Routine Postoperative Upper Gastroesophageal Imaging is Unnecessary after Laparoscopic Roux-en-Y Gastric Bypass

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Routine early postoperative upper gastroesophageal imaging (UGI) is often used in laparoscopic Roux-en-Y gastric bypass (LRYGB) procedures to confirm anastomotic patency and to exclude leaks. The aim of our study was to assess the usefulness of this practice. From January 2003 to November 2004, 322 LRYGB cases were performed using linear staplers for the gastrojejunostomy and jejuno-jejunostomy anastomoses. As part of our protocol, all patients received a Gastrografin® (Mallinkrodt, Inc., St Louis, Missouri) UGI on postoperative Day 1. The same radiological techniques were used and the same radiological team reviewed all films. Abnormal films were identified. In addition, patient demographics, time to discharge, and complications were collected and analyzed in a prospective database. There were no anastomotic leaks or obstructions. However, 42 of 322 (13%) studies demonstrated delayed gastric emptying. There were no statistically significant differences between patients with normal and delayed UGI studies. Routine UGI studies did not contribute significantly to patient care, and its routine use was subsequently abandoned.

OBESITY IS A growing epidemic in the United States that plagues over 10 million Americans. Surgical therapy for morbid obesity, known as bariatric surgery, has changed significantly from Mason's first account of a gastric bypass in 1967.[1] After the 1991 National Institutes of Health consensus statement, bariatric surgery has gained increasing acceptance and the Roux-en-Y gastric bypass has become the gold standard for bariatric surgery.[2] Wittgrove and Clark's[3] description of a laparoscopic Roux-en-Y gastric bypass (LRYGB) in 1994 ushered in the era of minimally invasive surgical techniques for bariatric surgery. Since 1994, the laparoscopic approach has evolved considerably; however, it remains a technically demanding procedure with a significant learning curve. When compared with the open procedure, LRYGB reduces hospital stay, postoperative pain, pulmonary dysfunction, incisional hernia rate, and wound complications, and maintains similar weight loss results.[4, 5]

Despite the effectiveness of the laparoscopic approach, it is associated with significant morbidity, with complication rates in the range of 20 per cent to 25 per cent and anastomotic leak rates in the range of 1 per cent to 6 per cent.[6–8] Therefore, most groups have advocated the routine use of postoperative upper gastroesophageal imaging (UGI) studies to rule out early complications before initiating a liquid diet. Recently, this approach has come under considerable scrutiny.[9–13] The use of routine UGI studies is controversial because of cost, difficulty performing an adequate study, patient discomfort, delay in resumption of liquid diet, and questionable sensitivity in detecting complications. A handful of groups have transitioned to the selective use of UGI studies based on clinical criteria.[9, 10] The purpose of this study was to review the utility of routine postoperative UGI in the clinical management of patients after LRYGB procedures.

Patients and Methods

From January 2003 to November 2004, the UCLA Laparoscopic Bariatric Surgery Program performed 322 LRYGB surgeries. Patient selection criteria fol-

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lowed National Institutes of Health consensus statement 1991 guidelines for surgical management of morbid obesity.[2] This included a multidisciplinary approach focused on aggressive patient screening, thorough preoperative patient education and preparation, tight control of comorbidities, clinical pathways for inpatient hospital course, and close postoperative follow-up. All procedures were performed by four surgeons with extensive minimally invasive surgery backgrounds. The steps to each procedure included the formation of a 30-mL gastric pouch, linear totally stapled gastrojejunostomy, 80-cm roux-limb length, and side-side linear stapled jejuno-jejunostomy. The linear stapled gastrojejunostomy was performed over a 32 Fr Inamed® (Allergan, Santa Barbara, California) gastric lavage tube with balloon tip to prevent narrowing of the anastomosis. In addition, this tube was used to rapidly instill 60 to 120 mL of diluted methylene blue to test for leaking. All intraoperative leaks were repaired with interrupted 2-0 absorbable suture, and the methylene blue test was repeated to confirm anastomotic integrity. The initial 141 surgeries in our series were performed in a retrocolic-retrogastric fashion. The mesocolic, Petersen's, and jejunal mesenteric defects were all closed in this group. In March 2004, our program transitioned from a retrocolic to an antecolic approach for all gastric bypass procedures. None of the defects were closed in the antecolic group.

On postoperative Day 1, each patient was evaluated with a Gastrografin® (Mallinkrodt, Inc., St Louis, Missouri) UGI study. Patients were evaluated in the standing position. The radiographic examination began with a baseline anteroposterior film of the upper abdomen. Patients were asked to swallow approximately 60 mL of Gastrografin®. A series of spot films were taken immediately after the patient began swallowing the contrast. Fluoroscopy was used to follow the course of the contrast, and multiple views were obtained to allow adequate visualization. A delayed film was taken approximately 30 min later to evaluate progress through the bowel. Occasionally, repeat delayed films were taken to rule out obstruction or ileus. Surgeons reviewed all films with an attending gastrointestinal radiologist. If there was no evidence of leak or obstruction, the patients were then started on a liquid diet.

Approval was obtained from our Institutional Review Board, and the data for all patients were entered into a prospective database. Patients were followed postoperatively at 2 weeks, 3, 6, 9, and months, 1 year, and yearly thereafter. A Student's *t* test was used for statistical comparison of parametric values and the chi-square test was used for nonparametric values. The differences were considered statistically significant if $P < 0.05$.

Results

Three hundred twenty-two patients underwent successful LRYGB procedures between January 2003 and November 2004. The initial 141 surgeries were performed retrocolic, retrogastric, and the subsequent 181 operations were performed antecolic, antegastric. All patients were followed for a minimum of 2 months. Demographics of the patient population are detailed in Table 1. The complication profile for the entire group is detailed in Table 2. There were no deaths or anastomotic leaks.

The UGI reports were reviewed for all patients. A normal study was reported in 280 (87%) patients. There were 42 (13%) patients with delayed empting. These were felt to be equivalent to a partial obstruction. All of these resolved without complication or further intervention. There were no serious complications detected by UGI, including complete bowel obstruction or anastomotic leakage. The patients with normal and delayed UGI studies were compared. There were no statistically significant differences between the two groups (Table 3).

Discussion

Routine postoperative UGI can be safely omitted from the clinical management of LRYGB procedures. Our results indicate that routine postoperative UGI studies add little information and, therefore, do not alter the management of our patients. In addition, these examinations are not without their disadvantages. There is the associated cost of the study, patient discomfort, and delay in resumption of liquid diet. In addition, multiple studies have cited questionable sensitivity for leak when done routinely.[9, 11, 13] When they are performed selectively using a clinical protocol to identify patients suspicious for a leak, Katasani et al.[10] was able to improve the sensitivity of the UGI

TABLE 1. *Patient Characteristics*

Average age	44 years
Average body mass index	49.7
Male	11.5%
Diabetic	22.4%
Hypertensive	47.2%
Sleep apnea	24.8%
Previous abdominal surgery	63.0%

TABLE 2. *Complication Profile*

Overall complications	14.6%
Readmission	6.8%
Reoperation	4.7%
Length of stay (average)	2.70 days
Anastomotic leak	0
Death	0

TABLE 3. *Normal Versus Delayed UGI*

	Normal UGI	Delayed UGI	*P*
Average age	44 years	42 years	0.2017
Average body mass index	49.7	50	0.6100
Diabetes	22.5%	21.4%	0.8769
Length of stay (average)	2.69 days	2.76 days	0.5889
Complication rate	15.7%	7.1%	0.1424

to 100 per cent. Our study's strength lies in its prospective accumulation of data from the inception of our minimally invasive bariatric program. Theoretically, this is when major complications are most likely to occur because of the long learning curve, and, therefore a UGI would have the greatest benefit. This was not our finding. Proponents of routine postoperative UGI cite the potential for early detection of anastomotic leaks and the ability to treat these conservatively by withholding a liquid diet, and using antibiotics and closed-suction drainage. We feel aggressive preoperative patient management decreases the likelihood of a postoperative leak. Additionally, it is our opinion that intraoperative methylene blue dye testing and selective UGI based on a clinical protocol are sufficient to identify leaks in this well-screened and aggressively managed patient population.

Our results compare favorably with previous descriptions by Sims and Ganci-Cerrud[9, 11] of their experience with routine postoperative UGI studies. Both groups reviewed their results from the inception of their programs. Unfortunately, only a small percentage of Ganci-Cerrud[11] operations were LRYGB. Both groups felt that routine postoperative UGI had questionable sensitivity in detecting anastomotic leaks and questioned their utility. In a follow-up paper to Sims,[9] Hamilton[14] retrospectively reviewed the same group of patients who underwent LRYGB. They reported low sensitivity of UGI (22%) in detecting leaks and suggested that clinical parameters such as tachypnea $\geq$22 and tachycardia $\geq$120 recorded during the postoperative period as the most useful indicators of leak. Our results do not compare favorably with the results of Serafini.[15] This group reviewed the results of 100 consecutive gastric bypasses performed at their institution with routine postoperative UGI. The postoperative UGI was able to detect all of their anastomotic leaks, and three of four were treated successfully with conservative management. On the fourth patient, the UGI was misread and the patient required operative intervention for the leak. Unfortunately, only 25 of their patients underwent laparoscopic procedures, and all of their leaks occurred in the open cohort.

Conclusion

Our study adds to the growing body of literature questioning the routine use of UGI in the clinical management of LRYGB patients. When performed selectively within a clinical protocol, the utility of postoperative UGI studies appears to increase significantly. A randomized, prospective study directly comparing the two techniques, including a careful cost analysis, would answer this question.

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