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HEAD AND NECK

Prospective experience of percutaneous endoscopic gastrostomy tubes placed by otorhinolaryngologist—head and neck surgeons: safe and efficacious

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Abstract Percutaneous endoscopic gastrostomy (PEG) is often the treatment of choice in head and neck cancer (HNC) patients needing long-term nutritional support. Prospective studies on PEG tube placement in an otorhinolaryngologist service are lacking. At our hospital, otolaryngologist—head and neck (ORL-HN) surgeons—have performed PEG insertions for HNC patients since 2008. We prospectively analyzed 127 consecutive HNC patients who received their PEG tubes at the Department of Otorhinolaryngology—head and neck surgery, and evaluated the outcome of PEG tube insertions performed by ORL-HN surgeons. To compare time delays before and after, PEG placement service was transferred from gastrointestinal surgeons to ORL-HN surgeons, and we retrospectively analyzed a separate group of 110 HNC patients who had earlier received PEG tubes at the Department of Gastrointestinal Surgery. ORL-HN surgeons' success rate in PEG insertion was 97.6%, leading to a final prospective study group of 124 patients. Major complications occurred in four (3.2%): two buried bumper syndromes, one subcutaneous hemorrhage leading to an abscess in the abdominal wall, and one metastasis at the PEG site. The most common minor complication was peristomal granulomatous tissue affecting 23 (18.5%) patients. After the change in practice, median time delay before PEG insertion decreased from 13 to 10 days ($P < 0.005$). The proportion of early PEG placements within 0–3 days increased from 3.6 to 14.6% ($P < 0.005$). PEG tube insertion seems to be a safe procedure in the hands of an ORL-HN surgeon. Independence from gastrointestinal surgeons' services reduced the time delay and improved the availability of urgent PEG insertions.

Keywords PEG · Head and neck cancer · Complications · Nutrition · Enteral feeding

Introduction

Percutaneous endoscopic gastrostomy (PEG) is often the treatment of choice to prevent malnutrition in patients with prolonged dysphagia. Patients with head and neck cancer (HNC) sometimes require enteral feeding with PEG, because the disease itself, treatment, or its side effects may impair oral intake and compromise nutritional status.

Departments of Otorhinolaryngology—Head and Neck Surgery (ORL-HNS) usually coordinate and are responsible for the management of HNC. Although PEG insertions are typically carried out in the units of gastrointestinal surgery, performing them in ORL-HNS centers provides advantages both for patients and for health-care providers. These advantages include: (1) cost-effectiveness in terms of performing tube placement simultaneously with other procedures included in pre-treatment work-up or treatment; (2) logistic advantages; (3) minimization of delays; and (4)

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simplification of the treatment process. In several developed countries, otorhinolaryngologists—head and neck (ORL-HN) surgeons—insert PEG tubes for patients with HNC [1], but only nine retrospective studies from four countries have evaluated the outcome of such practice [2–10]. None of them, however, analyzed time gains achieved by independence in practice.

ORL-HN surgeons have performed all PEG tube insertions for HNC patients at the Helsinki University Hospital, Department of ORL-HNS, since 2008. During the first two years after the introduction of the procedure at our department, the process was validated by comparing the outcome of PEG insertions with that of the Department of Gastrointestinal Surgery [3]. The aim of this study was to evaluate changed practice and the complications of PEG tube placements in a prospective setting. We also analyzed current time delay in PEG tube insertions and compared that with our earlier practice, where patients needing PEG were referred to the Department of Gastrointestinal Surgery.

Patients and methods

Our prospective study of HNC patients undergoing PEG tube placement at the Department of ORL-HNS, Helsinki University Hospital, Helsinki, Finland, took place between October 2011 and May 2013. Demographic data, tumor characteristics, indication for PEG tube insertion, time interval between the decision for PEG and the insertion, and details of the procedure were available for 127 consecutive patients. ORL-HN surgeons specialized to surgical oncology and trained to execute the procedure performed all PEG insertions.

We retrospectively reviewed a separate group of 110 HNC patients referred from our department to the Department of Gastrointestinal Surgery, Helsinki University Hospital, for PEG tube placement between 2005 and 2008. This enabled us to assess possible time gains and reduction of delays achieved by adopting this new practice of PEG insertions by ORL-HN surgeons.

The Research Ethics Board approved the study (DNRO 89/13/03/02/2011), and patients provided their written informed consent. The study was registered at ClinicalTrials.gov with identifier NCT02937610.

All patients, except for two with ongoing antibiotic treatment, received a single dose of preoperative intravenous antibiotic prophylaxis (Cefuroxime 1.5 g). The MIC® PEG kit of 20 French (Kimberly-Clark, Zaventum, Belgium) was used for all patients. The PEG placements were carried out with a pull-through technique [11] with two ORL-HN surgeons involved each time. Postoperatively, a trained nurse instructed all patients how to maintain and use the PEG tube, and three to five days after the placement loosened the external bumper during an outpatient visit. Patients were instructed to contact the nurse directly for any problems arising with the PEG tube.

When the patient was able to maintain body weight with oral nutrition only, and when no further treatment that would impact oral intake was scheduled, the PEG tube was removed. Any complications occurring within a year of the PEG placement were recorded, as were data on any PEG tube removal or patient's death. The complications were divided into minor and major according to Grant et al. [12]. After the follow-up period, we reviewed the medical charts and verified and completed all essential data.

Statistical analyses were performed with the SPSS software (IBM® SPSS® Statistics Version 21.0, Armonk, NY). The normality of data distribution was evaluated visually using histograms and with Skewness and Kurtosis measures. Comparisons of time delay between groups were performed with Mann–Whitney U and Pearson χ^2 tests. A two-sided P value of <0.05 was regarded as statistically significant.

Results

In the cohort of 127 HNC patients referred for PEG tube insertion during the study period, the success rate was 97.6%. Insertion failed in three patients: one had severe trismus, and in two cases, reliable determination of a proper site for the PEG on the abdominal wall was not possible. The final study group thus comprised 124 patients with a mean age of 61 (range 31–89) years and male predominance (76.6%). Mean body mass index before PEG tube placement was 25.0 (range 13.2–39.2).

The most common site of the primary tumor was oropharynx (43.5%), followed by oral cavity (24.2%; Table 1). The disease was locally advanced (Stage III–IV) in 84.7% of the patients. The majority received oncological treatment, as the definitive treatment was chemoradiotherapy for 67 (54.0%) patients and surgery combined with radiotherapy for 43 (34.7%) patients. The PEG tube was placed prophylactically in 95 (76.6%) cases. Other procedures were performed simultaneously for 21 (17.9%) patients.

Altogether, 47 (37.9%) patients experienced 51 complications (Table 2). Minor complications affected 43 (34.7%) patients: four of them suffered from two separate complications. Peristomal granulomatous tissue was the most common minor complication affecting 23 (18.5%) patients.

Four (3.2%) patients suffered major complications. Two had buried bumper syndrome (PEG tube's internal bumper migration into the gastric wall). One patient experienced a major postoperative subcutaneous hemorrhage on the fourth postoperative day. This led to an abscess and necrosis in the abdominal wall and caused considerable discharge of stomach contents, warranting laparotomy at

Table 1 Tumor characteristics and treatment details for 124 patients (%)

Site of primary tumor	
Oropharynx	54 (43.5)
Oral cavity	30 (24.2)
Larynx	21 (16.9)
Hypopharynx	7 (5.6)
Nasopharynx	3 (2.4)
Salivary gland	3 (2.4)
Unknown	3 (2.4)
Other	3 (2.4)
T classification	
T0	4 (3.2)
T1	16 (12.9)
T2	27 (21.8)
T3	26 (21.0)
T4	50 (40.3)
Tx	1 (0.8)
Nodal metastases	90 (72.6)
Distant metastases	3 (2.4)
Stage[a]	
I	2 (1.6)
II	12 (9.7)
III	22 (17.7)
IV	83 (66.9)
Treatment modality	
Chemoradiotherapy	67 (54.0)
Surgery and radiotherapy	43 (34.7)
Radiotherapy	8 (6.5)
Surgery	5 (4.0)
Timing of PEG tube placement	
Before treatment	95 (76.6)
During treatment	28 (22.6)
After treatment	1 (0.8)
Simultaneous other procedure[b]	23 (18.5)
Tracheotomy	12 (9.7)
Biopsy	10 (8.1)
Definitive surgery	6 (4.8)
Other procedure	3 (2.4)

BMI body mass index

[a]Data missing in five patients. [b]Simultaneous tracheostomy and biopsy for six patients, simultaneous tracheostomy and definitive surgery for one patient, and simultaneous tracheostomy and cricopharyngeal bar dilatation for one patient

Table 2 Complications in a cohort of 124 patients (%)

Minor	
Peristomal granulation	23 (18.5)
Peristomal infection	8 (6.5)
Discharge of PEG	6 (4.8)
PEG tube occlusion	4 (3.2)
Local hemorrhage	3 (2.4)
Minor abscess	2 (1.6)
Late extrusion of the PEG tube	1 (0.8)
Major	
Buried bumper	2 (1.6)
Major hemorrhage	1 (0.8)
Implantation metastasis	1 (0.8)

PEG percutaneous endoscopic gastrostomy

the Department of Gastrointestinal Surgery. A 50-year-old man with T2N2M0 epidermoid carcinoma in the base of his tongue developed an implantation metastasis at the PEG site five months after PEG tube placement. The metastasis was resected, but thereafter, he developed additional metastases during follow-up in the abdominal wall, omentum, and lungs, and he died 14 months after the diagnosis of the original implantation metastasis.

No deaths occurred during the first week after the procedure. One patient died from underlying liver cirrhosis 18 days after PEG tube placement, leading to a 30-day mortality rate of 0.8%. One-year mortality rate was 21.0% (26 patients out of 124). At the time of death, the PEG tube was still in place in 22 (84.6%) patients. PEG tube had been removed from 81 (82.7%) and was still in place in 17 (17.3%) out of the 98 patients alive at the one-year follow-up. Median time from tube placement to its removal was 130 days (range 41–327).

Figure 1 illustrates the time interval between the decision for PEG insertion and the procedure in the present prospective study population and in HNC patients who had received their PEG tubes at the Department of Gastrointestinal Surgery before PEG insertions began at our department (median for study patients, 10 days; for reference group, 13 days; $P = 0.002$). The proportion of early PEG insertions was higher in the study population (14.6 vs. 3.6% within 0–3 days; $P = 0.004$; and 24.4 vs. 14.5% within 4–6 days; $P = 0.06$).

Discussion

We found PEG placement to be a safe procedure in the ORL-HNS service, with only a few major complications and no procedure-related mortality. Transferring the practice of PEG insertions from gastrointestinal surgeons to ORL-HN surgeons saved time and allowed more prompt response to urgent need for nutritional support. All other reports addressing the outcome of PEG tube placements performed by otorhinolaryngologists are retrospective, with no data on the benefits regarding time gains. Our study on 124 consecutive HNC patients introduced with PEG at our department

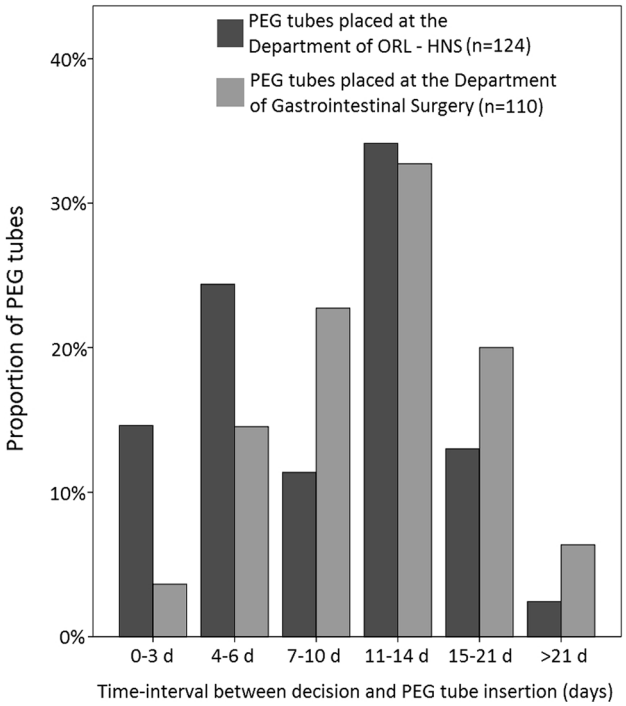

Fig. 1 Time interval between the decision for PEG and the insertion. Comparison of prospective study patients with a retrospective cohort of HNC patients referred to the Department of Gastrointestinal Surgery between 2005 and 2008

between 2011 and 2013 has the advantages of its prospective nature.

Our rate of successful PEG insertion (97.6%) is consistent with other published series of HNC patients, where failure rates vary between 0 and 9% [5, 9, 12–16]. Reported rates of minor complications associated with PEG tube placement range from 0 to 35% and those of major complications between 0 and 8% [3, 5, 12–14, 17–19]. Our major complication rate of 3.2% compares favorably with the corresponding results reported elsewhere. Our relatively high incidence of minor complications (34.7%) can in part have resulted from the prospective recording in this study. Furthermore, granulation at the stoma site might be considered an acceptable problem related to PEG use, and is not reported as a complication in most publications. We included it among the reported events to determine its incidence; this allows us to offer our future patients' accurate information regarding any possible problems with PEG.

Metastatic spread of squamous cell carcinoma to the PEG site in HNC patients is a rare but recognized complication [20–24]. Direct traumatic seeding is the leading hypothesis regarding early PEG-site metastases [21], whereas metastases after 12 months may ensue from spontaneous intermittent tumor shedding from the primary tumor along the gastrointestinal tract, or from systemic spread [20, 23]. In the current series, PEG-site metastasis developed in only one (0.8%) patient, which is in line with reported incidences of 0.5–1% [2, 25, 26]. Risk of metastatic seeding can be reduced by shielding the tumor during procedure, and avoided with using open or radiologically inserted gastrostomy (RIG) [20, 22, 27]. At our institution, availability of RIG is limited and open gastrostomy is a method of choice for patients with failure or anticipated failure of PEG.

PEG placement is recommended only in cases in which the expected need for tube feeding exceeds 30 days [28]. Thus, death or removal of the PEG within a month from insertion can be considered a failure in patient selection. A study by Ehrsson et al. [13] reported a 28-day mortality or removal rate of 10.5% in their HNC population, and Poulose et al. [29] a 30-day mortality of 5% in the subgroup with HNC. In mixed patient populations, 30-day mortality rates after PEG placements range from 2.4 to 22% [30–35]. In the present study, only one patient died, and no tubes were removed within 30 days after the procedure, reflecting high success in patient selection. At our department, every decision to insert PEG is discussed at a multidisciplinary tumor board meeting, and we follow internationally approved guidelines for the use of enteral nutrition [28].

Malnutrition in cancer patients is associated with slower recovery, prolonged hospital stay, and worse prognosis [36]. Therefore, maintaining and improving patient's nutritional status before, during, and after HNC treatment provides several benefits for the patient [37, 38]. Controversy remains regarding the optimal time for PEG placement. The literature supports the advantages of prophylactic PEG to enhance better quality of life with less aspiration, fewer strictures, infrequent hospitalizations, and uninterrupted chemoradiotherapy [39–42], whereas other studies have failed to confirm many benefits from prophylactic versus reactive nutrition through PEG [43, 44]. Moreover, there is concern about the impact of prophylactic PEG insertion on swallowing function as some studies have suggested that this practice may reduce patient's motivation to continue oral intake and thus lead to increased risk of dysphagia [45, 46]. A recent systematic review, however, addressed long-term outcomes in swallowing after prophylactic PEG tube placement in HNC patients and resulted with no consensus [47]. Our rate of prophylactic PEG placements was 76.6%. We follow strict criteria in patient selection, and the optimal timing for initiating the use of the tube is evaluated individually for each patient. We also strongly encourage our patients to continue oral nutrition with at least water on a regular basis.

As head and neck surgeons play the leading role in providing diagnostics and coordinating care for patients with HNC, implementing PEG tube placement to the ORL-HN oncological surgeon's tool kit seems beneficial. The feasibility of PEG insertion in the hands of a head and neck surgeon is a topic of interest [2–10]. The possibility of placing PEG tube for HNC patient simultaneously with other

interventions is clearly beneficial. Additional endoscopies, biopsies, tracheotomy, and dental procedures are easily combined with PEG insertion. Even when other simultaneous procedures are not required, sedation during PEG insertion may be exploited to perform comprehensive physical examination or specific surgical planning. HNC patients often experience pain which may hinder performing comprehensive status in outpatient clinic. In our series, other procedures were performed for only 17.9% of patients. The majority of diagnostic endoscopies and biopsies at our department take place in a consulting room under local anesthesia. Furthermore, a high proportion of patients treated without any surgical interventions (60.5%) restricts combining PEG with definitive surgery. However, in the future, we will focus upon exploiting the benefits of simultaneously performed other procedures.

Since 2008, logistics concerning the management of HNC patients at the Helsinki University Hospital have become more straightforward, because we have omitted a PEG-insertion visit to the Department of Gastrointestinal Surgery from our treatment protocol. Timing of the operation is easier to adjust with the many other visits to health care that these patients require. In addition, centralizing the treatment to one unit and commonly to one physician reduces the burden and stress for the patient and their family. Anesthetists and nursing staff are accustomed to this special patient group, which increases the safety of the procedure and enables efficient follow-up. We demonstrated that independence from other specialties regarding this procedure has reduced median time delay from decision to procedure at our unit by a few days, which is highlighted especially in patients who are malnourished at the time of diagnosis and who may need instant nutritional support. Nutritional compromise hinders therapy completion, impacts survival, and impairs post-treatment quality of life of HNC patients despite the definitive treatment modality [48, 49]. Every effort to avoid any delay in nutritional intervention is, therefore, an essential part of optimizing HNC treatment.

Conclusions

Sufficient nutritional supply is essential in the management of patients with HNC. We demonstrate that when nutritional support is required, a PEG tube can be safely and successfully inserted by ORL-HN oncological surgeons. In this prospective study, major complications after PEG tube placement were rare, but minor problems at stoma site appeared frequently. Therefore, emphasizing accurate stoma care in patient counseling is necessary. The number of unnecessary PEG tube placements can be minimized with careful patient selection. Adding PEG tube insertion to the ORL-HN surgeon armamentarium should reduce the delay in PEG tube placement and simplify HNC patients' treatment process. We suggest that PEG placement should be implemented as a part of the training of ORL-HN oncological surgeons.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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