Flexible Bronchoscope Use by Pulmonologists in Collaboration With Gastroenterologists for Placement of Percutaneous Endoscopic Gastrostomy Via Transnasal Route in Patients With Head and Neck Cancer

A 10-Year Experience in a Single Cancer Institution

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Summary: **This study was conducted with the aim of evaluating a 10-year experience in the Pulmonology Department of a cancer center for percutaneous endoscopic gastrostomy through transnasal route (TN-PEG) in patients with head and neck cancer whose oral access is precluded. This study was a retrospective analysis of 40 consecutive head and neck cancer patients referred for PEG placement, between 2005 and 2014, using a transnasal route because of the impossibility of intubation through the oral cavity. Demographics, outcome of TN-PEG procedure, indications for bronchoscopic approach (prophylactic/palliative), clinical need for bronchoscopy (trismus, oropharyngeal obstruction), location of cancer, complications, and overall survival were reviewed. In 40 TN-PEG procedures, executed by 1 of 3 pulmonologists, 39 were successfully placed and there were no immediate complications. All except 1 complication were minor, but no surgery or PEG removal was required. There was a rapid learning curve among all operators. A combined TN-PEG placement by a gastroenterologist and a pulmonologist is a safe and useful option for these patients; the learning curve for successfully performing the procedure was short.**

Key Words: transnasal PEG, adapted bronchoscope, oropharyngeal obstruction, trismus

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Patients with upper aerodigestive tumors are particularly prone to malnutrition due to dysphagia secondary to tumor mass effect (obstruction, trismus) and/or to treatment (chemotherapy, adiotherapy) side effects. Percutaneous endoscopic gastrostomy (PEG) is ultimately required in most of these patients for nutritional support. In some situations the tumor precludes the transoral approach with a conventional endoscope, demanding a thin endoscope for PEG tube placement, not always available in many institutions. The use of a flexible bronchoscope has previously been described for this purpose.[1]

OBJECTIVE

The aim of this study was to analyze all PEG through transnasal route (TN-PEGs) placed using an adapted bronchoscope in head and neck cancer patients in a single institution over a 10-year period.

PATIENTS AND METHODS

Between 2005 and 2014, we carried out a retrospective study of 40/1051 (3.8%) consecutive head and neck cancer patients referred for placement of PEG using the "pull" method, through the transnasal route, in collaboration with the Gastroenterology Department (gastroenterologist for abdominal procedure and the pulmonologist for endoscopic procedure). Demographic data, indication (prophylactic/ palliative), TN-PEG procedure outcomes, clinical situations (trismus, oropharyngeal obstruction), cancer site, complications, and overall survival were reviewed. A 600 mm length/5.3 mm outer diameter flexible bronchoscope with an adaptation for a specific suction/insufflation system was used. This was built using a Luer lock 3-way stopcock (Fig. 1A), which was attached simultaneously to a high-pressure vacuum tube (Fig. 1B) and an oxygen delivery system (Fig. 1C), allowing either suction or insufflation

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(Fig. 1D) by selecting the position on the stopcock and pressing the usual "aspiration" button of the bronchoscope. In Table 1 there is a list of equipment needed to accomplish this procedure. A pediatric endoscopic loop was passed through the 2.2 mm working channel of the bronchoscope, pulling the guidewire.

In Figures 2 and 3 some endoscopic images of the procedure are shown. When reaching the stomach, suction of stomach contents is performed in order to prevent aspiration. Thereafter, the stomach is insufflated using the channel on the bronchoscope (Fig. 2A). The abdominal wall is transilluminated and, when this is visible

FIGURE 1. A, Luer lock 3-way stopcock connected simultaneously to an O_2 system, vacuum system, and bronchoscope. B, Connection to vacuum system. C, Connection to O_2 system. D, Overall perspective.

TABLE 1. Equipment List for Pulmonologist's Setting

(1) One 600 mm length/5.3 mm outer diameter flexible bronchoscope
(2) One Luer lock 3-way stopcock
(3) One high-pressure vacuum system with a tube for connection to the stopcock
(4) One oxygen delivery system with a tube for connection to the stopcock
(5) One pediatric endoscopic loop (for pulling the PEG guidewire)
(6) Lidocaine
(7) Lubricant

PEG indicates percutaneous endoscopic gastrostomy.

externally, finger pressure is applied at the point of maximal transillumination and a focal indentation of the anterior gastric wall is visible endoscopically (Fig. 2B). After local abdominal wall anesthesia, a catheter is passed into the stomach (Fig. 2C) and, through this, a guidewire is also passed into the stomach, where it is caught by the pediatric bronchoscope loop (Figs. 2D, 3A, B). The loop is then pulled out through the nose along with the bronchoscope (Fig. 3C), with a final endoscopic checking of the PEG bumper (Fig. 3D).

Inclusion and exclusion criteria are presented in Table 2.

RESULTS

In the study period, a total of 40 patients were referred for TN-PEG placement by 1 of 3 pulmonologists. In a total of 30 men and 9 women with a mean age of 55 years (10 to 74 y), a TN-PEG was successfully placed. The only procedure failure was due to lack of transillumination. This is not an absolute contraindication for PEG placement,[2] but we decided not to proceed because of safety concerns. TN-PEG placement was performed with palliative intention in 27/39 and with prophylactic intention in 12/39. The transnasal route was chosen because of trismus in 25/39 and oropharyngeal obstruction in 14/39 in patients with cancer of nasal cavity/paranasal sinus (2/39), oral cavity (17/39), oropharynx (14/39), larynx (3/39), hypopharynx (1/39), and facial cutaneous melanoma with extensive involvement of mastication muscles (1/39) and metastatic involvement of the skull base with

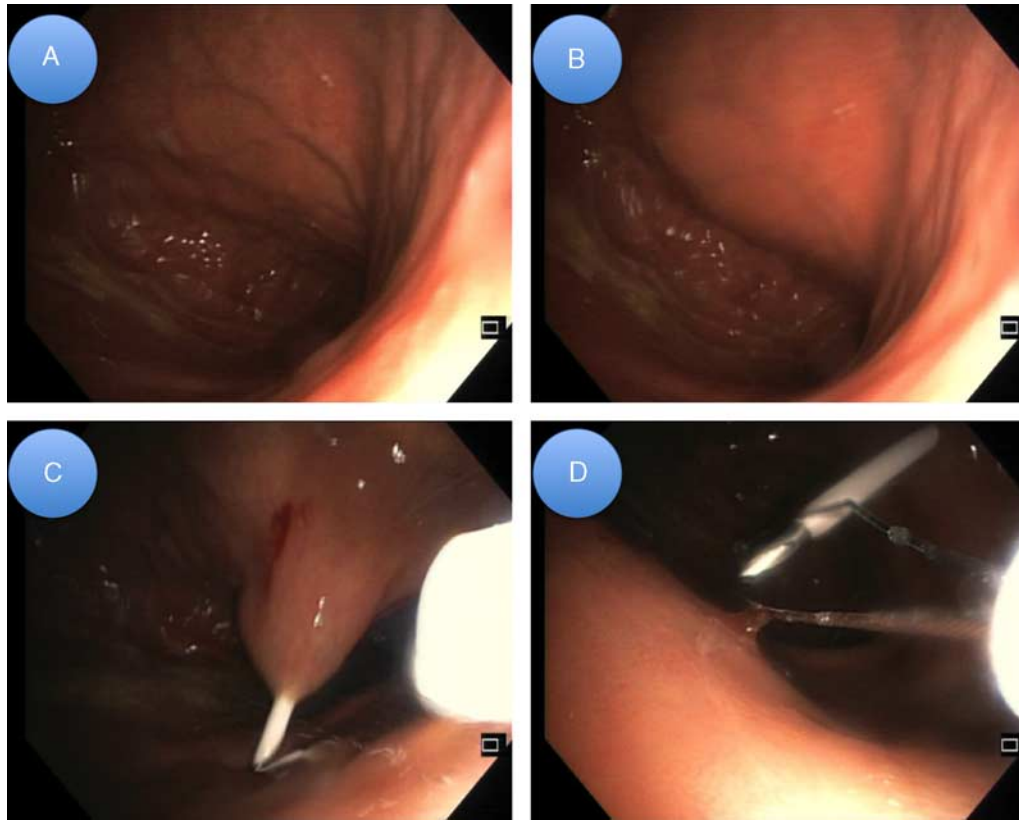

FIGURE 2. A, Insufflated stomach. B, Focal indentation related to finger pressure through the abdominal wall. C, Introduction of catheter through abdominal/gastric wall. D, Guidewire caught by the loop inserted through the bronchoscope.

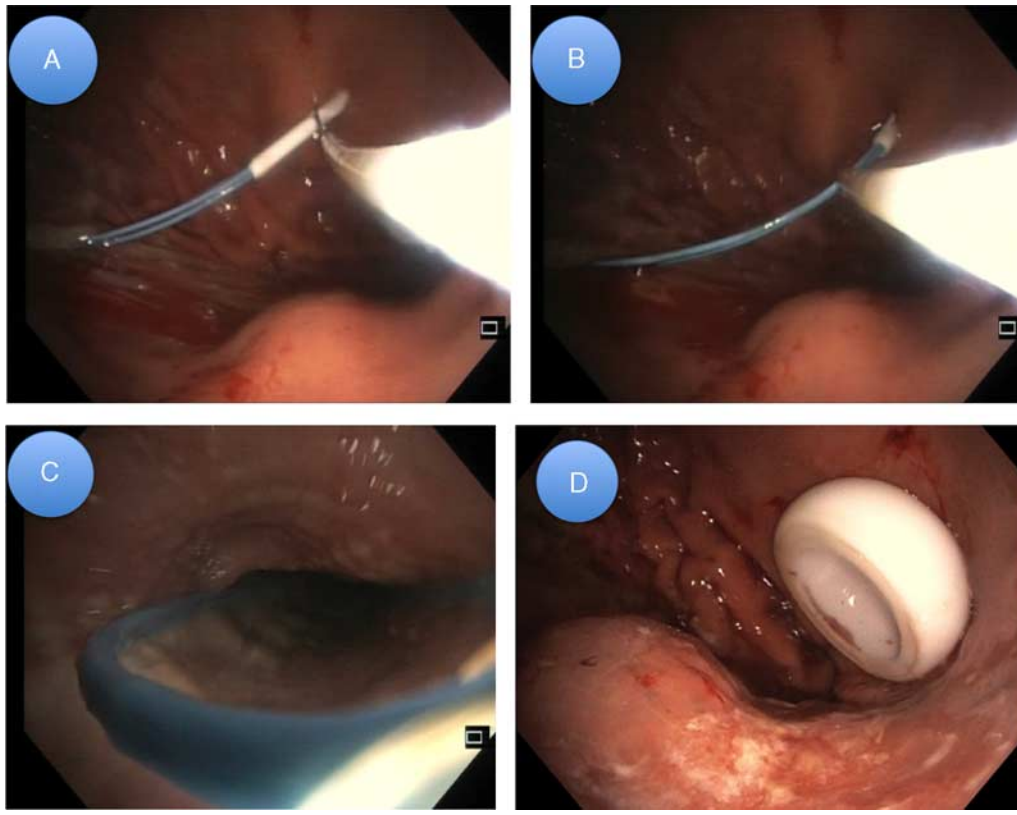

FIGURE 3. A and B, Other perspectives of the guidewire. C, Guidewire being pulled out through the esophagus. D, PEG bumper checked at the end of procedure. PEG indicates percutaneous endoscopic gastrostomy.

compromise of mastication muscles (1/39). Complications occurred in 9/39 patients: early (less than a week after the procedure) in 4/9 (local infection treated pharmacologically) and late in 5/9 (3 cases of local infections, 1 case of extrusion, 1 Buried Bumper syndrome). Our 10% rate of early infections (presumably because of infectious agents transported along the PEG tube, even with the use of prophylactic antibiotics) is in the range cited in the literature.[3] Buried Bumper syndrome is a complication that occurs when the internal bumper of a PEG tube erodes and migrates through the gastric wall, becoming lodged between the gastric wall and the skin. This complication is solved by replacing the PEG tube through the same route using a guidewire or, if the gastric orifice becomes totally closed, repeating the endoscopic procedure. No complications required surgery or PEG removal. On follow-up, 10/39 patients were alive and 7 were in remission. In all 29 patients died, 27 because of disease progression and 2 others because of unrelated causes. No immediate (first 24 h) mechanical or traumatic complications occurred, particularly with the use of the adapted suction/insufflation device.

DISCUSSION

PEG placement is fundamental to maintain nutrition in most patients with complicated head and neck cancer and/or treatment side effects. However, existing oropharyngeal obstruction and trismus can preclude procedure performance using the usual oral route with conventional endoscopes. Many Gastroenterology Departments

TABLE 2. Criteria for TN-PEG Procedure

Inclusion	Exclusion
Patients unable to move food from their mouth to their stomach*	Uncorrected coagulopathy or thrombocytopenia*
Gut decompression in abdominal malignancies*	Ascites*
AND	Intraabdominal perforation*
Severe trismus	Abdominal wall infection at the selected site of placement*
Oral/pharyngeal obstruction	Complete esophageal obstruction*
	Severe hypoxemia*
	Hemodynamic instability*

*As for traditional PEG placement.
TN-PEG indicates percutaneous endoscopic gastrostomy through transnasal route.

do not have endoscopes small enough to perform transnasal endoscopy; hence, a possible alternative is to use the flexible bronchoscope in collaboration with a pulmonologist. A "esophagogastroscopy" with the bronchoscope via the nasal route is performed by the pulmonologist, whereas the gastroenterologist ensures a correct intragastric canullation in order to seek the transillumination (mandatory step to ensure a safe and correct PEG placement) and capture the guidewire used to pull the PEG device through the nasogastric pathway. The learning curve is fast, however, demanding some mandatory steps including the following: knowledge about how to enter and pass the esophagus, how to distend it, how to maneuver inside the stomach and maintain it distended, how to find the anterior gastric wall for adequate transillumination, and how to catch and hold the guidewire.

The only unsuccessful PEG placement was due to transillumination failure in a patient with a particular gastric anatomy. None of the 9/39 supervened complications were related to the PEG procedure itself, and the majority occurred more than a week after the procedure. In our Department, all 3 pulmonologists were able to perform the procedure without difficulties after their experience with 1 or 2 patients. The use of a 600 mm length bronchoscope (instead of an 1100 mm conventional gastroscope), suitable for an average size population, was not related to a higher rate of unsuccessful placements (only 2.5% failures in our series over a 10 y period). In contrast, the role of an experienced gastroenterologist in PEG placement in this collaboration is fundamental, because moving through esophagogastric anatomy is not part of the pulmonologist's skills.

CONCLUSIONS

The use of an adapted flexible bronchoscope by a pulmonologist in collaboration with a gastroenterologist for TN-PEG placement is an easy procedure, with a high rate of successful placement and without procedure-related complications in patients without a transoral access available. Difficulties in performing the procedure are related to the transoral route and practitioners readily gained the necessary skills.

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