The utility of routine postoperative upper GI series following laparoscopic gastric bypass

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Received: 12 January 2007/Accepted: 22 January 2007/Online publication: 19 May 2007

Abstract

Background: Routine upper gastrointestinal (UGI) studies following laparoscopic Roux-en-Y gastric bypass (LRYGBP) have the potential advantage of early identification of anastomotic complications. The aim of our study was to evaluate the efficacy of routine postoperative UGI and its relationship to clinical outcomes.

Methods: Over a three-year period, 516 patients underwent LRYGBP followed by routine postoperative UGI studies. Data were collected on the results of the UGI, clinical parameters, and patient outcomes. Study groups were composed of patients with a normal UGI (Group I, n = 455), abnormal UGI not requiring further intervention (Group II, n = 36), and abnormal UGI requiring further intervention (Group III, n = 25). Statistical significance was set at α = 0.05 level for all analyses.

Results: The three study groups were not statistically different in mean age (42 years) or body mass index (BMI) (45) and were predominantly female (90%). Most patients had an uneventful postoperative course. Anastomotic complications (gastrojejunostomy and jejunoojunojejunostomy) were uncommon (1.3%). The sensitivity of the UGI for anastomotic leak in this study was low (33%). However, all patients with alimentary limb obstruction (n = 3) had UGI evidence of this complication. Of the 516 UGI reports, there were only 25 (4.8%, Group III) that were abnormal and required some form of intervention ranging from serial imaging (84%) to reoperation (16%). Of the various clinical parameters examined, the patients in Group III demonstrated a significantly higher prevalence of fever (p < 0.001), tachycardia (p < 0.01), vomiting (p < 0.001), and postoperative day 1 leukocytosis (p < 0.005).

Conclusions: Our data suggest that routine UGI after LRYGBP has limited utility as it may result in unnecessary intervention based on false-positive results or a delay in treatment based on false-negative results. We advocate selective UGI imaging following LRYGBP based on the patient's clinical factors, particularly fever and tachycardia.

Key words: Bariatric — Laparoscopy — Obesity — Gastric bypass — Upper GI — Radiology

Morbid obesity is a health epidemic in the United States, with an estimated 12.5 million people affected by the disease [1]. Bariatric surgery is the most effective treatment option for morbid obesity and its associated comorbidities [2]. Since the 1960s numerous weight-loss operations have been performed, aimed at eradicating the medical comorbidities of obesity and ultimately improving quality of life. The current gold standard bariatric operation is the laparoscopic Roux-en-Y gastric bypass (LRYGB) [3]. The success of laparoscopic bariatric surgery, combined with the increasing prevalence of obese patients, has led to a rapid increase in the number of operations being performed [4].

As part of routine postoperative care, some bariatric centers utilize upper gastrointestinal (UGI) contrast studies to evaluate for anastomotic leak or obstruction. The potential advantage of this strategy is early identification and management of anastomotic problems. The disadvantages of routine screening with UGI include additional cost, inconvenience to the patient, prolonged hospitalization, and false-positive or false-negative results. This retrospective study evaluates the use of routine UGI compared with selective UGI based on postoperative clinical parameters.

Materials and methods

Between October 2002 and October 2005, 516 LRYGBP operations were performed by two surgeons at the University of California, Davis Medical Center, using the same technique. Our technique for LRYGB
includes a side-to-side GIA-stapled jejunojjunostomy (JJ) with retrocolic, retrogastric jejunal Roux limb and closure of all mesenteric defects. The gastrojejunostomy (GJ) is a two-layer anastomosis consisting of GIA-stapled side-to-side posterior row with a running suture enterotomy closure and circumferential running suture outer layer. The GJ is routinely inspected endoscopically and tested for leak with insufflation. Patients who had an air leak underwent division of the anastomosis until no air leak was present. A closed-suction drain is placed posterior to the GJ in all cases.

Postoperative care was standardized according to a clinical care pathway. All patients remained NPO until the second postoperative day (POD2), when an UGI was obtained. Patients were started on a postgastric bypass diet only after the study confirmed no leak or obstruction. The UGIs were performed on protocol starting with gastrogastrografin followed by thin barium in both the oblique and antero-posterior projections. An attending radiologist interpreted all 516 studies.

Routine complete blood counts (CBCs) were obtained in the postanesthesia care unit and on the morning of postoperative day 1 (POD1) in all patients. In patients with stable hemoglobin, no further blood counts were checked. Therefore, all patients had a minimum of two CBCs postoperatively.

Clinical parameters and laboratory values were obtained by chart review and electronic medical record and included white blood cell count (WBC), fever, tachycardia, nausea, vomiting, fluid balance, and hypotension. These data were collected for POD0 and POD1, as well as the morning of POD2 before the UGI. Fever was defined as a temperature of greater than 38.5°C. Sustained tachycardia was defined as a heart rate greater than 100 beats per minute that persisted for more than four hours. The medication record was used to identify patients requiring antiemetics for nausea. The nursing record was used to identify those patients who, in addition to nausea, had actual emesis. An episode of hypotension was defined as systolic blood pressure less than 90 mmHg. The 24-h intake and output, starting from 0600 on POD1 to 0600 on POD2, were used to assess fluid balance.

Data were analyzed using Student’s t test for pairwise comparisons of continuous variables and Fisher’s exact test for discrete variables. Statistical significance was set at \( p = 0.05 \) for all comparisons.

Results

There were 464 (90%) female patients and 52 (10%) male patients included in this study. The mean age was 42 years (range = 18–61) and the mean BMI was 45 kg/m² (range = 35–65). Of the 516 UGI reports, 455 (88%) were found to be normal (Table 1, Group I). There were 61 (12%) studies that reported findings other than normal (Table 1, Groups II and III). Of these 61 studies, 36 (59%) were considered clinically insignificant (Group II). This group had findings that did not require any intervention and these patients proceeded with oral intake as per the clinical pathway. The most frequent radiographic finding in Group II (64%) was a delay in the emptying of the gastric pouch (Table 2). Intraoperative endoscopy assures that the anastomosis is patent and that the delay in pouch emptying is likely due to transient postoperative tissue edema. The remaining 25 of the 61 studies (Group III) displayed abnormalities that required some further intervention. This intervention ranged from serial radiographic imaging (repeat UGI or abdominal X-rays) before proceeding with oral intake to reoperation (Table 3). The majority of the abnormal findings in Group III (84%) were managed with serial imaging, while only 4 (16%) required reoperation. In addition to these four patients, there were two others with normal UGI studies who required reoperation for anastomotic complications. Thus, the overall reoperation rate for anastomotic complications was 1.2% (6/516). There were no mortalities in this study.

The overall GJ leak rate in our series of 516 patients was 0.58% (\( n = 3 \)). Two of the three patients with leaks had normal UGIs. The first of these patients had a fever to 39°C postoperatively but subsequently defervesced and was discharged on POD4. She returned two days later with fever, increasing abdominal pain, and foul-smelling drainage from her closed-suction drain site. A repeat UGI showed a leak and the patient was successfully treated nonoperatively with total parenteral nutrition and intravenous antibiotics. Patients with false-positive UGI studies had an average length of stay (LOS) of 4.4 days, whereas overall average LOS during this time was approximately 2 days.

The second patient who had a false-negative initial UGI continued to deteriorate clinically with fever, nausea, vomiting, and increasing abdominal pain. The negative UGI was followed with a CT scan that showed clear evidence of a GJ leak. This patient was urgently reexplored and found to have a GJ leak. There was also concern about a potential alimentary limb obstruction. Thus, we elected to laparoscopically revise the JJ, repair and widely drain the leak, and place a gastrostomy tube (GT) in the remnant stomach.

The third patient with a GJ leak had a positive intraoperative leak test on air insufflation that could not be repaired by laparoscopy and required conversion to open to fix the leak, perform wide drainage, and place a GT. This patient did not require reoperation for persistent leak on postoperative UGI but instead was successfully managed with GT feedings, drainage, and antibiotics.

There were seven cases initially interpreted as showing a GJ leak and one case of potential JJ leak. All these patients had remarkable clinical courses and repeat UGIs were negative. In other words, with regard to leaks, there was only one true-positive study, eight false-positive studies (7 for GJ leaks and 1 for JJ leaks), and two false-negative studies. Thus, routine UGI has a
Another finding was a lower incidence of nausea among patients in Group II (20%) compared to Groups I and III (44% and 48%, respectively), $p < 0.05$. Nausea was present in the majority of patients overall. Surprisingly, no patients in Group III developed hypotension, while 14% of patients in Group II did. Nausea was present in 45% of patients overall and was not significantly different among Group I (44%), Group II (53%), and Group III (60%). Vomiting, however, occurred significantly more frequently in Group III (20%) ($p < 0.001$). The average fluid balance in the 24-h period starting at 0600 of POD1 for the entire study population was 0.9 L positive and did not differ significantly among the groups.

Most patients (87%) had immediate postoperative leukocytosis (WBC > 11,000), as expected. By POD1, the majority of patients resolved the leukocytosis, with only 14.7% persisting. Patients in Group III, however, were much more likely to have persistent leukocytosis (36%) on POD1 ($p < 0.005$) compared with Group I.

### Discussion

The optimal use of UGI series in the management of postoperative LRYGB patients remains incompletely defined. Some argue that it should be used in all patients [5, 6], while others advocate selective use based on clinical parameters [7, 8]. The fact that postoperative GJ leaks follow a bimodal distribution, including early technical leaks and late leaks associated with tissue ischemia and healing, adds additional complexity to the issue.

Regardless of the etiology, early identification of postoperative leaks following LRYGB is critical. Therefore, it is standard practice in many institutions to obtain routine UGI to evaluate for anastomotic leaks or other complications. Early UGI will generally assess technical issues, while late UGI may identify leaks associated with physiologic and tissue-healing factors.
However, routine use of postoperative UGI has several limitations. The overall sensitivity of the study is low. Negative results of an early UGI may support technical proficiency but do not address the potential for late leaks. In addition, a negative study does not completely exclude the possibility of leak, especially when clinical signs are present. Similarly, the study has a low positive predictive value. For these reasons, UGI alone cannot be fully relied upon to identify or exclude an operative complication.

The limitations of routine postoperative UGI are demonstrated in this study. Two of the three patients with GJ leaks had a negative initial UGI. While it may not be possible to determine if this was due to poor test sensitivity or to the delayed formation of the leak, such findings support the limited utility of routine UGI. In addition, the vast majority of studies that demonstrated leaks were falsely positive. Prompted by clinical suspicion, all leaks were diagnosed and confirmed with radiographic studies in a timely fashion.

The sensitivity of UGI for detecting alimentary limb obstruction is significantly better. All three patients with radiographically identifiable problems were found using UGI. The patient with an obstruction of the biliopancreatic limb had a normal UGI as would be expected. This emphasizes the need to maintain clinical suspicion and recognize the limitations of the study.

Patient risk associated with UGI is minimal and, thus, the potential benefit is that the study would lead to early detection and treatment of anastomotic complications. UGI may also be useful in identifying Roux limb obstruction and gastric remnant dilation. However, low sensitivity and positive predictive value make this an unusual occurrence. In addition, false-positive results often prolong hospitalization and lead to further imaging to investigate the initial finding. Therefore, it has been suggested by several investigators that clinical criteria should be used to perform UGI studies selectively after gastric bypass [8, 9]. In a series of 210 patients, respiratory distress and tachycardia (>120 beats/min) were the two clinical parameters that most closely correlated with leak [10]. That study also reported a significant lack of sensitivity for UGI, with only two of nine leaks being successfully identified. The other leaks were identified either on exploration for clinical deterioration or by CT scan. Our data support the vital importance of clinical suspicion in detecting leaks, obstructions, and other significant intra-abdominal processes after gastric bypass. In fact, six of the seven patients in our study who either had a GJ leak or a JJ obstruction developed clinical signs that would have warranted a UGI if a selective approach had been used. The only patient that did not display any suspicious clinical signs was the patient who presented with biliopancreatic limb obstruction in a delayed fashion. Patients with GJ leak may initially be asymptomatic, highlighting the importance of vigilant postoperative follow-up of patients.

Early UGI can be useful in assessing patients with intraoperative anastomotic complications as well as patients who develop concerning clinical features. Used routinely, early UGI can also aid in objective assessment of performance when establishing a new program or developing a new technique. As a general practice guideline, however, we advocate and have adopted a selective use of UGI imaging in patients whose clinical courses warrant further investigation.

**Acknowledgments.** The authors thank Mr. William Smith for his assistance in accumulating data and Mrs. Marie Carvidi for her editorial assistance. This research was supported by a research grant from Stryker Endoscopy.

**References**
