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Feeding jejunostomy tube placement during resection of gastric cancers

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ABSTRACT

Background: Feeding tube placement is common among patients undergoing gastrectomy, and national guidelines currently recommend consideration of a feeding jejunostomy tube (FJT) for all patients undergoing resection for gastric cancer. However, data are limited regarding the safety of FJT placement at the time of gastrectomy for gastric cancer.

Methods: The 2005–2011 American College of Surgeons National Surgical Quality Improvement Program Participant User Files were queried to identify patients who underwent gastrectomy for gastric cancer. Subjects were classified by the concomitant placement of an FJT. Groups were then propensity matched using a 1:1 nearest neighbor algorithm, and outcomes were compared between groups. The primary outcomes of interest were overall 30-d overall complications and mortality. Secondary end points included major complications, surgical site infection, and early reoperation.

Results: In total, 2980 subjects underwent gastrectomy for gastric cancer, among whom 715 (24%) also had an FJT placed. Patients who had an FJT placed were more likely to be male (61.6% *versus* 56.6%, $P = 0.02$), have recent weight loss (21.0% *versus* 14.8%, $P < 0.01$), and have undergone recent chemotherapy (7.9% *versus* 4.2%, $P < 0.01$) and radiation therapy (4.2% *versus* 1.3%, $P < 0.01$). They were also more likely to have undergone total (compared with partial) gastrectomy (66.6% *versus* 28.6%, $P < 0.01$) and have concomitant resection of an adjacent organ (40.4 *versus* 24.1%, $P < 0.01$). After adjustment with propensity matching, however, all baseline characteristics and treatment variables were highly similar. Between groups, there were no statistically significant differences in 30-d overall complications (38.8% *versus* 36.1%, $P = 0.32$) or mortality (5.8 *versus* 3.7%, $P = 0.08$). There were also no differences in major complications, surgical site infection, or early reoperation. Operative time was slightly longer among patients with feeding tubes placed (median, 248 *versus* 233 min, $P = 0.01$), but otherwise there were no significant differences in any outcomes between groups.

Conclusions: Concomitant placement of FJT at the time of gastrectomy may result in slightly increased operative times but does not appear to lead to increased perioperative morbidity or mortality. Further investigation is needed to identify the patients most likely to benefit from FJT placement.

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1. Introduction

Gastric cancer accounts for 12% of cancer-related deaths worldwide and remains the second leading cause of death after lung cancer [1]. In the multimodality treatment of gastric cancer, adjuvant or perioperative therapy has been shown in randomized trials to improve survival [2–4]. However, as highlighted by the Medical Research Council Adjuvant Gastric Cancer Infusional Chemotherapy (MAGIC) trial, less than one-third of patients are able to tolerate and complete adjuvant therapy after gastrectomy [2]. Common gastrointestinal toxicities encountered during administration of chemotherapy include anorexia, nausea, vomiting, and diarrhea, all of which may increase risk of failure to complete adjuvant therapy [5].

The placement of a feeding jejunostomy tube (FJT) at the time of gastrectomy offers alternative and supplementary nutritional access, which may serve to maintain caloric requirements even in the setting of the profound gastrointestinal toxicity that is commonly associated with adjuvant therapy. Because an FJT may thus theoretically permit a patient suffering from the side effects of systemic therapy to complete treatment, the National Comprehensive Cancer Network currently recommends that FJT placement to be considered for select patients who will be receiving postoperative adjuvant therapy [6]. However, in other gastrointestinal oncologic operations, such as pancreaticoduodenectomy for pancreatic cancer, FJT placement has been associated with increased perioperative morbidity [7,8]. Because the hypothetical benefits of FJT placement remain unproven—and there are limited data regarding the effect of FJT placement on short-term perioperative outcomes—it is important to evaluate whether placement of an FJT results in inferior perioperative outcomes among patients undergoing gastrectomy for gastric cancer [9].

The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) provides the largest, risk-adjusted, validated data set of 30-d surgical outcomes of the United States. Because data in NSQIP are collected from a variety of hospitals across the United States, it is useful for analyzing perioperative outcomes that may then be generalizable across institutions. In this study, we hypothesize that concomitant FJT placement in patients undergoing gastrectomy for gastric cancer does not affect short-term perioperative outcomes.

2. Materials and methods

The Duke University Institutional Review Board approved this retrospective analysis. The NSQIP Participant User Files for 2005–2011 were queried to identify patients who had undergone gastrectomy for gastric cancer. Patients with International Classification of Diseases Ninth Revision codes 151.0–151.9 (primary malignancy of the stomach) were identified and cross-referenced with current procedural terminology (CPT) codes: 43631/43632/43633/43634 (partial gastrectomy) and 43620/43621/43622 (total gastrectomy). Exclusion criteria included subjects that had an associated CPT code that was inconsistent with a primary diagnosis of gastric cancer, had undergone emergent surgery, or had disseminated malignancy. Subjects were then classified by the concomitant placement of an FJT (identified by CPT codes 44300 and 44015). Baseline characteristics and outcomes were compared between groups using Pearson chi-square test for categorical variables and Student *t*-test for continuous variables.

To adjust for nonrandom differences between groups, we developed propensity scores, defined as the conditional probability of undergoing concomitant FJT placement. Propensity scores were based on the following variables: age, sex, body mass index, diabetes mellitus, chronic obstructive pulmonary disease, coronary artery disease, bleeding disorders, dyspnea, functional status, American Society of Anesthesiologists classification, existing do not resuscitate order, tobacco use, alcohol use >2 drinks per day, recent steroid use, year of operation, preoperative chemotherapy, preoperative radiation therapy, extent of resection (total *versus* subtotal gastrectomy), and concomitant major organ resection. Patients were then matched on these scores using a 1:1 nearest neighbor algorithm. Our primary outcomes of interest were 30-d overall complications and mortality. Secondary end points included major complications, surgical site infection, and early reoperation.

Missing data in the NSQIP database were handled using complete case analysis. We made an affirmative decision to control for type 1 error at the level of the comparison. For comparison of baseline characteristics and outcomes, P values <0.05 were used to indicate statistical significance. Standardized differences were used to compare baseline characteristics and treatment variables between propensity-matched groups, with standardized differences <0.20 representing a negligible difference for each covariate. All statistical analyses were performed using R (The R Foundation for Statistical Computing, version 3.0.2, Vienna, Austria).

3. Results

In total, 5881 patients were identified who had a primary diagnosis of gastric cancer. Of these, 2658 were excluded based on CPT codes that were inconsistent with a primary procedure of gastrectomy and 243 because of emergent surgery or disseminated cancer. This resulted in the study population of 2980 subjects. Of these patients, 715 (24%) had an FJT placed at the time of gastrectomy. Over the study period, there was no statistically significant change in the rate of FJT placement (Figure).

Subjects who met inclusion criteria were then grouped based on the concomitant placement of an FJT. Patients who had an FJT placed at the time of gastrectomy were more likely to be male (61.6% *versus* 56.6%, $P = 0.02$), have recent weight loss (21.0% *versus* 14.8%, $P < 0.01$), and have undergone recent chemotherapy (7.9% *versus* 4.2%, $P < 0.01$) and radiation therapy (4.2 *versus* 1.3%, $P < 0.01$). They were also more likely to have undergone total (compared with partial) gastrectomy (66.6% *versus* 28.6%, $P < 0.01$) and have concomitant resection of an adjacent organ (40.4% *versus* 24.1%, $P < 0.01$; Table 1). However, after adjustment with propensity matching, all baseline and treatment variables were highly similar between groups (Table 2).