ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2015) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Vertical sleeve gastrectomy specimens have a high prevalence of unexpected histopathologic findings requiring additional clinical management

Philipp W. Raess, M.D., Ph.D.[a], Marilyn Baird-Howell[a], Rajesh Aggarwal, M.D., Ph.D.[b], Noel N. Williams, M.D.[b], Emma E. Furth, M.D.[a,*]

[a]*Department of Pathology and Laboratory Medicine, University of Pennsylvania, Philadelphia, Pennsylvania*
[b]*Department of Surgery, University of Pennsylvania, Philadelphia, Pennsylvania*

Received August 23, 2014; accepted January 5, 2015

Abstract

Background: Laparoscopic vertical sleeve gastrectomy is used with increasing frequency as a therapeutic option for morbid obesity. Before the procedure, patients undergo a rigorous preoperative evaluation including double contrast upper gastrointestinal radiographic series at our institution. Patients undergoing sleeve gastrectomy are presumed to have no significant gastric pathology. Objectives: To investigate the prevalence of histopathologic findings requiring clinical follow-up in sleeve gastrectomy specimens. Setting: University Hospital, United States.

Methods: Retrospective review was conducted of all primary vertical sleeve gastrectomy specimens performed for morbid obesity at our institution from July 2008 until August 2012 (N = 248).

Results: Unanticipated findings warranting clinical follow-up were identified in 8.4% of cases and included cases of *H. pylori* gastritis, autoimmune gastritis with microcarcinoid formation, necrotizing vasculitis, and intestinal metaplasia. *H. pylori* was identified in 5.2% of all cases and in 33.3% of cases of gastritis. Neoplasms were identified at laparoscopy in 2 additional cases (0.8%).

Conclusions: Surgeons and pathologists should be aware of the high prevalence of diagnoses requiring clinical follow-up in vertical sleeve gastrectomy specimens. (Surg Obes Relat Dis 2015;▮:00–00.) © 2015 Published by Elsevier Inc. on behalf of American Society for Metabolic and Bariatric Surgery.

Keywords: Sleeve gastrectomy; Pathologic findings; Unexpected follow-up

Obesity is major public health problem that continues to rise in prevalence. More than 15 million adults are morbidly obese (body mass index [BMI] > 40 kg/m^2) in the United States, many of whom have co-morbid conditions such as hypertension, type 2 diabetes mellitus, and others [1]. Although many of these patients attempt to lose weight through nonsurgical methods, durable weight loss typically does not occur. Surgical intervention is increasing in popularity, with approximately 340,000 procedures performed globally in 2011 [2]. Laparoscopic vertical sleeve gastrectomy, Roux-en-Y gastric bypass, and laparoscopic adjustable gastric banding are the most commonly performed procedures. Of these 3, laparoscopic vertical sleeve gastrectomy is dramatically increasing in frequency and is the only procedure that routinely generates a specimen for histopathologic analysis [2,3].

Surgical patients typically receive an extensive preoperative evaluation and nutritional counseling before undergoing a surgical weight loss procedure. Recommendations on the necessity of upper gastrointestinal endoscopy (UGIE) vary by association: The American Society for Metabolic

*Correspondence: Professor Emma E. Furth, Department of Pathology and Laboratory Medicine, University of Pennsylvania, 6.46 Founders, 3400 Spruce St., Philadelphia, PA 19104.
E-mail: eef@mail.med.upenn.edu

http://dx.doi.org/10.1016/j.soard.2015.01.002

and Bariatric Surgery does not recommend UGIE, whereas the American Society for Gastrointestinal Endoscopy and the European Association for Endoscopic Surgery recommend UGIE before bariatric surgery [4–6].

Relatively few studies have investigated the incidence of unexpected histopathologic findings in sleeve gastrectomy specimens [7–12], and none have been performed in the United States. We performed a retrospective review of primary vertical sleeve gastrectomy specimens to determine the prevalence of unexpected histologic findings and findings requiring clinical follow-up in these specimens.

Methods

All procedures were approved by the Institutional Review Board. A retrospective review was conducted of all primary vertical sleeve gastrectomy specimens performed for morbid obesity at our institution from July 2008 until August 2012 (N = 248). All specimens were examined grossly and microscopically per clinical standard of care. Final reports were issued by 1 of 6 pathologists. Retrospective review of pathologic diagnoses and gross descriptions was performed for all specimens. A randomly selected subset of cases was rereviewed to confirm diagnoses. Clinical information, including postoperative outpatient visits, was reviewed in the electronic medical record for all patients who had diagnoses that required additional clinical action.

Results

Our institutional laboratory information system was searched to retrospectively identify all primary sleeve gastrectomy specimens performed from July 2008 until August 2012. Four hundred and three specimens were identified as "Stomach, nontumor." Clinical information provided with the specimen was reviewed to identify all primary sleeve gastrectomies performed for morbid obesity; 248 such cases were identified. Demographic information is provided in Table 1. Women comprised 69.2% of the study population. The median age of the study population was 43, with an age range from 19 to 73 years. The average and median number of tissue blocks submitted for microscopic analysis per specimen was 5.

Review of pathology reports of primary sleeve gastrectomy specimens identified a wide range of histopathologic diagnoses detailed in Table 2. The majority of specimens (218 of 248) had a single primary diagnosis; 30 cases had 2 or 3 diagnoses. A total of 269 histopathologic diagnoses were rendered. The most common diagnosis was "stomach tissue with no specific pathologic change" and was rendered in 35.2% of all cases. The second most prevalent diagnosis rendered was identification of "lymphoid aggregates" in 31.2% of cases. This diagnosis refers to benign mixed lymphohistiocytic aggregates in the lamina propria (Fig. 1). The next most common diagnoses rendered were gastritis (including all subtypes) and fundic gland polyps, respectively. Two cases (0.8%) had incidentally identified neoplastic findings on initial laparoscopic examination; a submucosal lipoma was identified in 1 case, and an ovarian mucinous cystadenocarcinoma was identified in the second case.

Table 1
Demographic characteristics of the study population

Sex	n	Median age	Age range
Male	78	48.5	19–73
Female	172	44	20–73

Table 2
Prevalence of histopathologic diagnoses in vertical sleeve gastrectomy specimens

Diagnosis	n	Percentage
No specific pathologic change	88	35.2
Lymphoid aggregates	78	31.2
Gastritis (all subtypes)	30	12
Chronic inflammation	30	12
Fundic gland polyps	19	7.6
PPI effect	8	3.2
Intestinal metaplasia	5	2
Focal ulceration	3	1.2
Hyperplastic polyp	2	0.8
Autoimmune gastritis with microcarcinoids	2	0.8
Necrotizing vasculitis	1	0.4
Giant cell granuloma	1	0.4
Mucosal hemorrhage	1	0.4
Mild acute serositis	1	0.4
Atypical lymphoid hyperplasia	1	0.4

PPI = proton pump inhibitor.

The prevalence of specific diagnoses was analyzed across age groups to determine whether patient age affected the likelihood of histopathologic findings on examination of sleeve gastrectomy specimens (Table 3). There were no statistically significant differences in the prevalence of both histopathologically unremarkable sleeve gastrectomy specimens and those with lymphoid aggregates between age groups (χ^2 test). There was no age difference between patients with gastritis (average 45.1 ± 2.2 yr) and those without (46.0 ± 0.8 yr). The average number of slides examined in cases with no specific pathologic change (5 slides) was not different from those cases with pathologic findings (5 slides).

H. pylori organisms were morphologically identified in 13 cases (5.2%); 10 had a primary diagnosis of "gastritis" (any subtype) and 3 had a primary diagnosis of "chronic inflammation." *H. pylori* were identified on routine hematoxylin-eosin staining in 3 of the 13 cases and by additional studies (thiazine or immunohistochemical staining) in the remaining 10 cases; 33.3% of cases diagnosed as gastritis (all subtypes) had evidence of *H. pylori* infection.

The prevalence of cases with diagnoses that required clinical follow-up was determined to be 8.4% in our study