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THE ROLE OF PHARYNGEAL REPAIR IN PRIMARY SURGICAL VOICE RESTORATION AFTER TOTAL LARYNGECTOMY

Thesis

Submitted in partial fulfillment of the requirements of the MD degree in

"Otolaryngology"

By

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2002

(سنريهم آياتنا في الآفاق وفي أنفسهم حتى يتبين لهم أنه
الحق، أولم يكف بربك أنه
على كل شيء شهيد)

(سورة فصلت، الآية ٥٣)

Acknowledgement

First, I would like to express my deepest gratitude and thanks to **ALLAH** whose magnificent help was the main factor in accomplishing this work.

My particular appreciation and deepest thanks are extended to Prof. Dr. **KEITH M. WILSON**, Associate Professor of E.N.T., Medical School, University of Cincinnati, Ohio, USA., who if not for his help, guidance and expertise in the field of Head and Neck Surgery and related research, this work would not have been possible and for his great effort in revising this work.

I would like to express my great thanks to Prof. Dr. **DAN KELLY**, Associate Professor of Speech Therapy, Medical School, University of Cincinnati, Ohio, USA, for his great work and advice in the development of this work.

I'm very grateful to Prof. Dr. **SAYED GAMIL EL-SHERIF**, Professor of E.N.T., Faculty of Medicine, Tanta University, for his instructive supervision, experienced guidance and full provision of all facilities together with the revision of the text that made the completion of this work possible.

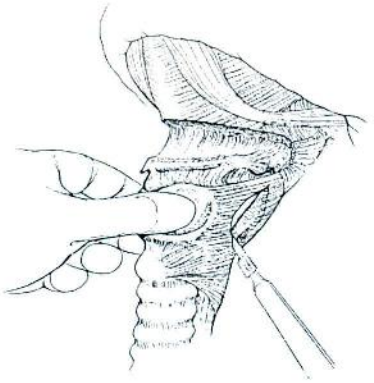
I would like to express my deepest thanks and sincere gratitude to Prof. Dr. **MUHAMMAD ADEL KHALIFA**, Professor and Head of the E.N.T. Department, Faculty of Medicine, Tanta University, for his unlimited support, continuous encouragement and meticulous guidance throughout the course of this work.

Gracious thank fullness and sincere indebtedness are extended to Prof. Dr. **AHMED SAMI EL-GUINDY**, Professor of E.N.T., Faculty of Medicine, Tanta University, for his laborious guidance, cordial supervision and valuable advice during this work.

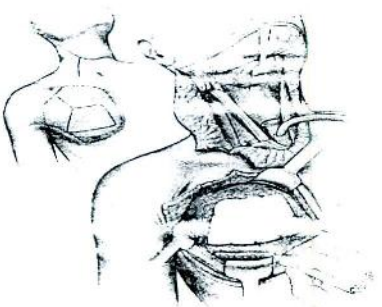
I'm greatly indebted to Prof. Dr. **MUHAMMAD NASER EL-SHEIKH**, Assistant Professor of E.N.T., Faculty of Medicine, Tanta University, for his generous assistance, supervision and unlimited encouragement made this work possible.

I'm very grateful to every member in the E.N.T. Department, Faculty of Medicine, Tanta University, and Medical School, University of Cincinnati, Ohio, USA, for their kind help and cooperation during this work.

CONTENTS



INTRODUCTION & AIM OF THE WORK



INTRODUCTION AND AIM OF THE WORK

Total laryngectomy is a functionally destructive procedure with substantial consequences that even the most experienced clinician can't fully appreciate. Altered respiration, voice and swallowing, coupled with disfigurement profoundly affect the laryngectomized person and his or her family. Rapid reestablishment of an acceptable voice and fluent, intelligible speech is a critical successful psychosocial adjustment [1].

Efforts to establish alaryngeal voice date back nearly to the first laryngectomy carried out on December 30th 1873 by Billroth [2]. Historically, esophageal voice has been the method of choice. Air systematically inhaled or injected into the cervical esophagus is released in a deliberate manner, exciting the approximated surfaces at various points along the pharyngoesophagus into vibration. Only a disappointingly Small percentage of laryngectomees acquired a level of esophageal voice proficiency that even remotely resembles presurgical communication parameters, despite months of therapy and practice [3].

The handled electrolarynx has the advantage for many patients of providing voicing capabilities soon after surgery. The devices are easy to learn to use and provide the relatively intelligible communication in face to face interaction. The drawbacks include less than ideal intelligibility, the mechanical quality of voice, the need for dexterity that can preclude use by some, ongoing costs associated with battery power and user self consciousness [1].

In the mid-1990s a succession of surgeons proposed reconstructive methods to establish voice following total laryngectomy. These methods usually incorporate shunts or planned fistulae through which pulmonary airflow could be directed to the cervical esophagus or pharynx. Virtually all of these methods failed over time because the reconstructive communication either became too patent and allowed aspiration or the opposite, stenotic, resulting in excessive airflow resistance and effortful phonation [4].

Initially the tracheoesophageal puncture (TEP) method was targeted for use with laryngectomized individuals who failed or did not choose to develop esophageal speech or use of an artificial larynx. The surgical technique of secondary endoscopic TEP, originally described by Singer and Blom in 1979

remains basically unchanged after 20 years of use [5]. Hamaker further advanced this method by incorporating TEP at the time of laryngectomy, a method widely employed today in centers around the world [6].

The pharyngeal constrictor muscles are a major concern in TE voice restoration. Prior to TE voice restoration, minimal attention was paid to these muscles and frequently they were used to help secure the pharyngeal closure or were left open [7]. Creamer and Schlagel (1957) [8] described an elevation of the upper esophageal sphincter tone as a reflex action during esophageal distention in normal patients during initial work in esophageal manometry. This hypertonicity varies with operative techniques and pharyngeal reconstruction. The surgical management of the constrictor muscles has probably been the cause of poor results in esophageal speech [7, 8].

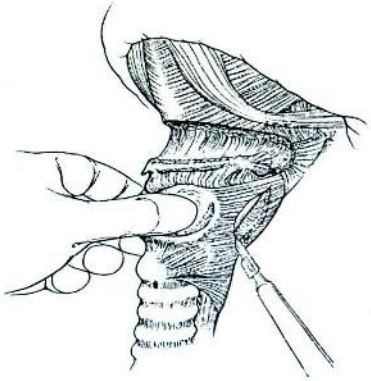
The initial work of Singer and Blom (1981) suggested that pharyngoesophageal (PE) segment was not limited to the cricopharyngeus muscle alone, but included an extended region of both the inferior and middle constrictor muscles [9]. Physiologically, the cricopharyngeus is described as part of the upper esophageal sphincter and seen to extend upwards for 4 cm from the lower border of the cricoid cartilage with videofluoroscopy. Research by Cheesman et al confirmed this physiological description, and the term upper esophageal sphincter was preferred. They would use the term PE segment to refer generally to the area of the reconstructed pharynx and upper esophagus and use the word neoglottis for the portion that produces TE voice [10].

Over the past 20 years since the introduction of TE voice restoration, pharyngeal myotomy and plexus neurectomy have been the gold-standard for surgical management of the pharyngeal constrictor muscles. Other methods have been introduced and tried by different surgeons [9].

Successful prosthetic voice rehabilitation is not limited to simple laryngectomy alone, however and should also be offered to patients who undergo treatment of more advanced tumors that involve the hypopharynx or cervical esophagus. The majority of these tumors are large at the time of presentation, and surgical removal can result in removal of the entire larynx, pharynx and even the entire esophagus. The reconstruction of such defects poses significant challenges not only in the technical aspects of restoring pharyngeal continuity, but also in the optimal rehabilitation of deglutition and phonation [11].

Though no current form of laryngopharyngectomy reconstruction can result in speech and swallowing function equal to what can be obtained with traditional laryngectomy, postoperative rehabilitation can be optimized by selecting a technique that results in anatomy that is close to normal as possible. The goal is for more than simply creating an intact neopharynx that does not leak saliva. This resultant neopharynx should not interfere with the normal transit of food and should be thin walled and sufficiently pliable. Its luminal diameter should be sufficient to allow for the passage of food bolus, but not so large that its walls are overlay flaccid to an extent that may adversely affect postoperative voice quality. It should allow for either primary or secondary TE voice restoration. Because postoperative voice quality can vary significantly depending on which reconstructive option is chosen, much thought should be put into the selection of the particular flap or graft for such patients [12].

The aim of this work is to evaluate the role of different types of hypopharyngeal repair and reconstruction in primary surgical voice restoration after total laryngectomy or laryngopharyngectomy to produce qualitatively and quantitatively acceptable voice communication.



REVIEW OF THE LITERATURE

ANATOMICAL CONSIDERATIONS

Surgical Anatomy of the Larynx

• External features

The larynx is situated in the midline compartment of the neck, deep to the infrahyoid muscles. The hyoid bone, thyroid prominence, and the cricoid cartilage are generally palpable in the midline anteriorly. Prior to commencing an operation on the larynx, it is useful for the surgeon to palpate these landmarks, particularly the cricoid cartilage to avoid inadvertent placement of a tracheostomy either too high or too low. Proper orientation with regard to the level of the larynx, the hyoid bone, and the trachea facilitates accurate placement of incisions, stomas, and planned fistulae [13].

• Mucosal surface features

The cavity of the larynx is divided into glottic, supraglottic, and subglottic regions. The glottis consists of the true vocal cords, the anterior commissure, and the posterior commissure. The anterior two thirds of the vocal cords, called the membranous portions, insert into the midline of the thyroid cartilage at the anterior commissure. The posterior third of the vocal cords consists of the vocal processes of the arytenoid cartilages covered by mucosa and forms together with the interarytenoid mucosa what is called the posterior commissure [14].

The supraglottic region contains the ventricles, the ventricular bands (false vocal cords), the epiglottis (both its lingual and laryngeal surfaces), and the aryepiglottic folds, as will as the expanse of supraglottic mucosa covering the arytenoids and extending from the false cords to the aryepiglottic folds (the vestibule). Most of the mucosal surface of supraglottic region covers the epiglottis; thus, the majority of supraglottic tumors are epiglottic [15].

The subglottic area, in particular, is not easy to define; it comprises the area at which the larynx merges with the trachea. The superior boundary of the subglottic region is arbitrary. Some suggests that it is the area between the inferior border of the vocal folds and the inferior margin of the cricoid cartilage, including the area caudal to the anterior and posterior commissures. Others consider it as beginning at the level of the conus elasticus (about 5 mm below the