Commentary (Shah): Current Status of Voice Restoration Following Total Laryngectomy

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Drs. Mark Singer and Eric Blom revolutionized the process of speech rehabilitation following total laryngectomy with their introduction of the tracheoesophageal puncture and insertion of a duck bill prosthesis. The physiologic principles of the procedure are obvious, the surgical technique is simple, and the results in terms of fluent speech production are immediate and quite satisfactory. Dr. Blom is to be complimented for providing in this article, a succinct summary of the “current methods” available for speech rehabilitation for a patient facing total laryngectomy.

It must, however, be emphasized that the incidence of total laryngectomy in the United States and perhaps around the world has significantly declined over the past 40 years. This is largely due to the development of larynx-conserving surgical techniques and the introduction of multidisciplinary treatment programs of chemoradiotherapy for preservation of the organ and/or organ function.

Key Advances

Detailed whole-organ section studies of total laryngectomy specimens by Kirchner and others have significantly improved our understanding of the intralaryngeal spread of squamous cell carcinoma of the larynx. This knowledge provided the basis for the development of laryngeal conservation surgical procedures. Advances in surgical techniques, both for supraglottic, glottic, and hypopharyngeal cancers by numerous investigators, have led to the availability of surgical procedures ranging from a simple cordectomy for early-stage vocal cord cancer to extended hemilaryngectomy, supraglottic partial laryngectomy, supracricoid subtotal laryngectomy, and extended subtotal laryngectomy, as described by Pearson et al. All of these surgical procedures preserve the spontaneous ability of voice production, although some procedures require the presence of a tracheostomy tube.

The Decline of Total Laryngectomy

Within the past 20 years, the introduction of chemotherapeutic agents for the treatment of squamous cell carcinoma of the head and neck has led to the utility of chemotherapeutic agents for organ/function preservation. Although survival has not improved, preservation of a functional larynx has been achieved in 30% to 80% of patients—depending on the site and stage of the primary tumor requiring total laryngectomy. Thus, the incidence of patients requiring total laryngectomy has significantly declined over the course of the past 40 years. Nevertheless, there remain patients who will indeed require total laryngectomy as initial treatment—those with massive hypopharyngeal or laryngeal tumors with cartilage destruction—as well as patients who fail larynx preservation programs of chemoradiotherapy and those who have developed recurrent cancer following previous conservation surgery. Other patients will require extended total laryngectomy, total laryngopharyngectomy for hypopharyngeal cancers, or total laryngopharyngo-esophagectomy for primary carcinomas of the cervical esophagus.

Tracheoesophageal Puncture

The performance of a tracheoesophageal puncture is a simple surgical procedure that can be easily accomplished at the time of total laryngectomy (primary tracheoesophageal puncture). When
feasible, this is currently the preferred method of speech restoration. High success rates have been achieved with this method in patients who have not been irradiated previously and in patients requiring a straightforward simple total laryngectomy.

On the other hand, there have been reports of significant complications secondary to the performance of tracheoesophageal puncture in patients who have previously failed radiation therapy and those in whom the region of the permanent tracheostome has received therapeutic doses of irradiation.[12-13] In these patients, the common complications encountered included lack of development of the seal between the prosthesis and the tracheoesophageal track and tissue necrosis, leading to frank esophageal tracheal fistula that is difficult to seal and may require a secondary surgical procedure for correction.

Patients who require pharyngolaryngectomy and reconstruction with a regional myocutaneous flap or a free flap are not ideal candidates for success following tracheoesophageal puncture. The bulk of soft tissue (e.g., in a pectoralis myocutaneous flap) proves to be a deterrent in the satisfactory transport of pulmonary air to the oropharynx for speech articulation. Lack of distensibility of the reconstructed pharynx appears to be the key problem in these situations. It is important to remember however, that when a flap reconstruction is performed, the tracheoesophageal puncture is done with the internal opening in the esophagus—not through the flap. On the other hand, performance of a tracheoesophageal puncture in patients requiring extended laryngectomy with pharyngectomy (such as those patients requiring reconstruction of the pharyngo-esophageal defect with a free segment of jejunum or those requiring gastric transposition for a pharyngo-esophageal defect) is not only difficult, but often fraught with the danger of fistulae developing.

The success rate of tracheoesophageal puncture–acquired speech in this group of patients meets with varying degrees of success. Generally, the procedure is not recommended if the puncture site leaves an internal opening into the transposed stomach or the jejunum.

Technical advances and refinements of the tracheoesophageal puncture prosthesis have led to the development of the “long-term prosthesis,” which requires infrequent changes and can be retained for as long as 6 months to 1 year.[16] The refinement of the Blom-Singer prosthesis developed by Dutch investigators is a vivid example of a much more satisfactory long-term prosthesis (Provox II).[14-17] The quality of life of patients undergoing immediate speech rehabilitation is clearly much improved compared to those who are unable to communicate with intelligible speech.

**Conclusions**

The currently available prosthesis and devices are satisfactory, although technical improvements, such as the development of a hands-free, leakage-free valve mechanism between the tracheoesophageal puncture prosthesis and the tracheal stoma, are urgently needed. Such improvements will facilitate communication significantly for patients requiring total laryngectomy.

**References:**


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