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Outcomes of octogenarians undergoing gastrectomy performed for malignancy

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ABSTRACT

Background: Studies on perioperative outcomes of octogenarians with gastric cancer are limited by small sample size. Our aim was to determine the outcomes of gastrectomy and the variation of treatments associated with advanced age (≥80 y).

Methods: The National Surgical Quality Improvement Program database was queried from 2005 to 2011. Patients who underwent gastrectomy for malignancy were identified using International Classification of Diseases, Ninth Revision and Current Procedural Terminology codes.

Results: Of 2591 cases, 487 patients were octogenarians (≥80) and 2104 were non-octogenarians (<80). Overall, 4.9% of patients had disseminated cancer. Octogenarians had higher 30-d mortality (7.2% *versus* 2.5%, $P < 0.01$) and more major complications (31.4% *versus* 25.5%, $P < 0.01$), though fewer octogenarians underwent total gastrectomy (24.0% *versus* 43.2%, $P < 0.01$) and extended lymphadenectomy (10.1% *versus* 17.4%, $P < 0.01$) than the nonoctogenarian cohort. On multivariate analysis, age ≥80 y was associated with major complications (OR, 1.3; 95% CI, 1.03-1.6; $P = 0.03$) and increased mortality (OR, 3.0; 95% CI, 1.9-4.9; $P < 0.01$).

Conclusions: Advanced age (≥80 y) was associated with worse outcomes in patients undergoing gastrectomy for malignancy. Therefore, careful staging is necessary to reduce unnecessary operations in this population. Furthermore, surgeons must place greater attention on optimizing the octogenarian population before surgery.

Introduction

While the incidence of gastric cancer has been decreasing in the United States, it remains the second leading cause of cancer mortality worldwide.[1] Although early screening, combined with advances in modern surgical therapy, chemotherapeutic agents and radiotherapy have improved survival for patients with gastric cancer in the developed nations in the East, 5-y survival for newly diagnosed gastric cancer in the United States remains dismal at 29.3%.[2-6]

In 2015, there were 24,590 new cases of gastric cancer diagnosed in the United States and 10,720 deaths.[6] As the population ages, more elderly patients will undergo gastrectomy for treatment of gastric cancer. Gastrectomy performed

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for gastric cancer in the United States carries a high perioperative morbidity and mortality.[7] Many studies looking at the outcomes of "elderly" patients have used a cutoff age of 70 y. This is, however, very close to the median age of diagnosis, which is 69 in the current era.[8-10] Furthermore, most series examining the perioperative outcomes of octogenarians are limited in size.[11,12] Therefore, we examined the American College of Surgeon's National Surgical Quality Improvement Program participant user file (ACS-NSQIP PUF) to examine the perioperative outcomes of octogenarians undergoing gastrectomy for malignancy. Our aim was to determine the 30-d mortality and morbidity of this patient population and to study the variation of treatments associated with advanced age (≥80 y).

Methods

After obtaining exemption from our institutional review board, we performed a review of the ACS-NSQIP PUF database. The ACS-NSQIP PUF database is a risk adjusted outcomes-based program designed to measure and improve the quality of surgical care. The program collects data on over 130 preoperative, intraoperative, and postoperative clinical variables. In addition, 30-d postoperative mortality and morbidity data are collected in the database. Currently, there are over 300 hospitals that participate in this program.[13]

The ACS-NSQIP PUF database was queried from 2005 to 2011 for gastrectomy performed for malignancy. Current Procedural Terminology (CPT) codes for subtotal and total gastrectomies (43620-43622, 43631-43634) were used in conjunction with International Classification of Diseases, Ninth Revision codes (151.x) to identify all patients who underwent gastrectomy for malignancy. Secondary CPT codes were used to identify additional organ resections, and CPT code 38,747 was used to identify extended lymphadenectomy defined as regional lymph node dissection including celiac, gastric, portal, peripancreatic with or without the para-aortic, and vena cava regions. All emergent cases were excluded from our analysis. Clinically relevant preoperative, intraoperative, and postoperative events including 30-day mortality and complications were noted and reviewed. Major complications were defined as occurrence of one of the following events: superficial and deep organ space infection, wound dehiscence, reintubation, prolonged ventilation, pulmonary embolism, acute renal failure requiring dialysis, cerebral vascular accident, coma greater than 24 h, cardiac arrest, myocardial infarction, need for transfusion greater than four units postoperatively, sepsis, septic shock, and return to the operating room. All clinical factors in the ACS-NSQIP database are defined in the user guide.[14]

Patients were grouped into octogenarians (≥80 y) and nonoctogenarians (<80 y). Categorical variables were analyzed between the two groups by chi-square test and continuous variables with Student's *t*-test and Mann–Whitney *U* test where appropriate. In addition, multivariate stepwise logistic regression was used to evaluate advanced age as an independent variable on occurrence of mortality and major postoperative complications. We also studied other clinically relevant preoperative variables to generate odds ratios for factors associated with mortality and occurrence of major complications. All statistical analyses were performed on SPSS for Windows version 23 (SPSS Inc, Chicago, IL).

Results

Patient demographics and characteristics

We identified 2591 gastrectomies performed for malignancy in the NSQIP database. The average age of the cohort was 66.6 ± 13.7 y. Of these patients, 487 were octogenarians (mean age, 83.8 ± 3.1 y). A significantly higher proportion of octogenarians had cardiac, pulmonary, and neurologic comorbidities compared to nonoctogenarians. Furthermore, a higher proportion of octogenarians had American Society of Anesthesiology III/IV classifications, worse functional status, and lower average body mass index compared to nonoctogenarians. Overall, 4.9% of the patients who underwent gastrectomy had a diagnosis of disseminated cancer. However, the proportion of patients with disseminated cancer, the sex profile, and preoperative weight loss were similar between the two groups (Table 1).

Treatment characteristics

A significantly lower proportion of octogenarians underwent radiation therapy (0.8% *versus* 3.2%, $P = 0.004$) and chemotherapy (1.6% *versus* 7.3%, $P < 0.001$) before gastrectomy compared to nonoctogenarians. However, the rate of a prior surgery within 30-d before gastrectomy was similar between the two groups (0.8% *versus* 1.4%, $P = 0.360$).

Octogenarians underwent less extensive operations compared to nonoctogenarians. Only 24.0% of octogenarians underwent total gastrectomy compared to 43.2% of nonoctogenarians ($P < 0.001$). In addition, fewer octogenarians underwent extended lymphadenectomy (10.1% *versus* 17.4%, $P < 0.001$). The rates of additional organ resection were similar between the two groups except for pancreatic resection, which was greater in the nonoctogenarian group (2.8% *versus* 1.6%, $P < 0.042$). Additional operative details are summarized in Table 2.

Outcomes

The rate of 30-d mortality in this overall cohort was 3.4%, and the rate of major complications was 26.5%. The 30-d mortality rate in octogenarians was nearly 3 times that of nonoctogenarians (7.2% *versus* 2.5%, $P < 0.001$). In addition, octogenarians experienced significantly higher rates of major complications compared to nonoctogenarians (31.4% *versus* 25.5% $P = 0.008$), even with less extensive operations. Specifically, in descending order, the rates of pulmonary complications, septic shock, and cardiac complications were significantly higher in octogenarians. The rates of pneumonia and unplanned intubation were almost twice as high in the octogenarian group. However, the average time to death and the length of stay were similar between the two groups (Table 3).