Basrah Journal Of Surgery

Bas J Surg, June, 24, 2018

MANAGEMENT OF STAPLE LINE LEAKS FOLLOWING SLEEVE GASTRECTOMY

Nasseif Jassim Mohammed[@] & Falih M Algazgooz[*]

@MB,ChB, CABS, FICMS, General and Laparoendoscopic Surgeon, Al-Sadr Teaching Hospital. *MB,ChB, CABS, FICMS, FACS, MRCS, Consultant Bariatric and Laparoendoscopic Surgeon, Al-Sadr Teaching Hospital, Basrah, IRAQ.

Abstract

Bariatric surgery is a growing specialty and the number of laparoscopic sleeve gastrectomies (LSG) has increased dramatically in the latest years all over the world. Gastric leak is considered one of the most serious complications following laparoscopic sleeve gastrectomy, it can become chronic, recurrent, and need multiple interferences.

The purpose of the present study is to determine the clinical presentation of gastric leak after LSG, its management, postoperative course, and to show the effectiveness of various ways of managing such complication.

This study included 200 patients who underwent sleeve gastrectomy at Al-Sadr Teaching Hospital for morbid obesity, they were 60 males(30%) and 140 females(70%). The mean age was 35 years and the mean body mass index (BMI) was 39 kg/m2.

Out of the 200 patients who underwent laparoscopic sleeve gastrectomy, 6 patients (3%) were recognized to have leak complication.

All leaks were proximal and identified at the gastroesophageal junction. Management was accomplished by putting T tube at the site of leak for 2 patients, direct closure for one patient, just drainage for one patient, and Roux-en-Y Gastric Bypass (RYGB) for the remaining 2 patients.

In conclusion, prompt diagnosis and treatment is vital in the management of a leak. However, it can be treated securely via numerous management ways depending on the time of diagnosis and magnitude of the leakage.

Introduction

The increasing prevalence of morbid obesity as well as the fact that surgery is the only proven long-term effective treatment for this condition, has led to the search for surgical techniques that can provide adequate weight loss with the least possible morbidity and mortality. Laparoscopic sleeve gastrectomy (LSG) was originally introduced as a first-step technique followed by biliopancreatic diversion or duodenal switch in high-risk morbidly obese patients. However, early findings of LSG showed excellent weight loss as well as co-morbidity resolution. Later on, LSG gained popularity as a primary restrictive bariatric procedure[1-3]. A recent reports showed similar excess weight loss for Roux-en-Y gastric bypass (RYGB) and LSG at 12 months after adjusting for age and body mass index[4]. Baltasar[5] consider it as multipurpose bariatric procedure. LSG has drawn attention because of its technical simplicity and lower long-term complication rate compared with those of RYGB[4,6].

Laparoscopic sleeve gastrectomy can be associated with important morbidity like bleeding, stricture, staple-line failure with dehiscence and gastric leak which is one of the most severe problems. Furthermore, overall complications rate

after LSG was lower than that of adjustable gastric banding ranging between 2–15%[7,8].

The incidence of significant staple line bleeding rate is reported to be 2% in average[3]. Staple line leaks are still of great concern and perhaps the most feared complication after LSG[7,9,10].

The purpose of the present study is to determine the clinical presentation, postoperative course and treatment of gastric leak after LSG, also to show the effectiveness of treatment by usage of a T tube drainage.

Patients and methods

During the period between Feb.2013 to Feb.2016, 200 patients underwent sleeve gastrectomy at Al-Sadr Teaching Hospital for morbid obesity, 60(30%) males, 140(70%) females, the mean age was 35 years the mean body mass index(BMI) was 39 kg/m2.

Surgical procedure: After administering 15mmHg pneumoperitoneum, 5 trocars were inserted: a 5-mm subxiphoid trocar aids as liver retractor; a 15-mm right upper abdomen trocar serves as operational channel and is used to remove the specimen; a 10-mm supraumbilical trocar help as optic system; a 12mm left upper quadrant trocar serves as working channel for the ENDO GIA and gastric retraction; and a 10mm left subcostal anterior axillary line trocar serves as another working channel. LSG is performed by dissecting the greater curvature vessels using a LigaSure device (Covidien), beginning 3cm proximal to the pylorus until 2 cm nearby the angle of His, cutting the short gastric and posterior fundic blood vessels. Once this step is finished, a 36F bougie is introduced by the anesthesiologist into the stomach, and the surgeon facilitate advancing it along the lesser curvature into the pylorus. An ENDO GIA stapler with 4.8mm staples (green cartridge) is used through the 15mm port, which is located at the right upper abdomen, to start the separation of the antrum 2 to 3 cm proximal to the pylorus. This is completed using another green cartridge up to the incisura angularis. Gastric division is completed by dividing the gastric corpus up to the angle of His, applying three to four blue cartridges of the 3.5mm stapler. Leaving a small gastric tubular pocket of 60-70 ml volume. Instillation of methylene blue by the way of a gastric tube, which is positioned after the bougie is removed, for assessment of gastric volume and to define any leakage, we momentarily block stream into the duodenum with an intestinal forceps at the pylorus. This maneuver done in some patients. The excised specimen, which is delivered simply through the 15mm port at the right upper abdomen, is sent for histological examination. One silastic tube drain is left at side of the gastric suture line. No leaks were observed throughout surgery in any patient.

Results

Out of 200 patients who underwent laparoscopic sleeve gastrectomy, 6(3%) patients were identified to have a leak complication after LSG.

The leakage rate was 3% in the laparoscopic group. All leaks were proximal and identified at the gastroesophageal junction.

Demographic characteristics of patients who developed leak complication after sleeve gastrectomy are shown in table I. No procedure-related death occurred during the period of follow-up.

Table I: Demographic characteristics of patients with leak

Characteristics	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Gender	Female	Female	Male	Male	Male	Female
Age	45 years	22 years	28 years	28 years	32 years	34 years
Body mass index (kg/m2)	45	42	52	42	46	44
Co-morbidities						
Hypertension	+ve	-ve	-ve	-ve	-ve	-ve
Diabetes mellitus	-ve	-ve	-ve	-ve	-ve	-ve
Hyperlipidemia	+ve	+ve	-ve	-ve	-ve	-ve
Sleep apnea	+ve	-ve	-ve	-ve	-ve	-ve

Case no.1: The diagnosis of leak was made at 3 days after LSG. Presenting symptoms were abdominal pain, fever, chills, and tachycardia after establishment of oral fluids, together with copious drainage in the tube drain. The decision was made for diagnostic laparoscopy and site of leak was determined at the gastroesophageal junction (GEJ) by methylene blue test. After cleaning the area and dissection of the GEJ, a T tube was put through the leak site and the long arm of the tube exteriorized through the port site. Extraluminal drain was put through a separate wound and the patient was kept on nil by mouth, broad spectrum antibiotics, and total parenteral nutrition.

Case no.2: This patient presented as a delayed case about 2nd post-operative week with high grade fever, tachycardia, and hypotension. blood picture showed leukocytosis. CT scan showed hug left subphrenic collection with extravasation of oral contrast media. Immediate diagnostic laparoscopy showed purulent collection in left subphrenic area and leakage of gastric contents. The site of the leak was defined at GEJ junction which was managed in the same way as in case no.1 by putting a T tube and extraluminal drain but with feeding jejunostomy. The patient was kept on nil by mouth, broad spectrum antibiotics and the patient was discharged on the 7th postoperative day.

Gastrografin swallow was done for both patients at 2 weeks, 3weeks intervals. After assurance of leak cessation and no gastrografin extravasation, T tube was clamped and the patient started oral fluids. After 2 days, the T tube was withdrawn. The total duration for the T tube in place was 4 weeks. No more morbidity developed, and the long term follow-up and recovery were uneventful.

Case no.3: This patient presented as acute abdominal pain, fever and tachycardia at the 2nd postoperative day. After stabilization, laparoscopy was done and after copious toilet of peritoneal cavity and methylene blue test, GEJ leak was found and so managed by direct closure by stapling together with feeding jejunostomy and extralumenal drain followed by same steps of management.

Case no.4: Five days after surgery he developed tachycardia with fever, immediate CT scan showed large collection at gastrosplenic area. Laparoscopy and methylene blue test showed GEJ leak. After toilet of peritoneal cavity immediate RYGB was done and 2 weeks later gastrografin swallow showed complete healing.

Case no.5: Three days after surgery, he developed tachycardia, fever, and signs of pertonism so immediate laparoscopy was done with drainage of the abscess and tube drain was kept in. Esophageal stent was put. Two weeks later, the stent was migrated distally and removed with the leak continues. Finally RYGB was done and healing occurred after 6 weeks.

Case no.6: One week after sleeve gastrectomy, she developed fever and

tachycardia. CT scan revealed gastrosplenic area collection. Laparoscopy was done with drainage of collection, and tube drain was put with feeding jejunostomy. Eight weeks later, oral contrast study showed complete healing.

Discussion

Large number of LSG has been performed universally in the recent years[1] as it had the advantage of excellent weight loss outcome, co-morbidity resolution, easy technique, avoidance of foreign bodies or adjustments, short operative time, and abrupt limitation of caloric intake[11,12]. Recent studies described that reoperation and surgery-related morbidity rates were the lowest for LSG in comparison with those of laparoscopic RYGB and adjustable gastric banding[13], even with the lower morbidity complications which are still happening. Staple line leak is one of these complications, which can become chronic, recurrent, and require multiple interventions[14].

Leaks are most frequently occur at the gastroesophageal junction in LSG patients[13,15]. A study of microperfusion patterns of the stomach during LSG by visible light spectroscopy (VLS) is very safe and effective tool allowing precise measurement of oxygen saturation (StO2%). The upper part of the stomach is the region of limited microperfusion with significantly reduced tissue oxygenation after sleeve surgery[16]. Also this considered as a high pressure zone. Our findings goes with these reports, as all our leaks occurred at the GE junction. Leak rates after LSG in many studies ranged between 0.6 to 5.3% as shown in table II.

Table II: The incidence of post sleeve gastrectomy leak in different studies

Author	No. of patients	Leaks no. (%)	Year
Cottam et al.[17]	126	2 (0.9)	2006
Serra et al.[18]	993	6 (0.6)	2007
Burgos et al.[19]	214	7 (3.2)	2009
Casella et al.[20]	200	6 (3)	2009
Sanchez-Santos et al.[21]	540	11 (2)	2009
Csendes et al.[22]	343	16 (5)	2010
Dapri et al.[23]	75	4 (5.3)	2010
Daskalakis et al.[24]	230	10 (4.3)	2010
Lacy et al.[25]	294	11 (4)	2010
Tan et al.[26]	500–600	14 (2.5)	2010
Bellanger and Greenway[27]	529	0	2011
Current study	200	6 (3)	

Many surgeons have tried to reduce the leak rate by over-sewing or strengthening of the staple line. Studies reported that staple line reinforcement with bovine pericardium bands will effectively reduce the risk of leak and suggested that over sewing of the staple line may lead to reduction in leak rate[14,28]. In our study no such maneuvers were used. It is also mentioned that leak rate is higher when the bougie size is smaller and the sleeve is tighter. Many demonstrated an inverse association between the bougie size and the rate of leak after LSG. A bougie size of 60Fr and beyond was related with a much lower danger of leaks than that of

40Fr and less[17,29]. However, Rosenthal[1] stated that best bougie size is 32–36Fr, and a 36Fr bougie was used in the present study.

Rosenthal also grouped the leak into acute (within 7 days), early (within 1–6 weeks), late (after 6 weeks), and chronic (after 12 weeks) according to the time of presentation after the primary procedure. Five of our patients had leaks within 1st week postoperatively. These patients were placed into the category of an acute leak, and leaks healed without recurrence. Other patients were diagnosed at the 2nd post-operative week after LSG (early). Rosenthal also suggested that after 30 days, the likelihood of a leak to seal by only using an endoscopic stent was very low. We tried putting endoscopic stent in one of our patients but the outcome was not acceptable because migration happened and leak continued.

Regarding endoscopic hemoclips and fibrin glue for leaks after LSG, some have poor success with endoscopic clip placement in leaks that do not heal after several weeks and have advocated the use of fibrin glue injection to the leak site[30]. In the present study such measures was not attempted because of lack of facilities and experience.

For acute leak within 7 days of the original surgery, some recommend relaparoscopy with drainage of collection and localization of leak site, then placement of T tube at leak site, which will provide maturation of fistula tract and prevent any further collection and enhance healing process. We tried such technique in two patients and the result was excellent. For late leaks, a more conservative approach should be undertaken. If the leak is small (1 cm) then a trial of hemoclips or fibrin glue should be justified. Failure of resolution or larger leaks should be managed by placement of an endoluminal stent. Sustained leaks should be managed by last surgical option which is the conversion to a RYGB[12,31], we also tried such procedure in two patients and we gain satisfactory results as demonstrated in table III.

Table III: Reoperation timing, type and outcome in patients with gastric leak

Patient reoperation	Reoperation timing Post operative day	Type of reoperation	Outcome
Case no.1	3rd	laparoscopy, lavage & t-tube drainage	satisfactory
Case no. 2	12th	laparoscopy, lavage & t-tube drainage	satisfactory
Case no. 3	2nd	laparoscopy, lavage & direct closure	satisfactory
Case no. 4	5th	laparoscopy, lavage & RYGB	satisfactory
Case no. 5	3rd	laparoscopy, lavage & RYGB	satisfactory
Case no. 6	7th	laparoscopy, drainage & feeding jejunostomy	satisfactory

In conclusion, management of leaks after LSG can be a tough job. Early diagnosis and treatment is important in the management of a leak. However, it can be treated safely via various management options depending on the time of diagnosis and size of the leak that's include; putting T tube at the site of leak, direct closure, just drainage, and Roux-en-Y Gastric Bypass.

References

1. Rosenthal RJ. International Sleeve Gastrectomy Expert Panel. Internal Sleeve Gastrectomy Expert Panel Consensus Statement: best practice guidelines based on experience of 412,000 cases. SurgeObesRelate Dis 2012; 8:8–19.
2. Akkary E, Duffy A, Bell R. Deciphering the sleeve: technique, indications, efficacy, and safety of sleeve gastrectomy. ObesSurg 2008; 18:1323–9.
3. Gagner M, Deitel M, Erickson AL, Crosby RD. Survey on laparoscopic sleeve gastrectomy (LSG) at the fourth international consensus summit on sleeve gastrectomy. ObesSurge 2013; 23:2013–7.
4. Yaghoubian A, Tolan A, Stabile BE, Kaji AH, Belzberg G, Mun E, Zane R. Laparoscopic Roux-en-Y gastric bypass and sleeve gastrectomy achieve comparable weight loss at 1 year. Am Surg 2012; 78: 1325–8.
5. BaltasarA,Serrs C. Perez N, et al , Laparoscopic sleeve gasterectomy multipurpose bariatic operation.obessurg.2005 seo ,15(8):1124-1128.
6. Trastulli S, Desiderio J, Guarino S, et al. Laparoscopic sleeve gastrectomy compared with other bariatric surgical procedures: a systemic review of randomized trials. SurgObesRelat Dis 2013;9: 816–30.
7. Lalor PF, Tucker ON, Szomstein S, Rosenthal RJ. Complications after laparoscopic sleeve gastrectomy. SurgObesRelat Dis 2008; 4: 33–8.
8. Brethauer SA, Hammel JP, Schauer PR. Systematic review of sleeve gastrectomy as staging and primary bariatric procedure. SurgObesRelat Dis 2009; 5:469–75.
9. Aurora AR, Khaitan L, Saber AA. Sleeve gastrectomy and the risk of leak: a systemic analysis of 4,888 patients. SurgEndosc 2012; 26: 1509–15.
10. Sieber P, Gass M, Kern B, Peters T, Slawik M, Perterli R. Five-year results of laparoscopic sleeve gastrectomy. SurgObesRelat Dis 2014; 10:243–9.
11. Deitel M, Gagner M, Erickson AL, Crosby RD. Third International summit: current status of sleeve gastrectomy. SurgObesRelat Dis 2011; 7:749–59.
12. Thompson CE 3rd, Ahmad H, Lo Menzo E, Szomstein S, Rosenthal R. Outcomes of laparoscopic proximal gastrectomy with esophagojejunalreconstruction for chronic staple line disruption after laparoscopic sleeve gastrectomy. SurgObesRelat Dis 2014; 10: 455–9.
13. Hutter MM, Schirmer BD, Jones DB, et al. First report from the American College of Surgeons Bariatric Surgery Center Network: laparoscopic sleeve gastrectomy has morbidity and effectiveness positioned between the band and the bypass. Ann Surg 2011; 254: 410–20.
14. Bulbuller N, Aslaner A, Oner OZ, et al. Comparison of four different methods in staple line reinforcement during laparoscopic sleeve gastrectomy. Int J. ClinExp Med 2013; 6:985–90.
15. Parikh M, Issa R, McCrillis A, Saunders JK, Ude-Welcome A, Gagner M. Surgical strategies that may decrease leak after laparoscopic sleeve gastrectomy: a systematic review and meta-analysis of 9991 cases. Ann Surg 2013; 257:231–7.
16. Delko, Tarik, et al. "Intraoperative Patterns of Gastric Microperfusionduring Laparoscopic Sleeve Gastrectomy." Obesity Surgery (2016): 1-7.
17. Cottam D, Qureshi FG, Mattar SG et al (2006) Laparoscopic Sleeve gastrectomy as an initial weight loss procedure for high risk Patients with morbid obesity. SurgEndosc 20:859–863
18. Serra C, Baltasar A, Andreo L et al (2007) Treatment of gastric Leaks with coated self-expanding stents after sleeve gastrectomy. ObesSurg 17:866–872
19. Burgos AM, Braghetto I, Csendes A et al (2009) Gastric leak After laparoscopic-sleeve gastrectomy for obesity. ObesSurg 19:1672–1677
20. Casella G, Soricelli E, Rizzello M et al (2009) Nonsurgical Treatment of staple line leaks after laparoscopic sleeve gastrectomy. ObesSurg 19:821–826
21. Sanchez-Santos R, Masdevall C, Baltasar A et al (2009) Short and Mid-term outcomes of sleeve gastrectomy for morbid obesity:theexperience of the Spanish National Registry. ObesSurg 19:1203–1210
22. Csendes A, Braghetto I, Leon P et al (2010) Management of leaks After laparoscopic sleeve gastrectomy in patients with obesity. J GastrointestSurg 14(9):1343–1348
23. Dapri G, Cadiere GB, Himpens J (2009) Reinforcing the staple line during laparoscopic sleeve gastrectomy: prospective randomized Clinical study comparing three different techniques. ObesSurg 20:462–467
24. Daskalakis M, Berdan Y, Theodoridou S et al (2011) Impact of surgeon experience and buttress material on postoperative complications after laparoscopic sleeve gastrectomy. SurgEndosc 25:88–97
25. Lacy A, Ibarzabal A, Pando E et al (2010) Revisional surgery After sleeve gastrectomy. SurgLaparoscEndoscPercutan Tech 20:351–356
26. Tan JT, Kariyawasam S, Wijeratne T et al (2010) Diagnosis and Management of gastric leaks after laparoscopic sleeve gastrectomy For morbid obesity. ObesSurg 20:403–409
27. Bellanger DE, Greenway FL (2011) Laparoscopic sleeve gastrectomy, 529 cases without a leak: short-term results and technical considerations. ObesSurg 21:146–150
28. Gagner M. Leaks after sleeve gastrectomy are associated with smaller bougies: prevention and treatment strategies. SurgLaparoscEndoscPercutan Tech 2010; 20:166–9.
29. Buchwald H, Oien DM. Metabolic/Bariatric surgery worldwide 2011. ObesSurg 2013; 23:427–36.
30. Nguyen NT, Nguyen XM, Dholakia C. The use of endoscopic stent in management of leaks after sleeve gastrectomy. ObesSurg 2010; 20: 1289–92.
31. Chouillard E, Chahine E, Schoucair N, et al. Roux-en-Y fistulajejunostomy as a salvage procedure in patients with post-sleeve gastrectomy fistula. SurgEndosc 2014; 28:1954–60.