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Increasing Rates of Surgery for Patients With Nonmalignant Colorectal Polyps in the United States

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This article has an accompanying continuing medical education activity, also eligible for MOC credit, on page e22. Learning Objective: Upon completion of this CME exam, successful learners will be able to identify and apply current recommendations for the management of nonmalignant colorectal polyps.

See Covering the Cover synopsis on page 1215.

BACKGROUND & AIMS: Despite the availability of endoscopic therapy, many patients in the United States undergo surgical resection for nonmalignant colorectal polyps. We aimed to quantify and examine trends in the use of surgery for nonmalignant colorectal polyps in a nationally representative sample. **METHODS:** We analyzed data from the Healthcare Cost and Utilization Project National Inpatient Sample for 2000 through 2014. We included all adult patients who underwent elective colectomy or proctectomy and had a diagnosis of either nonmalignant colorectal polyp or colorectal cancer. We compared trends in surgery for nonmalignant colorectal polyps with surgery for colorectal cancer and calculated age, sex, race, region, and teaching status/bed-size–specific incidence rates of surgery for nonmalignant colorectal polyps. **RESULTS:** From 2000 through 2014, there were 1,230,458 surgeries for nonmalignant colorectal polyps and colorectal cancer in the United States. Among those surgeries, 25% were performed for nonmalignant colorectal polyps. The incidence of surgery for nonmalignant colorectal polyps has increased significantly, from 5.9 in 2000 to 9.4 in 2014 per 100,000 adults (incidence rate difference, 3.56; 95% confidence interval 3.40–3.72), while the incidence of surgery for colorectal cancer has significantly decreased, from 31.5 to 24.7 surgeries per 100,000 adults (incidence rate difference, −6.80; 95% confidence interval −7.11 to −6.49). The incidence of surgery for nonmalignant colorectal polyps has been increasing among individuals age 20 to 79, in men and women and including all races and ethnicities. **CONCLUSIONS:** In an analysis of a large, nationally representative sample, we found that surgery for nonmalignant colorectal polyps is common and has significantly increased over the past 14 years.

Keywords: Colonic Polyps; Adenomatous Polyps; Intestinal Polyps; Colectomy.

An estimated 6.3 million screening colonoscopies are performed annually in the United States.[1] Among patients undergoing an average-risk screening colonoscopy, 4% to 11% will be found to have a large colorectal polyp.[2] Traditionally, many of these more complex colorectal polyps were managed surgically with a partial colectomy. With advances in endoscopic mucosal resection, this practice should be changing. Compared with surgical resection, endoscopic resection is associated with a reduced risk of adverse events[3–5] and is more cost-effective.[6,7] Before consideration of surgical resection, guidelines now recommend referral to an advanced endoscopist for repeat colonoscopy and, if appropriate, attempted endoscopic resection.[8–10]

Despite strong evidence favoring endoscopic resection, partial colectomies for nonmalignant colorectal polyps continue to be performed frequently in the United States.[11] Elective colectomy is often complicated by adverse events, and more so in older adults who are disproportionally affected with nonmalignant colorectal polyps.[3,11] One in 7 patients who has surgery for a nonmalignant colorectal polyp will have at least 1 major postoperative event.[3] The most common adverse events within 30 days are readmission (8%), reoperation (4%), and anastomotic leak or abscess (3%).[3] Although surgery for the management of nonmalignant colorectal polyps is commonly used in the United States, national incidence rates and trends for this surgery have not been published.

Understanding volume and trends in surgery for nonmalignant colorectal polyps in the United States can increase awareness of how nonmalignant colorectal polyps are managed and better identify barriers to endoscopic management. To this end, we examined trends in surgery for nonmalignant colorectal polyps stratified by patient characteristics and hospital-level factors in a nationally representative sample. To put these trends into context, we compared these data with data on surgery for colorectal cancer from the same national sample.

Abbreviations used in this paper: **CI, confidence interval; ICD-9, *International Classification of Diseases, Ninth Edition* codes; IRD, incidence rate difference; NIS, National Inpatient Sample.**

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EDITOR'S NOTES

BACKGROUND AND CONTEXT

Despite the availability of endoscopic therapy, many patients in the United States undergo surgical resection for non-malignant colorectal polyps.

NEW FINDINGS

Surgery for non-malignant colorectal polyps is common and the rate of surgery is increasing. The rate of surgery for non-malignant colorectal polyps has increased nationwide in individuals aged 20-79 among both men and women and including all races/ethnicities.

LIMITATIONS

We used administrative codes to identify our cases in the Healthcare Cost and Utilization Project National Inpatient Sample.

IMPACT

Understanding volume and trends in surgery for non-malignant colorectal polyps in the United States can increase awareness of how non-malignant colorectal polyps are managed and better identify barriers to endoscopic management.

Methods

Study Design and Population

We used the Healthcare Cost and Utilization Project National Inpatient Sample (NIS) for 2000 to 2014 to obtain incidence estimates for surgery for nonmalignant colorectal polyps and colorectal cancer. The NIS is the largest publicly available all-payer inpatient health care database in the United States, yielding national estimates of hospital inpatient stays. Unweighted, it contains data from more than 7 million hospital stays, at more than 1000 hospitals, each year. Before 2012, the NIS performed a stratified random sample of 20% of participating hospitals, with all discharge records from selected facilities included. In 2012, the NIS redesigned the sampling strategy to a stratified random sample of all discharge records. The NIS contains information on patients, regardless of payer, including individuals covered by Medicare, Medicaid, or private insurance, and those who are uninsured.

All patients $\geq$20 years old, who had diagnoses for either benign neoplasms of the colon, rectum, or anal canal (*International Classification of Disease, Ninth Edition* [ICD-9] codes: 211.3 or 211.4) or colorectal cancer (ICD-9 codes: 153–154.8, 230.3, or 230.4), and underwent elective colectomy or proctectomy (ICD-9 procedure codes: 17.3–17.39, 45.7–45.79, or 48.4–48.59) were eligible for inclusion. Patients with diagnoses for both benign neoplasms and colorectal cancer were classified as having colorectal cancer. We excluded patients classified as having benign neoplasms and intestinal perforation (ICD-9 code 569.83), all patients diagnosed with inflammatory bowel disease (555–555.9 and 556–556.9), and all patients who underwent total colectomy (45.8–45.83) (Supplementary Figure 1). To assess whether the polyps might be an incidental finding, we excluded all patients diagnosed with diverticulitis (ICD-9 code 562.11) in a sensitivity analysis. For the sake of clarity, benign neoplasms of the colon and rectum are referred to as nonmalignant colorectal polyps throughout the article. Discharge weights were applied to estimate the national incidence for surgery for nonmalignant colorectal polyps and colorectal cancer. The University of North Carolina at Chapel Hill Office of Human Research Ethics determined this study to be exempt from continuing review given use of de-identified data.

Statistical Analysis

Patient demographics and hospital characteristics, stratified by patient diagnosis (nonmalignant colorectal polyp vs colorectal cancer), were described using descriptive statistics. The yearly incidence of surgery for nonmalignant colorectal polyps and colorectal cancer, respectively, was calculated using Poisson regression, and expressed as the number of procedures per 100,000 US adults. The number of US adults was obtained using available 2010 US Census data. Additionally, age, sex, race/ethnicity, and region-stratified rates of surgery for nonmalignant colorectal polyps per 100,000 US adults were also calculated using Poisson regression. Age was categorized as 20 to 49, 50 to 64, 65 to 79, and $\geq$80 years old. The rates of surgery for nonmalignant colorectal polyps across teaching status/location and bed size were assessed among all US adults. A hospital is considered to be a teaching hospital if it has an American Medical Association–approved residency program, is a member of the Council of Teaching Hospitals, or has a ratio of full-time equivalent interns and residents to beds of 0.25 or higher. Incidence rate differences (IRDs) comparing the rates in 2014 to 2000 were also calculated and were expressed as rates per 100,000 adults. Significant change in the rate of surgery for nonmalignant colorectal polyps between 2000 and 2014 was assessed using a likelihood ratio test. All analyses were performed using SAS 9.4 (SAS Inc., Cary, NC).

Results

In the United States, there were an estimated 1,230,458 surgeries for either nonmalignant colorectal polyps or colorectal cancer between 2000 and 2014 (Table 1). Among these surgeries, 25% (n = 304,578) were performed for nonmalignant colorectal polyps. Most patients having surgery for nonmalignant colorectal polyps were non-Hispanic white, had Medicare, and were in the highest category of household income. Most surgery for nonmalignant colorectal polyps was performed in hospitals categorized as large bed size, urban teaching hospitals, and in the Southern region of the United States.

Incidence Estimates

In 2014, the incidence rate for nonmalignant colorectal polyp surgery was 1.0 per 100,000 among those 20 to 49 years old, 14.4 per 100,000 among those 50 to 64 years old, 34.5 per 100,000 among those 65 to 79 years old, and 13.4 per 100,000 among those $\geq$80 years old (Table 2). The incidence estimates for men and women were similar (9.7 vs 9.2 per 100,000, respectively). Non-Hispanic white individuals compared with non-Hispanic black and Hispanic individuals had a higher rate of surgery (10.5 vs 8.6 vs 3.7