Percutaneous Endoscopic Gastrostomy Tube Timing in Head and Neck Cancer Surgery

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Objective: To examine outcomes and complications in patients receiving a percutaneous endoscopic gastrostomy (PEG) tube on the same day of head and neck cancer (HNC) surgery versus later in hospitalization.

Methods: The 2003–2014 Nationwide Inpatient Sample was queried for patients undergoing ablative HNC procedures who had a PEG tube placed. Cases were stratified by PEG tube timing into an early (on the same day as ablative procedure) and late (later in hospitalization) group. Demographics and outcomes were compared using univariate analysis and multivariate regression modeling.

Results: A total of 4,068 cases were included, of which 2,206 (54.23%) underwent early PEG and 1,862 (45.77%) received a late PEG tube. Late PEG tube patients were more likely to have a diagnosis of malnutrition (18.0% vs. 15.3%, p = 0.018) or renal failure (4.7% vs. 3.0%, p = 0.006). On multivariate regression analysis, patients receiving late PEG tubes were more likely to experience aspiration pneumonia, acute pulmonary disease, infectious pneumonia, sepsis, hematoma, wound disruption, surgical site infection, and fistula formation (all p < 0.05). The mean length of stay and hospital charges in the late PEG group were significantly greater (17.1 vs. 12.6 days, p < 0.001) and ($159,993 vs. $125,705, p < 0.001), respectively.

Conclusions: Patients undergoing HNC who received a PEG tube on the day of ablative surgery had lower complication rates, shorter length of stay, and decreased hospital costs compared to those who had a PEG tube placed later during hospitalization. Further research is needed to determine the causal relationships behind these findings.

Key Words: head and neck surgery, head and neck cancer, nationwide inpatient sample, nutrition, percutaneous endoscopic gastrostomy tube.

Level of Evidence: 3

INTRODUCTION

Gastrostomy tube placement in patients with head and neck cancer (HNC) has become a customary practice for the prevention and treatment of malnutrition and other HNC-related complications. 50%–60% of patients undergoing HNC treatment receive a gastrostomy tube either prior to, or during treatment.1,2 Still, there remains debate about the absolute need for tube placement, and whether prophylactic or reactive gastrostomy tubes are most beneficial, with some arguing that proactive placement reduces the risk of malnutrition, improves quality of life, reduces hospital stays and decreases health care costs.3,4 On the other hand, gastrostomy tube placement is not without risk, with serious complications occurring in up to 10% of HNC patients, including infection, bowel perforation, and even death.5,6 In addition, it has been found that prophylactic gastrostomy tubes may go unused and may be unnecessary in up to 48% of HNC patients and that compared to nasogastric tubes (NGTs), gastrostomy tubes can lead to higher rates of prolonged dysphagia.7–10 As such, no consensus exists on the absolute need or timing of gastrostomy tube placement in HNC patients.

When the decision is made to place a gastrostomy tube and oncological surgery is planned, we also do not know if there are any harms or benefits to placing the tube at the time of oncologic surgery, or if postponed placement is a better alternative. To shed light on the decision of timing of gastrostomy tube placement in surgical HNC patients, we designed this retrospective study of the Nationwide Inpatient Sample (NIS) database with the goal of comparing outcomes and complications of patients receiving a percutaneous endoscopic gastrostomy (PEG) tube on the same day of HNC surgery (early PEG) versus later in hospitalization (late PEG).

METHODS

The NIS database was utilized for this retrospective analysis. The NIS is an administrative database that contains inpatient discharge data from over 7 million hospital stays per year,
representing 20% of all discharges from US nonfederal hospitals. All states that participate in the Healthcare Cost and Utilization Project are included. The database provides information on patient demographics, hospital characteristics, diagnosis codes, procedure codes, length of stay (LOS), hospital charges, and mortality. This study was exempt from review by the Rutgers New Jersey Medical School Institutional Review Board due to the fact that all NIS data are de-identified.

The 2003–2014 NIS was queried using International Classification of Diseases, 9th Edition (ICD-9) codes for adult patients with an HNC diagnosis who also underwent an ablative surgical procedure. Cases were only included if the ablative procedure appropriately corresponded to the primary site of a cancer.

**TABLE I.** Patient Demographics, Comorbidities, and Hospital Characteristics.

|                        | Same day PEG, % (n = 2,206) | Late PEG, % (n = 1,862) | p-value |
|------------------------|-----------------------------|-------------------------|---------|
| Age, mean (years)      | 62.6 +/- 12.3               | 63.8 +/- 12.1           | 0.001   |
| Gender                 |                             |                         |         |
| Male                   | 70.6                        | 70.4                    |         |
| Female                 | 29.4                        | 29.6                    |         |
| Race                   |                             |                         | 0.026   |
| White                  | 71.4                        | 69.6                    |         |
| Black                  | 10.1                        | 9.8                     |         |
| Other                  | 11.1                        | 14.1                    |         |
| Unknown                | 7.4                         | 6.4                     |         |
| Insurance              |                             |                         | 0.057   |
| Medicare               | 46.0                        | 47.7                    |         |
| Medicaid               | 14.4                        | 15.5                    |         |
| Private                | 33.6                        | 29.6                    |         |
| Other                  | 6.2                         | 7.1                     |         |
| Primary site           |                             |                         | 0.042   |
| Larynx                 | 27.9                        | 28.7                    |         |
| Hypopharynx            | 4.4                         | 5.0                     |         |
| Oral cavity            | 37.6                        | 35.2                    |         |
| Oropharynx             | 25.6                        | 24.7                    |         |
| Multiple               | 4.4                         | 6.3                     |         |
| Neck dissection        |                             |                         | 0.013   |
| Yes                    | 59.1                        | 55.3                    |         |
| No                     | 40.9                        | 44.7                    |         |
| Pedicle or flap        |                             |                         | 0.580   |
| Yes                    | 20.1                        | 20.8                    |         |
| No                     | 79.9                        | 79.2                    |         |
| Radiation history      |                             |                         | 0.542   |
| Yes                    | 9.7                         | 9.2                     |         |
| No                     | 90.3                        | 90.8                    |         |
| Comorbidity            |                             |                         |         |
| Hypertension           | 50.9                        | 52.3                    | 0.357   |
| Malnutrition           | 15.3                        | 18.0                    | 0.018   |
| Diabetes               | 15.2                        | 16.1                    | 0.441   |
| Obesity                | 4.7                         | 5.0                     | 0.629   |
| Chronic pulmonary      | 25.7                        | 27.8                    | 0.130   |
| Congestive heart failure | 4.9                       | 6.0                     | 0.152   |
| Hypothyroidism         | 11.5                        | 12.3                    | 0.415   |
| Liver disease          | 3.1                         | 3.8                     | 0.201   |
| Renal failure          | 3.0                         | 4.7                     | 0.006   |
| Hospital type          |                             |                         | 0.580   |
| Rural                  | 2.1                         | 2.6                     |         |
| Urban not teaching     | 13.1                        | 13.1                    |         |
| Urban teaching         | 84.8                        | 84.3                    |         |
| Hospital size          |                             |                         | 0.017   |
| Small                  | 11.2                        | 8.6                     |         |
| Medium                 | 16.7                        | 18.2                    |         |
| Large                  | 72.0                        | 73.2                    |         |
| Hospital region        |                             |                         | <0.001  |
| Northeast              | 20.3                        | 25.6                    |         |
| Midwest                | 12.6                        | 14.8                    |         |
| South                  | 46.2                        | 38.3                    |         |
| West                   | 20.9                        | 21.3                    |         |

**TABLE II.** Multivariate Logistic Regression of Odds of Receiving a Late PEG Versus Early PEG.

|                        | Odds Ratio | 95% Confidence Interval | p-value |
|------------------------|------------|-------------------------|---------|
| Age                    | 1.010      | 1.003–1.017             | 0.005   |
| Gender                 |            |                         |         |
| Male                   | Ref        |                         |         |
| Female                 | 1.016      | 0.884–1.168             | 0.824   |
| Race                   |            |                         |         |
| White                  | Ref        |                         |         |
| Black                  | 0.932      | 0.749–1.159             | 0.526   |
| Other                  | 1.270      | 1.045–1.543             | 0.016   |
| Unknown                | 0.927      | 0.721–1.192             | 0.555   |
| Insurance              |            |                         |         |
| Medicare               | Ref        |                         |         |
| Medicaid               | 1.199      | 0.963–1.492             | 0.105   |
| Private                | 1.027      | 0.861–1.225             | 0.768   |
| Other                  | 1.340      | 1.014–1.770             | 0.040   |
| Primary site           |            |                         |         |
| Larynx                 | Ref        |                         |         |
| Hypopharynx            | 1.100      | 0.806–1.501             | 0.546   |
| Oral cavity            | 0.982      | 0.820–1.176             | 0.844   |
| Oropharynx             | 1.016      | 0.844–1.223             | 0.866   |
| Multiple               | 1.470      | 1.089–1.983             | 0.012   |
| Neck dissection        |            |                         |         |
| Yes                    | Ref        |                         |         |
| No                     | 0.872      | 0.753–1.010             | 0.068   |
| Malnutrition           |            |                         |         |
| Yes                    | 1.212      | 1.024–1.435             | 0.026   |
| No                     | Ref        |                         |         |
| Renal failure          |            |                         |         |
| Yes                    | 1.437      | 1.030–2.004             | 0.033   |
| No                     | Ref        |                         |         |
| Hospital size          |            |                         |         |
| Small                  | Ref        |                         |         |
| Medium                 | 1.400      | 1.090–1.800             | 0.009   |
| Large                  | 1.275      | 1.029–1.579             | 0.027   |
| Hospital region        |            |                         |         |
| Northeast              | Ref        |                         |         |
| Midwest                | 0.947      | 0.764–1.173             | 0.616   |
| South                  | 0.665      | 0.564–0.784             | <0.001  |
| West                   | 0.803      | 0.665–0.971             | 0.024   |

**PEG** = percutaneous endoscopic gastrostomy.
cases were then selected if they also underwent a PEG procedure. The remaining cases were then stratified into early PEG and late PEG cohorts using a variable that provides the day of admission that each coded procedure was performed. The day of the earliest ablative surgery was compared to the day of the PEG procedure. Patients who underwent a PEG procedure on the same day as the ablative surgery were stratified into the early PEG group, and patients who underwent a PEG procedure on a day after the ablative surgery were stratified into the late PEG group. Patients were excluded if they underwent a PEG procedure on a day prior to the ablative surgery, if they underwent a PEG procedure over 30 days after the ablative surgery, and if data regarding procedure day was missing for any relevant procedure.

Patient demographics, comorbidities, procedure factors, and hospital characteristics were compared between the early and late PEG cohorts. The primary outcomes of interest were mortality, surgical complications, and medical complications. Other outcomes assessed were LOS and hospital charges.

All patient, comorbidity, and hospital variables were assessed using univariate analysis to identify any significant differences between the groups at baseline. A multivariate regression model was constructed with age, gender, race, insurance, and significant variables from univariate analysis as covariates to identify independent predictors of undergoing a late PEG. All outcomes and complications were evaluated with univariate analysis. Each outcome or complication variable that was significant in univariate analysis was set as the dependent variable in separate multivariate regressions with the following covariates: age, race, sex, insurance, PEG timing cohort, and significant baseline variables from univariate analysis. Two multivariate linear regressions were performed with the same covariates with LOS and hospital charges as the dependent variables. Pearson’s chi square ($\chi^2$), Fisher’s exact test, and independent t-tests were used as appropriate in all univariate analyses. The threshold for statistical significance was set at $p < 0.05$. SPSS version 22 (IBM, Armonk, NY) was used for all statistical analyses.

## RESULTS

### Demographics/Comorbidities

A total of 4,068 cases were included, of which 2,206 (54.2%) underwent early PEG and 1,862 (45.8%) late PEG. Demographics and comorbidities are listed in Table I. Late PEG patients were older than early PEG patients (mean age 63.8 vs. 62.6, $p = 0.001$). Gender composition and insurance status were similar between groups, and the late PEG group had more patients of other races (14.1% vs. 11.1%, $p = 0.026$). Neck dissection was performed more in the early PEG group (59.1% vs. 55.3%, $p = 0.013$) with no difference in pedicle or flap reconstruction. Previous radiation history was similar between the groups. The late PEG cohort had more patients with renal failure (4.7% vs 3.0%, $p = 0.006$) and malnutrition (18.0% vs. 15.3%, $p = 0.018$). There were no differences in hypertension, diabetes, obesity, chronic

### Table III.

| Outcomes | Early PEG, % ($n = 2,226$) | Late PEG, % ($n = 1,914$) | $p$-value |
|----------|-----------------------------|---------------------------|-----------|
| Death    | 1.1                         | 1.3                       | 0.458     |
| LOS, mean (days) | $12.6 \pm -10.5$ | $17.1 \pm -12.2$ | $<0.001$ |
| Charges, mean ($) | $125,705 \pm -110,868$ | $159,993 \pm -138,788$ | $<0.001$ |
| Medical complications | 28.8 | 37.8 | $<0.001$ |
| Cardiac  | 3.8                         | 4.7                       | 0.127     |
| PEG complication | 1.7 | 2.2 | 0.270 |
| Aspiration pneumonia | 4.1 | 7.8 | 0.001 |
| Acute pulmonary edema or failure | 13.7 | 16.5 | 0.013 |
| Acute renal failure | 2.9 | 5.1 | $<0.001$ |
| DVT/PE   | 2.6                         | 3.8                       | 0.032     |
| Infectious pneumonia | 8.1 | 11.9 | $<0.001$ |
| Urinary tract infection | 3.8 | 5.1 | 0.045 |
| Sepsis   | 2.4                         | 4.2                       | 0.001     |
| Surgical complications | 27.9 | 36.4 | $<0.001$ |
| Shock    | 0.2                         | 0.3                       | 0.740     |
| Hematoma, hemorrhage, seroma | 5.1 | 7.5 | 0.002 |
| Accidental puncture | 0.8 | 1.1 | 0.394 |
| Wound disruption | 6.2 | 11.1 | $<0.001$ |
| Surgical site infection | 5.4 | 6.8 | 0.057 |
| Fistula formation | 2.6 | 6.6 | $<0.001$ |
| Blood transfusion | 16.0 | 17.0 | 0.403 |
| Non-healing wound | 0.2 | 0.3 | 1.000 |
| Other surgical complication | 0.9 | 1.1 | 0.590 |
| Any complications | 45.1 | 57.0 | $<0.001$ |

DVT = deep venous thrombosis; LOS = length of stay; PE = pulmonary embolism; PEG = percutaneous endoscopic gastrostomy.

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pulmonary disease, congestive heart failure, hypothyroidism, and liver disease. Late PEG patients were more likely to be treated at the median or large size hospitals (p = 0.017). The south was the only region with a greater proportion of early PEG patients (p < 0.001).

On multivariate analysis, late PEG patients were more likely to be older (odds ratio (OR) 1.68, p = 0.005), acute renal edema (OR 1.87, p = 0.001), acute pulmonary edema (OR 1.46, p = 0.023), infectious pneumonia (OR 1.49, p = 0.001), sepsis (OR 1.68, p = 0.005), acute renal failure (OR 1.66, p = 0.004), DVT/PE (OR 1.44, p = 0.047), hematoma, hemorrhage, or seroma (OR 1.45, p = 0.005), wound disruption (OR 1.88, p < 0.001), surgical site infection (OR 1.33, p = 0.035), and fistula formation (OR 2.61, p < 0.001) (Table IV). When combining complications into medical and surgical categories, the late PEG group had higher odds of both medical (OR 1.43, p < 0.001) and surgical (OR 1.44, p < 0.001) complications. Multivariate linear regression showed that receiving a late PEG was associated with longer LOS (B = 4.18, p < 0.001) and greater hospital charges (B = 34,878, p < 0.001) (Table V).

**Outcomes/Complications**

The early and late PEG groups had similar rates of mortality (1.1% vs 1.3%, p = 0.458) (Table III). The late PEG group had a greater rate of any surgical complication (36.4% vs 27.9%, p < 0.001) and any medical complication (37.8% vs 28.8%, p < 0.001). Specifically, patients receiving late PEG tubes had greater rates of hematoma/hemorrhage/seroma, wound disruption, fistula formation, aspiration pneumonia, infectious pneumonia, acute pulmonary edema or failure, acute renal failure, DVT/PE, urinary tract infection, and sepsis (all p < 0.05). There were no differences in the rates of shock, accidental puncture, surgical site infection, blood transfusion, non-healing wound, other surgical complications, and cardiac complications. There were no differences in complications of PEG placement or other PEG-related complications in the early and late PEG groups. Furthermore, the mean LOS and hospital charges in the late PEG group were significantly greater compared to the early PEG group (17.1 vs. 12.6 days, p < 0.001) and ($159,993 vs. $125,705, p < 0.001), respectively.

On multivariate regression analysis, patients receiving late PEG had greater odds of experiencing the following complications during hospitalization: aspiration pneumonia (OR 1.87, p < 0.001), acute pulmonary edema (OR 1.46, p = 0.023), infectious pneumonia (OR 1.49, p < 0.001), sepsis (OR 1.68, p = 0.005), acute renal failure (OR 1.66, p = 0.004), DVT/PE (OR 1.44, p = 0.047), hematoma, hemorrhage, or seroma (OR 1.45, p = 0.005), wound disruption (OR 1.88, p < 0.001), surgical site infection (OR 1.33, p = 0.035), and fistula formation (OR 2.61, p < 0.001) (Table IV). When combining complications into medical and surgical categories, the late PEG group had higher odds of both medical (OR 1.43, p < 0.001) and surgical (OR 1.44, p < 0.001) complications. Multivariate linear regression showed that receiving a late PEG was associated with longer LOS (B = 4.18, p < 0.001) and greater hospital charges (B = 34,878, p < 0.001) (Table V).

**DISCUSSION**

The decision for gastrostomy tube placement in HNC patients is complex and requires the consideration of multiple factors. Common criteria to consider include the anticipated length of time needed for enteral nutrition (with gastrostomy tube placement indicated if over 3 to 4 weeks), pre-treatment nutritional status, and the site and stage of cancer. Factors associated with the need for a gastrostomy tube in HNC patients include older age, tracheostomy status, and the need for surgical reconstruction (both abdominal stoma and laryngopharyngeal tube), or the need for radiotherapy dose. Those with tongue base involvement and cancers involving the larynx, hypopharynx, and oropharynx are also most likely to require long-term nutritional support and feeding tubes. In this study, neither cancer subsite, history of radiation history, nor flap reconstruction played a significant role in the timing of PEG tube placement. Furthermore, patients receiving an early PEG tube—that is, on the day of cancer surgery—were more likely to be younger than those getting a PEG tube later in hospitalization. These data indicate that although we have identified factors that increase the risk of requiring a gastrostomy tube, these criteria are not always used to guide clinical decision making.
Two comorbidities were associated with the late PEG tube group: malnutrition and renal failure (which may be a sign of malnutrition or dehydration).\textsuperscript{14} We know that malnutrition affects about half of patients undergoing HNC treatment and is a key indicator for gastrostomy tube placement.\textsuperscript{1} If malnutrition was presumably the indication for PEG tube placement, then the early PEG group should have had more malnourished patients as this would be a clear reason for early placement. However, the opposite was true and the late PEG group had more malnourished patients. A possible explanation could be that hospitalized patients developed malnutrition in the post-operative period as the diagnosis of malnutrition is based on varying criteria including insufficient energy intake, weight loss, muscle and/or subcutaneous fat wasting, and reduced functional capacity.\textsuperscript{15} The development of these nutritional deficits could have then prompted the placement of a delayed, or un-anticipated PEG tube. Alternatively, we could also ask: does placing an early PEG tube prevent the diagnosis of malnutrition, at least in the immediate HNC post-operative period? Previous studies have shown that prophylactic PEG tubes are associated with lower mean weight loss and lower rates of hospitalization for dehydration and nutritional weight loss.\textsuperscript{16–18} Two randomized controlled trials found that although prophylactic gastrostomy tubes may not be superior to reactive PEG tubes in the long run, they have short-term benefits on weight, body mass index (BMI), and malnutrition status.\textsuperscript{19,20} If this holds true for post-operative HNC patients, then placing an early PEG for short-term nutritional improvement would be a significant gain as poor nutrition can lead to more post-operative complications, including poor wound healing and fistula formation.\textsuperscript{21,22} 

Several medical and surgical complications were associated with late PEG tube placement. There are 3 possible interpretations for these findings: either the complications led to having a delayed PEG tube placed, a delay in PEG tube placement was the reason for these complications, or there are other unidentified factors that explain these associations. The first hypothesis— that the complications experienced in the late PEG group were the indication for delayed PEG tube placement itself—is conceivable. In other words, the late PEG group may not have had an initial indication for a PEG tube, but later developed pulmonary or wound complications, which led to the decision for tube placement. These complications may be indirect markers of poor swallowing function, which has been reported as a reason for PEG tube placement.\textsuperscript{8} However, they may also give new insight into considerations other than oncological or nutritional factors that lead to PEG tube placement during hospitalization. This theory also paints a picture of a more reactive rather than proactive approach for PEG tube placement, which may reflect the reality of how these decisions are made.

The second theory—that delaying PEG tube placement results in these complications—has not been reported before. Although surgical site infections, fistulas, and impaired wound healing are known to be associated with malnutrition,\textsuperscript{21,22} the correlation of the surgical complications with delayed PEG tube placement was independent of a malnutrition diagnosis in this analysis. It is possible that these patients may not have met the full criteria to be diagnosed with malnutrition, but did have some degree of enteral or nutritional deficits as a consequence of delaying a PEG tube, which lead to more surgical site complications. Similarly, it is possible that the late PEG group was introduced to earlier oral intake, or had an initial placement of an NGT—both of which can increase aspiration risk— that led to complications such as aspiration or infectious pneumonia or sepsis. If this interpretation is true, then we should further investigate whether placing PEG tubes at the time of HNC surgery mitigates the risk of developing post-operative complications during hospitalization.

The third rationalization for these findings is that there are other confounding factors that could not be accounted for in this analysis. For example, neither cancer stage nor planned treatment with chemotherapy or radiation therapy was considered in this NIS sample, and these factors may explain the timing of PEG tube placement. Additionally, institutions and surgeons may have protocols or preferences about the timing of gastrostomy tube placement, which may elect to place NGTs first, or may not place feeding tubes at all until ultimately needed. Indeed, there was an association between late PEG placement and hospital size and location, with medium and large hospitals and southern and western hospitals placing PEG tubes at a later time compared to smaller hospitals and those in the northeast and midwest. While these factors were accounted for in the multivariate analyses, this indicates there may be regional or institutional biases that transcend other factors when deciding on PEG tube timing.

Hospital charges and LOS were increased in the late PEG group, with patients being hospitalized an average of 4 days longer and incurring an average cost of $34,000 more than the early PEG group. This is not surprising given that an intervention such as a PEG placement typically prolongs the number of hospitalization days, which would subsequently drive up costs. In other similar analyses on the economic impact of dysphagia, the presence of dysphagia increased health care costs by 40% and hospital LOS by approximately 3 days.\textsuperscript{23} 

PEG tube placement, although a relatively common procedure, is not without risk. Previously reported complications include peritonitis, perforation, gastrocolocutaneous fistula, peristomal wound infection and others.\textsuperscript{6,7,24,25} Over 20 years ago, Walton et al. reported major complications in up to 22.5% of HNC patients.\textsuperscript{24} However in 2018, a meta-analysis of complications of PEG tubes with a subgroup analysis for HNC patients found that infectious complications were as low as 2.2% with procedure-related mortality as low as 1%.\textsuperscript{25} We also found that PEG complications occurred in 1.7%–2.2% of patients and did not differ significantly between the early and late PEG tube groups. This trend seems to indicate that with advancing techniques and better safety measures, PEG tube placement has gotten safer over time.

There are other factors that are unique to surgical HNC patients that may influence the timing of PEG tube placement. As most PEG tubes are placed in the endoscopy suite under sedation, HNC patients with trismus, free flaps, or airway tumors are particularly at risk for respiratory distress during procedures. Reports of airway complications in HNC patients undergoing PEG tubes
under sedation range from 1% to 10.3%. Undergoing a PEG tube placement at the same time as an ablative surgery procedure could mitigate the risk of respiratory issues as these procedures are generally performed under general anesthesia with an already established airway. Secondly, HNC operations tend to be lengthy, and prolonging surgical time may increase the risk for perioperative complications, as has been previously shown for major head and neck surgeries. However, this does not account for the additional time it takes to orchestrate equipment and staff for 2 surgical procedures and teams. In this study, patients who had PEG tubes placed on the same day as HNC surgery did not have an increase in either surgical or post-operative complications. Therefore, it does not appear that placing a PEG tube at the time of cancer surgery adds unnecessary harm.

There are limitations to this study that should be considered before interpretation. The main limitation is the hypothesis-generating nature of this analysis. Although we found several associations between PEG tube timing and inpatient comorbidities and complications, the causal relationship between these findings is not clear. Additional prospective studies are needed to determine if early PEG tube placement decreases post-operative complications in HNC patients. Other limitations of this study are that it does not examine all costs related to PEG tube use, or the costs of PEG tubes that go unused. The results of this study only apply to patients undergoing oncological surgery and cannot be applied to those who had PEG tubes placed on the same day as HNC surgery.

CONCLUSION

We found that patients undergoing HNC surgery who received a PEG tube on the day of cancer surgery had lower hospital costs and shorter LOS when compared to those who had PEG tube placement later in hospitalization. Same-day PEG tube patients also had fewer surgical and medical post-operative complications compared to late PEG tube patients, however additional studies are needed to further investigate the causal relationships behind these findings.

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