Outcomes of Laparoscopic Splenectomy Using Hem-O-Lok Clips: Experience from 38 Cases

Nguyen Huy Toan*, Le Anh Xuan, Pham Minh Tuan, Tran Xuan Cong, Nguyen Van Huong
Hepatobiliary and Pancreatic Surgery Department -Nghe An General Friendship Hospital

Abstract

Background: Based on research activities and clinical practice at Nghe An Friendship General Hospital, we conducted this study to evaluate the outcomes of laparoscopic splenectomy using Hem-O-Lok clips at our institution. **Introduction:** A retrospective, cross-sectional study on 38 patients who underwent laparoscopic splenectomy at the Nghe An General Friendship Hospital from January 2020 to January 2025. **Methods:** A retrospective, cross-sectional study on 38 patients who underwent laparoscopic splenectomy at the Nghe An General Friendship Hospital from January 2020 to January 2025. **Results:** There were 38 patients, including 27 males (71%) and 11 females (29%), with an average age of 39.5 ± 10.2 years (range 18 - 65 years). The the main indications for splenectomy included hematologic disorders (34.2%), splenic tumors (34.2%), and splenic cysts (21.1%). The success rate of the surgery was 36 cases (94.7%), with total splenectomy performed in 33 cases (86.8%) and splenectomy with accessory spleen removal in 3 cases (7.9%). Splenic artery control at the splenic hilum was achieved in 12 cases (33.3%). Postoperative complications were observed in 5 cases (13.2%), including wound infection, pancreatic fistula, and splenic vein thrombosis. Good outcomes were achieved in 86.1% of patients, with no poor outcomes recorded. **Conclusion:** Laparoscopic splenectomy for the treatment of hematopoietic disorders and intrinsic diseases of the spleen is a safe method with a high success rate. The use of Hem-O-Lok instead of staplers for vascular control helps reduce surgical costs while still providing good outcomes for patients.

Keywords: *Laparoscopic splenectomy, Hem-O-Lok clips, splenic pedicle control, splenic surgery outcomes.*

1. INTRODUCTION

Since the 1990s, when laparoscopic splenectomy (LS) was first introduced, this method has yielded favorable outcomes and reduced postoperative complications. Today, laparoscopic splenectomy is the preferred approach for both benign and malignant splenic conditions. However, there are still some contraindications. Technological advancements have enabled the management of cases previously considered absolute contraindications for minimally invasive surgery through modified endoscopic techniques. Furthermore, the introduction of advanced endoscopic tools for vascular ligation has helped mitigate complications during surgery. Currently, laparoscopic splenectomy is considered safe, with better outcomes compared to open splenectomy, and the increasing experience of surgeons allows for comparable operative times to those of open surgery [1, 2]. In Vietnam, several major hospitals, such as Viet Duc Hospital, Bach Mai Hospital, and Binh Dan Hospital, have successfully implemented this technique [3, 4]. However, studies on laparoscopic splenectomy remain limited in surgical facilities, especially in provincial hospitals. Based on the research and treatment practices at Nghe An Friendship General Hospital, we aim to contribute to the study of laparoscopic splenectomy outcomes suitable for the context and conditions of our facility. Thus, we conducted a study to evaluate the results of laparoscopic surgery for splenic pathology at Nghe An Friendship General Hospital.

2. SUBJECTS AND METHODS

2.1. Subjects

A total of 38 patients underwent laparoscopic splenectomy at Nghe An Friendship General Hospital from January 2020 to January 2025.

Inclusion Criteria

The inclusion criteria were as follows:

- Patients with conditions diagnosed and treated with laparoscopic splenectomy.

- Patients selected for laparoscopic splenectomy based on the following criteria:

• Clinical examination shows that the spleen is not enlarged beyond grade II (splenomegaly exceeding the costal margin ≤ 4 cm) and splenic length on ultrasound ≤ 22 cm.

• Patients with no contraindications for pneumoperitoneum for laparoscopic surgery, such as heart failure, chronic obstructive pulmonary

**Corresponding Author: Nguyen Huy Toan. Email: Drhuytoan@yahoo.com*
Received: 25/02/2025; Accepted: 20/06/2025; Published: 30/08/2025
DOI: 10.34071/jmp.2025.4.21

disease, or increased intracranial pressure.

- Patients without severe comorbid conditions (ASA ≤ III) and no coagulopathy.
- Patients without a history of major surgery in the upper abdominal cavity.
- Patients agree to participate in the study.

2.2. Methods

The study was designed as a retrospective case series. The surgical procedure was performed in 5 steps: the patient was positioned with the head elevated and the feet lower, tilted to the right at an angle of 40-45 degrees.

Step 1: Trocar Placement

- The first trocar (10 mm) is placed below the umbilicus or slightly to the left along the left midclavicular line (depending on spleen size).
- The second trocar (5 mm) is placed in the epigastric region, just below the xiphoid process and shifted to the left.
- The third trocar (10 mm) is placed below the left costal margin, approximately midway between the costal margin and the iliac crest, along the anterior axillary line.
- The fourth trocar, if needed, is a 5 mm trocar placed posteriorly at the anterior border of the 11th rib.

Step 2: Abdominal Exploration: Identify any accessory spleen, assess the condition of splenic injury and other organs, and evaluate the status of lymph nodes and peritoneal fluid.

Step 3: Release of Perisplenic Ligaments

Release the splenic flexure of the colon, perisplenic ligaments, splenorenal ligament, and the phrenicocolic ligament. The branches of the short gastric vessels are carefully dissected and clamped with Hem-o-lok clips, while smaller branches may be cauterized. The splenic gastric ligament adjacent to the gastric fundus is often very short and requires meticulous dissection, minimizing the use of cautery to avoid damage to the gastric fundus.

Step 4: Control of the Splenic Pedicle

Identify the splenic artery at the upper border of the pancreas distal to the splenic hilum and clamp the anterior artery with Hem-o-lok clips. Carefully dissect to separately clamp the splenic vein afterwards.

Step 5: Specimen Retrieval, Closure, and Drainage

Retrieve the specimen, close the abdomen, and place a drain.

- **Data Processing**: Data were processed using SPSS 22.0 software.
- **Ethics in Research**: The study was approved by the Biomedical Research Ethics Committee of Nghe An Friendship General Hospital to ensure ethical, scientific, and feasible standards.

3. RESULTS

From January 2020 to January 2025, at the General Surgery Department of Nghe An Friendship General Hospital, we had 38 patients who underwent laparoscopic splenectomy, including 27 males (71%) and 11 females (29%). The average age was 38.95 ± 11.83 years (18-65).

3.1. Splenomegaly Classification and Splenic Size on Ultrasound

Table 1. Classification of Splenic Size and Indications for Splenectomy

Splenomegaly Classification	**n**	**Percent (%)**
Normal	12	31.6
Grade 1	21	55.3
Grade 2	5	13.1
Total	38	100
Indication	**n**	**Percent (%)**
Hematological Disorders	13	34.2
Splenic Cyst	8	21.1
Splenic Tumor	13	34.2
Splenic Abscess	4	10.5
Total	38	100

The majority exhibited splenic lesions on ultrasound, such as cysts, abscesses, or tumors, with a rate of 65.8%. Thirteen patients were indicated for splenectomy in the context of hematological disorders.

3.2. Surgical Methods

Table 2. Surgical Methods

Surgical Methods	Laparoscopy		Open Conversion	
	n	Percent (%)	n	Percent (%)
Total Splenectomy	33	83.8	2	5.3
Total Splenectomy with Accessory Spleen	3	7.9	0	0
Total	36	94.7	2	5.3
Number of Trocar	**Laparoscopy**		**Open Conversion**	
	n	**Percent (%)**	**n**	**Percent (%)**
3 ports	2	5.3	0	0
4 ports	33	86.8	0	0
5 ports	1	2.6	2	5.3
Total	36	94.7	2	5.3

Method of Splenic Pedicle Control	n	Percent (%)
Control of the Splenic Artery Proximal to the Splenic Hilum	24	66.7
Control of the splenic artery at the hilum	12	33.3
Hem-O-Lok Use	36	100
Total	36	100

Specimen Retrieval Method	n	Percent (%)
Extended Umbilical Trocar Access	25	69.4
Pfannenstiel Incision	11	30.6
Total	36	100

3.3. Adverse events and complications

Table 3. Intraoperative Complications and Postoperative Complications

Intraoperative Complications	n	Percent (%)
Rupture of the splenic capsule	2	5.6
Injury to the splenic pedicle	1	2.8
Causes of Conversion to Open Surgery	**n**	**Percent (%)**
Bleeding due to injury to the splenic	1	2.8
Adhesion to the colon, splenic hilum	1	2.8

Postoperative Complications	n	Percent (%)	Management
Wound infection	1	2.8	Dressing change
Pancreatic fistula	1	2.8	Medical treatment
Splenic vein thrombosis	2	5.6	Medical treatment
Pneumonia	1	2.8	Medical treatment
Death	0	0	-

3.4. Surgical outcomes

Table 4. Surgical outcomes

Average surgical time	78.9 ± 16.9 minutes (50-130 minutes)	
Average postoperative recovery time	6.8 ± 1.2 days (3-10 days)	
Surgical outcomes	**n**	**Percent (%)**
Good	31	86.1
Fair	5	13.9
Poor	0	0

According to the Visual Analog Scale (VAS) for pain, no patients experienced severe pain, and 95.5% reported mild to moderate pain.

4. DISCUSSION

From January 2020 to January 2025, we performed laparoscopic splenectomy on 38 patients, with a successful laparoscopic surgery rate of 94.7%.

4.1. Indications for Splenectomy

Indications for splenectomy include conditions associated with hemolysis or severe thrombocytopenia, depending on the function of the splenic reticuloendothelial system and/or autoantibody production; malignant disorders or infections primarily localized to the spleen, such as lymphomas or splenic abscesses; complete resection in conjunction with other organs during cancer surgery; and rare complications of other disorders, including massive splenomegaly and/or hypersplenism accompanied by decreased blood cell counts [5]. In our study, there were 13 (34.2%) patients with hematological disorders, including 5 cases of thalassemia and 8 cases of thrombocytopenic purpura; 13 (34.2%) patients with splenic tumors underwent surgery, with postoperative results showing 10 cases with malignant histopathology, all of which were lymphomas; 8 (21.1%) patients had splenic cysts, and 4 (10.5%) had splenic abscesses.

4.2. Surgical Outcomes

Surgical Time: The average surgical time was 78.9 ± 16.9 minutes, with a minimum of 50 minutes and a maximum of 130 minutes. According to Min Tan (2003), the average surgical time was 110 minutes (ranging from 50 to 270 minutes) [6]; Bhattacharya (2021) reported an average laparoscopic splenectomy time of 129.8 ± 41.2 minutes [7]. Surgical time depends on the underlying pathology of the spleen, such as adhesions to surrounding tissues or splenic size.

In this study, vascular control of the splenic pedicle was performed using medium-large (ML) and large (L) Hem-O-Lok clips. Unlike other studies that employed staplers for pedicle transection, our technique offers a cost-effective alternative while reducing the risk of pancreatic tail injury associated with stapler application.

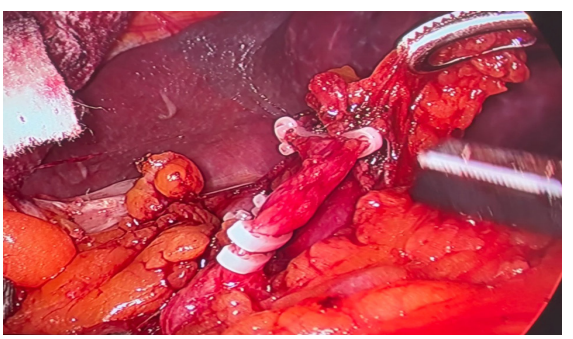

Figure 1. Vascular control of the splenic pedicle using Hem-O-Lok clips

Intraoperative Complications: We encountered splenic capsule rupture and vascular injury that required conversion to open surgery. There were 2 (5.6%) cases of splenic capsule rupture, both of which were successfully managed using monopolar or bipolar cautery. Additionally, there was 1 (2.8%) case of bleeding due to splenic vein rupture during dissection. In this case, the splenic vein was dilated and located behind the tail of the pancreas, making dissection very difficult. When bleeding occurred, temporary hemostasis was attempted using clips and sutures, but it was ineffective, leading us to decide on conversion to open surgery for management. Other intraoperative complications not recorded in our study have been reported by various authors, such as diaphragm perforation, bleeding from other sites, and injury to surrounding organs like the stomach and pancreas. A study by Nguyễn Ngọc Hùng et al. at Viet Duc Hospital (2006-2007) reported that among 20 patients undergoing laparoscopic splenectomy (for various reasons), there were 2 cases of intraoperative bleeding, all managed laparoscopically [3]. Chand and colleagues [8] reported a pancreatitis injury rate of 15%, commonly resulting in isolated elevated amylase levels - minor complications, peripancreatic fluid, pancreatic abscess, amylase-rich drainage fluid, and atypical postoperative pain.

4.3. Postoperative Complications: We encountered 1 (2.8%) case of wound infection, 1 (2.8%) case of pancreatic fistula, 2 (5.6%) case of splenic vein thrombosis, and 1 (3.2%) case of pneumonia. All of these complications were successfully managed with medical treatment.

One of the most serious and potentially life-threatening complications after splenectomy is superior mesenteric vein thrombosis, first described in 1895. The actual incidence of this complication remains undetermined due to the absence of symptoms or the presentation of nonspecific symptoms, along with a lack of systematic postoperative screening. Reported incidence rates range from 4.8% to 51.5%. Furthermore, portal-splenic-mesenteric vein thrombosis can lead to severe complications such as intestinal ischemia and even death. According to Ludovica Baldari (2023), 6 out of 22 patients post-splenectomy developed portal-splenic vein thrombosis, with 2 of these patients showing symptoms [9]. To date, there are no strong specific recommendations supporting the use of prophylactic anticoagulation after splenectomy. The European Association for Endoscopic Surgery (EAES) consensus statement on clinical practice guidelines for laparoscopic splenectomy recommends perioperative anticoagulant prophylaxis in all patients [10].

Another very dangerous complication after splenectomy is the condition known as fulminant post-splenectomy infection. This rapidly progressing acute infection is associated with spontaneous bacterial sepsis, particularly related to *S. pneumoniae* in more than 50% of cases. The manifestations are nonspecific and often lack a clear entry point. Initial symptoms typically include fever, gastrointestinal disturbances, and diffuse pain; it can quickly progress to septic shock with coagulopathy or disseminated intravascular coagulation and purpura. The mortality rate from this complication is nearly 50% and may be even higher in patients with hematological disorders. In our study, this complication did not occur, possibly due to a lack of long-term follow-up. To reduce the risk of this complication, vaccination against *S. pneumoniae*, *N. meningitidis*, and *H. influenzae* type B should be administered at least two weeks prior to surgery, or in emergency cases, at least two weeks after surgery [11].

All patients in our study achieved good or average outcomes, with no cases of severe complications, significant sequelae, or mortality. Of the 38 patients indicated for laparoscopic splenectomy, 2 cases required conversion to open surgery, and 5 cases experienced postoperative complications, but these were mild and successfully treated conservatively.

5. CONCLUSION

Laparoscopic splenectomy with Hem-O-Lok clips is a safe, cost-effective, and efficient approach for managing various splenic pathologies. This technique is particularly suitable for hospitals with limited access to high-cost surgical equipment.

REFERENCES

1. B Delaitre and B. Maignien. Splenectomy by the laparoscopic approach. Report of a case. *Press. Med*. 1991; 20(44), p. 2263.

2. E. P. Misiakos, G. Bagias, T. Liakakos, and A. Machairas. Laparoscopic splenectomy: Current concepts," *World J. Gastrointest. Endosc.* 2017; vol. 9, no. 9, p. 428. doi: 10.4253/wjge.v9.i9.428.

3. Nguyễn Ngọc Hùng, Quách Văn Kiên, Nguyễn Văn Trường. Cắt lách nội soi: một số nhận xét về chỉ định, kỹ thuật và biến chứng. *Tạp chí Y học thành phố Hồ Chí Minh*. 2008;12(4), pp. 137–142.

4. Nguyễn Hoàng Bắc, Huỳnh Nghĩa, Lê Quan Tuấn Anh. Phẫu thuật nội soi cắt lách điều trị xuất huyết giảm tiểu cầu. *Tạp Chí Học Thành Phố Hồ Chí Minh*. 2003; 7(1), pp. 56–59.

5. S. C. Katz and H. L. Pachter. Indications for splenectomy. *Am Surg*. 2006;vol. 72, no. 7, pp. 565–580.

6. M. Tan, C. X. Zheng, Z. M. Wu, G. T. Chen, L. H. Chen, and Z. X. Zhao. Laparoscopic splenectomy: The latest technical evaluation. *World J. Gastroenterol. 2003;* 9(5), pp. 1086–1089. doi: 10.3748/wjg.v9.i5.1086.

7. P. Bhattacharya, L. Phelan, S. Fisher, S. Hajibandeh, and S. Hajibandeh. Robotic vs. Laparoscopic Splenectomy in Management of Non-traumatic Splenic Pathologies: A Systematic Review and Meta-Analysis. *Am. Surg. 2022;* 88(1), pp. 38–47. doi: 10.1177/0003134821995057.

8. B. Chand, R. M. Walsh, J. Ponsky, and F. Brody. Pancreatic complications following laparoscopic splenectomy. *Surg Endosc. 2001;*15(11) pp. 1273–1276.

9. L. Baldari, L. Boni, B. Giuliani, and E. Cassinotti. Porto-spleno-mesenteric venous thrombosis after elective splenectomy: a retrospective cohort study. *Front Immunol*. 2023;pp. 1–8.

10. B. Habermalz, S. Sauerland, G. Decker, B. Delaitre, and J.-F. Gigot. Laparoscopic splenectomy: the clinical practice guidelines of the European Association for Endoscopic Surgery (EAES). *Surg Endosc*. 2008;vol. 22(4), pp. 821–48.

11. R. Buzelé, L. Barbier, A. Sauvanet, and B. Fantin. Medical complications following splenectomy," *J. Visc. Surg. 2016;* 153(4), pp. 277–286. doi: 10.1016/j.jviscsurg.2016.04.013.