

Risk Factors for the Development of Incisional Hernia Following Roux-en-Y Gastric Bypass Surgery

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Abstract: Roux-en-y gastric bypass (RYGB) has become the most common operation in the United States for morbid obesity. Even in the laparoscopic era many procedures are still done *via* laparotomy. Incisional hernias are a complication of any abdominal surgery with obese patients being at increased risk. Patients undergoing open RYGB over 6 years were reviewed to evaluate the risk factors for the development of incisional hernia. 444 adults (88 male, 356 female) using ASBS and NIH criteria who underwent open RYGB were studied. Patients with asthma and a history of steroid use were all off steroids for at least 6 months prior to surgery. Lesser curvature RYGB was performed through a 10-14 cm upper abdominal incision. The linea alba was closed using running 1-0 polydioxone sulfate (PDS) sutures. The mean follow up was 2 years. The incidence of incisional hernia was 18.7%, based upon post-operative office follow-up and/or CT scan. Overall, 130 (29.3%) required post-operative local wound care for drainage, 44 (33.8%) of which developed incisional hernias. 93 (23.3%) had a past medical history that included asthma, 32 (34.4%) of which developed incisional hernias. There was a statistically significant association between a history of asthma and post-operative wound infection with the development of incisional hernia. In this study, other variables, such as gender, prior incisional hernia repair, prior abdominal surgery, pre-operative BMI, history of smoking, diabetes, %EWL and post-operative pneumonia were not found to be associated with incisional hernia. Measures to minimize post-operative wound infection or excessive coughing in patients with asthma may reduce the incidence of incisional hernia following RYGB.

INTRODUCTION

Obesity (BMI >40kg/m²) is a chronic disease that affects roughly 31 percent of the US population, with 5 percent of adults in the United States being morbidly obese [1, 2]. It is associated with significant morbidity and mortality, and is the cause of death in 280,000 to 325,000 Americans annually [3]. Gastric bypass surgery offers resolution or significant improvement of many of the co-morbid conditions associated with obesity. It has thus far proven to be an effective long-term solution for weight loss in the morbidly obese population, with demonstrable long-term continued weight loss and resolution of many co-morbid illnesses [4]. Although there has been a trend toward laparoscopic surgery, many open gastric bypass operations are being performed annually, usually through an upper midline incision. Obesity clearly increases the risk of incisional hernia [8-11] but other risk factors may predispose patients for the development of incisional hernia following gastric bypass surgery. Respiratory problems and wound infection have been associated with an increased risk for the development of incisional hernias following all general surgical operations [6, 11].

The present study investigates the risk factors for the development of incisional hernia occurrence in patients who underwent open RYGB.

PATIENTS AND METHODS

Patients undergoing RYGB at a single institution over a 4 year period, between April 1999 and June 2005, were

reviewed to evaluate the risk factors for incisional hernia after open RYGB. 444 adults (88 male, 356 female) using American Society for Bariatric Surgery and National Institutes of Health (NIH) criteria who underwent open RYGB were studied. Patients with asthma and a history of steroid use were all off steroids for at least 6 months prior to surgery. Steroid replacement therapy was not given peri-operatively. A single dose of a first generation cephalosporin antibiotic was administered within 1 hour of the start of the operation, except in penicillin allergic patients who received one dose of clindamycin and gentamicin. Antibiotics were not prescribed following surgery. Lesser curvature RYGB was performed through a 10-14 cm upper abdominal incision by a single surgeon (IML). In all patients the linea alba was closed using running 1-0 polydioxone sulfate (PDS) sutures. No mesh was utilized in any patients for abdominal fascial closure. Saline lavage of the fascial closure was used utilized to decrease wound contamination. The skin was then re-approximated with surgical clips that were removed 12 days after surgery. The mean follow up for this group was 2 years. 25 patients were lost to follow-up and were not included in this analysis. Patients had routine follow-up examinations and wound care. Wound collections that were not purulent were treated with simple drainage, in the absence of fever, cellulitis or elevated white blood cell count. Patients with documented wound infections were treated with oral antibiotics, based upon cultured organisms and antibiotic sensitivity reports.

CT scans were generally performed as needed for the evaluation of gastro-intestinal symptoms or abdominal pain following surgery.

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Data were subjected to univariate and multivariate analysis. A p-value of less than 0.05 was considered statistically significant.

RESULTS

444 patients (88 male, 356 female) were followed for a mean of 25 months (11-66). The average age was 43.1 years (21-64). Percentage of excess weight lost averaged 44.2% (3-98). The average length of hospital stay was 4.6 days (3-44). Six patients (1.3%) developed anastomotic leak during the study period. None of the patients required re-operation during the same admission for fascial dehiscence. The thirty-day mortality was 0.7%. Two deaths were due to septic complications; the other resulted from post-operative cerebrovascular accident.

The incidence of incisional hernia during the study period was 18.7% (83 patients), based upon post-operative office follow-up physical examination and/or CT scan. Overall, 130 patients (29.3%) required post-operative local wound care for drainage, 44 (33.8%) of which developed incisional hernias ($p = 0.007$). In the entire study group, 93 patients (20.9%) had a past medical history of asthma requiring medical therapy of which 32 patients (34.4%) developed incisional hernias ($p = 0.005$). There was an association between a history of asthma and post-operative wound infection with the development of incisional hernia following open RYGB. Other variables, such as age, gender, prior incisional hernia repair, prior abdominal surgery, pre-operative BMI, %EWL, history of smoking, diabetes, and post-operative pneumonia were evaluated independently and were found not to be associated with significant increases in the development of incisional hernias after RYGB.

DISCUSSION

The general incidence of incisional hernia following abdominal surgery through the midline is reported to be 4 - 19% [17] and similar rates have been reported following gastric bypass surgery [18-21]. Many factors have been linked to the development of hernia following laparotomy such as male gender, advanced age, poor nutrition, diabetes, renal failure, steroid use, malignancy, anemia, and of course, obesity [18]. In this study several factors were evaluated independently to ascertain whether any of them increased the likelihood of development of an incisional hernia post-operatively. Factors evaluated were gender, prior incisional hernia repair, prior abdominal surgery, pre-operative BMI, history of smoking, diabetes, and post-operative pneumonia, as well as asthma and the necessity for post-operative local wound care. Post-operative wound infection rates following open gastric bypass surgery are high. Christou and others [19] reported a wound infection rate of 20%, more than 4 times higher than expected for similar clean-contaminated cases, which they correlated to the development of hernia. The development of an incisional hernia following post-operative wound infection has been reported by others, and may even be the most important risk factor for the development of incisional hernia [6, 11, 15]. This may be the result of impaired collagen synthesis at infected wound sites.

Obesity appears to cause a greater risk of incisional hernia than concomitant steroid use [19]. The present study also demonstrated that patients with preexisting asthma were

found to be more likely to develop incisional hernias post-operatively. Asthma has been noted to place patients at increased risk for hernia development by others [22]. This is likely due to the increased intra-abdominal pressure caused by excessive coughing. As reported by Sugarman [16], increased intra-abdominal pressure may play a significant role for incisional hernia following gastric bypass surgery. It is clear that laparoscopic gastric bypass surgery has reduced the incidence of incisional hernia [23].

One notable finding in this study was that there was no statistically significant correlation between prior incisional hernia and subsequent recurrence of incisional hernia. Many studies have clearly shown that there is indeed a significant correlation to this effect. It is possible that no correlation was found in this study due to a type 2 statistical error i.e. that the sample size was too small to fully evaluate this relationship. Had the sample size been larger it is probable that this relationship would have correlated with previously published reports.

For this retrospective review, patients were very carefully screened and selected. Those that were lost to follow-up or fell outside the scope of what is discussed here were excluded from the study. All data is based on a sample of patients that had the same operation, for the same illness. The variables studied were screened for in all of the patients in the study and available in the patients' charts for review.

CONCLUSIONS

The development of incisional hernia following gastric bypass surgery is common. Measures to minimize post-operative wound infection or excessive coughing and straining in patients with asthma may reduce the incidence. The incidence may be decreasing with the use of synthetic mesh placement and as the percentage of laparoscopic gastric bypass operations increases. However, this still remains an important cause of morbidity after bariatric surgery.

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