



Utility of Immediate Postoperative Upper Gastrointestinal Contrast Study in Bariatric Surgery

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Abstract

Introduction Routine use of postoperative upper gastrointestinal (UGI) contrast studies after sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB) is controversial. We sought to determine the usefulness of routine UGI contrast studies during postoperative day (POD) 1 in patients who underwent bariatric surgery.

Methods We performed a retrospective study of patients who underwent SG or RYGB between January 1, 2016, and October 31, 2017. Demographics, surgical data, and immediate surgical adverse effects were collected. We compared patients who underwent routine UGI contrast studies on POD 1 versus patients who did not.

Results A total of 284 patients were analyzed; 197 (69.4%) patients underwent RYGB, while 87 (30.6%) underwent SG. Routine UGI contrast study was performed in 96 (48.7%) patients in the RYGB group versus 31 (35.6%) in the SG group. The overall adverse effect rate was 2 (0.7%); postoperative UGI contrast study was negative in both cases. Mean (SD) length of stay (LOS) for patients who underwent UGI contrast study versus those who did not was similar in the RYGB group (1.8 [1.6] days vs 1.8 [0.9] days, respectively) and the SG group (2 [1.18] days vs 1.9 [0.9] days). The average cost of a postoperative UGI contrast study was \$600, resulting in an additional overall cost of \$76,800.

Conclusion Use of routine UGI contrast studies after bariatric procedures does not appear to add clinical value for the detection of leaks. Furthermore, systematic use of postoperative UGI contrast studies neither seem to reduce LOS, nor appear to increase procedure costs.

Keywords Upper gastrointestinal contrast study · Upper GI · Postoperative · Bariatric surgery · Gastric bypass · Sleeve gastrectomy

Introduction

Obesity has become an alarming burden in the US health care system. Recent meta-analyses estimate the total medical care

costs attributable to obesity to be \$94.3 billion (\$75.6–\$113.2 billion) [1, 2]. Despite efforts to consolidate nonsurgical treatments as a first-line tool for inducing and maintaining weight loss, it is well known that conservative interventions, such as weight loss programs, diets, and drug therapy, have limited efficacy, with repeatedly unsuccessful outcomes. Moreover, bariatric surgery has shown long-term effectiveness in treating morbid obesity [3–5], and laparoscopic sleeve gastrectomy (SG) being the criterion standard for bariatric procedures in the USA [6].

Among the postoperative adverse effects of bariatric surgery, the most feared are gastric leaks (GLs). Both laparoscopic SG and Roux-en-Y gastric bypass (RYGB) are safe procedures, with overall leak-related mortality rates of 0.14% [7] and 0.6% [8], respectively. Nevertheless, prompt diagnosis is critical to reduce postoperative morbidity and mortality [9, 10].

Throughout the evolution of bariatric procedures, use of routine upper gastrointestinal (UGI) contrast study within 24 to 48 h of surgery has been considered an essential imaging

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tool for the early detection of GLs, stenosis, and obstruction during the postoperative period [11–14]. However, several studies have challenged its utility due to the lack of sensitivity, unnecessary irradiation, and additional costs [9, 11, 13].

Based on the dearth of adequate evidence supporting routine use of postoperative UGI contrast studies after SG and RYGB, the American Society for Metabolic and Bariatric Surgery guidelines state that the decision to perform routine versus selective UGI contrast studies should be left to the discretion of the surgeon on the basis of their experience [15]. The aim of our study was to determine the usefulness of routine UGI contrast studies during postoperative day (POD) 1 after bariatric surgery.

Methods

Patient Population

We conducted a retrospective study, consistent with the STROBE guidelines for observational studies [16], to evaluate routine UGI contrast studies in all consecutive patients who underwent SG and RYGB from January 1, 2016, to October 31, 2017, at a single tertiary care center. Our study complied with the Mayo Clinic Institutional Review Board-approved ethical guidelines of Mayo Clinic. We identified the patients who underwent routine UGI contrast study on POD 1 after SG and RYGB procedures to exclude the presence of GL (Table 1).

We collected demographic information (age, sex, gender, and body mass index), procedure performed (SG vs RYGB and laparoscopic vs robotic-assisted), routine UGI contrast study on POD 1 (yes or no), outcome measures (length of stay [LOS], 30-day postoperative adverse effects [i.e., number of

leaks, leak rates, and leak sites], and mortality rate), costs of bariatric procedures with additional postoperative study costs, and follow-up data (weight loss evaluation at 1- and 6-month follow-up). Within all the patients who underwent bariatric procedures, routine UGI contrast studies were performed only by 1 of the 2 bariatric surgeons in our institution, so the decision was left to the discretion of the surgeon. Intraoperative endoscopy was performed according to surgeon preference.

Postoperative Care

Within the group where routine postoperative radiological images were planned, UGI contrast studies were performed on POD 1, with up to 250 mL of water-soluble contrast via a straw (diatrizoate meglumine and diatrizoate sodium solution, Gastrografin®) before oral feeding, and were read by experienced radiologists. All these studies were carried out using fluoroscopic equipment. First, one-per second rapid sequence images of the stomach are obtained in the frontal projection. Second, images in shallow oblique and lateral projections are achieved and, finally, while the patient is swallowing, images in the reverse Trendelenburg are used to rule out any leak missed on the previous views.

Diagnosis of postoperative leak was adopted in the presence of extra-digestive leaks of contrast solution on at least 1 projection of the UGI contrast study. If no leaks were observed and the clinical course was uneventful, patients were initiated on liquid diet 24 h after surgery. Liquids were started the same day as surgery if no routine UGI contrast study was performed. Hospital discharge occurred once the patients were able to maintain hydration and manage pain with oral analgesia (Fig. 1).

All patients were seen in the office within 4 weeks of surgery and had at least 6 months of postoperative follow-up.

Table 1 Patient data (N = 284)

Characteristic	RYGB (n = 197)	SG (n = 87)
Age, mean (range)	48.9 (22.0–80.0)	51.1 (23.0–80.0)
Sex, no. (%)		
Male	42 (21.3)	25 (28.7)
Female	155 (78.7)	62 (71.3)
Adverse effect rate, no. (%)	1 (0.5) ^a	1 (1.1)
Postoperative leaks, no. (%)	0 (0.0)	1 (1.1)
Routine UGI contrast study, no. (%)	96 (48.7)	31 (35.6)
Length of stay, mean (SD), d		
Routine UGI	1.8 (1.6)	2 (1.2)
No routine UGI	1.8 (0.9)	1.9 (0.9)

RYGB Roux-en-Y gastric bypass, SG sleeve gastrectomy, UGI upper gastrointestinal

^a One patient with small bowel obstruction

Study End Points

Our primary end point was to examine the usefulness of routine UGI contrast studies on the detection of postoperative adverse events during POD 1 in patients who underwent bariatric surgery in our center. Secondary end points were the impact of UGI contrast studies on LOS and costs incurred after bariatric surgery.

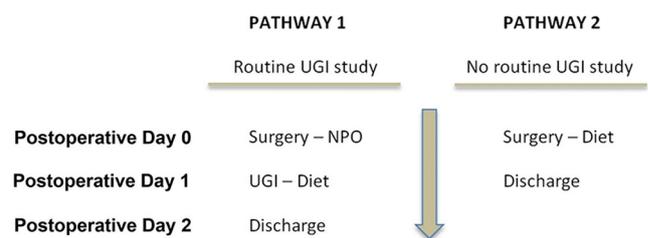


Fig. 1 Clinical postoperative pathways in bariatric surgery. NPO indicates nothing by mouth; UGI, upper gastrointestinal

Results

A total of 284 patients underwent bariatric procedures (217 [76.4%] women and 67 [23.6%] men) in our institution during the study period, with a mean (range) age of 50 (22–80) years. One hundred ninety-seven (69.4%) patients underwent RYGB, and 87 (30.6%) underwent SG. All procedures were performed laparoscopically or robotic-assisted laparoscopy.

Routine postoperative UGI contrast studies were performed in 127 patients (44.7%): 96 (48.7%) in the RYGB group and 31 (35.6%) in the SG group.

Mean (SD) LOS for patients receiving UGI contrast studies versus those who did not was similar in the RYGB group (1.8 [1.6] days vs 1.8 [0.9] days, respectively) and in the SG group (2 [1.18] days vs 1.9 [0.9] days, respectively).

The overall adverse effect rate was 0.7% (2/284): 1 GL on SG and 1 small bowel obstruction on RYGB. In both cases, a routine postoperative UGI contrast study on POD 1 was performed, showing no evidence of adverse effects. The GL became clinically evident on POD 5; computed tomography scan with oral contrast confirmed the diagnosis, and the patient received conservative management. Thus, the detection rate for leaks on routine UGI contrast studies on POD 1 at our institution was 0%, while the incidence of leak was 0.35% ($n = 1$). No postoperative mortality was observed.

The average cost of a routine postoperative UGI contrast study was \$600. Considering that 128 patients underwent UGI contrast studies, the overall additional cost was \$76,800.

Discussion

One of the most feared adverse effects after bariatric procedures is postoperative leak. Although its overall incidence has decreased over the years, the morbidity and mortality related to this cause is still an aspect of concern. For a long time, UGI contrast study has been recognized as an important tool for detecting leaks [17, 18], and many institutions maintain this practice during postoperative care. However, several studies have advocated against routine UGI contrast study in the early postoperative period after bariatric procedures due to its lack of sensitivity and the additional costs [9, 13, 19–22].

There are various hypotheses described in the literature that attempt to explain the poor sensitivity and lack of value of UGI contrast study on POD 1, suggesting that most GLs are not necessarily due to technical failure. The onset of the GL takes time if ischemia due to surgical dissection and increased intraluminal pressure are the suspected causes [23]. Other factors that may influence are the rapid passage of contrast material through the upper part of the staple line, the inflammatory component around the GL, and the size of the GL [24]. Hence, the question is, did the patient have a GL that the UGI

contrast study failed to detect, or did the patient develop a GL after the study?

According to a systematic analysis of 4888 patients [25], 79% of anastomotic leaks were diagnosed after hospital discharge. Thus, a UGI contrast study within 48 h after bariatric surgery is unlikely to identify a leak in an asymptomatic patient [25–27].

By contrast, clinical signs, including tachycardia, fever, nausea, vomiting, and respiratory distress, have had a high positive predictive value for detecting adverse effects [9, 10, 20]. The highest rate of leak detection and confirmation of clinical suspicion are achieved with computed tomography [7, 28].

Our experience is consistent with the results of previous studies [9, 13, 19–22, 25], where routine postoperative UGI contrast study is not an accurate tool for GL detection. Furthermore, the delay in time and severity until diagnosis of GL is not modified in patients with clinical symptoms.

Routine postoperative UGI contrast studies can lead to a delay in oral feeding, extended LOS, and increased costs. Rebibo et al. [11] estimated that the mean increased cost of hospitalization related to UGI contrast study was \$1482, representing 40% of the cost of hospitalization for their UGI group. In our review, we found an additional cost of \$600 per patient who underwent UGI contrast study after bariatric procedures. According to a meta-analysis on enhanced recovery after bariatric surgery, a reduction in LOS translates to reduced costs without any influence on morbidity [26].

However, our study has several limitations. First, the study design was retrospective; thus, the accuracy and thoroughness of the database are somehow biased. Second, this study has been performed in one single center; therefore, although the sample size is satisfactory, the possibility to generalize the outcomes might be limited. Lastly, prospective randomized and multicenter trials would be necessary to formally report the usefulness of routine UGI contrast studies after bariatric surgery.

Conclusions

Our findings suggest that routine UGI contrast studies one day after SG and RYGB procedures do not appear to add clinical value for the detection of leaks, especially given the delay in clinical presentation. Furthermore, systematic use of postoperative UGI contrast studies neither seem to reduce LOS, nor appear to increase procedure costs. Larger, prospective, and multicenter studies are required to more conclusively address this area of clinical practice uncertainty.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval Statement For this type of study, formal consent is not required.

Informed Consent Statement Does not apply.

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