7 Enteric Leaks After Sleeve Gastrectomy: Prevention and Management

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Key Points

- Leaks after LSG are rare (2–3 %), but may cause significant morbidity.
- Utilizing bougie ≥40 Fr may decrease leak rate without affecting overall weight loss up to 36 months postoperatively.
- For patients who develop leak after LSG, nutritional support and source control are cornerstones of management, including laparoscopic drainage and washout and feeding jejunostomy tube, if necessary.
- Most leaks resolve with endoscopic stenting.
- In rare cases, surgery (resection with Roux-en-Y esophagojejunostomy or placement of Roux limb to the fistula) is required for definitive management.

7.1 Introduction

Laparoscopic sleeve gastrectomy (LSG) involves a stapled vertical transection of the stomach and creation of a tubular alimentary channel along the stomach's lesser curvature, calibrated along an orogastric bougie (Fig. 7.1). Perhaps one of the most significant changes in bariatric surgery over the past decade is the growing popularity of the LSG. For instance, the University HealthSystem Consortium data reveals an increase in LSG from 0.9 % in 2008 to 36.5 % in 2012 [1]. Reasons for this increase include:

- Short-term weight loss comparable to that of the gastric bypass (60–70 % excess weight loss by 3 years)
- Improvement in insurance coverage for the LSG
- Favorable complication profile compared to the gastsric bypass
- Less required postoperative follow-up compared to gastric banding

Surgeons experienced with LSG report that the most common complications include leak, hemorrhage, stenosis, spleen/liver injury, portal vein thrombosis, and reflux [2]. This chapter focuses on leak after LSG, with a particular focus on prevention and management.

7.2 Presentation and Diagnosis

7.2.1 Incidence and Presentation

The rate of staple-line leaks after LSG varies in the literature, but is generally between 1.1 and 5.3 % of cases [3]. A systematic review of 9991 LSG

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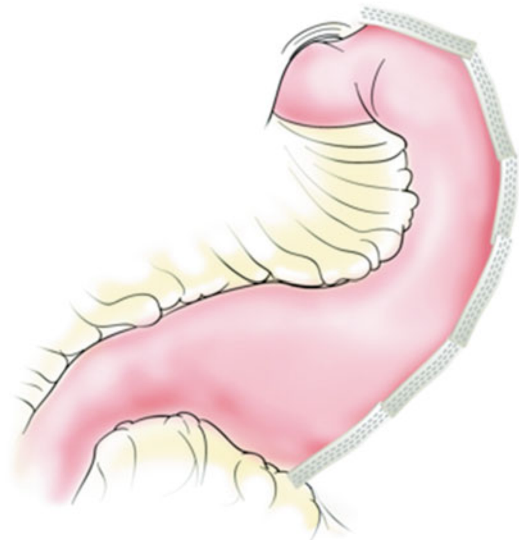

Fig. 7.1 Laparoscopic sleeve gastrectomy. Reprinted with permission from Parikh M, Gagner M, Pomp A. Laparoscopic Duodenal Switch. In: Nguyen NT, De Maria EJ, Ikramuddin S, Hutter MM. eds. The SAGES Manual: a Practical Guide to Bariatric Surgery. Springer, New York, 2008;109–129 [38] © Springer

reported a leak rate of 2.2 % [4]. The mortality rate from leaks after LSG is 0.11 % [4]. The vast majority of leaks (75–89 %) occur proximally, near the gastroesophageal junction [5].

Leaks present at a mean of 7 days postoperatively, but can present as late as 120 days postoperatively [3]. The majority of leaks present after patients are discharged home from the hospital; therefore close follow-up in the immediate postoperative period is critical after LSG. Rosenthal et al. proposed a classification system for leak after LSG based on timing: acute leak (within 7 days postoperatively), early leak (within 1–5 weeks postoperatively), late leak (greater than 6 weeks postoperatively), and chronic leak (after 12 weeks) [6].

Staple-line leak after LSG can present with many clinical scenarios, ranging from a stable patient with mild abdominal pain to a patient with manifestations of systemic inflammatory response syndrome (SIRS—see Table 7.1) to a patient with sepsis and multiorgan failure. A high index of suspicion is important, as early intervention is the key to successful management of these patients [7].

Table 7.1 SIRS criteria based on Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP)

SIRS criteria
Presence of two of the following:
• Temperature >100.4 ° F or < 96.9 ° F • WBC > 12,000 or <4000 or >10 % bands • HR >90 bpm • RR >20, PaCO2 < 32 • Gap acidosis

SIRS = Systemic inflammatory response syndrome; WBC = white blood count; HR = heart rate; RR = respiratory rate

7.2.2 Diagnostic Study

Abdominal computed tomography (CT) scan with oral and intravenous contrast is the diagnostic study of choice for most patients suspected of having leak. CT findings may range from blips of extraluminal air to frank contrast extravasation (Figs. 7.2 and 7.3). Esophagrams may also be used to diagnose leak; however it may be normal despite the presence of leak.

Since leaks often present after patient discharge from the hospital, the value of immediate postoperative upper GI studies has been debated. Studies have demonstrated the lack of association between routine postoperative swallow study and leak [8]. Similarly, intraoperative leak tests fail to detect leak, unless due to a stapler misfire or other

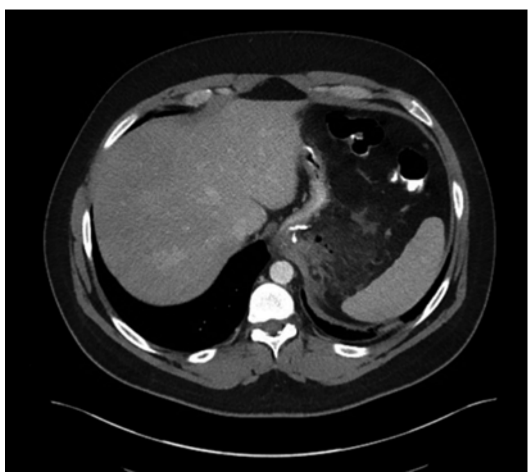

Fig. 7.2 Blips of air around staple line in patient POD#9 after LSG. This resolved with intravenous antibiotics

Fig. 7.3 CT scan POD#8 showing extraluminal fluid collection consistent with leak

technical error. A normal intraoperative leak test and a normal postoperative swallow study do not preclude the development of staple-line leak after LSG. Despite this, many surgeons still favor these tests and perform them routinely.

Some surgeons also advocate for routine drain placement after LSG. However, this has fallen out of favor as leaks present nearly a week after LSG, and leaving a drain in for this duration is unnecessary in a vast majority of LSG cases. In 2013, 39 % of surgeons left a drain in the abdominal cavity after LSG, and this number continues to decline [2]. If a drain is left in place, however, postoperative leak test with methylene blue may be effective in diagnosing leak. Some surgeons have also used this method during follow-up to monitor the progress of the fistula [9, 10].

7.3 Prevention of Leak After LSG

Leak after LSG can occur for a variety of reasons. Possible factors include patient-level factors that predispose to leak. Other factors may be related to the technical aspects of LSG construction, inadequate oxygenation with subsequent ischemia, or thermal injury [11].

7.3.1 Patient Characteristics

Certain patient factors may be associated with increased leak rate. Benedix et al. retrospectively reviewed 103 leaks in 5400 LSG cases (1.9 %) performed over a 6-year period in order to identify factors that increase the risk of leak [12]. They found that higher body mass index (BMI), male gender, presence of sleep apnea, conversion to laparotomy, longer operative time, year of procedure, and intraoperative complications significantly increased leak rate. On multivariate analysis, however, only operative time and year of procedure maintained a significant association with leak.

Superobese patients (BMI >50 kg/m^2) may have a higher incidence of leak, as is the case in gastric bypass. A systematic review of 4888 LSG found the leak rate to be 2.9 % among the superobese versus 2.2 % in those with a preoperative BMI <50 kg/m^2, but this was not statistically significant [5]. Another study found type 2 diabetes to be an independent risk factor for the development of leak ($p<0.01$) [13].

Sakran et al. found an association between previous bariatric surgery and increased likelihood of leak ($p<0.005$). Leaks developed in 44 out of 2834 LSG (1.5 %). Eleven patients (25 %) had a prior silastic ring vertical gastroplasty or LAGB, versus 10 % of non-leaks, implying a threefold increased risk of leak in patients with previous bariatric surgery [3].

7.3.2 Technical Factors

In a retrospective review of 529 cases with 0 % leak rate, Bellanger et al. discussed the technical principles for decreasing enteric leakage after LSG [14]. A key point mentioned is to position the tip of the stapler to give a distance of one and a half times the width of the bougie at the area of the incisura angularis (Fig. 7.4). Other technical principles included positioning the stapler to leave 1 cm of gastric tissue lateral to the angle of HIS to avoid stapling too close to the esophagus in the area of the cardia (Fig. 7.5), allowing adequate compression of the gastric tissue with the stapling device, and thorough visual inspection of the staple line after procedure completion [14].

Sakran et al. proposed that heat-producing instruments may cause thermal injury to the sleeve, leading to leak. Additionally, aggressive dissection near the posterior aspect of the upper sleeve may cause devascularization, increasing susceptibility to leak. They propose that dissection in this area should be kept to a minimum and the final staple fire should be directed away from the esophagus and to the left of the gastroesophageal junction [3].

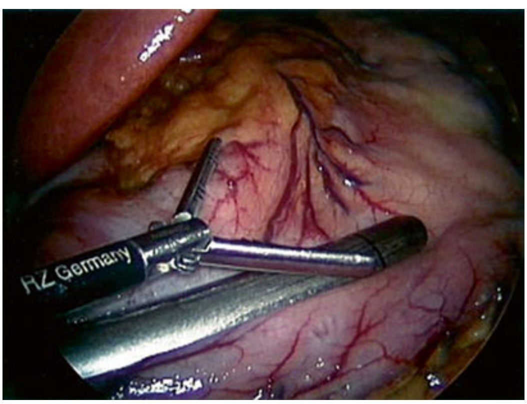

Fig. 7.4 First application of stapler one and a half times the distance from the bougie. Reprinted with permission from Bellanger et al. Laparoscopic sleeve gastrectomy, 529 cases without a leak: short-term results and technical considerations. Obesity Surgery 2011;21:146–50 [14] © Springer

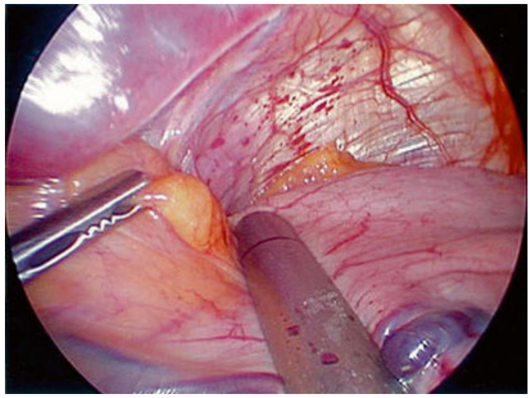

Fig. 7.5 Application of stapler lateral to periesophageal fat pad. Reprinted with permission from Bellanger et al. Laparoscopic sleeve gastrectomy, 529 cases without a leak: short-term results and technical considerations. Obesity Surgery 2011;21:146–50 [14] © Springer

7.3.3 Systematic Review and Meta-Analysis of Factors That Contribute to Leak (Table 7.2)

Technical aspects of LSG, including bougie size used to calibrate the sleeve, distance from the pylorus where the stapling begins, height of stapler used to transect the stomach, and the role of buttressing material on the staple line, may affect leak rate. Debate exists whether the creation of tighter (i.e., smaller) sleeves results in higher leak rate (Fig. 7.6) [15].

In a meta-analysis of 9991 LSG, various technical aspects of performing LSG were analyzed [4]. Bougie size was <40 Fr in the majority (69 %) of patients, LSG transection began ≥5 cm from the pylorus in 68 % of patients, and some form of buttressing was used in 82 % (Fig. 7.7). All leaks were analyzed based on bougie size, the distance from the pylorus, the use of buttressing, and the type of buttressing (Fig. 7.8).

Due to the fact that there are multiple factors that may contribute to leak, a general estimating equation (GEE) model was then created utilizing the variables of bougie size (<40 Fr, 40–49 Fr, ≥50 Fr), distance from the pylorus (<5 cm, ≥5 cm), and the use of buttressing (bioabsorbable,

Table 7.2 GEE (general estimating equation) model adjusting for the effect of bougie size, distance from pylorus, and the use of buttressing or sutures on leak rate while controlling for age and BMI

	Unadjusted			Adjusted		
	OR	95 % CI	*p*-Value	OR	95 % CI	*p*-Value
Bougie size						
<40 Fr (reference)	–			–		
40–49 Fr	0.69	[0.41, 1.16]	0.161	0.53	[0.37, 0.77]	0.0009
≥50 Fr	0.37	[0.18, 0.73]	0.0041	0.40	[0.15, 1.07]	0.068
Distance to pylorus						
<5 cm (reference)	–			–		
≥5 cm	1.16	[0.60, 2.25]	0.659	1.30	[0.81, 2.09]	0.279
Use of buttressing/sutures						
Bioabsorbable (reference)	–			–		
No buttressing, no sutures	1.00	[0.37, 2.69]	0.997	1.06	[0.49, 2.30]	0.873
Non-absorbable buttressing	1.78	[1.17, 2.72]	0.0075	2.01	[0.87, 4.68]	0.104
No buttressing, sutures only	1.95	[1.25, 3.02]	0.0031	2.87	[1.21, 6.84]	0.017
Age						
Mean age < 40	–					
Mean age 40–44	0.78	[0.51, 1.19]	0.250	0.83	[0.54, 1.27]	0.392
Mean age 45+	0.51	[0.27, 0.98]	0.044	0.57	[0.31, 1.03]	0.061
BMI						
Mean BMI < 45	–					
Mean BMI 45–49	1.82	[0.99, 3.32]	0.052	1.81	[1.21, 2.71]	0.0041
Mean BMI 50+	1.44	[0.73, 2.84]	0.296	1.96	[1.16, 3.34]	0.012

(OR = odds ratio; CI = confidence interval)

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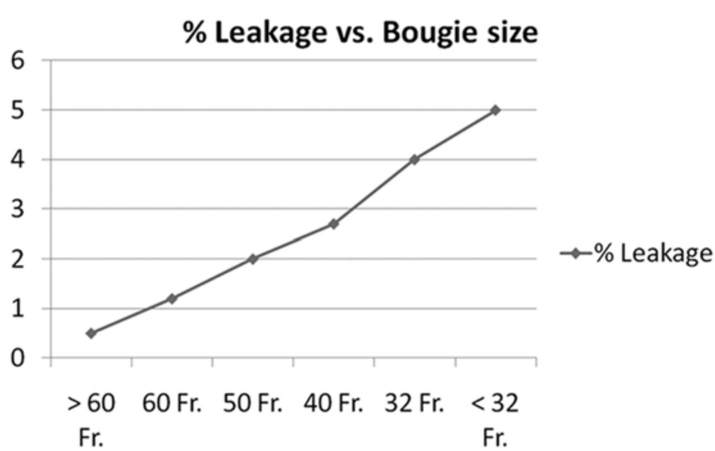


Fig. 7.6 Percentage of leakage versus bougie size. On the *x*-axis, a bougie size in French and on the *y*-axis leakage rate in percentage. Reprinted with permission, Gagner M. Leaks after sleeve gastrectomy are associated with smaller bougies. Prevention and treatment strategies. Surg Laparoscopic Endosc Percutan Tech 2010;20:166–169 [15] © Wolters Kluwer Health

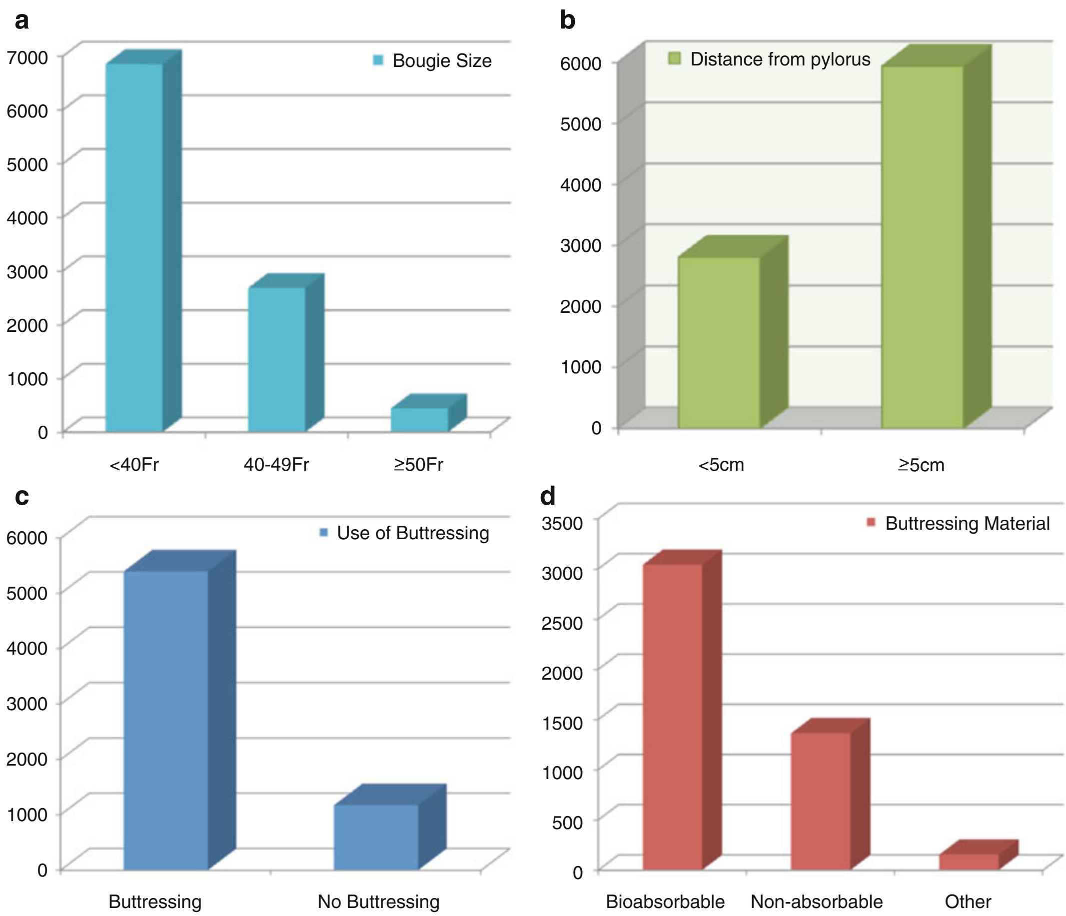


Fig. 7.7 Most common techniques used for LSG. Reprinted with permission from Parikh M, Issa R, McCrillis A, et al. Surgical strategies that may decrease leak after laparoscopic sleeve gastrectomy. Ann Surg 2013;257:231–237 [4] © Wolters Kluwer Health

non-absorbable, other, none) while controlling for age and BMI. The GEE model revealed that the risk of leak after LSG decreased by using a bougie ≥40 Fr (OR 0.53 [0.37–0.77], $p=0.0009$; see Table 7.2). Distance from pylorus did not impact leak rate ($p=0.279$). The use of bioabsorbable buttressing did not impact leak rate ($p=0.104$). However suturing alone (without buttressing) increased leak (OR 2.87 [1.21–6.84], $p=0.017$). BMI>50 also increased leak rate (OR 1.96 [1.16–3.34], $p=0.012$). A linear repeated measures regression model was used to compare weight loss between bougie size <40 Fr and bougie size ≥40 Fr and found no difference in weight loss up to 3 years (70.1 % mean EWL; $p=0.273$) (Fig. 7.9). Based on this study, one of the most important technical factors that may decrease leak is utilizing bougie ≥40 Fr.

The vast majority of surgeons utilize reinforcement when performing LSG [2, 4]. Reinforcement options include buttressing material (absorbable and non-absorbable) as well as oversewing. Oversewing techniques include a running baseball-type stitch throughout the staple line and invagination of the staple line. Buttressing has been shown to decrease bleeding along the staple line [16].

However the impact of buttressing on leak rate is controversial. The meta-analysis by Parikh (9991 LSG) did not show decreased leak with buttressing [3]. Another systematic review (4881 LSG) also failed to show a difference [17]. On the other hand, one retrospective multicenter

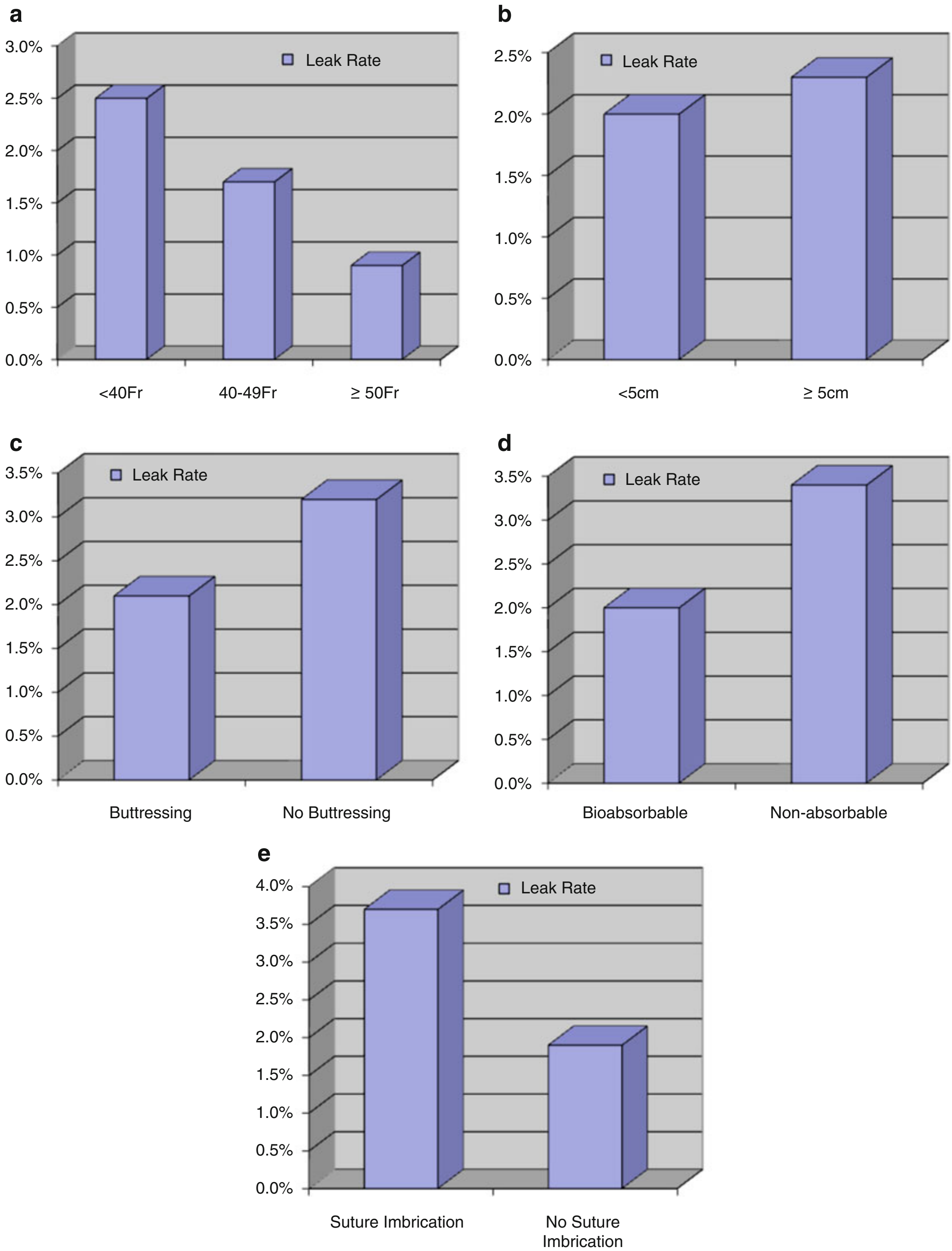
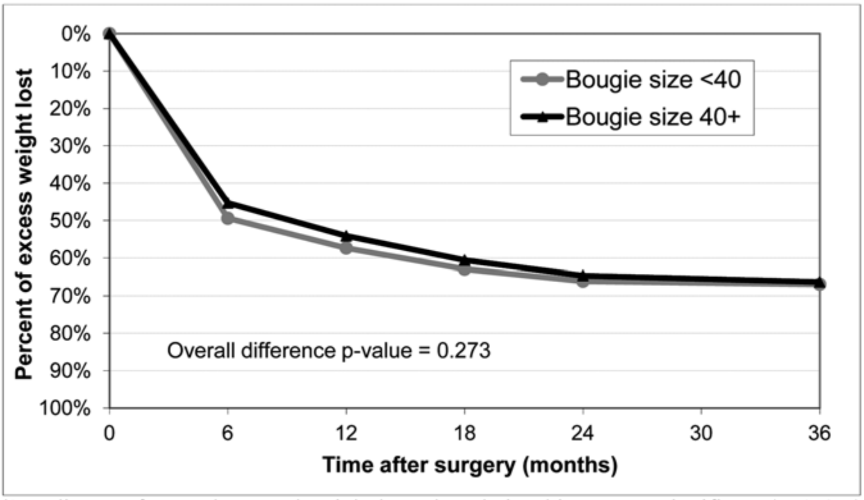


Fig. 7.8 Effect of technique on leak rate. Reprinted with permission from Parikh M, Issa R, McCrillis A, et al. Surgical strategies that may decrease leak after laparoscopic sleeve gastrectomy. Ann Surg 2013;257: 231–237 [4] © Wolters Kluwer Health



*For distance from pylorus and weight loss, the relationship was not significant (p=0.647).

Fig. 7.9 Linear repeated measures regression model comparing weight loss between bougie size < 40 Fr and ≥ 40 Fr. Reprinted with permission from Parikh M, Issa R, McCrillis A, et al. Surgical strategies that may decrease leak after laparoscopic sleeve gastrectomy. Ann Surg 2013;257:231–237 [4] © Wolters Kluwer Health

study that analyzed multiple types of staple-line reinforcement in 1162 LSG found a significantly decreased leak rate among LSG reinforced with bovine pericardium relative to other types of staple-line reinforcement and no reinforcement (0.3 % vs. 2.8 %, $p < 0.01$) [13].

A more recent systematic review was performed by Gagner et al. comparing no reinforcement, oversewing, nonabsorbable bovine pericardial strips, and absorbable polymer membrane (APM) staple-line reinforcement [18]. Leak rates ranged from 1.09 % in the APM group to 3.3 % in the bovine pericardium group, with APM having a significantly lower leak rate than other groups ($p < 0.05$). However, this review did not control for other technical factors such as bougie size.

7.3.4 Other Factors

Some authors propose that early gastric decompression for at least 24 h postoperatively may decrease intragastric pressure and therefore prevent leak. In a prospective randomized study on gastric decompression with a nasogastric tube, there was no difference in leak rate between the groups [19]. However this study was likely underpowered with only 75 patients per treatment group.

7.4 Management of Leak After LSG

The approach to managing LSG leak has evolved as surgeons gain more experience with leak. Early intervention is the key to successful management of these patients. Treatment options depend on the clinical scenario and range from intravenous antibiotics and nutritional support to endoscopic interventions including stenting to surgical interventions including gastrectomy with Roux-en-Y esophagojejunostomy or fistula-jejunostomy. Sepsis control and nutritional support are cornerstones of management, but specific treatments should be based on a patient's clinical presentation and timing of the leak [20]. With the evolution of endoscopic stents to treat leaks, the majority of leaks may be treated without definitive surgery [21].

We favor a treatment algorithm based on the presence of SIRS. Generally, patients with SIRS (Table 7.2) or peritonitis benefit from immediate reoperation with laparoscopic washout, and placement of a large-bore drain (e.g., 19 Fr Blake), with or without placement of a feeding jejunostomy. Stable patients without systemic illness can be treated non-operatively, with percutaneous image-guided drainage, antibiotics, and parenteral hyperalimentation. After drainage, we routinely utilize upper GI series to demonstrate the anatomy of the leak. Then, endoscopic stenting is the treatment of choice to manage the leak.

7.4.1 Endoscopic Intervention

Endoscopic stent placement was originally utilized in the management of anastomotic leak after esophagectomy, and has been adapted to treat enteric leak after LSG. The stent provides a temporary seal of the leak while also allowing oral intake during the process of healing. Stents may also aid in the correction of the sleeve axis in cases of gastric torsion or twist [19]. Generally, stents should be placed in hemodynamically stable patients after any intraabdominal collection has been drained by either laparoscopy or percutaneous CT-guidance (Fig. 7.10).

The use of endoscopic stents to treat LSG leaks is well established in the literature; however, most of the studies on this topic suffer from small sample sizes. Additionally, the lack of standardized stent timing and treatment limits meaningful comparison between studies. Nonetheless, current data suggest that stents are safe and effective in treating proximal leaks after LSG.

In a recent retrospective study, 17 LSG patients with leak underwent endoscopic stenting with self-expandable metal stents [22]. The median duration of stent placement was 42 days, and stenting was successful in treating 13 (76 %) leaks. This study also found that shorter duration between LSG and time of stent placement was associated with improved outcomes. In a similar study, Simon et al. used self-expanding metal stents to treat patients with enteric leaks after LSG, with a mean stent duration of 6.4 weeks and a 78 % success rate [23]. The authors of this study advocate for early (<3 weeks) stent placement as it decreases healing time. There is little consensus on the ideal size and type of stent in treating leak after LSG or the duration of the stent, but most authors recommend a period of 6–8 weeks prior to stent removal.

Another study with six patients with leaks stented with Hanarostent demonstrated an 84 % success rate [24]. In contrast, Tan et al. reported eight cases of endoscopic stenting for leak after LSG, with only a 50 % success rate due to stent-related complications [9]. Complications included stent migration, hematemesis, and gastric obstruction from kinking at the proximal aspect of the stent. Other possible causes of stent failure include erosion, as well as patient intolerance with nausea, vomiting, drooling, early satiety, retrosternal discomfort, and exacerbation of reflux symptoms. Table 7.3 summarizes the current literature regarding endoscopic stents and leaks after LSG.

Additional endoscopic methods have been reported in treating leak. Some have reported

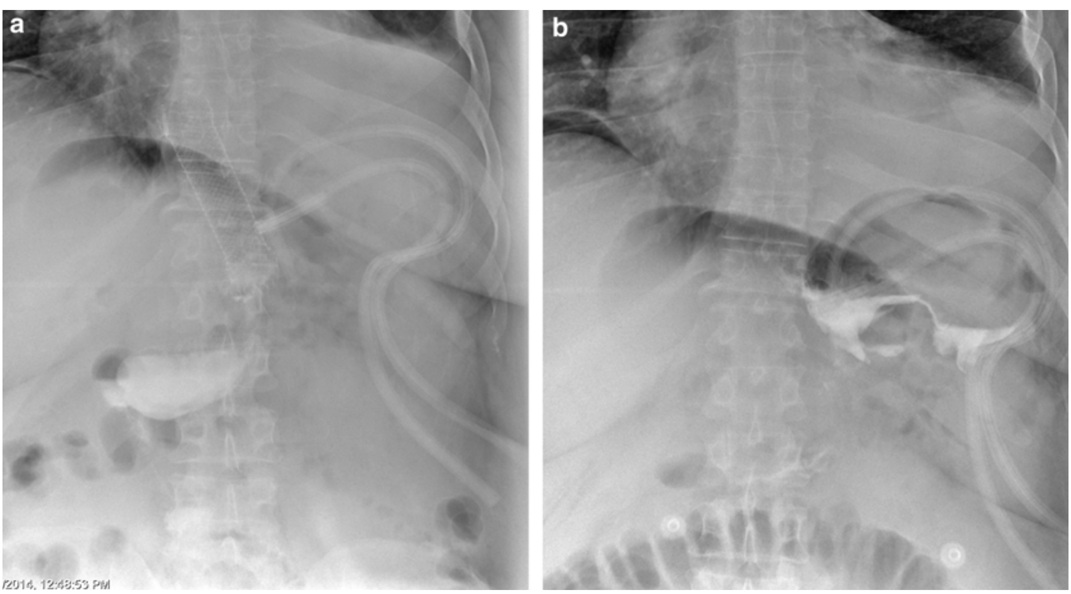


Fig. 7.10 Example of LSG leak treated with stent

using endoscopic internal drainage with pigtail stents [28]. In one study, three stents on average were placed in each of 21 patients, with a 95 % success rate at a mean of 55.5 days postoperatively [29]. Overall, pigtail stents were found to require fewer procedures per patient, were better tolerated, and had lower morbidity-mortality than self-expanding metal stents.

Another study reported successful management of late (16 months post-op) LSG leak with a 10 mm over-the-scope metallic clip [30]. In another case, a patient with a leak refractory to multiple attempts at endoscopic stenting and drainage was successfully treated endoscopically by placing a vascular plug in the fistula and stenting over the plug [31]. Lastly, Oshiro et al. reported on their success with percutaneous transesophageal gastro-tubing (PTEG) in treating two patients with refractory leak [32].

While imperfect, of all the endoscopic treatment options available, stents are most commonly used and have been associated with the most success.

7.4.2 Surgical Interventions

Surgical management of leak after LSG has two main indications:

- Source control in a systemically ill or septic patient.
- Salvage treatment in chronic or refractory leaks that have failed endoscopic management.

Patients exhibiting SIRS or overt signs of sepsis benefit from laparoscopic drainage of the contaminated peritoneal fluid. A well-placed large-bore surgical drain along the staple line also helps maintain source control. We have found in our experience that surgical drainage/washout leads to quicker resolution of SIRS than percutaneous drainage or intravenous antibiotics alone. A feeding jejunostomy tube can also be placed at this time. Usually the leaks present too late to directly repair the defect. Another well-described surgical option is to place a t-tube into the defect to help establish drainage [33].

Surgery has also been described for successful management of chronic leak (>12 weeks). Roux-en-Y reconstruction with resection of the leak site is the most common treatment option in proximal chronic leaks, because it resects the pathology and converts the high-pressure system with distal obstruction of a gastric sleeve to the lower pressure system of a Roux-en-Y gastric bypass [34, 35]. A more recently described option that avoids resection is placement of a Roux limb to the defect to avoid gastrectomy and its attendant complications. This is done with a one-layer anastomosis utilizing a running absorbable monofilament suture (Fig. 7.11a–c) [36]. Chour et al. propose this technique at an early stage to prevent chronic morbidity and increased hospitalization associated with chronic leak [37]. However there was a small leak reported in 3/6 (50 %) patients. Most surgeons advise waiting at least 12 weeks before definitive surgical management to avoid dense adhesions [2]. Even in these scenarios, surgery for definitive treatment of LSG leak can have substantial morbidity [27].

7.4.3 Algorithm (Fig. 7.12)

We recommend a treatment algorithm based on the clinical presentation of the patient, specifically the presence of SIRS. Patients suspected of having a leak should undergo abdominal imaging via CT with IV and PO contrast. If there is radiographic evidence of leak, the patient should be assessed for SIRS (Table 7.1). If SIRS is present, we recommend surgical drainage and consideration of placement of a feeding jejunostomy tube. Primary repair is attempted only in the immediate post-op period (<48 h). If the patient does not have SIRS, image-guided percutaneous drainage should be used to drain any collection.

After resolution of SIRS, we perform esophagram to delineate the anatomy of the leak. Next, an endoscopic covered stent can be placed. Anecdotally, we have had more success with shorter (100 mm) and wider stents (23–25 mm); however there is no definitive literature regarding ideal stent size. We reserve surgery (gastrectomy with Roux-en-Y esophagojejunostomy) for those patients with ongoing morbidity from chronic leak.

Table 7.3 Summary of data regarding endoscopic stent placement after LSG leaks

Study Year	*n* (stented leaks)	Time to leak presentation	Stent type	Stent duration (days)	Time to healing	Success rate	Additional findings
Alazmi 2014 [22]	17	n/a	UltraFlex + polyFlex 18 × 150 mm self-expandable metal stent	42	n/a	76 %	• Shorter duration between gastrectomy and time of stent placement was associated with improved outcomes. Persistent leaks were treated with conversion to RYGB.
Sakran 2012 [3]	11	Mean 7 days	Unnamed endoscopic stents	n/a	40 day	55 %	• Routine intra- and postoperative to rule out leaks are superfluous. • Management options should be based on patient disposition.
Corona 2013 [25]	6	Range 1–7 days	Wallflex fully covered esophageal stent	30	n/a	100 %	• An algorithmic approach to treatment based on the eligibility for percutaneous drainage is beneficial in treating leak after LSG.
Simon 2013 [23]	9	Mean 11 day, range 2–29 days	Hanarostent 18 × 170 mm	45	141 day	78 %	• Early (<3 weeks after leak diagnosis) stent placement as it decreases healing time.
Nguyen 2010 [26]	3	Range 7 days–9 months	Alimax-E 22 × 120 mm covered stent	63	n/a	100 %	• Endoscopic stenting was safe and effective in treating both early and late leaks.
Tan 2010 [9]	8	n/a	n/a	n/a	n/a	50 %	• Stents were removed for complications and patient intolerance. • The authors now reserve stents for use in patients who failed other management.

Table 7.3 (continued)

Study Year	*n* (stented leaks)	Time to leak presentation	Stent type	Stent duration (days)	Time to healing	Success rate	Additional findings
de Aretxabala 2011 [20]	4	Range 3–25 days	Unnamed covered stents	42	21–240 day	100 %	• Management should be tailored to patient presentation. • Stents are effective, but sepsis control and nutritional support are cornerstones of treatment.
Moskowicz 2013 [27]	6	Mean 5.3 days	n/a	n/a	n/a	60 %	• Stenting alone was associated with a high failure rate, but salvage was achieved in by Ovesco clip + stent.

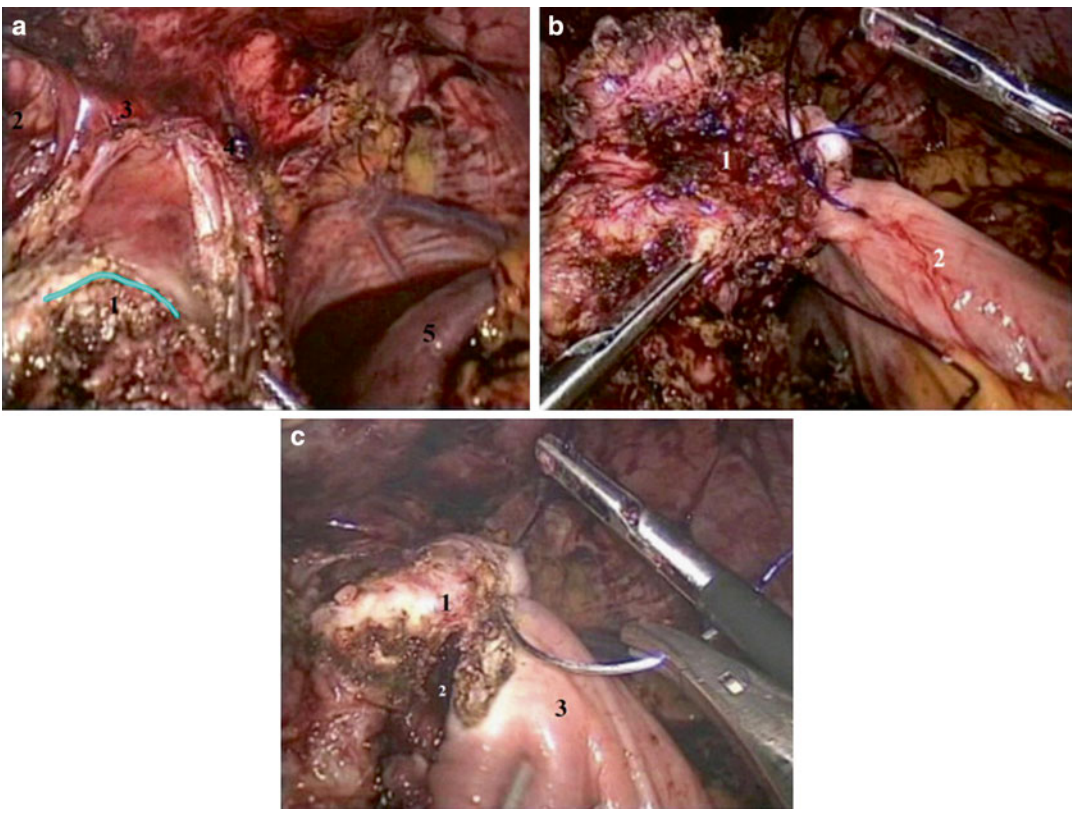


Fig. 7.11 Fistulojejunostomy surgical technique. (**a**) The hiatal region with the chronic fistula of the proximal sleeve. (1) Edge of the defect; (2) left lobe of the liver; (3) right crus; (4) left crus; (5) spleen. (**b**) Posterior anastomosis between the defect and the Roux limb. (1) Chronic fistula. (2) Roux limb. (**c**) Anterior anastomosis after opening the small bowel lumen of the Roux limb. (1) Edge of the defect; (2) nasogastric tube; (3) Roux limb. Reprinted with permission from van de Vrande S, Himpens J, El Mourad H, Debaerdemaeker R, Leman G. Management of chronic proximal fistulas after sleeve gastrectomy by laparoscopic Roux-limb placement. Surgery for Obesity and Related Diseases 2013;9:856–61 [36] © Elsevier

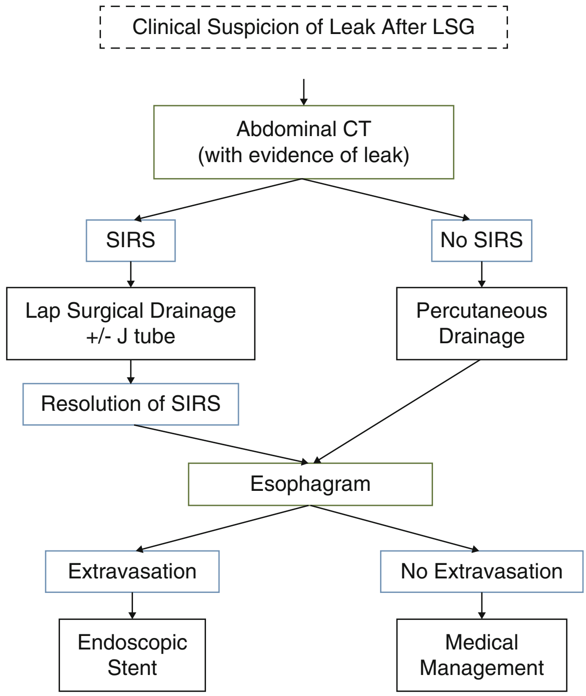


Fig. 7.12 Treatment algorithm for leak after LSG

7.5 Conclusion

Although rare, leaks after LSG may result in significant morbidity. Intraoperative techniques such as using a bougie size ≥40 French may decrease the rate of leak. Cornerstones of management include sepsis control and nutritional support, including laparoscopic washout, drainage, and placement of a jejunostomy tube, if necessary. Fortunately, most leaks resolve with endoscopic stenting alone. Surgical treatment (resection with Roux-en-Y esophagojejunostomy or fistula-jejunostomy) is occasionally needed in patients with chronic leaks refractory to endoscopic treatment.

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