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Long-Term Gastrostomy Tube Dependence More Likely In Head and Neck Cancer Survivors without Partners

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Abstract

Background—We evaluated factors associated with long-term dependence on percutaneous endoscopic gastrostomy (PEG) tubes.

Methods—154 patients receiving treatment at the University of Alabama at Birmingham between 2002 and 2004 who underwent PEG tube placement were identified through retrospective review of medical records. Using binary logistic regression, we evaluated the association of various factors on long-term dependence on PEG tubes.

Results—25.3% of survivors remained PEG tube dependent at 12 months. The odds of long-term PEG-tube dependence were greater for those who did not have partners compared with those who had partners (OR 3.33, $p=0.004$), for patients who received radiation therapy (OR 6.21, $p=0.018$), and for those who had a tracheotomy in place for longer than thirty days (OR 4.328, $p=0.035$).

Conclusions—Data suggest that interventions targeted at reducing long-term dependence on PEG tubes take into account not only treatment-related factors, but also the important role that social support plays.

Keywords

Gastrostomy Tubes; Head and Neck Cancer; Long-term PEG Dependence; Survivors; Social Support

Introduction

Advancements in treatment for head and neck cancer over the past decade have resulted in maintenance of organ anatomy, increased tumor control, and increased survival; but not without severe oral complications.^{1, 2, 3, 4, 5, 6, 7, 8, 32} In fact, dysphagia is one of the most serious and persistent complications associated with all treatments for head and neck cancer patients, particularly radiation therapy.^{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21} Percutaneous endoscopic gastrostomy (PEG) tubes are routinely placed in head and neck cancer patients,

both prior to and following onset of treatment, in order to provide temporary nutritional support until adequate oral intake is possible following completion of treatment.^{22,23} Unfortunately, the resumption of oral intake does not occur in all patients, and dependence on feeding tubes has been defined as one of the most debilitating late toxicities associated with treatment for head and neck cancers.²⁴

Research, including our own work, has just begun to examine patient, tumor, and treatment factors associated with long-term dependence on PEG tubes in head and neck cancer survivors.^{24, 25, 26, 27, 28, 29} Patient characteristics associated with long-term dependence on PEG tubes include older age, preoperative weight loss, and heavy alcohol use. Tumor characteristics include tumor site (larynx/hypopharynx primary site and pharyngeal tumors) and advanced stage disease. Treatment-related factors associated with long-term dependence on PEG tubes include neck dissection after chemoradiation therapy and the addition of chemotherapy to definitive radiation therapy. To our knowledge, no study has investigated the important role that social support may play in long-term dependence on PEG tubes in head and neck cancer survivors.

Recent work has demonstrated that men without partners who participated in Radiation Therapy Oncology Group (RTOG) head and neck trials experienced worse overall survival compared with men who had partners; and this is true for all patients diagnosed with any type of cancer.^{30, 31} Other work has similarly found that head and neck cancer patients with low ratings of perceived post-treatment social support experienced poorer health related quality of life across several domains.³² These findings are not surprising as a large body of research over an extended period of time provide strong and compelling evidence linking social support and networks with positive health outcomes.^{33, 34} Our own recent work has described the important role that social support, and particularly spousal caregivers, play in providing nutritional support to older adults with cancer, including patients with head and neck cancer.^{35,36} Head and neck cancer survivors without partners may lack necessary social support that might facilitate removal of PEG tubes.

Thus, the aim of this study was to evaluate whether head and neck cancer survivors who did not have partners were more likely than survivors with partners to experience long-term dependence on percutaneous endoscopic gastrostomy (PEG) tubes. We hypothesized that survivors without partners would be more likely to be dependent on PEG tubes 12 months following treatment compared with survivors with partners.

Materials and Methods

Participants

One-hundred fifty-four patients who had a PEG tube placed prior to treatment for carcinoma of the oral cavity, oropharynx, hypopharynx, and larynx at the University of Alabama at Birmingham (UAB) and who were seen in the Otolaryngology Clinic between 2002 and 2004 were included in the study. Additionally, patients had to have survived and to have follow-up of at least 12 months post-treatment in order to determine whether the PEG tube was still in place or less if the PEG tube was removed earlier. Exclusion criteria included patients receiving a PEG tube for carcinoma of the nasopharynx, maxillary sinus, or skull base, lymphoma, neurological defects, ventilatory dependence, or palliative treatments.

Design

The study used a retrospective cohort design. Medical records were selected for review based upon the criteria described above. The study protocol was reviewed and approved by the University of Alabama at Birmingham Institutional Review Board.

Measurement

The dependent measure was long-term dependence on PEG-tubes, defined as PEG-tube placement > 12 months following treatment. The primary independent variable was partner status defined as either married or living with someone as a partner (yes or no). Independent variables that were controlled for in our analyses, because it was thought that they might affect long-term dependence on PEG-tube dependence, included patient characteristics, tumor characteristics, and treatment characteristics.

Patient characteristics. Patient characteristics included age, gender, race, and insurance status (yes or no).

Tumor characteristics. Tumor characteristics included cancer site, TMN stage, and overall stage.

Treatment characteristics. Treatment characteristics included: surgery (including the subsets of tracheotomy, free-flap reconstruction, and salvage surgery), radiation, chemotherapy, or a combination of any of the three.

Statistical Analysis

Descriptive statistics were used to characterize the sample. Chi-square and t-test statistics were used to evaluate bivariate associations between PEG-tube dependence and the independent variables. A multivariate binary logistic regression was performed to analyze the effect of partner status, while controlling for the other independent variables that were statistically significant in the bivariate analyses, on long-term PEG-tube dependence. A p -value of < 0.05 was considered statistically significant.

Results

Patient Characteristics

One hundred fifty-four patients were identified who met the study criteria. Of those 154 patients, 16 patients had 17 additional PEG procedures performed from 2002 to 2007. Twelve patients had 13 secondary PEG tubes placed for recurrent disease. Two patients had additional feeding tubes placed for chronic dysphagia. One patient had a second PEG tube placed for aspiration pneumonia, and one patient had an additional feeding tube placed for ventilator dependence. Table 1 presents baseline characteristics of patients broken down according to whether or not a PEG tube was in place at 12 months following treatment. The patients included 116 men and 38 women ranging in age from 31 to 85 years, with a mean age of 59.6 years. The majority of patients were white (83.1%) and insured (84.4%). Patients who were African American were more likely to have a PEG tube in place at 12 months. Thirty-three patients (21.4%) had a previous history of treatment for head and neck cancer. The period of observation that commenced 12 months following treatment ranged from 1 month to 58 months.

Partner Status. Thirty-seven percent of patients did not have a partner. Those without partners were more likely to have PEG tubes in place at 12 months.

Tumor Characteristics

The most common head and neck sites were the oropharynx (37.0%), oral cavity (35.1%), and larynx (23.4%). Advanced stage was the most common presentation with 36.4% of patients presenting with a T4 lesion, 34.4% presenting with a T3 lesion, and 22.7% presenting with a T2 lesion. Nearly all patients presented with stage III or IV disease (89.5%) (Table 1).

Treatment Characteristics

Patients in the study were treated either with primary radiation (5%), combined chemoradiation (28%), primary surgical extirpation (21%), surgery with post-operative radiation (27%), or salvage surgery for recurrent disease after primary radiation (15%).

Sixty-seven percent of the patients underwent surgery. Free-flap reconstruction was performed in 53.2% of the patients and 15% of patients underwent salvage surgery. Thirteen (8.4%) of the patients had a tracheotomy tube for longer than 30 days (Table 1). Seventy-nine percent of patients received radiation treatment, and receipt of radiation therapy was significantly associated with PEG tube dependence at 12 months. Primary radiation was performed in 48.7% of the patients and post-operative radiation was given to 31.2% of the patients. Chemotherapy was given to 37.7 percent of the patients (Table 1).

Long-Term PEG Tube Dependence

The majority of patients (74.7%) had their PEG tube removed prior to 12 months. Correspondingly, 25.3% had a PEG tube at 12 months; and 16.2% had a PEG tube at 24 months. Eighty percent of patients who had a PEG tube at 12 months still had a PEG tube in place at 24 months.

Logistic Regression

The results of the logistic regression model are presented in Table 2. Based upon bivariate analyses, four covariates were included in our logistic regression model: partner status (with versus without a partner), race (white versus African American), radiation therapy (yes versus no), and tracheotomy tube dependence > 30 days (yes versus no). Findings reveal that the odds of long-term PEG-tube dependence were greater for those who did not have partners compared with those who had partners (OR 3.33, $p=0.004$), for patients who received radiation therapy (OR 6.21, $p=0.018$), and for those who had a tracheotomy in place for longer than thirty days (OR 4.328, $p=0.035$). Race was not statistically significant.

Discussion

Long-term nutritional support using PEG tubes may be beneficial to patients undergoing treatment for head and neck cancer, especially for those with advanced stage cancer who will undergo aggressive radiation therapy. Use of PEG tubes is not without risk, though, including likelihood of long-term dependence of use. Debate exists regarding the timing of the placement of a PEG tube in these patients. While this controversy exists, the focus of this study was to identify those patients who had a PEG tube placed and whether presence of a partner influenced long-term dependence.

There is no consensus on the definition of long-term PEG tube use. Schweinfurth et al. reported long term use to be more than six weeks and less than one year following treatment.³³ Gardine et al. defined long-term enteral support to be more than 30 days.³⁴ That study included patients with nasogastric, esophagostomy, and gastrostomy tubes. The present report uses a broader definition for long-term use. Because treatment for head and neck cancer may last up to three months in duration, and recovery may also take several months, tube feeding after 12 months of completion of treatment was determined to be long-term. In our study, we found that approximately one-fifth of patients who undergo PEG tube placement to support nutritional feeding during treatment for head and neck cancer still have the tube in place within the first year; and patients with PEG tubes at one year are not likely to have the tube removed within a year later.

Patients undergoing treatment for head and neck cancer are likely to experience significant problems with nutritional intake.^{4, 5} Anti-cancer therapies designed to treat head and neck cancer patients contribute significantly to nutritional problems. This is related to both the decreased nutrient intake associated with the side effects of the treatments and to the increased nutrients that are required because of the increased metabolic needs and the physical stressors associated with the duration and intensity of the treatments. Acute and late toxicity that occurs during and following radiation treatment, including mucositis, infection, salivary gland dysfunction, taste dysfunction, pain, xerostomia, rampant dental carries, soft tissue necrosis, and osteonecrosis, is the result of the high volume and doses of the radiation treatment.³⁷ Patients who undergo surgery may additionally experience functional and anatomical impairments that interfere with chewing and swallowing. Finally, in addition to experiencing ulcerative oral mucositis and bacterial and viral infections, patients who undergo chemotherapy are likely to experience nausea and vomiting.

Two treatment related factors were significantly related to long-term PEG tube dependence in this study: receipt of radiation as part of treatment (OR 6.21, $p=0.018$) and presence of a tracheotomy tube for longer than 30 days (OR 4.328 $p=0.035$). In contrast, surgery (OR 1.72, $p=0.431$), or the addition of chemotherapy (OR 1.27, $p=0.729$) were not found to be significantly associated with dependence. These findings are unexpected as it is believed commonly that the effects of surgery on the head and neck may significantly contribute to severe swallowing disability.^{36, 37, 38} However, in two other studies, it was found that free flap reconstruction may provide reasonable swallowing function in patients undergoing resection of head and neck cancer.^{39, 40} This suggests a plausible explanation for the findings of this study.

The one surgical factor that did demonstrate an association with long-term PEG tube use was the presence of a tracheotomy for more than 30 days. Leder et al. reported that a tracheotomy tube did not predispose a head and neck cancer patient to aspiration or that decannulation led to improved swallowing function.⁴¹ Instead, they concluded that a tracheotomy tube better indicated other comorbidities that predispose a patient to dysphagia. While this present study identified patients with tracheotomies to be at risk for long-term PEG use, it did not identify the cause.

Patient characteristics directly influence nutritional status in head and neck cancer patients, as well. Risk factors associated with head and neck cancer, including low socioeconomic status, male gender (especially if living alone), older age, and the heavy use of alcohol and tobacco, are also the same risk factors which may affect dietary intake and quality of diet.³⁸ While most studies have focused on tumor and treatment related factors that lead to malnutrition, Locher et al. identified social factors that contribute to nutritional difficulties in adults with cancer and found that matters related to nutrition activities were a source of significant distress for patients and caregivers.^{35, 36} Additionally, patients who are older, who have significant preoperative weight loss, and those with a history of heavy alcohol use are noted to be at risk for long-term enteral support.^{33, 34, 35}

This study has identified another important patient-related factor associated with long-term PEG tube dependence—namely being without a partner. Single patients were found to be 3.33 times more likely to use their PEG tube at 12 months than patients with partners ($p=0.004$). Recent work has demonstrated that men without partners who participated in Radiation Therapy Oncology Group (RTOG) head and neck trials experienced worse overall survival compared with men who had partners.³⁹ Our own recent work has described the important role that social support, and particularly spousal caregivers, play in providing nutritional support to older adults with cancer, including patients with head and neck cancer.^{35, 36} Head and neck cancer survivors without partners may lack necessary social

support that might facilitate removal of PEG tubes. Work by Karnell et al. support this observation; they suggest that clinical interventions focused on social support have the potential to improve survivorship of head and neck cancer patients across multiple domains, including eating.³²

The mechanisms by which such social support may operate is varied. Survivors may be encouraged to engage in healthy behaviors, including consuming food orally. Additionally, eating is a social activity that requires others' presence for its full enjoyment; without partners, patients may be less motivated to have PEG tubes removed simply to eat alone. Moreover, food and eating activities require much work; and reliance on a PEG tube might require less effort than engaging in all of the activities required to feed oneself orally. Finally, receipt of social support, especially by a partner, may directly or indirectly enhance one's personal competence and enable one to access relevant nutritional supportive resources or services. This may be especially important for head and neck cancer survivors who experience dysphagia and might need supportive services by speech pathologists and dieticians.

It may also be the case that partner status is a proxy for late stage of presentation of cancer, such that patients without partners are more likely to present with advanced illness which may be associated with long-term PEG tube use. While our findings on tumor characteristics were not statistically significant, the observed associations were in the expected directions. Also, tumor stage appeared important such that patients with T4 tumors were 3.67 times more likely to have a feeding tube at one year ($p=0.097$). In post-hoc analysis, we examined whether tumor stage and partner status were associated with one another. There appeared to be a trend with patients without partners presenting with later stage disease, but this finding was not statistically significant. Lack of association in both of these cases may be attributable to small sample size and future investigation is clearly warranted.

Other tumor characteristics, namely tumor site, have also been implicated in long-term PEG tube use. The anatomical location of the tumor restricts swallowing leading to reduced caloric intake. Again, Schweinforth et al. noted that tumors involving the base of the tongue and Gardine et al. reported that advanced stage tumors predict the need for long-term PEG feeding.^{33, 34} It was noted that tumor site approached significance with patients having tumors of the oropharynx and hypopharynx to be 2.5 times more likely to rely on PEG tube feeding at one year ($p=0.112$).

It is important to note that race was significantly associated with long-term PEG tube use in our bivariate analysis, but not in the multivariate logistic regression model. We performed several sensitivity analyses to evaluate whether the effect of race was masked by marital status—that is, were African Americans less likely to have a partner. This was not the case. Race may be an independent predictor of long-term dependence of PEG-tubes, but our sample size was not sufficiently large enough to detect a statistically significant relationship. This disparate finding warrants further investigation.

Our study relied upon one single measure of social support (i.e., the presence or absence of a partner). There are certainly other sources of social support that are important, as well. Additionally, we do not know precisely how social support operates for head and neck cancer patients. Future work that includes: 1) a more comprehensive assessment of sources of social support for head and neck cancer patients and survivors and 2) elucidation of the mechanisms by which social support works to improve quality of life, especially as it relates to eating behavior, is clearly warranted.

Our study is limited by its relatively small sample size, utilization of a single site, lack of inclusion of some potentially relevant data (e.g., comorbidity), and lack of a randomized

controlled design. Nonetheless, findings from our study contribute to the growing evidence base regarding how to provide better nutritional support for patients undergoing treatment for head and neck cancer. Further health services research using large databases like the SEER-Medicare database and randomized clinical trials are necessary to determine more definitively the benefits and risks of PEG tube placement in head and neck cancer patients and to evaluate the role of social support in supportive care interventions.

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Table 1

Baseline Characteristics of Study Sample

Variables	Entire Sample (N=154)	PEG-Free at 12 Months (N=115)	PEG-Dependent at 12 Months (N=39)	P-Value
Patient Characteristics	Mean (SD, Range) or (%)			
Age	59.6 (10.6, 31-85)	60.3 (10.7)	57.6 (10.1)	.056
Gender (%)				.260
Male	116 (75.3)	84 (73.0)	32 (82.1)	
Female	38 (24.7)	31 (27.0)	7 (17.9)	
Race (%)				.026
White	128 (83.1)	100 (87.0)	28 (71.8)	
African-American	25 (16.2)	14 (12.2)	11 (28.2)	
Asian	1 (0.6)	1 (0.9)		
Partner Status				.002
With Partner	97 (63.0)	81 (70.4)	16 (41.0)	
Without Partner	57 (37.0)	34 (29.6)	23 (59.0)	
Insurance Status				.071
Insured	130 (84.4)	101 (87.8)	29 (74.4)	
Uninsured	24 (15.6)	14 (12.2)	10 (25.5)	
Tumor Characteristics				
Site				.112
Oral Cavity	54 (35.1)	44 (38.3)	10 (25.6)	
Oropharynx	57 (37.0)	38 (33.0)	19 (48.7)	
Hypopharynx	6 (3.9)	4 (3.5)	2 (5.1)	
Larynx	36 (23.4)	28 (24.3)	8 (20.5)	
Hypopharynx/Oral Cavity	1 (0.6)	1 (0.9)	0	
Tumor Stage (T Classification)				.062
T1	6 (3.9)	6 (5.2)	0	
T2	35 (22.7)	29 (25.2)	6 (15.4)	
T3	53 (34.4)	40 (34.8)	13 (33.3)	
T4	56 (36.4)	36 (31.3)	20 (51.3)	
TX	4 (2.6)	4 (3.5)	0	
Overall Stage (N=152)				.783
I	2 (1.3)	2 (1.8)	0	
II	14 (9.2)	11 (9.7)	3 (7.7)	
III	34 (22.4)	26 (23.0)	8 (20.5)	
IV	102 (67.1)	74 (65.5)	28 (71.8)	
Treatment Characteristics				
Surgery	103 (66.9)	78 (67.8)	25 (64.1)	.669

Variables	Entire Sample (N=154)	PEG-Free at 12 Months (N=115)	PEG-Dependent at 12 Months (N=39)	P-Value
Patient Characteristics	Mean (SD, Range) or (%)			
Free Flap	82 (53.2)	61 (53.0)	21 (53.8)	.991
Salvage Surgery	23 (14.9)	16 (13.9)	7 (28.0)	.726
Radiation**	122 (79.2)	85 (73.9)	37 (94.9)	.005
Primary	51 (33.1)	37 (32.2)	14 (35.9)	.669
Post-operative	48 (31.2)	32 (27.8)	16 (41.0)	.124
Chemotherapy	58 (37.7)	38 (33.0)	20 (51.3)	.056
TrTracheotomy Tube Dependence >30 days	13 (8.4)	5 (4.3)	8 (20.5)	.004

Table 2

Logistic Regression Model for Long-term PEG Dependence.

Variable	Odds Ratio	Regression Coefficient	Chi-Square	P-Value
African-American	1.546	.436	.653	.419
Without Partner	3.327	1.202	8.374	.004
Radiation	6.211	1.826	5.583	.018
Tracheotomy Tube Past 30 days	4.328	1.465	4.462	.035