*Artur Binda, Paweł Jaworski, Emilia Kudlicka, Wiesław Tarnowski

Leak after sleeve gastrectomy. Endoscopic treatment with the use of fibrin sealant – case report

Nieszczelność po rękawowej resekcji żołądka. Leczenie endoskopowe z zastosowaniem kleju tkankowego – opis przypadku

Department of General, Oncological and Digestive Tract Surgery, Medical Centre of Postgraduate Education, Warszawa
Head of Department: prof. Wiesław Tarnowski, MD, PhD

Key words
sleeve gastrectomy, leak, cutting a bougie, fibrin sealant

Słowa kluczowe
rękawowa resekcja żołądka, nieszczelność, przecięcie zgłębnika żołądkowego, klej fibrynowy

Address/adres:
*Artur Binda
Department of General,
Oncological and Digestive Tract Surgery
Medical Centre of Postgraduate Education
ul. Czerniakowska 231, 00-416 Warszawa
tel. +48 (22) 621-71-73, +48 (22) 584-11-36
fax +48 (22) 622-78-33
quiz0@interia.pl

Summary

Leak within the staple line belongs to the heaviest, life-threatening complications of sleeve gastrectomy. The leakage usually occurs in the proximal part of the sleeve, close to the angle of His. In most cases, in this area, there are the greatest technical difficulties with the proper application of endostapler and with effective staple line reinforcement. There are many different theories on the etiology of leaks after sleeve gastrectomy. It seems that one reason may be technical errors during surgery. In this paper, we describe a case of a patient in whom there was a leakage within the staple line resulting from cutting the bougie used to calibrate the sleeve. We also describe an effective course of treatment with fibrin sealant applied endoscopically.

During surgery, you should put a special emphasis on respecting the rules enabling avoidance of errors resulting in the occurrence of leakages and the surgeon performing the sleeve gastrectomy should have extensive knowledge on the treatment of this complication. The management of leaks after sleeve gastrectomy depends mainly on the general condition of the patient, the time of fistula occurrence, its size and location and the experience of the center.

Streszczenie

Przeciek w obrębie linii zszywek należy do najcięższych, zagrażających życiu powikłań po rękawowej resekcji żołądka. Do nieszczelności dochodzi na ogół w proksymalnej części wytworzonego mankietu, w okolicy kąta Hisa. W większości przypadków w tej okolicy występują największe trudności techniczne związane z prawidłowym zastosowaniem endostaplera oraz ze skutecznym wzmocnieniem linii zszywek. Istnieje wiele różnych teorii dotyczących etiologii przecieków po rękawowej resekcji żołądka. Wydaje się, że jedną z przyczyn mogą być błędy techniczne w trakcie operacji. W pracy opisujemy przypadek pacjentki, u której doszło do nieszczelności w obrębie linii zszywek w wyniku przecięcia zgłębnika żołądkowego używanego do kalibracji wytwarzanego mankietu. Opisujemy również przebieg skutecznego leczenia z użyciem kleju tkankowego aplikowanego endoskopowo.

W trakcie operacji należy położyć szczególny nacisk na przestrzeganie zasad pozwalających na uniknięcie błędów prowadzących do wystąpienia nieszczelności, a chirurg wykonujący rękawową resekcję żołądka powinien posiadać rozległą wiedzę na temat leczenia tego powikłania. Postępowanie w przypadku wystąpienia nieszczelności po rękawowej resekcji żołądka zależy głównie od stanu ogólnego pacjenta, czasu wystąpienia przetoki, jej rozmiarów oraz doświadczenia danego ośrodka.

INTRODUCTION

The prevalence of laparoscopic techniques favors the development of bariatric surgery. Minimally invasive techniques are associated with fewer complications and lower mortality in the perioperative period and laparoscopic access is currently preferred in bariatric surgery (1-3). Among the many methods of surgical treatment of obesity, sleeve gastrectomy is becoming increasingly popular. Over the last decade, sleeve gastrectomy has become one of the most frequently

performed bariatric procedures and the effectiveness and safety of this method has been confirmed in numerous reports (4-8). The most feared complications associated with sleeve gastrectomy include leakage within the staple line. There are different theories on the causes of the leakage within the staple line after sleeve gastrectomy. A number of different methods of treatment were described in the case of this complication. In this paper, we will present a case of a patient in whom there was a leakage resulting from cutting the bougie used to calibrate the sleeve, and fibrin sealant, applied endoscopically, was used in the treatment.

CASE REPORT

A 46-year-old patient with BMI of 44.6 kg/m^2, without comorbidities, was qualified for sleeve gastrectomy. During the surgery, after sleeve gastrectomy and suturing the staple line with a continuous suture, abnormal cluster of staples was found at the top of the produced sleeve. After removal of the resected part of the stomach from the peritoneal cavity, the end of the bougie used for calibration with a length of about 10 cm was found in the gastric lumen. The bougie was cut in spite of constant monitoring its position before each subsequent use of the endostapler. The gastric tube was cut off during the use of the penultimate cartridge at the upper part of the stomach, close to the angle of His. No leakage was found after checking the staple line. Due to the existing doubts, intraoperative gastroscopy was performed. In endoscopy, no remnants of the tube were found, macroscopically, the staple line was correct. Air insufflation of the stomach was performed through an endoscope after immersion from the peritoneal cavity in saline solution and no leakage was found. An unsuccessful attempt was made to suture with another continuous suture, due to the difficulty of maintaining pneumoperitoneum and the surgery was finished at this stage. The patient, on the first postoperative day, was in good general condition, the body temperature was 37°C and the pulse was 78/minute. During a physical examination, the abdomen was slightly painful in the left side of the upper abdomen, without peritoneal signs. The drain from the peritoneal cavity took 140 milliliters of sero-bloody fluid. A water-soluble contrast study was performed and a leakage of contrast was found in the upper part of the stomach (fig. 1). The patient was qualified for a revision surgery. Re-laparotomy was decided on, not re-laparoscopy because of the difficulty to obtain pneumoperitoneum during the first surgery. Intraoperatively, the leak was identified and sutured with interrupted sutures, the peritoneal cavity was rinsed, and drains were introduced into the peritoneal cavity and the abdominal integuments. The patient, after revision surgery was fed parenterally, intravenous antibiotics was administered. On the 5th day after the revision surgery, a contrast swallow test was performed and no leakage characteristics were found. On the 7th day after the revision surgery, oral diet was administered. On the 11th postoperative day, in generally good condition, the patient was discharged home. The patient was re-admitted to the hospital 71 days after the first surgery because of clinical and radiological signs of late fistula, without leakage of contrast into the abdominal cavity (fig. 2). A water-soluble contrast study revealed a narrow band of contrast outside the gastric lumen in the upper part of the stomach, at the greater curvature. CT scan revealed small gas bubbles in the area of the spleen and the greater curvature of the stomach and in the vicinity of the front surface of the pancreas – outside the gastrointestinal tract lumen. The image suggested the suture line dehiscence with limited passage of gastric contents outside the gastric lumen, to the left of the infradiaphragmatic area and between the stomach and the pancreas. No free air or collections of fluid in the peritoneal cavity were found. Conservative therapy, broad spectrum antibiotics, total parenteral nutrition were administered. The patient did not consent to a self-expandable stent after being informed about the possibility of stent migration. Two trials to deploy enteral nutrition also failed because every time the intestinal tube was blocked. Due to the persistence of chronic gastric fistula, despite properly conducted conservative treatment, the patient went through 3 endoscopic sessions of closing the fistula with fibrin sealant Tissel-Lyo 2 ml (Baxter). The glue was applied endoscopically using the Duplocath (Baxter) set with a length of 180 centimeters. It is a dual-channel catheter adapted for the use with flexible endoscopes provided with a syringe and an applicator for administration of fibrin sealant components. The patient sessions using tissue glue took place, respectively, on the 171st, 185th and 199th day after the sleeve gastrectomy. During subsequent endoscopy and radiological examinations, decrease in the fistula was observed. No contrast outflow outside the gastrointestinal tract lumen was observed during a recent radiological examination (fig. 3). Drinking was recommended and oral diet in subsequent days. The patient, in generally good condition, was discharged home after 148 days of the second hospitalization. To date, she remains under the control of a outpatient department, with no radiological and clinical evidence of fistula, with very good results in terms of weight loss.

DISCUSSION

Rates of serious complications and mortality after bariatric surgery are relatively low (9). Mortality to 30 days after the surgery, is in the range of 0.08-2% (9, 10). The experience of the center and the surgeon has beneficial effect on reducing the percentage of postoperative complications and mortality (11-13). The more technically advanced surgery is generally associated with better performance in terms of weight loss, but also potentially higher rate of complications (9, 14-16). The risk of complications, readmission, revision surgery in the case of sleeve gastrectomy is greater than in the case of adjustable gastric banding while smaller than in the case of Roux-en-Y gastric bypass (RYGB). There

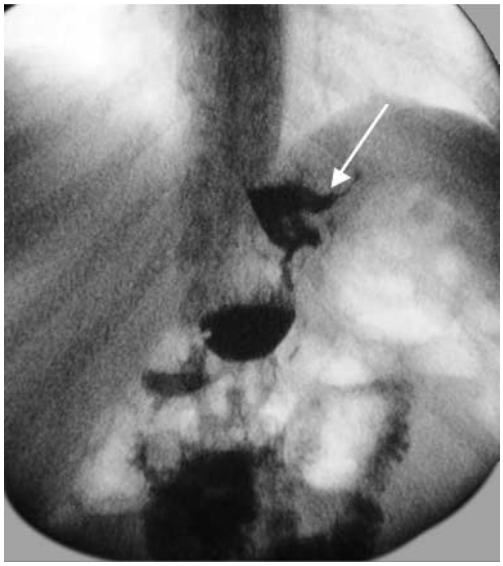

Fig. 1. Swallow examination on the 1st postoperative day.

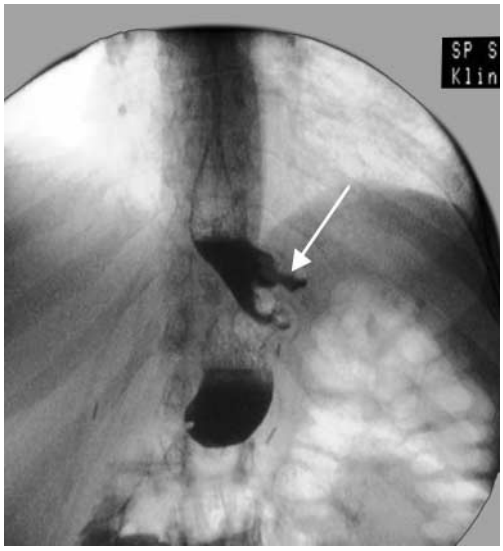

Fig. 2. Radiological signs of late fistula.

Fig. 3. Water-soluble contrast study after closing the fistula with fibrin sealant.

are no significant differences in the rates of mortality between these methods (15). Surgical complications associated with sleeve gastrectomy include: leakage within the staple line, stricture of the sleeve, intra-abdominal abscesses, fistulas, trocar wound infections, bleeding and trocar site hernia (17, 18). Rates of major complications are at the following levels: leakage – 1.1%, bleeding – 1.8%, stricture – 0.9%, and mortality – 0.33 ± 1.6% (8).

Gastric leak within the staple line is one of the most feared complications after a sleeve gastrectomy. Due to the time of onset, early leakage can be identified, from postoperative day 1 to 3, the intermediate, from day 4 to 7 and the late, from day 8 (19). In some cases, signs of leakage occur in the distant days after the surgery (20). In our case, leakage was found on the 1st postoperative day. It was the result of a technical error during surgery. The late fistula that occurred on a distant day was, with a high probability, associated with the cutting the gastric tube during the first surgery and was diagnosed in the 71st day. Leaks after sleeve gastrectomy generally occurs in the proximal third of the stomach, close to the angle of His (21, 22). In most cases, the greatest technical difficulties occur in this area. Leakages less frequently occur in the distal part of the produced sleeve (23). Increased risk of leakages occurs particularly in patients with high BMI (20, 21). In order to reduce the risk of leakages after sleeve gastrectomy a few rules should be followed. The surgeon should avoid tissue trauma and thermal injuries within the produced sleeve. The position of the bougie used for calibration should be continually monitored and narrowing should be avoided, particularly around the angle of the stomach, as it promotes excessive pressure in the proximal part of sleeve. It is also important to appropriately choose the size of stapler's height.

The rates of leakages after sleeve gastrectomy can be affected by the way of reinforcing of the staple line. The staple line is reinforced by nearly 79% of the surgeons performing sleeve gastrectomy, 57% of this group use buttressing materials, and 43% oversew the staple line with a continuous suture (8). In the case of using a buttressing material, the staple line is reinforced with a absorbable polymer membrane integrated with the stapler cartridge or bovine pericardial strips (24). Dapri et al. compared three ways to reinforce the staple line. It was found that strengthening the staple line using the Gore Seamguard reduces intraoperative blood loss, and the resignation of reinforcing the staple line significantly reduces the duration of surgery. No statistically significant differences in the percentage of leakages in each group were found (23). Gagner published a very interesting report on the impact of different methods of strengthening the staple line on the incidence of leaks after sleeve gastrectomy. Rates of leaks, depending on the method used to reinforce the staple line, were at the following levels: absorbable membrane (Gore Seam-

guard) – 1.09%, oversewing – 2.4%, no reinforcement – 2.6% bovine pericardial strips – 3.3%. Differences of the other three methods, as compared to the absorbable membrane reached statistical significance. The average rate of leakage amounted to 2.14% (25). In a prospective study by Albanopoulos et al., comparing the use of Gore Seamguard with oversewing with a continuous suture PDS 2.0, leakage occurred only in the group in which absorbable membrane was used (4.2%) (26). Other studies indicate a beneficial effect of the use of bovine pericardial strips, as compared with staple line oversewing, on decreasing the percentage of leakages after sleeve gastrectomy (27). In our center, staple line is routinely strengthened using the PDS 3-0 or Maxon 3-0 continuous suture. In addition to the described case, there was no leakage in the group of more than 340 patients who underwent sleeve gastrectomy due to morbid obesity.

Rates of leaks may also be affected by the diameter of the bougie used. The use of smaller diameters may be associated with higher rates of leaks, while the use of bougie with a diameter of 40Fr or greater, favors the less frequent occurrence of this complication (21, 28).

The need for careful monitoring of patients within 30 days of surgery is stressed, as most of the leakages are symptomatic after discharge from the hospital, and delayed diagnosis can have catastrophic consequences (21). Our center has adopted the principle that, in the case of doubt, the patient is re-admitted and undergoes diagnosis with a view to the exclusion of major complications. Features of respiratory failure, abdominal pain, tachycardia above 120/min, lasting more than 4 hours, tachypnea, hypoxia, fever are clinical symptoms that we should pay attention to considering the possibility of leaks (3). In the case of suspected leakage with a stable clinical condition of the patient, radiography should be performed with a water-soluble agent or a CT scan. In the case of clinical signs of leakages, even despite no features of leakages in images, revision laparotomy or revision laparoscopy should be performed (3). Some authors recommend routine radiological examination with a water-soluble agent for early complications after sleeve gastrectomy (19, 29). But this is not a common view, and this type of examinations, in some centers, are performed only in the case of suspected leakage or stenosis.

Treatment in the case of leakage after sleeve gastrectomy is generally difficult and long lasting. In most cases, it is possible to improve the general condition of the patient, and the healing of the fistula remains problematic enabling oral feeding. The management of leaks post sleeve gastrectomy depends mainly on the general condition of the patient, the time of fistula occurrence, its size and location and the experience of the center. The treatment of choice should be adequate drainage and a self-expending stent covering the leakage, pig-tail drainage on the luminal side of the stomach or the use of fibrin glue (20, 30-33). Hand suturing seems justified only in the case of early leakages (19). The primary suturing usually has no effect (34). Antibiotic therapy and parenteral nutrition should be integral parts of the treatment. A nutrition jejunostomy is an alternative to parenteral nutrition. This procedure allows for the administration of enteral nutrition conducive to the healing of the fistula (20). The major complication associated with the use of stents is the possibility of migration. Migration can reach almost 60% of the cases, resulting in surgical stent removal (35). The migration is associated with the use of coated, self-expanding stents for implantation into the esophagus. A solution to this problem could be the use of fully-covered, self-expanding metal stents dedicated to covering leakages after sleeve gastrectomy (Megastent, Taewoong Medical Industries). The use of such stents does not result in migration (36). Early stent placement after diagnosis of the leak seems to be associated with shorter healing time (37, 38).

In the literature, there have been many reports on the subject of endoscopic methods of management of leaks after sleeve gastrectomy, other than self-expandable stents. Odemis et al. presented an interesting method for the treatment of gastrocutaneous fistula after sleeve gastrectomy involving the use of a self-expandable device (AMPLATZER™ Muscular VSD Occluder, St. Jude Medical, MN, USA) intended for closing of ventricular septal defects in the course of congenital heart diseases (39). Another treatment for leakages is to close the orifice using endoclips (40). Not always, however, there are conditions for the introduction of clips, for example, if there is no possibility of bringing together the edges of the fistula orifice. In such cases, an effective solution can be fistula treatment using tissue glues applied endoscopically (41). Fibrin glue promotes the healing of the fistula due to its mechanical closure and through the activation of fibroblasts. This type of solution was assumed in the case of our patient. The patient, informed of the potential complications associated with stent introduction, did not consent to such treatment. It is difficult to assess to what extent the use of fibrin glue accelerated healing of fistulas in the presented case. If the above-described methods are ineffective, more radical solutions should be considered, like: execution of Roux-en-Y gastric bypass (42, 43). In the case of chronic fistulas, intractable to treatment using the methods described above, laparoscopic gastrectomy can be an effective solution (44). If the leakage is located in the peripheral section of the stomach, resection of the stomach with the fistula orifice is possible (45).

Independently of the factors discussed, technical errors may be the most common cause of surgical complications after sleeve gastrectomy. During surgery, you should put a special emphasis on respecting the rules enabling avoidance of errors resulting in the occurrence of leakages and the surgeon performing the sleeve gastrectomy should have extensive knowledge on the treatment of this complication.

BIBLIOGRAPHY

1. Fried M, Hainer V, Basdevant A et al.: Inter-disciplinary European guidelines on surgery of severe obesity. Int J Obes 2007; 31: 569-577.
2. Reoch J, Mottillo S, Shimony A et al.: Safety of laparoscopic vs open bariatric surgery: a systematic review and meta-analysis. Arch Surg 2011; 146: 1314-1322.
3. Mechanick JI, Youdim A, Jones DB et al.: Clinical practice guidelines for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient – 2013 update: cosponsored by American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic Bariatric Surgery. Obesity 2013; suppl. 1: S1-27.
4. Buchwald H, Oien DM: Metabolic/Bariatric Surgery Worldwide 2011. Obes Surg 2013; 23: 427-436.
5. Gagner M, Deitel M, Kalberer TL et al.: The Second International Consensus Summit for Sleeve Gastrectomy, March 19-21, 2009. Surg Obes Relat Dis 2009; 5: 469-475.
6. Bellanger DE, Greenway FL: Laparoscopic sleeve gastrectomy, 529 cases without a leak: short-term results and technical considerations. Obes Surg 2011; 21: 146-150.
7. Bobowicz M, Lehmann A, Orlowski M et al.: Preliminary outcomes 1 year after laparoscopic sleeve gastrectomy based on Bariatric Analysis and Reporting Outcome System (BAROS). Obes Surg 2011; 21: 1843-1848.
8. Gagner M, Deitel M, Erickson AL et al.: Survey on laparoscopic sleeve gastrectomy (LSG) at the Fourth International Consensus Summit on Sleeve Gastrectomy. Obes Surg 2013; 23: 2013-2017.
9. Chang SH, Stoll CR, Song J: The effectiveness and risks of bariatric surgery: an updated systematic review and meta-analysis. 2003-2012. JAMA Surg 2014; 149: 275-287.
10. Buchwald H, Oien DM: Metabolic/bariatric surgery Worldwide 2008. Obes Surg 2009; 19: 1605-1611.
11. Hollenbeak CS, Rogers AM, Barrus B et al.: Surgical volume impacts bariatric surgery mortality: a case for centers of excellence. Surgery 2008; 144: 736-743.
12. Zevin B, Aggarwal R, Grantcharov TP: Volume-outcome association in bariatric surgery: a systematic review. Ann Surg 2012; 256: 60-71.
13. Markar SR, Penna M, Karthikesalingam A et al.: The impact of hospital and surgeon volume on clinical outcome following bariatric surgery. Obes Surg 2012; 22: 1126-1134.
14. Sanni A, Perez S, Medbery R et al.: Postoperative complications in bariatric surgery using age and BMI stratification: a study using ACS-NSQIP data. Surg Endosc 2014; 28: 3302-3309.
15. 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: 410-420; discussion 420-422.
16. Zhang C, Yuan Y, Qiu C et al.: A meta-analysis of 2-year effect after surgery: laparoscopic Roux-en-Y gastric bypass versus laparoscopic sleeve gastrectomy for morbid obesity and diabetes mellitus. Obes Surg 2014; 24: 1528-1535.
17. Frezza EE, Reddy S, Gee LL et al.: Complications after sleeve gastrectomy for morbid obesity. Obes Surg 2009; 19: 684-687.
18. Brethauer SA, Hammel JP, Schauer PR: Systematic review of sleeve gastrectomy as staging and primary bariatric procedure. Surg Obes Relat Dis 2009; 5: 469-475.
19. Burgos AM, Braghetto I, Csendes A et al.: Gastric leak after laparoscopic-sleeve gastrectomy for obesity. Obes Surg 2009; 19: 1672-1677.
20. Fuks D, Verhaeghe P, Brehant O et al.: Results of laparoscopic sleeve gastrectomy: a prospective study in 135 patients with morbid obesity. Surgery 2009; 145: 106-113.
21. Aurora AR, Khaitan L, Saber AA: Sleeve gastrectomy and the risk of leak: a systematic analysis of 4,888 patients. Surg Endosc 2012; 26: 1509-1515.
22. Lalor PF, Tucker ON, Szomstein S et al.: Complications after laparoscopic sleeve gastrectomy. Surg Obes Relat Dis 2008; 4: 33-38.
23. Dapri G, Cadière GB, Himpens J: Reinforcing the staple line during laparoscopic sleeve gastrectomy: prospective randomized clinical study comparing three different techniques. Obes Surg 2010; 20: 462-467.
24. Choi YY, Bae J, Hur KY et al.: Reinforcing the staple line during laparoscopic sleeve gastrectomy: does it have advantages? A meta-analysis. Obes Surg 2012; 22: 1206-1213.
25. Gagner M, Buchwald JN: Comparison of laparoscopic sleeve gastrectomy leak rates in four staple-line reinforcement options: a systematic review. Surg Obes Relat Dis 2014; 10: 713-723.
26. Albanopoulos K, Alevizos L, Flessas J et al.: Reinforcing the staple line during laparoscopic sleeve gastrectomy: prospective randomized clinical study comparing two different techniques. Preliminary results. Obes Surg 2012; 22: 42-46.
27. Al Hajj GN, Haddad J: Preventing staple-line leak in sleeve gastrectomy: reinforcement with bovine pericardium vs. oversewing. Obes Surg 2013; 23: 1915-1921.
28. Yuval JB, Mintz Y, Cohen MJ et al.: The effects of bougie caliber on leaks and excess weight loss following laparoscopic sleeve gastrectomy. Is there an ideal bougie size? Obes Surg 2013; 23: 1685-1691.
29. Goitein D, Goitein O, Feigin A et al.: Sleeve gastrectomy: radiologic patterns after surgery. Surg Endosc 2009; 23: 1559-1563.
30. Casella G, Soricelli E, Rizello M et al.: Nonsurgical treatment of staple line leaks after laparoscopic sleeve gastrectomy. Obes Surg 2009; 19: 821-826.
31. Pequignot A, Fuks D, Verhaeghe P et al.: Is there a place for pigtail drains in the management of gastric leaks after laparoscopic sleeve gastrectomy? Obes Surg 2012; 22: 712-720.
32. Serra C, Baltasar A, Andreo L et al.: Treatment of gastric leaks with coated self-expanding stents after sleeve gastrectomy. Obes Surg 2007; 17: 866-872.
33. Vix M, Diana M, Marx L et al.: Management of staple line leaks after sleeve gastrectomy in a consecutive series of 378 patients. Surg Laparosc Endosc Percutan Tech 2015; 25: 89-93.
34. Tan JT, Kariyawasam S, Wijeratne T et al.: Diagnosis and management of gastric leaks after laparoscopic sleeve gastrectomy for morbid obesity. Obes Surg 2010; 20: 403-409.
35. Eubanks S, Edwards CA, Fearing NM et al.: Use of endoscopic stents to treat anastomotic complications after bariatric surgery. J Am Coll Surg 2008; 206: 935-938; discussion 938-939.
36. Galloro G, Magno L, Musella M et al.: A novel dedicated endoscopic stent for staple-line leaks after laparoscopic sleeve gastrectomy: a case series. Surg Obes Relat Dis 2014; 10: 607-611.
37. Simon F, Siciliano I, Gillet A et al.: Gastric leak after laparoscopic sleeve gastrectomy: early covered self-expandable stent reduces healing time. Obes Surg 2013; 23: 687-692.
38. Alazmi W, Al-Sabah S, Ali DA et al.: Treating sleeve gastrectomy leak with endoscopic stenting: the kuwaiti experience and review of recent literature. Surg Endosc 2014; 28: 3425-3428.
39. Odemis B, Beyazit Y, Torun S et al.: Endoscopic closure of gastrocutaneous fistula with an AMPLATZER™ septal occluder device. Therap Adv Gastroenterol 2015; 8: 239-242.
40. Mercky P, Gonzalez JM, Aimore Bonin E et al.: Usefulness of over-the--scope clipping system for closing digestive fistulas. Dig Endosc 2015; 27: 18-24.
41. Papavramidis TS, Kotzampassi K, Kotidis E et al.: Endoscopic fibrin sealing of gastrocutaneous fistulas after sleeve gastrectomy and biliopancreatic diversion with duodenal switch. J Gastroenterol Hepatol 2008; 23: 1802-1805.
42. Baltasar A, Serra C, Bengochea M et al.: Use of Roux limb as remedial surgery for sleeve gastrectomy fistulas. Surg Obes Relat Dis 2008; 4: 759-763.
43. Szewczyk T, Janczak P, Janiak A et al.: Laparoscopic sleeve gastrectomy – 7 years of own experience. Wideochir Inne Tech Malo Inwazyjne 2014; 9: 427-435.
44. Ramos AC, Ramos MG, Campos JM et al.: Laparoscopic total gastrectomy as an alternative treatment to postsleeve chronic fistula. Surg Obes Relat Dis 2015; 11: 552-556.
45. Eisenberg D, Bellatorre A, Bellatorre N: Sleeve gastrectomy as a stand--alone bariatric operation for severe, morbid, and super obesity. JSLS 2013; 17: 63-67.

received/otrzymano: 09.08.2015
accepted/zaakceptowano: 03.09.2015