

COMPARISON OF ANTIREFLUX SURGERY AMONG ETHNICITY

Benjamin Haithcock, MD and Vic Velanovich, MD
Detroit, Michigan

African Americans appear less likely than caucasians to undergo surgery for gastroesophageal reflux disease (GERD). When they do, they appear to have higher conversion and complication rates. Nevertheless, satisfaction with surgery is similar to caucasians.

Background: There is little information comparing the prevalence and treatment of GERD in various ethnic populations. The purpose of this study was to examine the variations in outcomes between caucasians and African Americans undergoing antireflux surgery.

Methods: The records of all patients who underwent antireflux surgery for GERD or parasophageal hernia by a single surgeon from January 1997 through December 2001 were reviewed for preoperative and postoperative symptoms, complications, and postoperative satisfaction with surgery.

Results: Of the 204 procedures performed, 198 patients were either African American (24) or caucasian (174). Of the 18 African Americans undergoing laparoscopic antireflux surgery (LARS), five were converted to open and four had grade-1 or -2 complications. Of the 160 caucasians undergoing LARS, 27 were converted, and 17 had grade-1, -2, or -3 complications. African-American females had a heavier weight (222 lbs. versus 175 lbs., $p < 0.05$) and conversion rate (55% versus 18%, $p < 0.05$), compared to caucasian females. Satisfaction rates for African Americans were 88%, compared to 82% for caucasians.

Conclusion: This study demonstrated significant differences between conversion rates in African Americans and caucasians with respects to frequency of surgery for GERD and conversion rates for LARS. Nevertheless, African Americans appear more satisfied with their surgical outcome. Further research is needed to determine whether African Americans truly have a lower incidence of GERD or if bias exists in referral patterns or cultural attitudes. (*J Natl Med Assoc.* 2004;96: 535–541.)

Key words: gastroesophageal reflux disease ♦ antireflux surgery ♦ ethnicity ♦ African Americans ♦ caucasians

INTRODUCTION

Gastroesophageal reflux disease (GERD) is arguably one of the most common disorders affect-

ing western civilization.¹ The prevalence of the disease is difficult to determine since the pathologic insult can occur in the unassuming person. However, 40% of the U.S. population report heartburn on a monthly basis, and 7% on a daily basis.² Because of the protean nature of GERD, treatment varies from lifestyle changes to esophagectomy. Laparoscopic antireflux surgery (LARS) has become the mainstay of surgical treatment with the number of antireflux procedures increasing tremendously over the past decade.³ The current surgical approach of choice is a minimally invasive transabdominal antireflux procedure—most commonly,

© 2004. From the Department of Surgery, Henry Ford Hospital, Detroit, MI. Send correspondence and reprint requests for *J Natl Med Assoc.* 2004;96:535–541 to: Vic Velanovich, MD, Division of General Surgery, K-8, Henry Ford Hospital, 2799 W. Grand Blvd., Detroit, MI 48202-2689; e-mail: vvelano1@hfhs.org

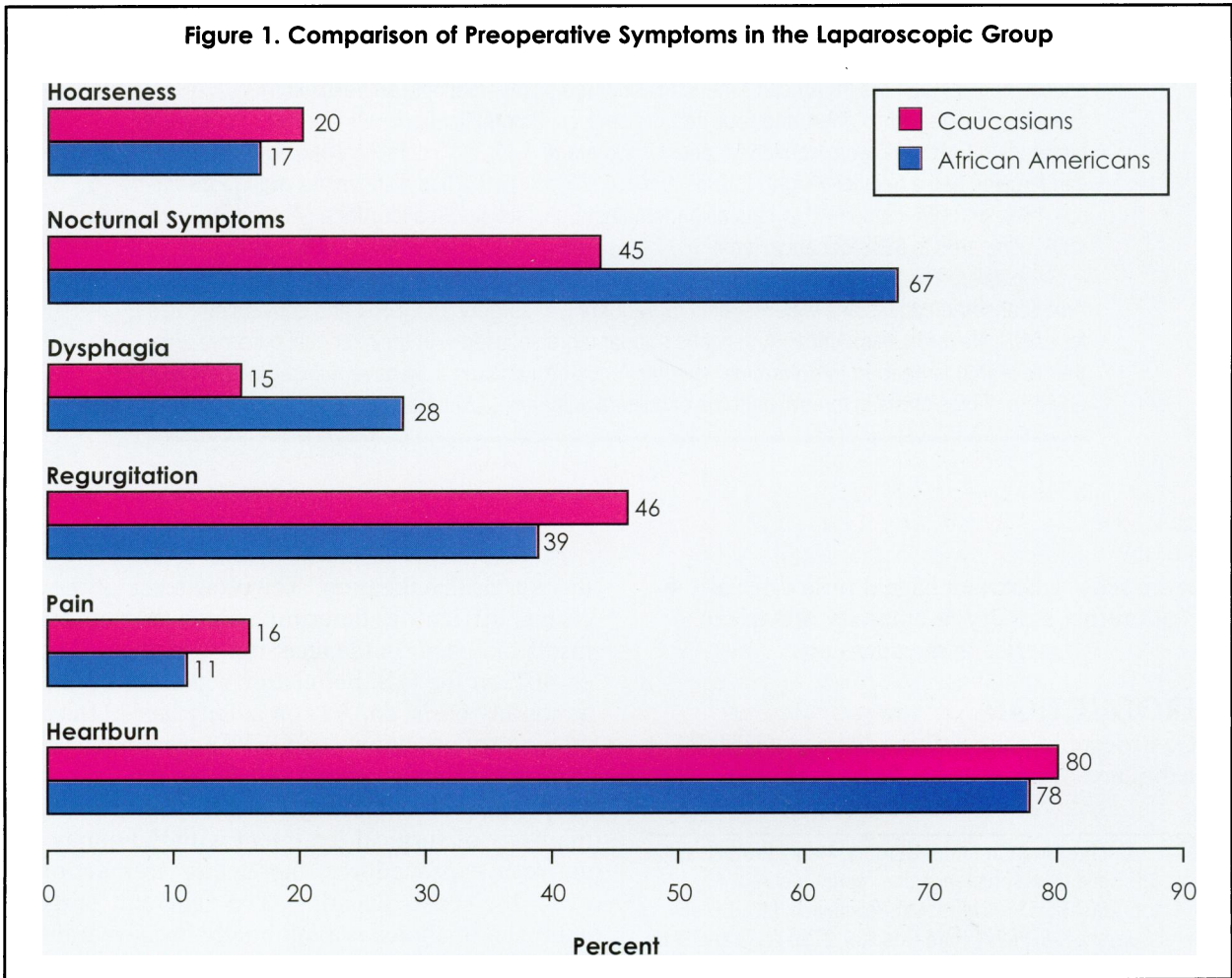
the Nissen fundoplication.

Although GERD affects individuals from all ethnicities, there is very little data comparing its natural history and treatment outcomes. Many reasons may be culprit.⁴ The prevalence of GERD may be different in Africans and African Americans. For example, the prevalence of GERD in Senegal is 0.5%⁵ and overall uncommon in sub-Saharan Africa.⁶ In a telephone interview of residents in the metropolitan Memphis, TN area, Eisen, et al.⁷ found an age- and gender-adjusted prevalence of 45.4/100 for African Americans and 53.2/100 for non-Hispanic whites. Also, there may be cultural differences in the perceived healthcare needs by African Americans.⁸ Lastly, African Americans may be a neglected group for referral, as has been demonstrated in other disease processes.⁹⁻¹¹ The purpose of this study was to examine the variations in outcome that exist between caucasians and African Americans undergoing LARS.

METHODS

The experience of a single surgeon (V.V.) performing laparoscopic and open antireflux surgery at Henry Ford Health System was reviewed between January 1997 and December 2001. All patients were initially evaluated by a gastroenterologist with esophagogastroduodenoscopy (EGD), 24-hour esophageal pH monitoring, and esophageal manometry. Other studies, such as contrast upper gastrointestinal series and gastric emptying scintigraphy, were done selectively. Those patients with pathologic GERD as determined by symptoms and objective testing were referred for surgical management. A retrospective review of the medical records was performed from this subset of patients. These patients were categorized by procedure (open versus laparoscopic) and by race (caucasian versus African American). Patients were routinely followed for six weeks, or longer if nec-

Figure 1. Comparison of Preoperative Symptoms in the Laparoscopic Group



essary, by the operative surgeon. Pre- and postoperative symptoms, complications, and follow-up were analyzed. Complications were characterized using Clavien¹² classification scheme as grade 1 through 4. Grade-1 complications are those that carry minor risks and, if left untreated, have a spontaneous resolution or require a bedside procedure with no or minor analgesia. These are complications that do not result in a hospital stay greater than twice the median hospitalization for the procedure. Grade-2 complications are those that are potentially life threatening and usually requires some form of intervention. These events do not produce lasting disability or require organ resection. Grade-3 complications are those with residual or lasting disability. Grade-4 complications are deaths as a result of any complication.

Analysis of the data was performed using the Fishers exact test with odds ratios and the students' t test. Statistical significance was determined by a p value of less than 0.05.

RESULTS

There were 204 patients evaluated during the above time periods; six of these patients were not included because they did not identify as either African American or caucasian. Of these 198 patients, 178 individuals underwent attempted laparoscopic procedures and 20 underwent open procedures. Of the laparoscopic procedures, 36 involved repairing a paraesophageal hernia. Of the open procedures, three involved repairing a paraesophageal hernia. Of the laparoscopic procedure, 18 were African American (10%) and 160 were caucasian (90%). Comparisons of age, gender, and weight between the two groups are seen in Table 1.

Within the African-American laparoscopic group, the average age was 53±15 years. Of the nine females and nine males in this patient group, the average weight was 215±27 lbs. The major preoperative complaints were heartburn, nocturnal symptoms, regurgitation, pain, hoarseness, and dysphagia (Figure 1). Of the African-American patients undergoing laparoscopic procedures, 5/18 were converted from laparoscopic to open (28%). The reasons for the conversion were: inadequate visualization (two), large liver (one), and intraoperative bleeding (two). The postoperative complication rate was 4/18 (27%) and included 3/18 grade-2 complications and 1/18 grade-1 complications (Table 2). In the postoperative period, the major complaints at the end of the

Table 1. Demographic Comparison Between African Americans and Caucasians Undergoing Laparoscopic Antireflux Surgery

	African Americans	Caucasians
Age (±SD) years	53±15	50±15
%male:%female	50:50	53:47
Weight (±SD) lbs.	215±27	187±35

Table 2. Complications from the African-American Laparoscopic Group

Grade 1

Urinary retention: spontaneously resolved after catheterization

Grade 2

Delayed gastric emptying

Paraesophageal hernia

Contained leak: spontaneously resolved

six-week period included regurgitation, dysphagia, and heartburn (Figure 2). However, only two patients (11%) were eventually placed on antireflux medications. Comorbidities included diabetes (2/18), hypertension (9/18), COPD (1/18), and psychological issues (1/18).

In the caucasian laparoscopic group, the average age was 50±15 years. Males made up 84/160 (53%) of this group, while 76/160 (47%) were female. The average weight was 187±35 lbs. The major preoperative complaints were heartburn, regurgitation, nocturnal symptoms, hoarseness, dysphagia, and pain (Figure 1). Of the caucasians undergoing laparoscopic procedures, 28/160 were converted from laparoscopic to open [compared to African Americans, odds ratio of 1.9 (p=0.3)]. The main reasons for conversion being inadequate visualization (13/160), foreshortened esophagus (7/160, of note, six of these were in paraesophageal hernia repairs), perforated viscus (3/160), scar tissue (3/160), and intraoperative bleeding (2/160). Complications were 12% (19/160) and included grade 3 (2/160), grade 2 (13/160), and grade 1 (4/160) [odds ratio of 2.8 (p=0.07), when compared to African-American patients] (Table 3). Postoperative follow-up complaints at the end of six weeks included dysphagia, bloating, heartburn, pain, and regurgitation (Figure 2); 21/160 (13%) patients restarted antireflux medications. Comorbidities included diabetes (4/160), hypertension (43/160), COPD (25/160), hypercholesterolemia (11/160), and psychological issues (23/160).

Further comparison of the two laparoscopic groups according to gender revealed several findings. When comparing African-American and caucasian women, there was a significant difference in their weight (222 lbs. versus 175 lbs., $p < 0.001$). There was also a significant difference in relation to conversion rates. African-American women had a higher conversion rate than caucasian women [5/9 (55%) versus 14/76 (18%); odds ratio of 5.5, (95% CI of 2.7) $p = 0.02$]. There was no significant difference in rate of conversion when comparing African-American and caucasian males who underwent laparoscopic antireflux procedures.

African Americans had an overall satisfaction rate of 89%, compared to 82% of caucasians; this was not significant. There was also no significant difference in patient satisfaction between those patients that were converted to open procedures and laparoscopic completed patients.

Of the planned open procedures, six (30%) were African American, and 14 were caucasians (70%). The major reasons for these patients to undergo planned open procedures were previous intra-abdominal operations and large paraesophageal hernias. The average age in the African-American group was 50 ± 11 years; two males (33%) and four females (67%), and the average weight was 202 ± 51 lbs. The preoperative symptoms were heartburn, regurgitation, nocturnal symptoms, hoarseness, pain, dysphagia, and bloating (Figure 3). One patient had a grade-1 complication (1/6, 17%) consisting of wound seroma. The major complaints at the end of six weeks were dysphagia, pain, bloating, heartburn, and diarrhea (Figure 4). These symptoms were mostly transient; 2/6 (33%) had to take antireflux medication. Comorbidities included hypertension (2/6, 33%) and COPD (2/6, 33%).

The average age in the caucasian open procedure was 58 ± 15 years; seven were males and seven were females; average weight was 168 ± 27 lbs. Preoperative symptoms included heartburn, nocturnal symp-

Figure 2. Comparison of Postoperative Symptoms in the Laparoscopic Group

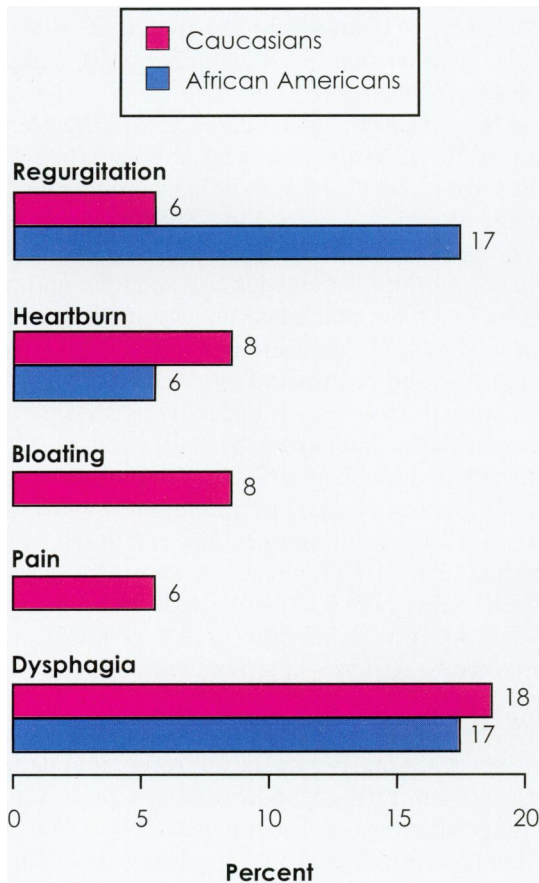


Table 3. Complications from the Caucasian Laparoscopic Group

<i>Grade 1</i>
Wound infection (two)
Atelectasis: resolved spontaneously
Subcutaneous emphysema: resolved spontaneously
<i>Grade 2</i>
Edema of wrap: resolved spontaneously
Esophageal perforation (four): three were repaired intraoperatively, one leading to major morbidity
Intra-abdominal abscess
Postpneumatic empyema
Deep vein thrombosis
Clostridium difficile colitis
Perforated stomach
Diaphragmatic perforation
Upper GI bleeding: managed conservatively
Atrial fibrillation
<i>Grade 3</i>
Gastrocutaneous fistula: associated with a pyloroplasty
Stroke: occurred seven days postoperative

toms, regurgitation, pain, and dysphagia (Figure 3). The complication rate in this group was 4/14 (29%) which included grade-3 (1/14), grade-2 (2/14), and grade-1 (1/14) complications (Table 4). Follow-up complaints included dysphagia and regurgitation (Figure 4); 1/14 (7%) required antireflux medication. Comorbidities included diabetes (3/14), hypertension (3/14), COPD (1/14), and psychological issues (2/14).

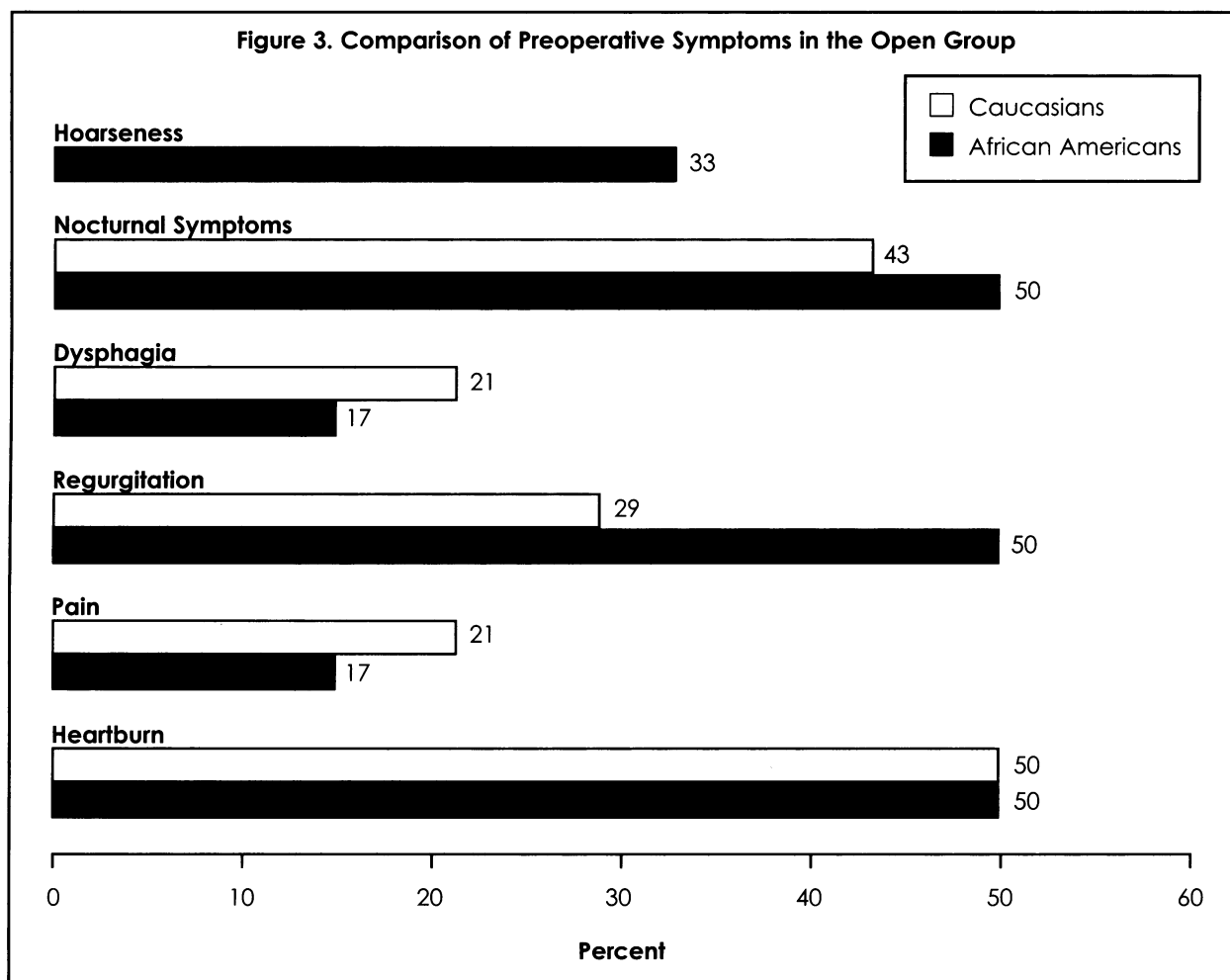
Satisfaction rates among the African-American and caucasian groups were 12/14 (86%) and 5/6 (83%); this was not statistically significant.

DISCUSSION

From our study, 18/200 (9%) patients who underwent surgical management for gastroesophageal reflux disease were African American. We believe that this may not represent the true prevalence of GERD in the African-American community treated at this hospital. For example,

32% of the patients operated upon by the senior author within the last six months were African American. It continues to be a challenge to accurately detect the true prevalence of this disease process in populations of color in general. Until recently, studies have used primarily homogenous communities to predict prevalence of disease process. Eisen and associates⁷ attempted to predict the prevalence of GERD symptoms in a region that consisted of non-Hispanic whites and African Americans through a previously validated phone questionnaire. Their results determined that non-Hispanic whites had an overall prevalence rate of heartburn and/or acid regurgitation of 53.2% and African Americans 12.9%. Unfortunately, statistical analysis of this data was not performed.

Another explanation for the low rate of GERD surgery in African Americans is that this group may not seek medical care for GERD symptoms, or



if they do, they are not referred for surgical management. There is no data on how African Americans view GERD symptoms. Therefore, we cannot comment on possible cultural differences. Some have suggested that economic factors do not explain the racial and ethnic differences in demand and utilization of healthcare services.^{13,14} On the other hand, data does exist on potential referral bias.⁹⁻¹¹ This has been shown to exist in managed-care plans, where “access” is theoretically equal.¹⁵ We do not believe that this is a substantial problem in our institutions, as we have previously shown in breast cancer that stage and surgical treatment did not vary by race, implying that in our system, when access is equal, treatments are equal.¹⁶ Nevertheless, it is still an open question that African Americans may not aggressively seek care for GERD symptoms, or their physicians not aggressively refer for surgical management.

Fewer surgical procedures done in the African Americans seen in our study may be related to a

true lower prevalence of GERD in this community. Marcinkiewicz and associates¹⁷ reported that the potentially lower prevalence of GERD in the African Americans compared to caucasians could be due to an increased level of salivary mucin, protecting the esophagus from acid and pepsin. This study was later challenged by Rayment and associates,¹⁸ who determined that no differences existed in the concentration of mucin levels among the two populations and that it seems unlikely that changes in mucin levels were a factor in the prevalence of GERD. Therefore, it is still an unsettled issue as to whether or not there are true physiologic differences between caucasians and African Americans with respect to GERD.

A further explanation for the lower prevalence of GERD, and therefore the lower surgical rate in African Americans, may be related to *Helicobacter pylori*. There is evidence to suggest that *H. pylori* gastritis leads to a decrease in gastric acid secretion, thereby decreasing the symptoms associated with GERD.¹⁹⁻²¹ Malaty and associates²² have demonstrated an increased prevalence of *H. pylori* infection in African Americans compared to non-Hispanic whites. By extrapolation, if African Americans have a lower gastric acid output, they may have fewer and/or shorter, less-acidic episodes of reflux. In our study, the DeMeester scores from 24-hour pH probe monitoring demonstrated a trend toward higher scores in the caucasian laparoscopic group, compared to the African Americans—48 versus 39—although both groups had symptomatic GERD. Further studies are needed to confirm this difference.

In our experience, we found a significant difference in weight between African-American females and caucasian females. We believe that weight—and not race—leads to a significant rate of conver-

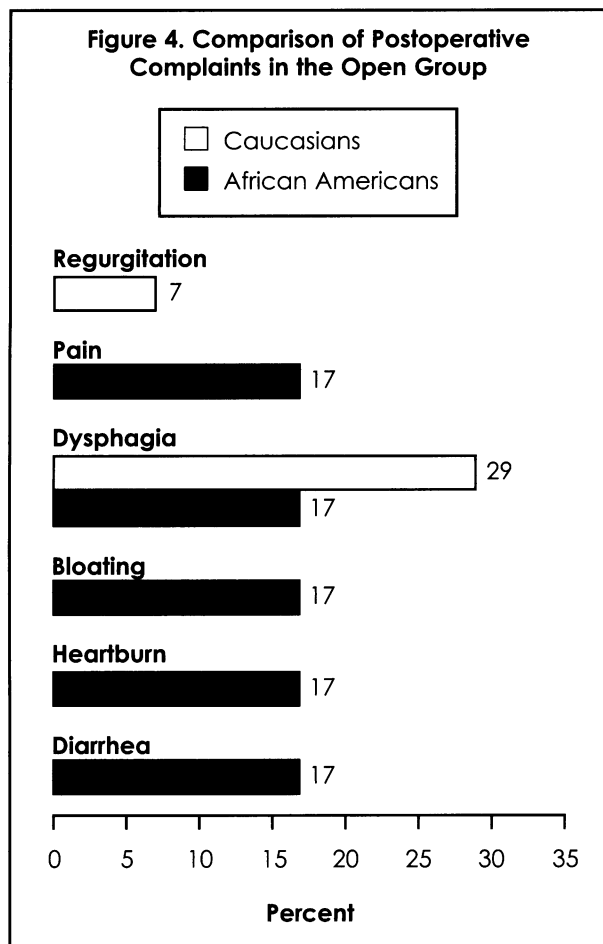


Table 4. Complications from the Caucasian Open Group

Grade 1	Wound seroma: resolved spontaneously
Grade 2	Pericarditis: resolved with medical management Atrial fibrillation
Grade 3	Angina pectoris: required stress testing

sion from laparoscopic to open antireflux procedures in these patient groups. Certainly, it is our impression that obesity is associated with large amounts of intra-abdominal fat, thereby making visualization of the hiatus and the esophageal dissection more difficult. Nevertheless, the literature is mixed on the effect of obesity on the outcome of LARS. Campos et al.²³ and Fraser et al.²⁴ both report that obesity did not seem to influence the symptomatic outcome of LARS, while Perez et al.²⁵ did. However, in none of these studies was the conversion rate discussed. Certainly, better techniques are needed to address laparoscopy in obese patients.

We made an effort to be complete with our complications and untoward effects. The vast majority of these were early in the postoperative course and were self-limiting. Only four patients required reoperation: paraesophageal hernia repair, repair of a delayed esophageal perforation, pyloroplasty for intractable gastroparesis, and repair of a gastrocutaneous fistula associated with a laparoscopic pyloroplasty. There was no association with ethnicity or obesity related to these complications.

Despite higher conversions in the African-American patient group, there was no significant difference between satisfaction rates among the caucasian and African-American groups. Interestingly, there also seems to be similar rates of satisfaction in laparoscopically completed, converted, and planned open patients. This is consistent with a study from this institution comparing laparoscopic versus open antireflux surgery.²⁶ This may be due to an overall end result of effective relief of initial reflux symptoms, regardless of the method.

REFERENCES

1. Kahrilas PJ. Gastroesophageal reflux disease. *JAMA*. 1996;276:983-988.
2. Nebel OT, Fornes MF, Castell DO. Symptomatic gastroesophageal reflux: incidence and precipitating factors. *Am J Dig Dis*. 1976;21:953-956.
3. Carlson MA, Frantzides CT. Complications and results of primary, minimally invasive antireflux procedures: a review of 10,735 reported cases. *J Am Coll Surg*. 2001;193:428-439.
4. Vega KJ. Gastroesophageal reflux disease in minority America. *Practical Gastroenterology*. 2002;26:35-45.
5. Armstrong D. Reflux disease and Barrett's oesophagus. *Endoscopy*. 1994;26:9-19.
6. Segal I. The gastro-oesophageal reflux disease complex in sub-Saharan Africa. *Eur J Cancer Prev*. 2001;10:209-212.
7. Eisen GM, Bush A, Lavalley K, et al. A population based study of gastroesophageal reflux in a racially diverse area. *Gastroenterology*. 2001;120(Suppl 1):A420.
8. Baldwin KA, Humbles PL, Armmer FA, et al. Perceived health needs of urban African-American church congregants. *Public Health Nursing*. 2001;18:295-303.
9. Earle CC, Neumann PJ, Gelber RD, et al. Impact of referral patterns on the use of chemotherapy for lung cancer. *J Clin Oncol*. 2002;20:1786-1792.
10. Fiscella K, Franks P, Doescher MP, et al. Disparities in healthcare by race, ethnicity, and language among the insured: findings from a national sample. *Med Care*. 2002;40:52-59.
11. Mukamel DB, Murthy AS, Weimer DL. Racial differences in access to high-quality cardiac surgeons. *Am J Pub Health*. 2000;90:1774-1777.
12. Clavien PA, Sanabria JR, Strasberg M. Proposed classification of complications of surgery with examples of utility in cholecystectomy. *Surgery*. 1992;111:518-526.
13. Fichtenbaum R, Gyimah-Brempong K. The effects of race on the use of physician's services. *Int J Health Services*. 1997;27:139-156.
14. Freiman MP. The demand for healthcare among racial/ethnic subpopulations. *Health Services Research*. 1998;33(4 Pt 1):867-890.
15. Hargraves JL, Cunningham PJ, Hughes RG. Racial and ethnic differences in access to medical care in managed-care plans. *Health Services Research*. 2001;36:853-868.
16. Velanovich V, Yood MU, Bawle U, et al. Racial differences in the presentation and surgical management of breast cancer. *Surgery*. 1999;125:375-379.
17. Marcinkiewicz M, Scheurich CJ, Goldin GF, et al. Salivary glycoconjugate (mucin): is it the answer to the lower prevalence of gastroesophageal reflux disease in African Americans? *Am J Gastroenterol*. 1996;91:1893.
18. Rayment SA, Liu B, Offner GD, et al. Salivary mucin: a factor in the lower prevalence of gastroesophageal reflux disease in African Americans? *Am J Gastroenterol*. 2000;95:3064-3070.
19. Falk GW. GERD and *H. pylori*: does it matter? *Practical Gastroenterology*. 2001;25:26-37.
20. Vakil NB. Gastro-oesophageal reflux disease and *Helicobacter pylori* infection. *Aliment Pharmacol Ther*. 2002;16(Suppl 1):47-51.
21. Wu JC, Chan FK, Wong SK, et al. Effect of *Helicobacter pylori* eradication on oesophageal acid exposure in patients with reflux oesophagitis. *Aliment Pharmacol Ther*. 2002;16:545-552.
22. Malaty HM, Evans DG, Evans DJ, et al. *Helicobacter pylori* in Hispanics: comparison with blacks and whites of similar age and socioeconomic class. *Gastroenterology*. 1992;103:813-816.
23. Campos GMR, Peters JH, DeMeester TR, et al. Multivariate analysis of factors predicting outcome after laparoscopic Nissen fundoplication. *J Gastrointest Surg*. 1999;3:292-300.
24. Fraser J, Watson DI, O'Boyle CJ, et al. Obesity and its effect on outcome of laparoscopic Nissen fundoplication. *Dis Esophagus*. 2001;14:50-53.
25. Perez AR, Moncure AC, Rattner DW. Obesity adversely affects the outcome of antireflux operations. *Surg Endosc*. 2001;15:986-989.
26. Velanovich V. Comparison of symptomatic and quality of life outcomes of laparoscopic and open antireflux surgery. *Surgery*. 1999;126:782-789.