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Technical note

In-clinic secondary tracheoesophageal puncture and voice prosthesis placement in laryngectomees

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ABSTRACT

Secondary tracheoesophageal puncture (TEP) with voice prosthesis placement represents one of the possibility to restore vocal function after total laryngectomy. However, some patients have comorbidities that contraindicate general anesthesia. In our department, an in-clinic TEP procedure for retrograde voice prosthesis placement was developed. It allows the immediate placement of the prosthesis and the avoidance of the use of dilators. We described our technique with advantages and pitfalls. The Provox Vega Puncture Set was used. Our technique for in-clinic secondary TEP without general anesthesia or target controlled infusion was a safe and effective procedure. It allows the use of the traditional TEP set, with possibility of voice prosthesis placement after previous TEP closure.

1. Introduction

Tracheoesophageal puncture (TEP) with voice prosthesis placement represents one of the possibilities to restore vocal function after total laryngectomy. TEP may be performed in a primary or secondary setting. Secondary TEP is generally performed under general anesthesia or profound sedation with target controlled infusion. Rigid esophagoscopy is used for direct visualization of the proposed TEP site [1,2].

However, some comorbidities, such as heart or liver diseases and poor neck extension make rigid esophagoscopy in general anesthesia difficult. These subjects are often recommended to use esophageal voice for speech production. Some previous studies described an in-office procedure for anterograde voice prosthesis placement under local anesthesia and visualization with flexible transnasal endoscopy [3–5].

In our department, we developed an in-clinic secondary TEP procedure for retrograde voice prosthesis placement. It allows the immediate placement of the prosthesis and the avoidance of the use of dilators. The aim of this paper is to describe our technique with its advantages and pitfalls.

2. Surgical technique

Our in-clinic procedure for secondary TEP with immediate retrograde voice prosthesis placement is based on flexible transoral esophagoscopy (Fig. 1). It is essential for visualization and it is performed by a gastroenterologist.

The procedure is performed under local pharyngeal anesthesia. Nervous patients have slight sedation with intravenous diazepam. A flexible esophago-gastroscope is introduced into the upper esophagus to view the pharyngoesophageal segment. Insufflated air allows a better visualization of the segment and the avoidance of injuries to the posterior esophageal wall during the following maneuvers. The TEP site is identified by transillumination and local anesthesia with lidocaine is performed. The correct site is confirmed by endoscopic visualization of the movement of the anterior esophageal wall during palpation with a blunt surgical instrument from the trachea. The puncture cannula of Provox Vega Puncture Set (Atos Medical AB, Hörby, Sweden) is inserted with an angle of 45° upward through the posterior tracheal wall into the esophageal lumen by the surgeon (Fig. 2). The correct site of the puncture is verified endoscopically. The guide wire is inserted into the esophagus via the puncture cannula and pulled out of the mouth. To further avoid injuries to the posterior wall of the esophagus, the guide wire is taken and pulled out with forceps (Fig. 3).

The Provox valve is attached to the end of the guide wire that exits from the mouth. The cannula in the puncture site is removed, leaving the guide wire in situ. The surgeon then pulls the guide wire out of the tracheoesophageal fistula, thereby pulling the silicone valve through the esophagus and into fistula. The proper placement of the prosthesis is confirmed endoscopically.

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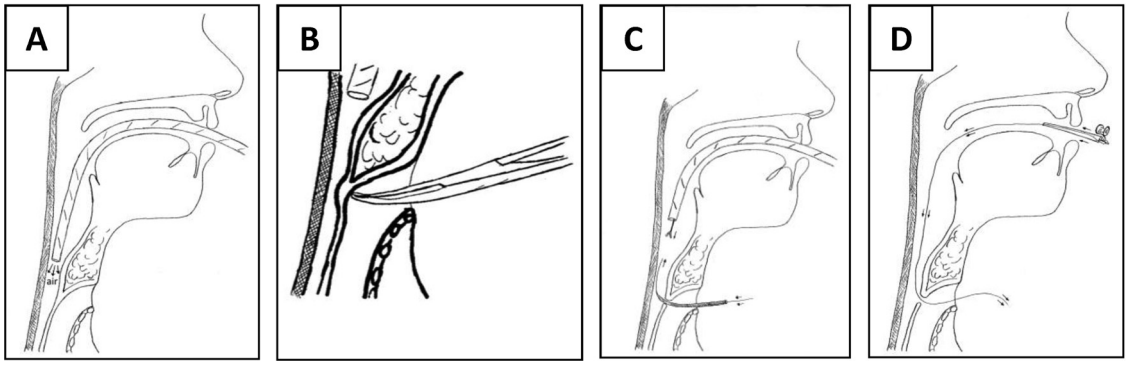

Fig. 1. A. Insufflated air through the flexible endoscope allows visualization of the pharyngoesophageal segment. B. Palpation of the tracheoesophageal wall with blunt instrument. C. The guide wire (arrow) is inserted into the esophagus via the puncture cannula. Then, it is taken and pulled out with forceps. D. The voice prosthesis is attached to the end of the guide wire. The puncture cannula is removed. The voice prosthesis is retrogradely positioned by pulling the guide wire out of the tracheoesophageal fistula.

The main errors to avoid are the following:

- to perform TEP without transillumination and previous palpation with a blunt surgical instrument. This may lead to an erroneous site of TEP and a consequent nonfunctional voice prosthesis;
- to insert the puncture cannula with a wrong inclination. Horizontal insertion may lead to injuries to the posterior esophageal wall, while the surgeon may miss the esophageal lumen using an excessively vertical inclination;
- to use an excessive force to insert the puncture cannula. This may lead to injuries to the posterior wall of the esophagus.

It is important to pay attention to some pitfalls:

- previous TEP could create a scar and make it difficult to perform the new TEP. More force should be used, but the risk of damage to the posterior wall of the esophagus increases;
- transillumination without palpation is not enough for identifying the correct site of puncture.

3. Discussion

Secondary TEP is traditionally performed employing rigid esophagoscopes during general anesthesia [6]. However, rigid techniques have several drawbacks. In particular, rigid esophagoscopy can be difficult in the irradiated patient, because of limited passive neck extension, cervical spondylosis and osteophytes, stenosis of the neopharynx at the resection site, prominent superior incisors, or a low stoma in a long neck [7]. Furthermore, general anesthesia in patients with significant cardiovascular disease, that often coexists in patients with laryngeal cancer, may be associated with significant morbidity.

Some TEP procedures with local anesthesia and flexible esophagoscopy have been described [3–5]. In 2001, in a series reported by Desyatnikova et al., a technique employing only local anesthesia in an outpatient setting was described for the placement of TEP [8]. However, although the flexible nasopharyngoscope was employed for visualizing the hypopharynx, direct visualization of the esophageal lumen during the procedure was not obtained. Other authors described some techniques with direct visualization of the operative site within the esophageal lumen during TEP [3–5]. Moreover, these techniques allow to avoid many of the difficulties and potential complications associated with the use of the rigid endoscope. The possibility of these techniques to be performed in an outpatient surgical setting using only intravenous sedation confers another significant advantage.

A recent report described the use of a standard gastroscope (passed through the oral cavity) for direct visualization of the esophagus and of a set for percutaneous endoscopic gastrotomy (PEG) in order to create the TEP [9]. The advantage of our technique is the use of the traditional Provox Vega Puncture Set, instead of the PEG set. The Provox Vega Puncture Set allows to create a TEP with the optimal inclination without injuries to the posterior wall of the esophagus. This is a significant advantage because unrecognized injuries of the posterior esophageal wall may lead to the creation of a false passage, infectious complications and subsequent stenosis. Our procedure was safe also in patients with scar formation and difficulty of puncture, such as those with previous TEP closure or previous radiation therapy. Moreover, the use of dilators was avoided leading to a less traumatic TEP procedure and the absence of general anesthesia allows an outpatient procedure.

Between 2015 and 2017, 15 laryngectomees (13 male, 2 female) underwent an in-clinic secondary TEP with immediate retrograde voice prosthesis placement in our department. Exclusion criteria were: presence of neoplastic disease; severe pharyngoesophageal stenosis secondary to total laryngectomy. Mean age was 65.36 ± 10.57 years (range 56–75 years) and mean time interval from total laryngectomy and TEP ranged from 10 to 36 months. Eight patients underwent the procedure after closure of a previous TEP. Cardiovascular diseases were the main contraindication for general anesthesia (10 cases). Five patients were enrolled for this procedure due to poor neck extension. No patient had pharyngoesophageal stenosis secondary to total laryngectomy. Nine patients underwent adjuvant radiation therapy. Operating time ranged 10 to 20 minutes. Immediate placement of the voice prosthesis was possible in all the cases. No complications (bleeding, dysphagia, prosthesis displacement, infections) were recorded. Avoiding antiflammatory drugs that can impair coagulation, slight pain was adequately controlled with acetaminophen in the first postoperative day. Hospital discharge occurred after one or two hours. A good voice restoration was achieved and an understandable voice was maintained after 2 months. All the patients perceived the voice as satisfying.

Finally, in our case series, the immediate prosthesis placement was achieved in all the patients with their satisfaction. Previous estimates of speech restoration have ranged from 50% to 79% after secondary TEP. One study demonstrated a difference in voice quality between primary and secondary TEP (50% vs 80%) [10]. Speech related outcomes in patients undergoing TEP with voice prosthesis placement is an important end point. Cheng et al. analyzed 36 patients who underwent primary TEP and 14 patients who underwent secondary TEP. They found that nearly 80% of patients who underwent primary TEP had excellent voice quality, while only 50% of patients who underwent secondary TEP achieved the same results [10]. On the contrary, in our study all the patients achieved communicative speech after secondary TEP.

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