Minimally Invasive, Maximally Controlled: Hand-Assisted Laparoscopic Splenectomy in a Hostile, Inflamed Surgical Field

Dr. Modugula Jai Pavan Reddy[1], Dr. Sudarshan Chaugale[2], Dr. Sadyojata Bhavani[3]

[1]Post Graduate, MS General Surgery, Jawaharlal Nehru Medical College. Email: mjaipavanreddy@gmail.com

[2]Associate Professor, Department of Surgical Gastroenterology, Jawaharlal Nehru Medical College.
Email: sudarshanchaugale14@gmail.com

[3]Junior Resident, MS General Surgery, Jawaharlal Nehru Medical College. Email: sadyojatabhavani98@gmail.com

ABSTRACT

We report a 34-year-old woman with multiple splenic artery aneurysms who underwent complete splenic artery embolization using coils and n-butyl cyanoacrylate. Post-procedure, she developed acute mild pancreatitis, managed conservatively, but follow-up imaging revealed splenic infarction with abscess formation. After appropriate pre-splenectomy vaccination against encapsulated organisms, she underwent laparoscopic hand-assisted splenectomy. Intra-operatively, dense adhesions were found between the spleen, stomach, diaphragm, and transverse colon, with ischemic parenchyma and a large abscess sparing only the upper pole. An embolization coil extended beyond the hilum into splenic tissue. The surgery was completed uneventfully, and the patient recovered well with stable vitals, good oral intake tolerance, and satisfactory wound healing. She was discharged with instructions for wound care, activity modification, and follow-up for histopathology and booster immunizations. This case highlights the value of multidisciplinary, well-planned management in complex post-embolization complications.

Keywords: Splenic artery aneurysm, Coil embolization, Splenic infarction, Splenic abscess, Laparoscopic splenectomy, Pancreatitis, Endovascular complications.

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Introduction

Splenic artery aneurysms (SAAs) are the most common type of visceral artery aneurysm, accounting for up to 60% of cases, but remain a relatively rare vascular pathology overall [10]. The condition is more prevalent in women, particularly in multiparous individuals, and is often discovered incidentally during imaging for unrelated abdominal symptoms [11]. The natural history of SAAs is unpredictable, with rupture risk increasing in the presence of aneurysms greater than 2 cm, symptomatic lesions, pregnancy, or underlying portal hypertension. Rupture can lead to catastrophic intra-abdominal hemorrhage, making timely diagnosis and management critical [11]. Endovascular coil embolization has emerged as the preferred first-line treatment for many SAAs, particularly those that are anatomically accessible and in patients who are poor surgical candidates [12]. It offers a minimally invasive alternative to open repair, with high technical success rates and relatively low perioperative morbidity. However, the technique is not without potential complications. Post-embolization syndrome, splenic infarction, abscess formation, pancreatitis due to proximity to the pancreatic tail, and coil migration have all been reported. The likelihood of these complications increases when embolization is extensive or involves complete occlusion of the main splenic artery, as occurred in this case. Infarction of splenic tissue is a recognised post-embolization outcome, but in some cases, as here, it progresses to abscess formation. Once secondary infection occurs, conservative measures are rarely effective, and splenectomy becomes the definitive treatment. Our patient's case underscores the need for close postoperative monitoring following embolization, with prompt recognition of complications to guide timely intervention. Laparoscopic splenectomy,

including the hand-assisted approach, offers significant advantages in such scenarios, allowing for minimally invasive access while providing tactile feedback and control in a difficult surgical field. In this patient, the hand-assisted technique was particularly useful due to the presence of dense adhesions between the spleen and adjacent structures, residual vascular coils, and the friable nature of the infarcted tissue. Successful splenectomy in such cases depends on careful preoperative planning, appropriate immunization against encapsulated organisms, and readiness to manage intraoperative challenges such as bleeding from collateral vessels or inadvertent injury to adjacent viscera. This case also reinforces the importance of a multidisciplinary approach, with interventional radiologists, surgeons, and infectious disease specialists collaborating to deliver staged, tailored care. While embolization remains an excellent first-line option for SAA, surgical expertise must be available to address complex post-procedural complications.

Case Presentation

Patient information:

A 34-year-old woman with multiple splenic artery aneurysms underwent coil and n-butyl cyanoacrylate embolization. She developed acute mild pancreatitis, managed conservatively, but later imaging showed splenic infarction with abscess. Following pre-splenectomy vaccination, she underwent laparoscopic hand-assisted splenectomy, which revealed dense adhesions, ischemic parenchyma, and an abscess sparing the upper pole. Recovery was uneventful, and she was discharged with follow-up instructions. This case highlights the importance of timely, multidisciplinary management in post-embolization complications.

Post-embolization course:

Her immediate post-operative period was complicated by nausea, vomiting, and elevated serum amylase and lipase levels, consistent with acute mild pancreatitis. Gradual symptomatic improvement was noted with conservative management.

Pre-operative preparation:

She was vaccinated with pneumococcal vaccine and meningococcal vaccine as per infectious disease prophylaxis protocol prior to splenectomy.

Parameter	Finding
General condition	Moderately built and nourished
Pulse rate	74 beats/min
Blood pressure	110/80 mmHg
Temperature	Afebrile
Respiratory rate	16 breaths/min
Abdominal inspection	Soft abdomen, non-distended
Abdominal palpation	Mild tenderness in the left hypochondrium
Bowel sounds	Present
Other systemic findings	No organomegaly (apart from splenic pathology noted on imaging), no jaundice, no pedal edema

Investigations:

CECT abdomen revealed wedge-shaped hypodense areas involving the splenic hilum and lower pole, suggestive of splenic infarcts, along with post-embolization coil artifacts. The pancreas was firm, correlating with prior pancreatitis. Laboratory parameters were within acceptable limits for surgery.

Surgical management:

Management

The patient initially underwent endovascular management with complete splenic artery embolization using metallic coils and n-butyl cyanoacrylate (NBCA) glue for multiple splenic artery aneurysms, including a giant mid-segment lesion. Although technically successful, this was complicated by acute mild pancreatitis, which improved with conservative measures. Subsequent imaging demonstrated persistent splenic infarction with abscess formation, prompting definitive surgical intervention.

After administration of pneumococcal and meningococcal vaccines as part of pre-splenectomy prophylaxis, the patient was taken up for laparoscopic hand-assisted splenectomy.

Access and Exposure: A mini-laparotomy incision was made, and a hand port with wound protector–retractor was inserted to allow atraumatic entry while maintaining pneumoperitoneum (Fig. 1).

Abscess Drainage: On entering the peritoneal cavity, a large abscess cavity was identified within the spleen. Thick purulent material was drained using a laparoscopic suction device (Fig. 2).

Vascular Control: Dissection at the splenic hilum revealed the splenic artery with prior embolization coil visible within the vessel. The coil was noted extending into the parenchyma (Fig. 3).

Splenic Parenchyma: Intraoperative findings included an ischemic spleen with segmental necrosis, particularly involving the mid and inferior poles, while the superior pole remained well-vascularized (Fig. 4).

Mobilization and Splenectomy: The spleen, noted to be enlarged and congested, was mobilized laparoscopically with hand assistance and delivered en bloc (Fig. 5). Hemostasis was meticulously achieved.

The procedure was completed uneventfully. The

postoperative course was smooth, and the patient was discharged in stable condition with follow-up instructions and counseling on infection prophylaxis.

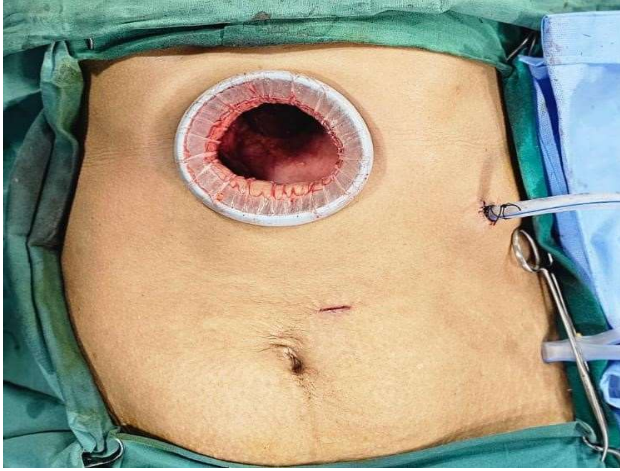

Fig 1: Intraoperative photograph showing a hand-assisted laparoscopic port (hand port) inserted through a mini-laparotomy incision with a wound protector–retractor.
This allows the surgeon to introduce a hand into the abdominal cavity while maintaining pneumoperitoneum during laparoscopic splenectomy.

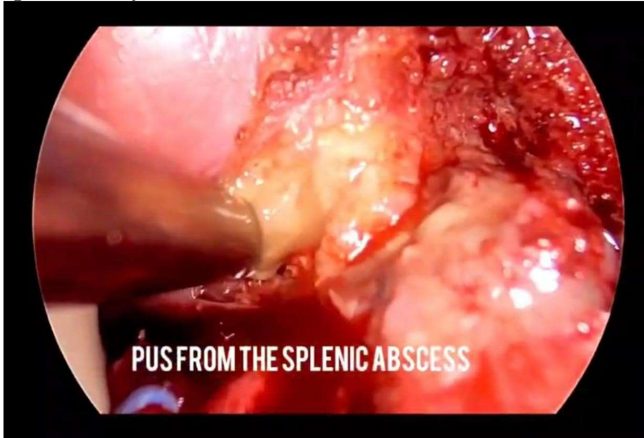

Fig 2: Intraoperative image showing drainage of thick purulent material from a splenic abscess using a laparoscopic suction device. The abscess cavity demonstrates inflamed
and congested splenic tissue.

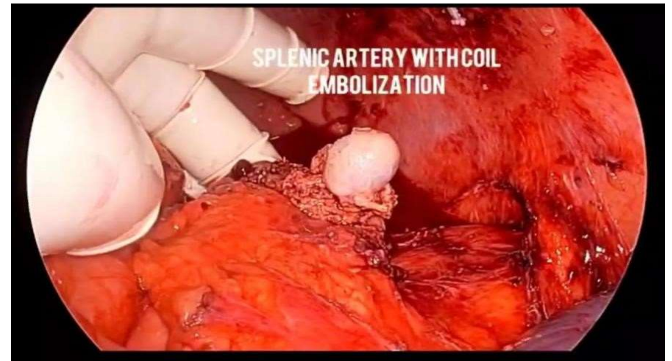

Fig 3: Intraoperative view demonstrating the splenic artery with prior coil embolization. The metallic coil is seen within the vessel lumen, placed for hemostasis and vascular control prior to splenectomy.

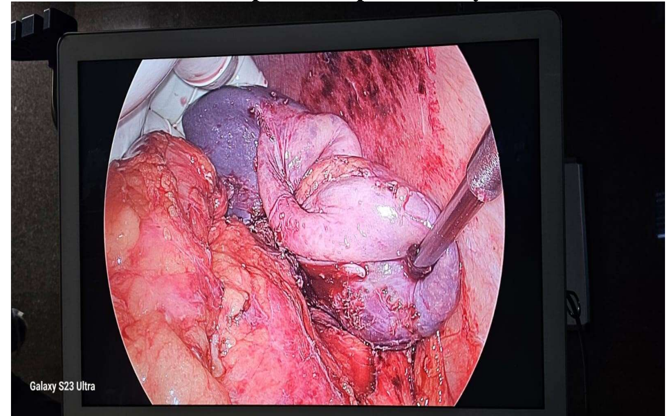

Fig 4: Laparoscopic intraoperative image of the spleen showing a well-vascularised superior pole and necrotic mid and inferior poles, indicating segmental splenic ischemia and infarction.

Discussion

Splenic artery aneurysms (SAAs) are the most common visceral artery aneurysms, representing up to 60% of

cases but remaining relatively rare overall [10,11]. They are more frequent in multiparous women and can present incidentally or with nonspecific abdominal symptoms. Rupture risk increases in aneurysms >2 cm, during pregnancy, or with underlying portal hypertension, and can result in catastrophic hemorrhage [11]. Early detection and timely management are therefore essential. Endovascular coil embolization is widely regarded as the preferred first-line treatment for SAAs due to its minimally invasive nature and high technical success rates [12]. However, complications such as splenic infarction, abscess formation, coil migration, and pancreatitis may occur, especially when the main splenic artery is completely occluded. In this case, embolization successfully excluded the aneurysms but led to extensive splenic infarction with abscess formation, requiring surgical intervention.

Laparoscopic hand-assisted splenectomy provided a safe and effective approach in this complex setting, enabling careful adhesiolysis, control of friable ischemic tissue, and retrieval of the spleen containing residual coils. Successful outcomes in such cases depend on vigilant post-embolization monitoring, prompt recognition of complications, appropriate preoperative vaccination against encapsulated organisms, and multidisciplinary coordination between interventional radiology, surgery, and infectious disease teams.

This case also reinforces the importance of a multidisciplinary approach, with interventional radiologists, surgeons, and infectious disease specialists collaborating to deliver staged, tailored care. While embolization remains an excellent first-line option for SAA, surgical expertise must be available to address complex post-procedural complications.

Conclusion

Multiple splenic artery aneurysms require prompt, tailored management. While endovascular coil embolization is an effective first-line treatment, complications such as infarction or abscess may necessitate splenectomy. Laparoscopic hand-assisted splenectomy offers a safe, minimally invasive option in complex cases, with success dependent on timely diagnosis, vaccination, surgical precision, and multidisciplinary care.

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