their voice prostheses, including tracheoesophageal prostheses. Currently, they must additionally evaluate whether their training and prostheses have increased the quality of life of their patients, because after all, any tool is useless if it does not make a job easier. A team of five doctors -- Onofre, Ricz, Takeshita-Monaretti, Prado, and Aguiar-Ricz, developed and assessed a program to train laryngectomees outfitted with tracheoesophageal prostheses to sing and consider their phonation, vocal extension, pitch and legato. The results of this study encourages the researchers to look further into singing training with laryngectomees and determine whether the training will increase normal speech articulation, thereby increasing the laryngectomee's quality of life. This research article expands upon the more human side of voice prostheses, such as the exact extent to how a tracheoesophageal prosthesis restores vocal communication, what disadvantages the prosthesis still carries since its development in 1978, and how a portable insufflator can potentially alleviate the drawbacks of a stand-alone prosthesis.

 Onofre et al. acquired five participants (two women and three men, mean age 49.8 years) for the study who all underwent similar total laryngectomies and received the same type of speech therapy rehabilitation. Prior to singing training, each participant video-recorded themselves pronouncing the vowels "a", "i", and "u" in his or her habitual voice, again with the same vowels but in the tone of an octave scale, and also singing "Happy birthday to you". Three speech specialists would rate different characteristics of the participant's voice according to the GRBASI scale, which judges intensity of roughness, deviance from true tone, and breathlessness, and other factors After acquiring the baseline data, the participants undergo a twelve 30-minute sessions over the span of three months, practicing different breathing exercises and vocalizations. Following the training, the participants take the same test they had 3 months ago.

 The results reveal that the degree of dysphonia (difficulty in producing voice), roughness, and asthenia (weakness in muslce structure) improved or remained the same in all patients while instability slightly declined. Curiously, the results also show that a number of patients showed increased deviance from pitch when pronouncing "a", "i", or "u". When judging by what the article calls "tunning" and "legato" for the singing segment, nearly all patients were considered to carry a tune and legato either more or equally noticeably than before the training. These results led Onofire *et al.* to conclude that the singing training has an impact on singing capability of total laryngectomees equipped with tracheoesophageal voice prostheses.

 There are several criticisms about the article that should be considered. The small number of participants in the study makes the data results more difficult to discern, thus undermining the confidence of the researcher's conclusions. From a mathematical standpoint, one out of five persons or approximately 20% of the subject population, can be perceived as significant, but in reality the significance is more ambiguous. For example, the article states that the GRBASI parameter of voice strain for the vowel pronunciation of "i" worsened after voice singing, but the data table indicates that only one person increased in one degree of vocal deviation. It is understandable that the amount of resources and effort to measure and train the subjects is a significant consideration, which may be why the number of participants is small. Should this study be performed again with a much higher subject population, then the data results and conclusions could be strengthened.

 Despite certain criticisms, there are still many commendable aspects of the article. The results of the musical evaluations were more clear-cut than the GRBASI data and stands to promote the notion that vocal training on total laryngectomees has positive effects. After singing training, all subjects exhibited tunning when a majority exhibited none before the training, and a majority of subjects exhibited very noticeable legato when none was determined before training. These results look promising, even with only five participants. The very specific details about the investigation methods was impressive as well. For example, mean temperature and humidity was reported for the recordings of the subjects, and the speech therapists that performed the perceptive-auditory evaluations all had at least three years of clinical experience. Details like these eliminate avenues of nitpicking criticism. Onofre, et al. attempt to find a cause behind the increased deviance in the pronunciation of "i" and "u" post-training, which they suspect could be insufficient training due to individual limitations, physical barriers due to the complex conformation required of the pharyngoesophageal segment, or different breathing and respiratory practices. Though they do not find a definite answer, they were competent enough to leave certain avenues of investigation in future related studies.

 The Blom-Singer-style voice prosthesis was a breakthrough for total laryngectomy patients seeking another chance at a vocal life. Even after therapy and training, the patient must put more effort into speaking everyday words than a normal human being, often with sufficiently audible but somewhat unpleasant-sounding results. For a laryngectomy patient to sing with a prosthesis seemed extreme, but this clinical study has shown that it is possible. The development of a tracheoesophageal insufflator could help a patient expand the limits of what a voice prosthesis can do.