Transnasal PEG tube placement in patients with head and neck cancer

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Background: Head and neck cancer (H&NCa) patients have an increased risk of malnutrition and dysphagia because of their malignancy and the adverse events of therapy. Most of these patients require gastrostomies. Four percent to 7% of H&NCa patients are unable to undergo per oral percutaneous gastrostomies. Transnasal endoscopy is an option for gastrostomy placement in selected patients.

Objective: Clinical, epidemiologic characteristics and outcomes of transnasal PEG (t-PEG) placement.

Design: Retrospective analysis.

Setting: Tertiary care hospital, The University of Texas MD Anderson Cancer Center.

Patients: All patients who underwent t-PEG placement.

Main Outcome Measurements: Epidemiology, adverse events, and outcomes of t-PEG placement.

Results: Sixteen patients underwent t-PEG placement from January 2010 to May 2013. All patients had H&NCa and 56.3% had metastasis. Indications for the transnasal approach were airway compromise, malignant oropharyngeal obstruction, and trismus, among others. All procedures were successful using a 20F gastrostomy tube, push technique, anesthesiologist-guided propofol sedation, and/or nasotracheal intubation. Of all patients, 68.8% were white and 68.8% were men. Mean age was 54 years, and mean body mass index was 20.87. Two patients had a total of 2 adverse events: poor wound healing and wound site infection. Of all patients, 18.75% had leukopenia, 6.25% neutropenia, and 50% lymphopenia. Mean white blood cell count, absolute neutrophil count, and absolute lymphocyte count were 8.6 $\times$ 10^9/L, 6.57 $\times$ 10^9/L, and .93 $\times$ 10^9/L, respectively. Eleven patients were alive, 2 were lost to follow-up, and 3 had died at the time of review.

Limitations: Retrospective analysis, small cohort, patient selection bias.

Conclusion: t-PEG placement is a viable and safe option for H&NCa patients when the standard endoscopic approach is not feasible. (Gastrointest Endosc 2014;79:599-604.)

PEG was described in 1980 and since then has largely replaced surgery for enteral access.[1] The morbidity associated with PEG ranges between 5% and 10.3%, and major adverse events occur in less than 3%.[2] The most common indication for PEG placement is enteral nutritional support. Gastrostomies can be either permanent or temporary depending on recovery of oral intake and the initial indication for the gastrostomy. The 3 main methods of placing gastrostomies are

Abbreviations: H&NCa, head and neck cancer; t-PEG, transnasal PEG.

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endoscopical, radiological, and surgical. Presently, most percutaneous gastrostomies are placed endoscopically. The most common endoscopic techniques described for PEG include the "pull" and "push" techniques. Because both methods require the advancement of the feeding tube through the oral cavity, oropharyngeal obstruction and severe trismus can compromise or prevent placement.[3]

Transnasal endosocopy is a well-described and widely accepted method of endoscopic evaluation of the upper GI tract. It has been used for diagnosis and treatment of upper GI pathologies and for insertion of enteral feeding and biliary drainage tubes.[4] Transnasal endoscopy can be performed with or without sedation and has been associated with less cardiovascular and hemodynamic changes when compared with per oral endoscopies.[5-7]

A reported 4% to 7% of head and neck cancer (H&NCa) patients were unable to undergo per oral gastrostomy tube placement because of their underlying pathology.[8] Transnasal PEG (t-PEG) placement has been described in a number of case reports and small series as a viable and safe option for placement of gastrostomies.[4] The aim of this study is to describe the clinical and epidemiologic characteristics and outcomes related to t-PEG placement at our institution.

METHODS

We performed a retrospective analysis of all patients who underwent t-PEG placement at The University of Texas MD Anderson Cancer Center from January 1, 2010 to May 31, 2013 and describe clinical and epidemiologic data. Data collection included demographic data (age at time of PEG insertion, gender, and race), underlying cancer diagnosis, history of chemotherapy and radiation therapy, laboratory data (leukocyte count, neutrophil count, platelet count, coagulation studies, and serum albumin), reason for the transnasal approach, adverse events related to the procedure, and survival.

t-PEG placement was carried out by a senior gastroenterologist/endoscopist with over 30 years of experience and over 3000 gastrostomy placements with the aid of a gastroenterology fellow. Sedation for all procedures was directed by the attending anesthesiologist using intravenous propofol or general anesthesia with nasotracheal intubation. A topical anesthetic and vasoconstrictor were applied to the nasal mucosa uniformly.

A forward-viewing ultraslim videoendoscope was used for all procedures (GIF-N180; Olympus Optical Co., Ltd., Tokyo, Japan). This endoscope has the following characteristics: outer diameter, 4.9 mm; air/water and accessory channel diameter, 2 mm; working length, 1100 mm; field of view, 120 degrees; and 2-way tip angulation (210 degrees up and 90 degrees down). The Sachs-Vine push over-the-wire technique was used in all patients (Fig. 1). The "push" technique was used because it was believed to be more gentle on the nasal mucosa. The EndoVive PUSH PEG kit (Boston Scientific, Natick, MA) was used on all patients.

Take-home Message

- Transnasal PEG (t-PEG) placement is a viable and safe option for head and neck cancer patients and patients with other types of cancer in which the oral cavity or the oropharynx is compromised, precluding the standard endoscopic approach

Transnasal insertion was attempted in 16 patients, and all 16 patients are included in this analysis. Standard informed consent for PEG insertion was obtained from the patient or from a responsible relative. Institutional review board approval was obtained for data collection and publication.

RESULTS

A total of 508 PEGs were placed in H&NCa patients at our institution during the study period. Sixteen patients (3.1%) required a transnasal approach. All patients who had t-PEGs placed received prophylactic intravenous antibiotics within 1 hour of the procedure per standard PEG protocol.

All gastrostomies were placed using a 4.9-mm Olympus ultraslim endoscope, a Boston Scientific 20F gastrostomy tube, and the Sachs-Vine push technique (Fig. 1). Of the patients, 68.8% were men and 68.8% white; the median age was 54 years (range, 19-75 years) at the time of gastrostomy tube placement. The median body mass index was 20.87 (range, 13.1-31.56), with 37.5% of patients being underweight (body mass index $<$ 18.5) according to the most recent World Health Organization classification. All patients who required t-PEG placement had H&NCa; 81% were squamous cell carcinomas of the oropharynx. At the time of gastrostomy tube placement, 56.3% had metastatic disease (Table 1).

Indications for t-PEG placement were malignant obstruction of the oropharyngeal region in 62.5% of patients and trismus and airway compromise in 12.5% of patients. Deep hypopharyngeal ulcer was the indication in 1 patient (6.25%). The transnasal route of gastrostomy tube placement was attempted initially in 93.75% of the cohort (Table 1). Of the 16 patients, 6 procedures required nasotracheal intubation and 10 were performed using anesthesiologist-guided propofol sedation; this choice was directed by the attending anesthesiologist.

Twenty-five percent of patients had received chemotherapy 30 days before the procedure. The chemotherapeutic agents used were bevacizumab in 2 patients, cisplatin in 1 patient, and disatinib and erlotinib combination in 1 patient. Two patients had radiation therapy 30 days before PEG placement; both patients had received chemotherapy in the same time period (cisplatin, disatinib, and erlotinib). No patient had clinical evidence of oropharyngeal mucositis at the time of gastrostomy insertion (Table 2).

Nineteen percent (18.75%) of patients had leukopenia, 6.25% neutropenia, 50% lymphopenia, and 12.5% thrombocytopenia. The median white blood cell count, absolute

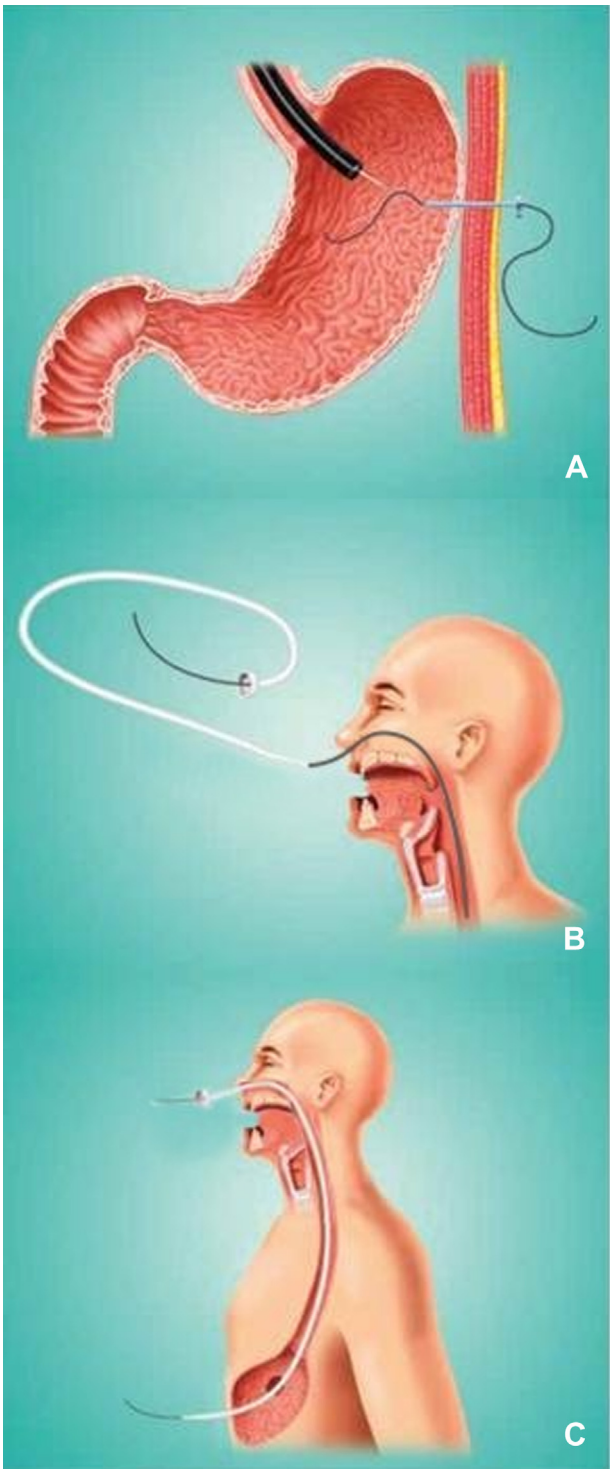

Figure 1. t-PEG push technique. **A,** With the endoscope in a fully insufflated stomach and adequate transillumination and 1:1 indentation, the trocar is advanced into the stomach. The wire is advanced through the trocar and grasped with a snare. **B,** The gastrostomy tube is fed over the wire. **C,** The tube is advanced and "pushed" over the wire into the esophagus and out through the gastric and abdominal wall.

neutrophil count, absolute lymphocyte count, and platelet count were 8.6 × 10^9/L, 6.57 × 10^9/L, .93 × 10^9/L, and 218 × 10^9/L, respectively. Only 1 patient had leukopenia, neutropenia, and thrombocytopenia at the time of t-PEG placement. This patient did not receive chemotherapy or radiotherapy in the 30 days before the procedure, no adverse events were recorded, and the patient was still alive at the time of the review. Median albumin and International Normalized Ratio values were within normal range in the cohort.

Two postprocedure adverse events were observed, and the average time from procedure to adverse event was 31.5 days. Poor wound healing at the gastrostomy site was documented in 1 patient at 33 days after the procedure. This patient had received bevacizumab within 30 days of the procedure and was neither thrombocytopenic nor coagulopathic at the time of the procedure. The adverse event was managed conservatively with good outcome. Unfortunately, the patient died 229 days after the procedure because of progression of her underlying malignancy (Table 2). PEG site infection was seen in 1 patient 7 days after t-PEG placement. The patient's malignancy was a necrotic, ulcerated, and infected squamous cell carcinoma of the oral tongue with obstruction of the oropharyngeal cavity. Management of the infection required a 48-hour hospitalization. Intravenous antibiotics were administered in the first 24 hours and per feeding tube thereafter for 10 days, and wound care was carried out with twice-daily cleansing (antibacterial soap and water) followed by topical antibiotic ointment for 14 days. The patient was discharged home in excellent condition, and no other infectious adverse events were observed. The patient had documented follow-up for 197 days after the procedure, but mortality information was not available.

At the time of the review, 3 patients had died and 2 patients had no mortality information. None of the documented deaths was related to the PEG procedure. Patient 2 died at home under hospice care 10 days after t-PEG placement because of pulmonary adverse events of her metastatic papillary thyroid cancer. The electronic medical record of Patient 5 indicates that he died as a consequence of his malignancy 22 days after gastrostomy insertion. Patient 6 died 229 days after the procedure because of progression of her underlying metastatic parotid cancer. Patients 4 and 7 had follow-up to 38 and 197 days, respectively, after the procedure. No information is available regarding mortality or adverse events because both patients returned to their country of origin (Table 2).

DISCUSSION

Patients with H&NCa have a high incidence of malnutrition, not only because of the malignancy and location of the tumor itself but also because chemoradiation increases the risk of debilitating oropharyngeal dysfunction.[9-11] Seventy percent of patients with H&NCa require feeding tube placements for enteral nutritional support either as prophylaxis before initiation of therapy or as a reactive

TABLE 1. Patient clinical characteristics, underlying cancer diagnosis, and reason for transnasal approach

Patient no.	Age (yr)	Sex	Race	BMI	Cancer	Metastasis	Reason for t-PEG
1	75	M	W	25.9	SCC base of tongue	Y	Hypopharyngeal ulcer
2	52	F	W	19.8	Papillary thyroid cancer	Y	Airway compromise
3	49	F	W	13.1	SCC larynx	N	Airway compromise
4	69	M	H	25.4	SCC tongue	Y	Oropharyngeal tumor obstruction
5	53	M	W	18.3	SCC tonsil	Y	Trismus
6	19	F	H	14.6	Parotid cancer	Y	Trismus
7	49	M	O	18.1	SCC tongue	Y	Oropharyngeal tumor obstruction
8	50	M	W	21.92	SCC tongue	N	Oropharyngeal tumor obstruction
9	46	M	W	31.56	SCC tongue	Y	Oropharyngeal tumor obstruction
10	24	M	W	24.57	Mucoepidermoid submandibular gland carcinoma	N	Oropharyngeal tumor obstruction and recent H&N surgery
11	55	F	W	17.85	SCC tongue	Y	Oropharyngeal tumor obstruction
12	62	M	W	27.14	SCC larynx	N	Recent H&N surgery
13	62	M	AA	17.80	SCC larynx	N	Oropharyngeal tumor obstruction
14	70	M	AA	28.57	SCC larynx	N	Oropharyngeal tumor obstruction
15	58	F	W	23.67	SCC tongue	N	Oropharyngeal tumor obstruction
16	58	M	W	16.51	SCC buccal mucosa	Y	Oropharyngeal tumor obstruction

BMI, Body mass index; *t-PEG,* transnasal percutaneous endoscopic gastrostomy; *M,* male; *F,* female; *W,* white; *AA,* African American; *H,* Hispanic; *O,* other; *SCC,* squamous cell carcinoma; *H&N,* head and neck; *Y,* yes; *N,* no.

approach after therapy adverse events.[12-14] Unfortunately, 4% to 7% of patients with H&NCa are unable to undergo routine per oral PEGs.[15]

Transnasal endoscopy is a new and widely accepted diagnostic and therapeutic approach for upper GI diseases.[4] In 1996 the first t-PEG was described.[16] The authors were able to successfully place a PEG tube in a patient with intermaxillary fixation with the use of conscious sedation, topical anesthesia, and a pediatric upper endoscope without documented procedure-related adverse events.[16] Since then, many additional case reports and case series have been described.[16-24] The indication for the transnasal approach in those reports include severe trismus because of neurologic disorders, oropharyngeal obstruction secondary to H&NCa, dental misalignment, maxillary fractures, and postsurgical changes.[16-24] Compared with those cases, all of our patients had H&NCa, and the indications for the transnasal route were either malignancy-associated obstruction, trismus, recent head and neck surgery, and hypopharyngeal ulceration.

All patients in previous reports had procedures performed with conscious sedation and/or local and topical anesthetics.[16-24] In comparison, all of our patients received intravenous propofol and/or endotracheal intubation. Nasal topical anesthesia was universal in previous reports and in our series. Per current guidelines, all patients received intravenous prophylactic antibiotics before gastrostomy tube placement.

In our series, we standardized the procedure by using a 4.9-mm (outer diameter) Olympus gastroscope, a 20F Boston Scientific gastrostomy tube kit, and the push technique. Previous authors have used different endoscopes, gastrostomy tubes, and techniques. The largest-diameter endoscope used in a previous report was a 10.3-mm therapeutic upper endoscope.[23] The brand of gastrostomy kit varied, and sizes used were either 18F or 20F. Both the push and the pull techniques were used.

Two studies were performed that evaluated PEG placements using transnasal endoscopy.[5,22] Both studies described successful PEG insertions without intravenous sedation and only topical anesthesia. One of the studies was a randomized controlled trial evaluating hemodynamic changes in those undergoing transnasal versus transoral procedure.[5] The study revealed no significant differences between the transnasal and the transoral approach in regards to hemodynamics, success, or adverse events.[5] The technique used in the previously mentioned study was the modified introducer method. The most

TABLE 2. Mortality outcomes and adverse events in relationship to chemotherapy and radiation therapy

Patient no.	Adverse events	Chemotherapy	Radiation	Death
1	None		N	N
2	None	Bevacizumab	N	Y
3	None		N	N
4	None		N	U
5	None		N	Y
6	Poor PEG site wound healing (33 d)	Bevacizumab	N	Y
7	PEG site infection (7 d)		N	U
8	None	Disatinib/erlotinib	N	N
9	None	Cisplatin	Y	N
10	None		Y	N
11	None		N	N
12	None		N	N
13	None		N	N
14	None		N	N
15	None		N	N
16	None		N	N

N, No; *Y,* yes; *U,* unknown.

recent case series out of Taiwan also confirmed this finding.[25]

Our success rate in t-PEG placement was 100%, resembling previously described rates that ranged from 50% to 100%.[21,22,24] We did experience 2 minor adverse events in 2 patients (poor wound healing and PEG site infection), all of which were managed conservatively and with good results. The patient who experienced poor healing (defined as lack of granulation tissue and a mature gastrostomy tract) had received bevacizumab, which interferes with the wound-healing process. Although it is not a direct adverse event related to PEG insertion, we still considered it as an adverse event of our procedure because we created the wound. Our findings are comparable with all other described cases of t-PEG placement. So far, including our series, there have been no deaths related directly to t-PEG insertion.

A specific concern that applies to our patient population is the fear of tumoral seeding at the time of PEG placement.[26] Although the risk of this adverse event is small and the pathophysiology not understood, there have been no reports of tract seeding using the transnasal approach; this may be related to the small total numbers of procedures performed. Because of the nature of the patients we see at our institution, morbidity and mortality will be influenced more by the underlying malignancy and not the procedure itself.

The main limitations to our study include its retrospective nature, small numbers, and patient selection bias. Key points to consider in t-PEG placement are adequate patient selection and type of sedation, which depends on the endoscopist and endoscopy unit protocols. Topical nasal anesthesia and vasoconstrictors are highly recommended even if deep sedation or general anesthesia is used. Endoscope size appears to have no influence on procedure success or outcome, although most reporters have used the thinnest endoscope available at the time. The use of topical nasal antibiotics is controversial, as is the type of technique (push vs pull).

In conclusion, t-PEG placement is a viable and safe option for patients with head and neck and other cancers in which access to the oral cavity or the oropharynx is greatly compromised and the standard endoscopic approach is not possible.

REFERENCES

1. Gauderer M, Ponsky J, Izant RJ. Gastrostomy without laparotomy: a percutaneous endoscopic technique. J Pediatr Surg 1980;15:872-5.
2. McClave SA, Chang W-K. Complications of enteral access. Gastrointest Endosc 2003;58:739-51.
3. Jain R, Maple JT, Anderson MA, et al. The role of endoscopy in enteral feeding. Gastrointest Endosc 2011;74:7-12.

4. Lee S-Y, Kawai T. Transnasal route: new approach to endoscopy. Gut Liver 2008;2:155-6.
5. Suzuki REI, Hikichi T, Sato M, et al. Prospective randomized comparative study of hemodynamic changes between ultrathin transnasal and conventional transoral esophagogastroduodenoscopy in percutaneous endoscopic gastrostomy placement with modified introducer method under sedation. Fukushima J Med Sci 2011;57:28-32.
6. Yuki M, Amano Y, Komazawa Y, et al. Unsedated transnasal small-caliber esophagogastroduodenoscopy in elderly and bedridden patients. World J Gastroenterol 2009;15:5586-91.
7. Kim CY, O'Rourke RW, Chang EY, et al. Unsedated small-caliber upper endoscopy: an emerging diagnostic and therapeutic technology. Surg Innovat 2006;13:31-9.
8. Zuercher B, Grosjean P, Monnier P. Percutaneous endoscopic gastrostomy in head and neck cancer patients: indications, techniques, complications and results. Eur Arch Oto-Rhino-Laryngol 2011;268:623-9.
9. Rosenthal DI, Lewin JS, Eisbruch A. Prevention and treatment of dysphagia and aspiration after chemoradiation for head and neck cancer. J Clin Oncol 2006;24:2636-43.
10. Trotti A, Bellm LA, Epstein JB, et al. Mucositis incidence, severity and associated outcomes in patients with head and neck cancer receiving radiotherapy with or without chemotherapy: a systematic literature review. Radiother Oncol 2003;66:253-62.
11. Murphy BA, Gilbert J. Dysphagia in head and neck cancer patients treated with radiation: assessment, sequelae, and rehabilitation. Semin Radiat Oncol 2009;19:35-42.
12. Clavel S, Fortin B, Després P, et al. Enteral feeding during chemoradiotherapy for advanced head-and-neck cancer: a single-institution experience using a reactive approach. Int J Radiat Oncol Biol Phys 2011;79:763-9.
13. Nugent B, Parker MJ, McIntyre IA. Nasogastric tube feeding and percutaneous endoscopic gastrostomy tube feeding in patients with head and neck cancer. J Hum Nutr Diet 2010;23:277-84.
14. Koyfman SA, Adelstein DJ. Enteral feeding tubes in patients undergoing definitive chemoradiation therapy for head-and-neck cancer: a critical review. Int J Radiat Oncol Biol Phys 2012;84:581-9.
15. Gibson S, Wenig B, Watkins J. Complications of percutaneous endoscopic gastrostomy in head and neck cancer patients. Ann Otol Rhinol Laryngol 1992;101:46-50.
16. Counihan T, Napolitano L, Heard S. Transnasal insertion of percutaneous endoscopic gastrostomy in a patient with intermaxillary fixation: case report. J Trauma 1996;41:530-2.
17. Lustberg A, Fleisher AS, Darwin PE. Transnasal placement of percutaneous endoscopic gastrostomy with a pediatric endoscope in oropharyngeal obstruction. Am J Gastroenterol 2001;96:936-7.
18. Taller A, Horvath E, Iliás L, et al. Technical modifications for improving the success rate of PEG tube placement in patients with head and neck cancer. Gastrointest Endosc 2001;54:633-6.
19. Desai D, Joshi A, Abraham P, et al. Transnasal percutaneous endoscopic gastrostomy using a standard-diameter gastroscope (9.8 mm). Endoscopy 2005;37:1035-5.
20. Seth A, Puri P, Chandra A. Transnasal percutaneous endoscopic gastrostomy. Trop Gastroenterol 2010;31:54-5.
21. Lustberg AM, Darwin PE. A pilot study of transnasal percutaneous endoscopic gastrostomy. Am J Gastroenterol 2002;97:1273-4.
22. Vitale MA, Villotti G, D'Alba L, et al. Unsedated transnasal percutaneous endoscopic gastrostomy placement in selected patients. Endoscopy 2005;37:48-51.
23. Taller A, Horváth E, Harsányi L, et al. Transnasal percutaneous endoscopic gastrostomy. Endoscopy 1997;29:337.
24. Dumortier J, Lapalus M-G, Pereira A, et al. Unsedated transnasal PEG placement. Gastrointest Endosc 2004;59:54-7.
25. Lin L, Shen H. Unsedated transnasal percutaneous endoscopic gastrostomy carried out by a single physician. Dig Endosc 2013;25:130-5.
26. Cruz I, Mamel JJ, Brady PG, et al. Incidence of abdominal wall metastasis complicating PEG tube placement in untreated head and neck cancer. Gastrointest Endosc 2005;62:708-11.