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BRIEF COMMUNICATION

Early Routine Upper Gastrointestinal Contrast Study Following Bariatric Surgery: an Indispensable Postoperative Care or a Medicolegal Heritage?

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Abstract

Concerns still exist regarding the role of early routine upper gastrointestinal contrast study (UGI) after bariatric procedures for detection of early complications. We reviewed our database to identify patients who underwent laparoscopic primary or redo surgery (previously placement of adjustable gastric banding), between January 2012 and December 2017. All the patients underwent UGI within 48 h after surgery. Among 1094 patients, early UGI was abnormal in 5 patients: in 4 cases a leak (one false positive) and in one case stenosis (one true positive) were suspected. In this clinical setting, five leaks were observed and required surgical re-exploration: 3 correctly identified and 2 not detected at UGI. Overall, 3 patients developed anastomotic stenosis. Our data suggest that early routine UGI after bariatric procedures has limited utility.

Keywords Upper gastrointestinal contrast study · Bariatric surgery · Medicolegal issue · Personalized medicine · Leakage · Stenosis · Complications

Introduction

The most common and feared complications after bariatric surgery are anastomotic leak, bleeding, obstruction, and stenosis [1]. Furthermore, the incidence of gastrointestinal leak (GL) ranges from 0 to 8.3%, having a mortality rate of up to 50% [2]. Nevertheless, from a medicolegal perspective, the most common adverse event initiating actions against bariatric surgeons is a postoperative leak (53%) and its delay in diagnosis [3].

The clinical presentation of GL may be subtle or delayed in obese patients, in comparison to normal weight patients, making the correct diagnosis of GL challenging. Consequently, many bariatric centers, including our center, have suggested the use of an early routine postoperative upper gastrointestinal contrast study (UGI) before initiating a liquid diet [4, 5]. However, this approach has become controversial in favor of more personalized medicine, due to additional costs, discomfort for the patients, the risk of irradiation, technical difficulties in monitoring contrast in obese patients, and questionable sensitivity with the risk of prolonged hospitalization in case of false positive results [6].

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Materials and Methods

We conducted a retrospective chart review of prospectively collected data into a dedicated bariatric database of patients who underwent laparoscopic primary bariatric surgery or redo surgery (in case of previous placement of adjustable gastric banding) between January 2012 and December 2017 at the Fondazione Policlinico Universitario A. Gemelli IRCSS and Università Cattolica del Sacro Cuore, in Rome, a high-volume center for bariatric surgery. All patients had intraoperative methylene blue test to check possible leakage from the staple line and/or anastomosis.

A standard postoperative bariatric protocol to perform UGI was used in the first 24 to 48 h.

Patients with symptoms and signs of suspected leak despite negative gastrointestinal series underwent further radiologic evaluation (abdominal computed tomography (CT) with intravenous and oral contrast material) and/or surgical exploration.

Basic demographic and clinical data were collected through review of patient charts as well as electronic database. Data were analyzed using IBM SPSS Statistic 22.0. Continuous variables were expressed as mean ± standard deviation (range), while categorical variables were expressed as a value (percentage). McNemar's test was utilized to compare abnormalities on UGI studies and true presences of leakage and stenosis. $p \leq 0.05$ was considered statistically significant.

Results

During the study period, 1094 patients met the inclusion criteria. Baseline clinical data are shown in Table 1.

The differences between the distributions of abnormal UGI and true presences of leakage and stenosis are shown in Table 2.

Abnormal clinical cases are shown in Table 3. All patients underwent surgical re-exploration. Two cases deserve a description. In the first case, the UGI study was false positive (FP). The patient underwent a laparoscopic removal of gastric banding and Roux-en-Y gastric bypass (RYGB). The clinical presentation was only with tachycardia on POD 2; however, we performed a diagnostic laparoscopy with a new check of anastomoses by using methylene blue test without evidence of leakage. The second case was previously published [7].

Regarding stenosis, the UGI was positive only in one of three cases: the patients had an abdominal CT that confirmed the suspicion of jejuno-jejunal anastomosis' stenosis and underwent surgical revision on POD 1. In the last 2 cases, the UGI contrast was a false negative (FN): for persistent nausea, vomiting, and abdominal pain, we performed an abdominal CT with intravenous and oral contrast on POD 2 that showed in one case a jejuno-jejunal anastomosis' stenosis and in the other a gastro-jejunal anastomosis' stenosis. Surgical revision was necessary for both.

Table 1 Preoperative patient characteristics and postoperative outcomes

Patients	1094
Men/women	305 (27.9%)/789 (72.1%)
Mean age ± SD (range) years	42.68 ± 10.54 (19–69)
Mean BMI ± SD (range) kg/m^2	44.95 ± 6.03 (33.20–70.21)
BMI ≥ 50 kg/m^2	219 (20.0%)
Comorbidities	946 (86.5%)
Procedures	
RYGB	722[1*] (66.0%)
OAGB	111[4*] (10.4%)
SG	247 (22.6%)
BPD	10[1*] (0.9%)
SADI-S	3 (0.1%)
Mean operative time ± SD (range) minutes	80 ± 42 (20–330)
90th days—major complications	34 (3.1%)
Leakage	5 (0.4%)
Stenosis	3 (0.3%)
Hemorrhage	19 (2.0%)
Pulmonary embolism	1 (0.1%)
Pneumonia	3 (0.3%)
Acute pancreatitis	1 (0.1%)
Internal hernia	2 (0.2%)
90th days—mortality	1 (0.1%)
Mean postoperative hospital stay ± SD (range) days	4.13 ± 1.96 (2–20)

*Cases with associated removal of adjustable gastric ben

Table 2 Statistical analyses of the distributions between leaks, stenosis, and UGI results

	Abnormal UGI (Yes/no)	Normal UGI (Yes/no)	*p* value
Leakage	4/1090	5/1089	1
Stenosis	1/1093	3/1091	0.5

RYGB, Roux-en-Y gastric bypass; *OAGB*, one-anastomosis gastric bypass; *SG*, sleeve gastrectomy; *BPD*, biliopancreatic diversion; *SADI-S*, single anastomosis duodeno-ileal bypass with sleeve gastrectomy

Conclusion

The optimal use of UGI is still controversial in bariatric surgery literature [1, 5]. The fact that postoperative GL follows a bimodal distribution, including early technical leaks and late leaks associated with tissue ischemia and abnormal healing, adds complexity to the issue [5]. However, routine use of postoperative UGI has several limitations, like it is an overall sensitivity which is low [1, 5]. Negative results of an early UGI may support technical proficiency but do not address the potential risk for late leaks. Furthermore, a negative study does not completely exclude the possibility of a leak, especially when clinical signs are present. Similarly, it has a low positive predictive value [5]. Nevertheless, Spaniolas et al. reported that GL occurred on average on POD 10, so the diagnosis was made after hospital discharge in 62.4% of patients [8].

For these reasons, UGI alone cannot be fully relied upon to identify or exclude a postoperative complication but we continued to perform it until now for medicolegal issues.

In this study, we demonstrated the limitations of routine postoperative UGI. Two of the five patients with GL had a negative UGI but all were clinically suspicious, and on the basis of the clinical suspicion, all leaks were diagnosed, confirmed with radiographic studies and/or surgical exploration. In our series, we experimented one case of FP UGI for leakage. In our series, for GL, the sensitivity of UGI study is 60.0%, the specificity is 99.9%, the positive predicted value (PPV) is 75.0%, and the negative predicted value (NPV) is 99.9%. While it may not be possible to assess if this is due to poor test sensitivity or delayed formation of leaks, such findings support the limited utility of routine early routine UGI for detection of GL. In addition, FP results often delay discharge and lead to further imaging/procedures to investigate the initial finding. Therefore, it has been suggested by several investigators that clinical criteria should be used to perform personalized (selective) UGI after bariatric surgery [9]. We had similar results for the detection of stenosis with 33.3% for sensitivity, 100% for specificity, 100% for PPV, and 99.8% for NPV. The UGI recognized stenosis only in one case; in fact, for the other patients that were both clinically symptomatic, it was necessary to perform CT study to make a diagnosis.

Our data support the vital importance of clinical suspicion in detecting leaks, obstructions, and other significant intra-abdominal complications after bariatric procedures.

The cost of routine UGI studies after bariatric surgery has been reviewed in previous studies. Recently, Musella et al. [9] reported the cost in our healthcare system: an upper abdominal CT scan with oral contrast is refunded from regional offices to the hospital approximately 140 €, while the cost for a standard UGI is about 50 €. Despite the higher cost of a CT scan, it should be reminded that the current standard of only six radiograms per single UGI sometimes does not assure the identification of GL; moreover, a CT scan is often required after an unclear UGI, making total costs very similar, or even advantageous in favor of CT scan at first instance.

Table 3 Summary of clinical cases

Procedure	Suspicious complication	Site of confirmed complication	Clinical suspicious	UGI	CT scan	
RYGB	Leakage	Gastric pouch	Present	Abnormal	Not performed	TP
RYGB	Leakage	Jejuno-jejunal anastomosis	Present	Abnormal	Not performed	TP
SG	Leakage	Proximal	Present	Abnormal	Not performed	TP
RYGB	Leakage	Gastric pouch	Present	Normal	Positive	FN
RYGB	Leakage	Jejuno-jejunal anastomosis	Mild	Normal	Positive	FN
RYGB	Leakage	–	Present	Abnormal	Non performed	FP
RYGB	Stenosis	Gastro-jejunal anastomosis	Present	Abnormal	Positive	TP
RYGB	Stenosis	Jejuno-jejunal anastomosis	Present	Normal	Positive	FN
RYGB	Stenosis	Jejuno-jejunal anastomosis	Present	Normal	Positive	FN

RYGB, Roux-en-Y gastric bypass; *OAGB*, one-anastomosis gastric bypass; *SG*, sleeve gastrectomy; *TP*, true positive; *FN*, false negative; *FP*, false positive

One last observation should be made with regard to total radiation exposure. Bingham et al. [10] reported a dose of about 6 mSv for UGI, and approximately 10 mSv for CT scan. But also, in this case, we should consider that an abdominal CT scan is anyway required in case of suspected leakages to confirm an uncertain UGI or to evaluate the entire abdominal involvement.

Very interesting is the manuscript of Musella et al. [9] that is the first meta-analysis study comparing UGI versus CT scan in terms of sensitivity, specificity, PPV, NPV in patients who underwent primary sleeve gastrectomy (SG), or RYGB: their results about low sensitivity of early UGI (similar to ours) following bariatric surgery confirm data from previous systematic reviews [9]. Although a recent position statement from ASMBS has suggested leaving to the surgeons the decision to perform routine versus selective UGI [2], their result on 7516 patients reported early routine UGI to be useless, showing instead that selective, personalized postoperative contrast abdominal CT scan is definitely more reliable.

Supporters of routine early UGI claim it provides documentation of the postsurgical anatomy and may stand in favor of the surgeon if the medicolegal issue were to present. It also allows evaluation of performance, especially for general surgery residents in training programs or when surgeons establishing a new program or develop a new technique [5].

This study presents several limitations. First, it is a retrospective study over a long period. Second, our series concerned a single institution with extensive experience in bariatric surgery that could affect the results, since surgery is performed according to standardized procedures with a low overall complications rate. Third, we did not include patients with previously bariatric surgery (redo surgery), except for gastric banding, for which surgery may be more difficult.

In conclusion, we believe that the routine use of early UGI is a medicolegal heritage. Supporting the literature, to date, bariatric surgeons should be aware of clinical symptoms (tachycardia, abdominal pain, respiratory distress) suggesting a GL that should prompt for further radiological evaluation by CT abdomen with oral contrast rather than UGI and/or surgical revision.

Authors' Contributions • Study conception and design: Francesco Pennestrì, Luca Sessa
• Acquisition of data: Pierpaolo Gallucci, Luigi Ciccoritti, Piero Giustacchini, Pietro Princi
• Analysis and interpretation of data: Brunella Barbaro, Maria Gabriella Brizi
• Drafting of manuscript: Francesco Pennestrì, Francesca Prioli
• Critical revision of manuscript: Rocco Bellantone, Marco Raffaelli

Compliance with Ethical Standard

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

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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