Outcomes of operations for benign foregut disease in elderly patients: A National Surgical Quality Improvement Program database analysis

Daniela Molena, MD,[a] **Benedetto Mungo, MD,**[a] **Miloslawa Stem, MS,**[b] **Richard L. Feinberg, MD,**[b] *and* **Anne O. Lidor, MD, MPH,**[b] *Baltimore, MD*

Background. *The development of minimally invasive operative techniques and improvement in postoperative care has made surgery a viable option to a greater number of elderly patients. Our objective was to evaluate the outcomes of laparoscopic and open foregut operation in relation to the patient age.*
Methods. *Patients who underwent gastric fundoplication, paraesophageal hernia repair, and Heller myotomy were identified via the National Surgical Quality Improvement Program (NSQIP) database (2005–2011). Patient characteristics and outcomes were compared between five age groups (group I: ≤65 years, II: 65–69 years; III: 70–74 years; IV: 75–79 years; and V: ≥80 years). Multivariable logistic regression analysis was used to predict the impact of age and operative approach on the studied outcomes.*
Results. *A total of 19,388 patients were identified. Advanced age was associated with increased rate of 30-day mortality, overall morbidity, serious morbidity, and extended length of stay, regardless of the operative approach. After we adjusted for other variables, advanced age was associated with increased odds of 30-day mortality compared with patients <65 years (III: odds ratio 2.70, 95% confidence interval 1.34–5.44,* P = *.01; IV: 2.80, 1.35–5.81,* P = *.01; V: 6.12, 3.41–10.99,* P < *.001).*
Conclusion. *Surgery for benign foregut disease in elderly patients carries a burden of mortality and morbidity that needs to be acknowledged. (Surgery 2014;156:352-60.)*

From the Division of Thoracic Surgery, Department of Surgery[a] *and Department of Surgery,*[b] *Johns Hopkins University School of Medicine, Baltimore, MD*

The progressive aging of the population is inducing a slow but profound demographic change in the Western World: it has been estimated that, by the year 2050, approximately one quarter of US inhabitants will be older than 65 years.[1] This widespread phenomenon is likely to represent an interesting challenge for the present and future generations of physicians. The therapeutic approach to the elderly patient, in fact, must consider the unique characteristics of these patients, such as the presence of multiple comorbidities and diminished cardiopulmonary reserve.[2]

Mr Edwin Lewis provided generous support of Dr Lidor's Department of Surgery Research Fund.

Presented at the 9th Annual Academic Surgical Congress in San Diego, CA, February 4–6, 2014.

Accepted for publication April 2, 2014.

Reprint requests: Daniela Molena, MD, Division of Thoracic Surgery, Department of Surgery, Johns Hopkins University, 600 N Wolfe Street, Blalock 240, Baltimore, MD 21287. E-mail: dmolena2@jhmi.edu.

0039-6060/$ - see front matter

http://dx.doi.org/10.1016/j.surg.2014.04.005

The technical advancements in minimally invasive surgery along with the widespread adoption of advanced laparoscopic training have made surgical therapy an appealing option for this group of patients. Since the late 1980s, laparoscopic surgery has gained increasing popularity and has been extended to a broad number of procedures, because of its well-known advantages over a traditional open approach, such as decreased postoperative pain, lessened hospital stay, less morbidity, and quicker recovery.[2,3] These benefits have led surgeons to consider laparoscopy the optimal approach for frail and older patients, and minimally invasive techniques currently are applied commonly to the treatment of the most prevalent benign foregut conditions, such as gastroesophageal reflux disease, paraesophageal hernias (PEHs), and achalasia.

Although multiple authors have reported previously the feasibility and safety of laparoscopic foregut surgery in elderly patients, an operative procedure carries a burden of mortality and morbidity that should not be neglected, especially when performed in a high-risk patient.[4] This

concept is particularly true for the treatment of benign foregut conditions, in which the primary outcome is mostly symptomatic and functional improvement.

To investigate the influence of age on operative complications, we queried the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database and compared the perioperative outcomes of benign foregut surgery in young and elderly patients. We also sought to evaluate the differences in outcomes based on the chosen surgical approach.

METHODS

Data source. This was a retrospective analysis in which we used the NSQIP database from 2005 through 2011. NSQIP is a large, nationally validated, risk-adjusted, outcomes-based program and it is used to measure and improve the quality of operative care. Nearly 500 hospitals that vary in size and academic affiliation participate in NSQIP. This program uses a prospective, systematic data collection on 135 preoperative and intraoperative variables, as well as 30-day postoperative morbidity and mortality. The data are collected from clinical records by trained surgical clinical reviewers. Details of the American College of Surgeons NSQIP are described elsewhere.[5,6] This study was deemed exempt by the Institutional Review Board of the Johns Hopkins University School of Medicine.

Study population. Patients 18 years of age and older who underwent an operative procedure for gastric fundoplication, PEH repair, and Heller myotomy (HM) were included. For the purpose of this study, five clinically relevant age subgroups were created for comparison: group I consisted of patients younger than 65 years, group II consisted of patients ages 65–69, group III consisted of patients ages 70–74, group IV consisted of patients ages 75–79, and group V consisted of patients 80 years and older. These cut-off points were determined based on the age distribution within our study population and previous NSQIP studies on the elderly. Patients were categorized further into two groups according to the operative approach to assess the impact of the treatment on short-term outcomes after foregut surgery. The first group consisted of patients who underwent laparoscopic (lap) procedure (defined as Current Procedural Terminology codes of 43281, 43282, 43280, and 43279), and the second group consisted of patients who underwent an open (laparotomy or thoracotomy) procedure (defined by Current Procedural Terminology codes of 39502, 43324, 43332, 43333, 39520, 43334, 43335, 43336, 43337, 43330, and 43331).

Patient baseline demographics and clinical characteristics were compared between the five age groups. Patient demographics included sex and race (white or black). Clinical characteristics consisted of functional health status before surgery (independent, or partially/totally dependent), American Society of Anesthesiology (ASA) classification of patient physical condition, body mass index (BMI) (normal: BMI <25, overweight: BMI 25–29, and obese: BMI ≥ 30), and preoperative comorbidities such as diabetes mellitus (with oral agents or insulin), current history of smoking (within 1 year before the operation), dyspnea, steroid use, previous cardiac surgery, and history of chronic obstructive pulmonary disease, congestive heart failure, and myocardial infarction within 6 months. After reviewing the frequency distribution of patients by ASA class, we combined ASA class one and two (no or mild disturbance) and ASA class four and five (life-threatening and moribund) while leaving ASA class three (serious disturbance) as a standalone variable. Other variables assessed included operative approach (lap or open), surgical procedure (gastric fundoplication, PEH repair, or HM), and type of admission (elective or emergent).

Outcomes. Intraoperative and postoperative outcomes between the five age groups were compared according to the operative approach (lap or open) among the elective cases. The primary outcome was 30-day mortality. The secondary outcomes included overall and serious morbidity, prolonged length of hospital stay (PLOS), and operative time. PLOS was defined as a stay greater than or equal to the 90th percentile and was calculated as length of stay (LOS) ≥ 6 days. Overall morbidity was defined by presence of at least one of the following NSQIP complications: wound infection, pneumonia, urinary tract infection, return to operating room, venous thromboembolic events, cardiac complication, shock/sepsis, unplanned intubation, bleeding requiring transfusion, renal complication, and ventilator dependency >48 hours. Serious morbidity included occurrences of the following NSQIP complications: return to OR, cardiac complication, shock/sepsis, unplanned intubation, and ventilator dependence for >48 hours. Similar NSQIP-measured intraoperative and postoperative complications were combined into groups as follows: the wound infection variable was