Primary TE Puncture in Stapler-Assisted Total Laryngectomy

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Objectives:

1) To present a safe method for placement of a primary tracheoesophageal puncture (TEP) during stapler-assisted total laryngectomy.

2) To discuss the challenges and pitfalls of primary TEP placement when performing stapler-assisted total laryngectomy.

Surgical Technique:

Direct laryngoscopy was performed on all ten patients immediately prior to laryngectomy to ensure the endolaryngeal nature of the tumor. The laryngectomy was performed according to the technique described by Boden et al.1 2 3 All patients had their any neck dissection to be performed prior to skeletonization of the larynx. Once the inner and outer tumours are created and the trachea is divided and freed up to the cricothyroid cartilage (Figure 2), special attention is directed to skeletonization of the laryngeal framework. Both pylon sinuses are freed from the inner surface of the thyroid ala (Figure 3, yellow arrow). This allows for a maximum of pharyngoesophageal mucosa to be incorporated into the closure. The greater cornu of the hyoid bone are freed anteriorly and retroflexed. Additionally, the greater cornu of the thyroid cartilage are cut. This allows for easier placement of the stapler. At this point, a modification is added to the technique. A 4:4:4 Maloney esophageal dilator is placed in the mouth/esophagus. This prevents creating a neospharynx that is too small. The epiglottis is then retroflexed into the laryngectomy lumen with a skin hook (Figure 3, white arrow). Finally, the specimen is retracted anteriorly and the TA–60 stapler is placed under the larynx (Figure 5). After the stapler is fixed, the cut is excised with a scalpel leaving a watertight staple line (Figure 4).

An Olympus flexible adult endoscopy is placed into the high cervico-esophageal lumen and insufflated to dilate and inspect the esophageal lumen (Figure 5). The position of the scope is externally verified by transillumination through the party wall. Using a Russel gastroscopy kit, the needle-dilator is inserted through the party wall under direct visualization. Once through the guide wire is inserted and visualized to proceed into the distal esophagus (Figure 6). The needle is removed and the tract is dilated over the guidewire. The final dilator is a breakaway sheath which is left in place after wire and dilator are removed. Finally, the RRC is placed through the sheath (Figure 7) and the breakaway sheath is removed. The entire procedure is visualized on the monitor. The RRC is secured and the neck closure is performed. Patients' tube feeds are typically started in the first post-operative week. They are usually discharged home after about 7 hospital days. The patients maintain the RRC until they are seen in clinic approximately 1–2 weeks post-op, at which time they have the voice prosthesis placed.

Results:

10 consecutive cases of stapler-assisted laryngectomy with primary tracheoesophageal puncture successfully achieved alaryngeal speech without complication.

Discussion:

In the care of the head and neck patient, as with all patients, we aim to maximize patient safety at every step throughout the process. In order to achieve this, the tried and true armament of surgical oncology must meld with the advances of technology. The nexus of this ideology is seen in the coupling of stapler-assisted laryngectomy and primary TEP creation using flexible esophagoscopy. Various groups have highlighted the benefits of stapler-assisted laryngectomy 1–3. By using the stapler to both resect and close the pharynx, patient safety is improved. Not only has it been demonstrated that the overall length of the procedure can be decreased by using this technique, but the resulting staple line is more uniform, less traumatic to the sensitive pharyngeal mucosa, and more reproducible than standard suturing techniques 4. Because the typical head and neck patient usually has significant co-morbidities, patient outcomes can be improved thanks to shorter operations and fewer variables with respect to the closure, thereby decreasing post-operative complications.

In the original descriptions of the technique 5–7, the authors provide techniques for creation of a primary TEP. Because of the closed nature of the laryngectomy, however, creation of the TEP was done without direct visualization. As early as 1991, flexible esophagoscopy has been used to visualize the esophageal lumen during the creation of the TEP 8–9. Previous descriptions of TEP utilize the rigid esophagoscope, however, this instrument can not be used in all patients for a variety of reasons. Flexible esophagoscopy provides direct visualization of the esophageal lumen while the TEP is created. In addition to enhance visualization, the esophagus can be insufflated during the procedure, protecting the posterior esophageal wall from iatrogenic injury. The combination of the flexible esophagoscope and TE puncture has been carried out safely as an outpatient procedure for years 4–5. It has proven to be safe enough for secondary TE puncture to be performed in the clinic with a transnasal esophagoscope 10–11. However, this is the first report of combining stapler-assisted total laryngectomy and primary TEP placement using flexible esophagoscopy and a modified Seldinger technique similar to what Kochi described for secondary TEP creation.

References:


Methods:

A case series of 10 consecutive patients treated with stapler-assisted total laryngectomy who underwent primary tracheoesophageal puncture at the time of the initial surgery was described. We re-presented a case series of patients treated with a stapler-assisted total laryngectomy. Because poses a unique challenge, we applied the technique of flexible esophagoscopy to perform the placement of concurrent TEP under direct visualization. A modified Seldinger technique was employed using a Russel percutaneous gastroscopy kit in order to allow creation of a TE puncture. This concept was performed at a single academic institution. The primary outcome measured was ability of alaryngeal speech.

Figure 1: Russel gastroscopy kit: a) dilators, b) sheath with dilator, c) guidewire

Figure 2: Trachea separated from cervical esophagus up to the cricoid (intubation view of larynx)

Figure 3: Stapler placement under larynx. White arrow denotes skin hook retroflexing epiglottis. Double skin hook rotating thyroid epiglottis (fully released pyriform mucosa yellow arrow)

Figure 4: Double row of staples after single firing of TA–60 stapler (blue ellipse)

Figure 5: Double firing of TA–60 stapler (blue ellipse)

Figure 6: Esophageal lumen with sheath (white arrow) and guidewire (yellow arrow)

Figure 7: Esophageal lumen with sheath (white arrow) and red rubber catheter (yellow arrow) passing distally

Figure 8: Open view of TEP after stapled TA–60 (blue ellipse)