SPLENIC SPARING SURGICAL APPROACH TO BENIGN SPLENIC CYSTS: CASE REPORT AND REVIEW OF THE LITERATURE

Simran K Parmar, BSc, MD; Brianna A Brand, BSc; Estifanos Debru, BSc, MD, FRCSC; Christine Wang BSc, MD; Richdeep Gill, MD, PhD, FRCSC

Department of Surgery, Cumming School of Medicine, University of Calgary

CASE REPORT

We present the case of a healthy 36-year-old male who presented with symptoms of abdominal fullness and flank discomfort. The patient had CT findings of an upper pole nonparasitic splenic cyst (NPSC) with magistral splenic arterial anatomy. The patient underwent an uncomplicated laparoscopic spleen preserving total cystectomy which included intraoperative drainage of the cyst and devascularization and resection of the splenic parenchyma containing the cyst. The patient was discharged 48 hours later and followed up at 6 weeks with no evidence of intraoperative or acute postoperative complications. Postoperative pathology demonstrated benign splenic tissue with pseudocyst present.



Figure 1: Coronal view of an abdominal computed topography scan demonstrating an upper pole splenic cyst in a 36-year-old male.

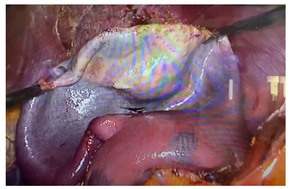


Figure 2: Intra-operative laparoscopic view of an upper pole nonparasitic splenic cyst following aspiration in a 36-year-old male.

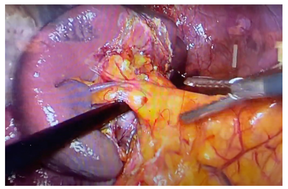


Figure 3: Intra-operative laparoscopic view of isolated splenic hilar vasculature identified in the event of major bleeding during a laparoscopic spleen preserving surgery in a 36-year-old male with a nonparasitic splenic cyst.

INTRODUCTION

Nonparasitic splenic cysts (NPSC) are rare benign lesions of the spleen and may be true cysts or pseudocysts that may develop after a traumatic event. No treatment guidelines exist for the management of NPSC, and many variations of minimally invasive techniques have been reported to preserve the spleen.[1] Laparoscopic treatment of NPSC is associated with reduced morbidity and shorter hospital stay compared to open procedures.[2] Laparoscopic spleen preserving surgical techniques include partial splenectomy, cyst fenestration, cyst deroofing, marsupialization, and partial or total cystectomy.[1] Minimally invasive spleen preserving surgery (SPS) has distinct advantages for patients presenting with NSPC; however, there is limited literature comparing minimally invasive SPS techniques.[3]

SCOPING REVIEW METHODS

A scoping review was performed in adherence with PRISMA guidelines using PubMed, Ovid Embase, Web of Science and Mbase. Search criteria included English language studies published from 2000 to 2022, describing laparoscopic management of NPSC for human patients greater than 17 years of age. Search terms included laparoscopy, spleen, splenic, and cyst(s). Studies were screened to identify papers that described laparoscopic partial splenectomy/ unroofing/ deroofing /partial cystectomy/ decapsulation/ marsupialization or fenestration of NPSC. We excluded those studies that described parasitic cysts, cysts in pregnant patients, acute traumatic injuries, open procedures, and total splenectomy. We screened 2567 studies and 327 of those were duplications. 268 underwent full-text assessment for eligibility. Of these we excluded 213 studies. Of the 55 included studies, there were 157 cases described using minimally invasive spleen preserving surgery (SPS) techniques.

INCLUDED
• Benign splenic cyst
• English language
• Surgical intervention of splenic cyst
• Published after 2000
• Attempted spleen preserving surgery
• Laparoscopic; started laparoscopic; laparoscopically assisted

EXLUDED
• Known malignancy
• Age less than 18
• Known pregnancy
• Acute traumatic injury
• Parasitic
• Mesotheliomas
• Intrapancreatic splenic cyst
• Splenic hamartoma, hemangioma
• Wandering spleen
• Echinococcosis
• Ruptured cyst

RESULTS

Of the 55 papers, 39 described one patient case,16 described multiple patient cases. One hundred fifty-seven cases of NPSC were managed operatively with SPS. Of those, intraoperative complications occurred in 8 patients. Cyst recurrence was seen in 13 patients. Depending on the size of the recurrent cyst, patients required a total splenectomy for resolution. Recurrence was seen in cysts treated with fenestration, decapsulization, unroofing, partial cystectomy, marsupialization and aspiration. The surgeon's ability to perform SPS was dependent on the cyst size, the peripheral location of the cyst in the splenic parenchyma and the vascular arterial pattern of the spleen

Table 1: Demographics of 157 patients undergoing laparoscopic spleen preserving surgery for management of NPSC.

Age (years)	18-67 (mean age 33.5)
Sex (Female:Male:Unknown)	88 female: 54 male: 15 unknown
Cyst size (cm, largest diameter)	3 – 30 (mean 10.2 cm)
Cyst location (Upper pole: Lower pole: Central/Hilar)	64 upper pole: 23 lower pole: 11 central/hilar

Table 2: Methods of spleen preserving surgery used in the management of NPSC.

Laparoscopic Partial Splenectomy	49 patients (31%)
Robotic Partial Splenectomy	7 patients (5%)
Laparoscopic fenestration	18 patients (11%)
Laparoscopic cystectomy /partial cystectomy	28 patients (18%)
Laparoscopic cyst unroofing	21 patients (13%)
Laparoscopic decapsulization/partial decapsulization	11 patients (7%)
Laparoscopic marsupialization	6 patients (4%)
Omentopexy performed	10 patients (6%)
Cyst drainage	81 patients (52%)
Devascularization	56 patients (36%)

Table 3: Surgical outcomes for patients undergoing spleen preserving surgery for management of NPSC

Interoperative complications*	8 patients
Conversion to total splenectomy	2 patients
Conversion to open approach	3 patients
Discharge date	POD 1- POD 10
Postoperative complications**	16 patients
Follow-up (months)	1-72 months (mean 19.1 months)
Recurrence ***	13 patients

*Interoperative complications were described in 8 patients including: bleeding in 5 cases (2 requiring conversion to open SPS, 1 requiring conversion to laparoscopic total splenectomy, one requiring conversion to open total splenectomy and one requiring transfusion), change to the surgical plan in two patients (conversion to laparoscopic partial splenectomy in one and conversion to aspiration in the other), and an adherent cyst requiring resection of a portion of the stomach in one case.

**Postoperative complications were described in 16 patients and included: 1 splenic vein thrombosis with splenic abscess, 1 takeback for possible splenic perfusion defect, 5 readmissions for sub-phrenic fluid collection, 2 patients with urinary retention, 1 urinary tract infection, 2 pleural effusions, 1 post-operative ileus, 1 patient with atelectasis and 2 patients with post-operative fever and leukocytosis.

***Recurrent cysts were described in 13 patients. These patients were initially treated with fenestration, decapsulization, unroofing, partial cystectomy, marsupialization or aspiration. Five of the 13 patients eventually required total splenectomy with 4 patients undergoing laparoscopic total splenectomy and 1 patient undergoing open total splenectomy.

CONCLUSIONS

- Minimally invasive spleen preserving surgical techniques are a viable and safe approach for the management of benign nonparasitic splenic cysts.
- While many minimally invasive spleen preserving surgical techniques exist, partial splenectomy is common, and is superior to other techniques in preventing cyst recurrence.
- Spleen preserving surgical approaches have the advantage of preserving splenic immune function and mitigating patient morbidity.
- In this study we present a review exploring minimally invasive surgical approaches to non-parasitic splenic cysts. Guidelines for preferred management of NPSC should be explored.

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CONTACT

Simran Parmar: simranparmar7@gmail.com
Department of Surgery, Cumming School of Medicine, University of Calgary
Brianna Brand: babrand@ualberta.ca
Faculty of Medicine and Dentistry, University of Alberta

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