



Sleeve Gastrectomy: You Might Lose your Liver!

J. Danion¹  · L. Genser¹ · O. Scatton¹

Published online: 31 October 2018
© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract

Sleeve gastrectomy (SG) is currently the most popular bariatric procedure. Portomesenteric venous thrombosis (PVT) is a feared and increasingly reported complication. Herein, we describe the history of a patient who developed a post-operative PVT after SG, aggravated with refractory ascites, and finally required orthotopic liver transplantation (LT). Acquired thrombophilia-anti-cardiolipin syndrome was present. As SG expands worldwide, this first case of LT for PVT following SG may warrant a systematic screening for prothrombotic condition and information on the possible consequences of PVT prior to bariatric surgery.

Keywords Liver · Transplantation · Sleeve · Portal · Thrombosis · Obesity

Introduction

Bariatric surgery is the most effective long-term treatment for severe and morbid forms of obesity [1]. Sleeve gastrectomy (SG) is currently the most popular bariatric procedure providing sustained weight loss with long-term comorbidity remissions [2, 3]. SG is associated with limited post-operative morbidity [4], but is not free from severe and dreaded complications. Among them, post-operative portomesenteric vein thrombosis (PVT) has become increasingly reported [5, 6]. Presentation is heterogeneous, as observed in the general population, and can range from asymptomatic with radiological diagnosis or abnormal biological finding to acute bowel ischemia or chronic symptomatic portal-hypertension with cavernoma [7]. The liver function itself remains relatively unaltered, but in some cases, histologic liver abnormalities, such as nodular regenerative hyperplasia (NRH), may develop in the context of portal vein obliteration and vascular

abnormalities [8]. Some forms of NRH can result in liver transplantation (LT) as the only therapeutic option [9].

Patient History

A 33-year-old woman was referred to our tertiary department for refractory ascites. She had a medical history of spontaneous pulmonary embolism at the age of 29, attributed to obesity and oral contraceptive treatment. She never smoked and had neither a history of thrombosis, nor cancer or diabetes. Initial oral anticoagulant therapy was discontinued after 6 months because a cause of acquired thrombophilia (i.e., oral contraception) was identified. She initiated on a preoperative bariatric surgery assessment and performed a systematic computed tomography (CT) scan that was normal without evidence of hepatic steatosis or other abnormality. One year later, she underwent a SG at body mass index (BMI) 45 kg/m² with no intraoperative and early post-operative adverse events. She had 3 weeks of conventional post-operative thromboprophylaxis consisting of twice daily low molecular weight heparin subcutaneous injections. On post-operative day (POD) 28, the presence of unspecific abdominal pain prompted an emergency CT scan that revealed a PVT without evidence of digestive ischemia, abdominal sepsis, or gastric leak. The treatment consisted of initial unfractionated intravenous heparin injections with subsequent oral relay. A thrombophilia investigation led to the diagnosis of an anti-cardiolipin syndrome. After a 2-year uneventful follow-up, her BMI was 31 kg/m² and she decided to discontinue her oral anticoagulant treatment on her own

✉ O. Scatton
olivier.scatton@aphp.fr

J. Danion
jerome.danion@me.com

L. Genser
laurent.genser@aphp.fr

¹ Assistance Publique-Hôpitaux de Paris, Department of Digestive and Hepato-Pancreato-Biliary Surgery, Liver Transplantation, Pitié-Salpêtrière University Hospital, Sorbonne University, 47-83 Boulevard de l'Hôpital, 75013 Paris, France

in a context of loss of medical follow-up. She then gradually developed symptomatic portal hypertension. Three years after SG, she had developed refractory abdominal and pleural ascites. The CT revealed an extension of the PVT with complete portal thrombosis, an extensive cavernoma, and a moderate splenomegaly. The liver was dysmorphic with enlarged segment one. A transjugular liver biopsy revealed the presence of NRH.

High-dose diuretic therapy was introduced to reduce the frequency of paracentesis. The patient had mild malnutrition due to portal enteropathy aggravated by gastric restriction and required enteral nutritional support. These first-line treatments improved the initial clinical condition. Inserting a portosystemic intrahepatic transjugular shunt to cure non-cirrhotic portal hypertension [10] was not considered because there was no receiving area for the distal endovascular prosthesis. In addition, in-depth interpretation of the CT scan revealed a disconnection between the left and right portal arrays. Indeed, SG eliminates the portosystemic physiological venous flow through the gastrosplenic vessels and the esophagus. In this case, the only remaining portal anastomoses were the right gastroepiploic and the left gastric veins, which were not permeable due to thrombotic extension. There was no major spontaneous splenorenal shunt. As surgical portosystemic derivation was unable to treat the NRH evolution in the liver, and in a worsening of the patient condition, orthotopic LT was proposed. Portal inflow was achieved using a mesenteric-portal bypass performed with donor iliac vein. The post-operative course was uneventful. A systematic CT scan was realized at POD 14 with patent venous and arterial reconstructions. Pathological analysis of the explanted liver showed diffuse NRH. Hepatic veins were permeable and examination of the portal vein revealed a chronic subtotal thrombus. The patient is doing well 6 months after LT, without ascites, and under normal liver function. She is now taking permanent and mandatory oral anticoagulation.

Discussion

This observation is, to our knowledge, the first record of LT for symptomatic cavernoma associated with NRH due to PVT following SG. We want to emphasize three major concerns about this case.

Our first warning is about post-operative PVT that is a rare, dreaded but now well-described complication which can occur after bariatric surgery [11] and more commonly SG [5]. This can happen in spite of appropriate perioperative thromboprophylaxis, as pulmonary embolism which concerns 2% of the patients after SG [4] and especially in a post-operative bleeding setting [12]. However, post-operative chemoprophylaxis discontinuation or absence is directly responsible for a significant increase in venous thrombotic events

[13]. The presence of a known and reversible thrombotic factor such as oral contraceptive intake, which seems to be sufficient to interrupt curative anticoagulation after 6 months in a non-surgical context, requires further attention in case of planned bariatric surgery. Although it is still difficult to achieve a proper balance of risks and benefits in patients with long-term curative anticoagulation undergoing bariatric surgery [14], thorough screening for thrombophilic conditions should be mandatory to warrant patient's safety.

Then, when PVT occurs in a post-bariatric setting, and particularly after SG, it can ultimately lead to potentially lethal complications despite initial appropriate treatment such as liver dysfunction secondary to NHR, upper gastrointestinal bleeding due to gastroesophageal varices. In most of the cases, PVT is resolute under curative anticoagulation and observation [15]. In severe forms, initial presentation may come with digestive ischemia, requiring small bowel resection or late chronic biliportal cholangiopathy due to non-cirrhotic, non-neoplastic PVT with LT being the last treatment option. The young and specific bariatric patient population should be informed about their diagnosis and the consequences in case of anticoagulation treatment discontinuation.

Finally, when the patient ends up needing LT, the procedure is technically challenging. Both liver explantation and implantation are often painful because of the cavernoma rendering the hilar dissection difficult. As extensive cavernoma is a well-known pitfall during LT, surgical transplant teams need to plan appropriate preoperative strategies to manage the portal inflow to the liver transplant [16]. In our team, when a thrombectomy is not safe or feasible, we prefer to perform extra-anatomical reconstruction, as it can be easily realized with the vessels from the donor. In order to obtain a suitable reconstruction, an adequate supply of donor vessel grafts is readily required and must therefore be harvested after organ collection.

Conclusion

As more and more patients are now being successfully treated for severe or morbid obesity through bariatric surgery and especially SG, we can expect similar cases to occur in the coming years. This observation highlights a specific and hopefully still rare indication for LT. It emphasizes the need for a systematic and comprehensive exploration of thrombophilia in the event of a medical history of deep vein thrombosis when bariatric surgery is planned. Prevention of thromboembolic disease is essential and must be tailored to the patient's risk factors to optimize risk-benefit balance. Patient and physician education can assist in screening, treating, and thus avoiding chronic PVT potentially leading to LT.

Compliance with Ethical Standards

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

Ethical Approval For this type of study, formal consent is not required; Informed consent was obtained from all individual participants included in the study.

References

1. Sjöström L. Review of the key results from the Swedish Obese Subjects (SOS) trial - a prospective controlled intervention study of bariatric surgery. *J Intern Med.* 2013;273:219–34.
2. Salminen P, Helmiö M, Ovaska J, et al. Effect of laparoscopic sleeve gastrectomy vs laparoscopic Roux-en-Y gastric bypass on weight loss at 5 years among patients with morbid obesity. *JAMA.* 2018;319:241–14.
3. Peterli R, Wölnerhanssen BK, Peters T, et al. Effect of laparoscopic sleeve gastrectomy vs laparoscopic Roux-en-Y gastric bypass on weight loss in patients with morbid obesity. *JAMA.* 2018;319:255–11.
4. Zellmer JD, Mathiason MA, Kallies KJ, Kothari SN. Is laparoscopic sleeve gastrectomy a lower risk bariatric procedure compared to laparoscopic Roux-en-Y gastric bypass? A meta-analysis. *Am J Surg.* 2014;208:903–10.
5. Tan SBM, Hopkins G, Greenslade J, et al. Portomesenteric vein thrombosis in sleeve gastrectomy: a 10-year review. *Surg Obes Relat Dis.* 2018;14:1–5.
6. Moon RC, Ghanem M, Teixeira AF, et al. Assessing risk factors, presentation, and management of portomesenteric vein thrombosis after sleeve gastrectomy: a multicenter case-control study. *Surg Obes Relat Dis.* 2018;14:478–83.
7. Alshreadah S, Alotaibi R, Aldabaeab A, et al. Thrombosis of the spleno-mesenteric portal axis following laparoscopic sleeve gastrectomy: a rare case report. *Int J Surg Case Rep.* 2018;43:29–31.
8. Plessier A, Rautou P-E, Valla D-C. Management of hepatic vascular diseases. *J Hepatol.* 2012;56:S25–38.
9. Meijer B, Simsek M, Blokzijl H, et al. Nodular regenerative hyperplasia rarely leads to liver transplantation: a 20-year cohort study in all Dutch liver transplant units. *United European Gastroenterol J.* 2016;5:658–67.
10. Regnault D, d’Alteroche L, Nicolas C, Dujardin F, Ayoub J, Perarnau JM. Ten-year experience of transjugular intrahepatic portosystemic shunt for noncirrhotic portal hypertension. *Eur J Gastroenterol Hepatol.* 2018;30:557–562.
11. Shoar S, Saber AA, Rubenstein R, Safari S, Brethauer SA, Al-Thani H, et al. Portomesenteric and splenic vein thrombosis (PMSVT) after bariatric surgery: a systematic review of 110 patients. *Surg Obes Relat Dis.* 2018;14:47–59.
12. Nielsen AW. Perioperative bleeding and blood transfusion are major risk factors for venous thromboembolism following bariatric surgery. *Surg Endosc.* 2018;32:2488–2495.
13. Thereaux J, Lesuffleur T, Czernichow S, et al. To what extent does posthospital discharge chemoprophylaxis prevent venous thromboembolism after bariatric surgery? *Ann Surg.* 2018;267:727–33.
14. Sharma G, Hanipah ZN, Aminian A, Punchai S, Bucak E, Schauer PR, et al. Bariatric surgery in patients on chronic anticoagulation therapy. *Obes Surg.* 2018;28:2225–223.
15. Bhat R, Bhadoria A, Maiwall R, et al. Extrahepatic portal vein obstruction and portal vein thrombosis in special situations: need for a new classification. *Saudi J Gastroenterol.* 2015;21:129–10.
16. Rodríguez-Castro KI, Porte RJ, Nadal E, et al. Management of nonneoplastic portal vein thrombosis in the setting of liver transplantation. *Transplantation.* 2012;94:1145–53.