Laparoscopic partial splenectomy for a splenic cyst

Amalia Rosaria Rita Rossetti, Augusto Striano, Adele Noviello, Antonio Miro, Enrico Coppola Bottazzi, Francesco Esposito, Francesco Crafa

Oncological and General Surgery Unit, 'St. Giuseppe Moscati' Hospital of National Relevance and High Speciality, Avellino, Italy

Correspondence to: Francesco Crafa, MD. Oncological and General Surgery Unit, 'St. Giuseppe Moscati' Hospital of National Relevance and High Speciality, Plesso Città Ospedaliera-Contrada Amoretta, 83100 Avellino, Italy. Email: crafa@tiscali.it.

Abstract: The importance of preserving splenic parenchyma, due to its immunological and hematopoietic function, has led modern surgeons to perform a conservative surgical treatment for benign, cystic and solid lesions, hematological disorders and, even traumas. We present the case of a 33-year-old female patient with the evidence of extensive cystic formation occupying the upper two-thirds of the spleen at the instrumental examinations. She underwent a laparoscopic partial splenectomy, a safe and feasible approach to treat this type of disease, in order to preserve splenic function and avoid complications related to total splenectomy.

Keywords: Partial splenectomy; laparoscopic partial splenectomy; splenic cyst

Received: 14 December 2019; Accepted: 05 June 2020; Published: 20 October 2020.

doi: 10.21037/ales-19-257

View this article at: http://dx.doi.org/10.21037/ales-19-257

Introduction

Partial splenectomy has become one of the most widely used surgical procedure in the treatment of hematologic disorders (1), trauma (2) and benign (3,4), solid and cystic diseases of the spleen. The conservative approach is useful to avoid all the complications of total splenectomy, such as overwhelming post-splenectomy infection (OPSI), intra-abdominal abscesses, thrombocytosis, portal hypertension, thromboembolism and pulmonary hypertension (5,6). This is the reason why it should be preferred in selected cases, especially in younger ones (7). The first partial splenectomy was performed by Morgenstern and Shapiro in 1980 (8), but the first laparoscopic intervention was practiced by Poulin some 15 years later, in 1995 (9). Despite everything, the laparoscopic partial splenectomy still represents an important surgical challenge, because of intraoperative and postoperative risk of bleeding. For this reason the knowledge of anatomy, the current tools of dissection and control of hemostasis and the hemostatic play a fundamental role. The following one is a description of a partial laparoscopic splenectomy, performed by our team. We present the following case in accordance with the CARE reporting checklist.

Case presentation

A 33-year-old female patient came to our observation in December 2004 complaining of constant pain in her left side of abdomen. Abdominal computed tomography (CT-scan) and magnetic resonance imaging (MRI) showed the presence of a bulky cystic lesion of the upper two-thirds of the spleen, with a diameter of 11.5 cm. Laboratory coagulation tests and platelet count were normal, tumor markers (CEA, CA19.9) were negative, as well as viral and parasitic markers (CMV, Herpes virus, EBV). According to the literature (10), patients with cysts greater than 5 cm, localized at the hilum of the spleen or complicated by secondary infection, intracystic hemorrhage, rupture or, in any case, symptomatic are treated with surgery. We performed a laparoscopic partial splenectomy 2 weeks after the vaccinoprophylaxis (anti-Hemophilus influenzae, anti-pneumococci and anti-meningococcal). The patient, under general anesthesia, was placed in the right semi-lateral decubitus (Gagner Position). Laparoscopy was performed using the open technique, using a pneumoperitoneum with CO_2 with an insufflation pressure of 12 mmHg. The first 12 mm trocar in the peri-umbilical area was positioned with the Hasson technique. Three other trocars (one of 12 mm

and another two of 5 mm) were placed along the left costal arch. A 30° optic was used. An intraoperative ultrasound was performed to assess the nature of the lesion, its size, its extent and the vascular supply to the remaining splenic parenchyma. After exploration of the abdominal cavity, the access to the epiploon's retrocavity was gained through the gastrocolic ligament with the opening of the Bouchet's area. Subsequently the section of the short gastric vessels was performed. This step was practiced through Harmonic Device (Harmonic scalpel, Ethicon Endo-Surgery, Inc., Cornelia, GA, USA) and clips (Absolok 300, Ethicon Endo-Surgery, Cincinnati, OH, USA). Identification and clamping of the splenic artery and vein were carried out by bulldogs, subsequently, dissection and section of the upper splenic polar vessels using two clips upstream and one valley. Finally, the brake-splenic ligament was dissected. At this point, the extension of the ischemic area, including the cystic lesion, was evaluated at the declamping of the main splenic peduncle. The section of the splenic parenchyma was performed at 1 cm inside the ischemic demarcation area using the Harmonic Device. Evaluated hemostasis, a fibrin sealant (Tissel Baxter, Vienna, Austria) was applied to the splenic resection and the remaining part wrapped in a resorbable mesh (Vycril Mesh Bag, Ethicon) and fixed to the left hemidiaphragm by detaching points in prolene 4-0 to prevent possible organ rotations and subsequent vascular suffering. The resected spleen was taken out of the abdominal cavity by an endo-bag through a mini-laparotomy where the 12 mm trocar was. A drain was left in place and removed in the first postoperative day. The operative time was seventy minutes and the estimated blood loss was 120 mL (*Video 1*). The postoperative course was uneventful and no blood transfusion was required. Histological examination confirmed the diagnosis of primary epithelial cyst of the spleen. The patient was discharged on the seventh post-operative day. Six months later, the patient was symptom-free and she underwent a CT-scan that was negative for abscesses and other lesions. Written informed consent was obtained from the patient for publication of this study and any accompanying images.

Discussion

The spleen is an important peripheric organ that regulates the volume of circulating blood, the hematic filtration, the endocrine system and the production of immunoglobulins and opsonins. Its most important function, however, is to filter virulent pathogens and external antigens. For this reason, partial splenectomy should be the gold standard for the treatment of benign diseases of the spleen and hematological disorders (1), especially in childhood or as a consequence of traumas (2). According to literature, the 25% of the remaining splenic parenchyma would suffice to ensure its immunological response to external antigens (11).

The other point of discussion is the modality of execution of partial splenectomy, whether laparoscopic or laparotomic. In 2003, Winslow *et al.* (12) published a meta-analysis comparing the laparoscopic and laparotomic approaches. First of all, they highlighted a longer duration of laparoscopic interventions (179.9 *vs.* 114.1 min; P<0.0001). Moreover, the patients operated in laparoscopy had a shorter duration of hospitalization (3.6 *vs.* 7.2 days; P<0.0001), a lower percentage of postoperative transfusions (10.2% *vs.* 14%; P=0.02), a lower blood loss (224.9 *vs.* 254.4 mL; P>0.05) and a lower rate of postoperative complications (15.5% *vs.* 26.6%; P<0.001).

We can say that the only real failure of partial laparoscopic splenectomy is its conversion to total splenectomy due to intra- and postoperative bleeding. The knowledge of the topographic anatomy of the splenic hilum is fundamental. In particular it's essential to know how the splenic artery divides and if collateral branches of anomalous origin starting from the left gastroepiploic artery could be present (13).

An important role in prevention of blood loss is also played by devices for simultaneous dissection and coagulation (ultrasound, radiofrequency, electrical, argon plasma coagulation), linear staplers, resorbable meshes and from fibrin sealants and hemostatic sponges (14). Works in this regard, indicate that their combined use, called "sandwich", reduces the risk of bleeding from resection by obtaining a synergy of action on the coagulation cascade (15). de la Villeon *et al.* (16) affirm that despite the instruments used to reduce blood loss it is important to respect the splenic parenchyma within 1 cm of the ischemic boundary line.

According to literature (17), a valid help for the partial surgery of the spleen, especially if laparoscopic, is the preoperative embolization of the vessels affluent to the lesion and therefore subject to section during the operation. This means a reduction in intra- and postoperative bleeding, a better visualization of the ischemic demarcation area, a better control of the vessels during the section, and a study of anatomical variants. The time that must elapse between embolization and surgery is controversial. In the

past surgery was performed about a month later, but now we should proceed with laparoscopic surgery immediately afterwards to avoid the risk of abscesses, sudden rupture of the spleen, post-embolization syndrome and other complications (18).

Finally, Vasilescu *et al.* (19) compared the laparoscopic partial splenectomy with the robotic one, detecting statistically relevant data in favor of robotic surgery in terms of blood loss (35 *vs.* 90 mL) and duration of vascular dissection (20 *vs.* 15 min) with a similar duration of intervention. As reported in a study by Giulianotti *et al.* (20), the 3D robotic surgery and the "wrist-like" instruments involve a better control and isolation of the vessels, but they imply a high cost of intervention.

In conclusion, it can be stated that spleen surgery aims to be increasingly minimally invasive. Nowadays laparoscopy should be considered the gold standard for partial surgery of the spleen as this approach reduces intervention times, hospitalization time, costs, and, the risk of blood loss, through the use of section/coagulation instruments and hemostatics.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editors (Giovanni Battista Levi Sandri and Massimo Carlini) for the series "Minimally Invasive Spleen Surgery" published in *Annals of Laparoscopic and Endoscopic Surgery*. The article has undergone external peer review.

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/ales-19-257). The series "Minimally Invasive Spleen Surgery" was commissioned by the editorial office without any funding or sponsorship. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this study and any accompanying images.

References

1. Héry G, Becmeur F, Méfat L, et al. Laparoscopic partial splenectomy: indications and results of a multicenter retrospective study. Surg Endosc 2008;22:45-9.
2. Wu HM, Kortbeek JB. Management of splenic pseudocysts following trauma: a retrospective case series. Am J Surg 2006;191:631-4.
3. Gianom D, Wildisen A, Hotz T, et al. Open and laparoscopic treatment of nonparasitic splenic cysts. Dig Surg 2003;20:74-8.
4. Karfis EA, Roustanis E, Tsimoyiannis EC. Surgical management of nonparasitic splenic cysts. JSLS 2009;13:207-12.
5. Bhandarkar DS, Katara AN, Mittal G, et al. Prevention and management of complications of laparoscopic splenectomy. Indian J Surg 2011;73:324-30.
6. Balaphas A, Buchs NC, Meyer J, et al. Partial splenectomy in the era of minimally invasive surgery: the current laparoscopic and robotic experiences. Surg Endosc 2015;29:3618-27.
7. Esposito F, Noviello A, Moles N, et al. Partial splenectomy: A case series and systematic review of the literature. Ann Hepatobiliary Pancreat Surg 2018;22:116-27.
8. Morgenstern L, Shapiro SJ. Partial splenectomy for nonparasitic splenic cysts. Am J Surg 1980;139:278-81.
9. Poulin EC, Thibault C, DesCôteaux JG, et al. Partial laparoscopic splenectomy for trauma: technique and case report. Surg Laparosc Endosc 1995;5:306-10.
10. Palmieri I, Natale E, Crafa F, et al. Epithelial splenic cysts. Anticancer Res 2005;25:515-21.
11. Han XL, Zhao YP, Chen G, et al. Laparoscopic partial splenectomy for splenic hemangioma: experience

of a single center in six cases. Chin Med J (Engl) 2015;128:694-7.
12. Winslow ER, Brunt LM. Perioperative outcomes of laparoscopic versus open splenectomy: a meta-analysis with an emphasis on complications. Surgery 2003;134:647-53.
13. Redmond HP, Redmond JM, Rooney BP, et al. Surgical anatomy of the human spleen. Br J Surg 1989;76:198-201.
14. Caronna R, Chirletti P, Fanello G. L'emostasi in chirurgia d'urgenza. In: Zanon C, editor. Emostasi in chirurgia. Torino: Ananke, 2007:53-66.
15. Baiamonte M, Gargano G, Agosta G, et al. Impiego degli emostatici nelle resezioni parziali di milza. Report su di un caso clinico. Minerva Chir 2012;67:5-14.
16. de la Villeon B, Zarzavadjian Le Bian A, Vuarnesson H, et al. Laparoscopic partial splenectomy: a technical tip. Surg Endosc 2015;29:94-9.
17. Mignon F, Brouzes S, Breitel DL, et al. Preoperative selective embolization allowing a partial splenectomy for splenic hamartoma. Ann Chir 2003;128:112-6.
18. Zheng L, Deng C, Li J, et al. Treatment of hemangioma of the spleen by preoperative partial splenic embolization plus laparoscopic partial splenectomy: a case report. Medicine (Baltimore) 2018;97:e0498.
19. Vasilescu C, Stanciulea O, Tudor S. Laparoscopic versus robotic subtotal splenectomy in hereditary spherocytosis. Potential advantages and limits of an expensive approach. Surg Endosc 2012;26:2802-9.
20. Giulianotti PC, Buchs NC, Addeo P, et al. Robot-assisted partial and total splenectomy. Int J Med Robot 2011;7:482-8.

doi: 10.21037/ales-19-257
Cite this article as: Rossetti ARR, Striano A, Noviello A, Miro A, Coppola Bottazzi E, Esposito F, Crafa F. Laparoscopic partial splenectomy for a splenic cyst. Ann Laparosc Endosc Surg 2020;5:43.

