

## Role of Endoscopy in Tracheo-esophageal Prosthesis Phonation. Technical and Psychological Aspects. Our Institutional Experience

Luigi Sivero \*, Donato Alessandro Telesca \*, Cesare Formisano \*\*, Teresa Russo \*,  
Stefania Sivero \*, Grazia Salerno \*\*\*.

\* Department of Gastroenterology, Endocrinology and Endoscopic Surgery. Federico II  
University Hospital, Naples.

\*\* Department of General and Specialized Surgery. Federico II University Hospital, Naples.

\*\*\* Head-Neck Department. Federico II University Hospital, Naples.

LS: sivero@unina.it; DAT: alessandro.telesca@gmail.com; CF: cformisa@unina.it; MD:  
michele.danzi@unina.it; LG: luxgrimaldi@alice.it; TR: ttrusso86@gmail.com; GM:  
guido.massa@gmail.com; BA: SS: stefaniasivero@hotmail.it, GS: grazia.salerno@unina.it.

Luigi Sivero: Aggregate Professor of Surgery at University Federico II of Naples.

Donato Alessandro Telesca: Assistant of Surgery at University Federico II of Naples.

Cesare Formisano: Associate Professor of Surgery at University Federico II of Naples.

Teresa Russo: Assistant of Surgery at University Federico II of Naples.

Stefania Sivero: Psychology at University Federico II of Naples.

Grazia Salerno: Medical Director at University Federico II of Naples.

Correspondence to:

Luigi Sivero, MD

Department of Advanced Biomedical Sciences. University of Naples Federico II – School of  
Medicine. Naples - Italy.

Via Sergio Pansini 5, 80131, Napoli.

### Abstract

#### Background and Aims:

In our study, we have analyzed the use of flexible video endoscopy in patients undergoing total laryngectomy and candidates for the placement of a voice prosthesis, with the creation of a tracheo-esophageal fistula in which the prosthesis is positioned, which acts as a valve one-way, which allows the passage of air from the trachea to the oesophagus and prevents the passage of liquids in the opposite direction, allowing the pulmonary air to vibrate a segment of the cervical oesophagus. The use of flexible video endoscopy for the positioning of the prosthesis can be both primary and secondary to the intervention of total laryngectomy. Endoscopy has also been used in the ontological follow-up for the assessment of the hypo pharyngeal-oesophageal-gastric district in the search for relapses or secondary tumors, which may develop in this district in more than 10% of patients with pathological neoplasia. Higher aero-digestive.

#### Methods:

We performed a complete esophagogastroduodenoscopy on 36 patients who had total laryngectomy divided into two groups of 18 patients, in group A there were patients who had

already been prosthetic for at least one year, and in the B group the patients underwent for the first time creation of a tracheo-esophageal fistula.

**Results:**

At endoscopy we found three neoplastic recurrences in group A that did not allow the placement of a new prosthesis, in group B we excluded 3 patients who had a grade B esophagitis according to the classification of Los Angeles, in the remaining 15 patients there were minor complications, in particular two patients presented intense inflammatory reaction after the creation of the fistula, one patient had phonatory difficulties, one patient had a progressive deterioration of the phonatory function, which endoscopic control showed was determined by a too short prosthesis.

**Conclusions:**

Without a doubt the flexible video endoscopy in recent years has been very widespread, we believe that our experience has confirmed the interesting and beneficial use in patients undergoing total laryngectomy and candidates for the placement of a tracheo-esophageal voice prosthesis, in the evaluation contraindications such as recurrences or secondary neoplasm's of the oesophagus, and in the presence of reflux esophagitis in patients with hiatal hernia and / or cardiac incontinence.

**Keywords:** Total laryngectomy, trachea-oesophageal fistula, voice prosthesis, flexible video endoscopy.

**INTRODUCTION:**

The intervention of total laryngectomy involves the complete sacrifice of the organ and the creation of a permanent tracheotomy. The total laryngectomy that is usually performed in association with functional or demolition lymph node depletion, or bilateral, involves, once the larynx is removed, the need to reconstruct the pharynges-esophageal continuity, and provide for the full-channel, of the tracheal stump (tracheotomy). The immediate and most evident consequence of total laryngectomy is the loss of the voice. Fortunately, it is possible to return the voice to the laryngectomies inserting a tacheo-esophageal voice prosthesis. In our study we have analyzed the use of flexible video endoscopy in patients undergoing total laryngectomy and candidates for the placement of a tracheo-esophageal voice prosthesis, with the creation of a tracheo-esophageal fistula in which the prosthesis is positioned, which it works as a one-way valve, which allows air to pass from the trachea to the esophagus and prevents the passage of liquids in the opposite direction, allowing the pulmonary air to vibrate a segment of the cervical esophagus. The fistula can be either primary, ie created at the time of surgery, or secondary even after a long time from surgery, the technique has minimal morbidity, and a high percentage of positive results. The most widely used prostheses are the so-called dwelling ones that are replaced on average every 5-6 months.

The use of flexible video endoscopy for positioning the prosthesis can be both primary and secondary. The primary indication is to evaluate patients before the intervention of total laryngectomy, looking for possible primary or secondary neoplasm's of the esophagus, of any

gastro-esophageal reflux esophageal mucosal injury in patients with hiatal hernia and / or incontinence cardiac. The secondary one after surgery has the advantage of being able to evaluate the compliance of the hypo pharyngeal-esophageal segment before the application of the prosthesis, excluding post-surgical cicatrice stenosis or after radiation therapy, to highlight the presence of mucosal diverticulitis at the suture level. hypo pharyngeal, or local recurrences or second esophageal tumors, to control the tracheo-esophageal fistula, looking for possible post-fistula iatrogenic lesions, granulations of the esophageal mucosa, necrosis of the mucosa in irradiated patients, a too beany fistula. The use of videoendoscopy after prosthetic application, allows to evaluate the correct positioning and the length of the prosthesis, the closure or stenosis of the fistula for malposition or extrusion of the prosthesis, to diagnose the cause of improper functioning of the prosthesis, such as the presence of mucosal granulations, of variable prosthesis inflexion, of bacterial colonization at the valve mechanism, of physiological wear. In the ontological follow-up endoscopy carefully assesses the hypo pharyngeal-esophageal-gastric district in search of possible relapses or secondary tumors, which can develop in this district in over 10% of patients carrying neoplasia of the upper aero-digestive tract.

In this study, we did not neglect the assessment of the psychological aspects of laryngectomies patients, who experience the trauma of loss of voice, and the fear of being alone with the total deprivation of every verbal relationship.

**METHODS:**

In 2016 we followed 36 patients, 32 males and 4 females, ranging in age from 45 to 70 years, operated by total laryngectomy, divided into two groups of 18 patients. All patients underwent video-endoscopic control with an esophagogastroduodenoscopy, using a Fuji model EG570ZW video gastro copy, to exclude the presence of pathologies that contraindicated the positioning of the prosthesis. In group A, there were patients who had already had a removable prosthesis for at least one year, 3 patients who had a local recurrence or a secondary location in the esophagus were excluded from repositioning, in the others the prostheses were replaced with 10 Bloom Singer implants and 5 Provox2. In group B patients underwent for the first time the creation of a tracheo-esophageal fistula, and 12 Provox2 and 3 Bloom Singer were applied, in 3 patients it was not possible to proceed due to the presence of a hiatus hernia and / or incontinence cardio with a grade B esophagi according to the Los Angeles classification. In all the procedures for positioning the voice prostheses, endoscopy has been used to support the correct placement of the prosthesis, its opening and functioning. All patients in the two groups were assessed for the psychological aspects of voice loss and the possibility of recovery with prostheses. At endoscopic post-prosthesis control there were minor complications only in group B, in particular two patients presented intense inflammatory reaction after the creation of the fistula, resolved with medical therapy, one patient had phonatory difficulties that at the endoscopic control were not caused by no problem of the prosthesis, and finally a patient has had a progressive deterioration of the phonatory function, that the endoscopic control has shown to be determined by a too short prosthesis.

**DISCUSSION:**

Phonatory prostheses are certainly an important technique in allowing laryngectomies patients to improve their quality of life, both for the physical and functional aspects (recovery of the voice) and for the psychological aspects (anxiety, depression). The success of the method is in relation to various factors, such as the careful selection of patients, from the motivational point of view, and the ontological follow-up for the evaluation of the hypopharyngeal-esophageal-gastric district. For this last aspect we have considered the use of flexible videoendoscopy, which allows a better evaluation.

**CONCLUSIONS:**

Flexible video endoscopy in recent years has been very widespread, and among the many applications we have tried its use in the technique of packaging the trachea-esophageal fistula and the subsequent implantation of a voice prosthesis. We believe that our experience has confirmed the interesting and advantageous use of esophagogastroduodenoscopy in patients undergoing total laryngectomy and candidates for the placement of a trachea-esophageal voice prosthesis, both in the diagnostic and operative phases, and in the follow-up, allowing a careful selection of patients and the verification of any complications.

**REFERENCES**

- Selective Patient Experience With the Blom-Singer Dual Valve Voice Prosthesis. [Brownle B](#), [Ahmad S](#), [Grammer T<sup>1</sup>](#), [Krempl G](#). *Laryngoscope*. 2017 Aug 7.
- The Pharyngoesophageal Segment After Total Laryngectomy. [Arenaz Búa B](#), [Olsson R](#), [Westin U](#), [Rydell R](#). *Ann Otol Rhinol Laryngol*. 2017 Feb;126(2):138-145.
- Esophageal Dysmotility in Patients following Total Laryngectomy. [Teng Zhang](#), MEng, [Julia Maclean](#), PhD, [Michal Szczesniak](#), PhD, [Paul P.Bertrand](#), PhD, [Harry Quon](#), MD, [Raymond K. Tsang](#), MD, PhD, [Peter I. Wu](#), MBBS, [Peter Graham](#), MD, PhD, [Ian J. Cook](#), MD, PhD. *Otolaryngol Head Neck Surg*. 2017 Nov 1:194.
- Effect of the tracheoesophageal voice resistance test in total laryngectomees. [Pellicani AD](#), [Ricz H](#), [Iqueda AP](#), [Aguiar-Ricz L](#). *Laryngoscope*. 2017 Feb;127(2).
- Candida biofilm formation on voice prostheses. [Talpaert MJ](#), [Balfour A](#), [Stevens S](#), [Baker M](#), [Muhlschlegel FA](#), [Gourlay CW](#). *J Med Microbiol*. 2015 Mar;64(Pt 3):199-208.
- Removable prosthesis insertion steps: controls-qualifications. [Kouadio AA](#), [Niagha G](#), [N'Goran K](#), [Le Bars P](#). *Odontostomatol Trop*. 2014 Mar;37(145):13-26.

Clinical application of the Provox NiD voice prosthesis: a longitudinal study. [Lewin JS<sup>1</sup>](#), [Portwood MA](#), [Wang Y](#), [Hutcheson KA](#). [Laryngoscope](#). 2014 Jul;124(7):1585-91.

Correlation of intraluminal esophageal pressure with the dynamic extension of tracheoesophageal voice in total laryngectomees. [Reis N<sup>1</sup>](#), [Aguiar-Ricz L](#), [Dantas RO](#), [Ricz HM](#). [Acta Cir Bras](#). 2013 May;28(5):391-6.

Objective and subjective assessment of tracheoesophageal prosthesis voice outcome.

[D'Alatri L<sup>1</sup>](#), [Bussu F](#), [Scarano E](#), [Paludetti G](#), [Marchese MR](#). [J Voice](#). 2012 Sep;26(5):607-613.

Correlation between tracheoesophageal voice and speech and intraluminal

pharyngoesophageal transition pressure. [Takeshita TK](#), [Zozolotto HC](#), [Ricz H](#), [Dantas RO](#), [Aguiar-Ricz L](#). [Pro Fono](#). 2010 Oct-Dec;22(4):485-90.