

## **LARGE SPLENIC CYSTS AT THE UPPER POLE OF THE SPLEEN – LAPAROSCOPIC MANAGEMENT**

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**LARGE SPLENIC CYSTS AT THE UPPER POLE OF THE SPLEEN – LAPAROSCOPIC MANAGEMENT (ABSTRACT):** Splenic cysts represent a rather rare pathology. The traditional management consisted in splenectomy and it is performed more and more frequently by laparoscopy. However, with the recognition of the important immunological function of the spleen, new techniques to preserve splenic function as fenestration, cystectomy or partial splenectomy may be considered. The authors present the cases of 2 women of 17 and 23 years old in whom dynamic enhanced intravenous contrast computed tomography revealed 2 cystic lesions located in the upper pole of the spleen, measuring 7 and 10 cm in diameter with thin walls and homogenous low-density fluid content. Serology for hydatid cyst was negative. The patients were approached by laparoscopy in a right lateral decubitus position. In the first case, only a small area from the upper part of the cyst was visible, outside the spleen parenchyma, needle aspiration removing clear, yellowish fluid. A partial cystectomy was possible after posterior and superior mobilization of spleen attachments, removing almost two-thirds of the cystic wall with spleen parenchyma around it, to avoid recurrence. In the second case, the cyst was not visible, being completely surrounded by parenchyma. Splenectomy was decided and performed. Both cases evolved uneventfully. Histopathology report indicated epithelial cysts in both cases. The conservative laparoscopic management of large splenic cysts is more difficult when located in the upper pole and almost entirely surrounded by parenchyma. Splenectomy is safer for the patient if the true nature of the cyst could not be established before or during the intervention.

**KEYWORDS:** SPLENIC CYST, CYSTECTOMY, LAPAROSCOPY

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### **INTRODUCTION**

Splenic cysts represent a rather rare pathology. They are of different origins, may have different size and may be located in all areas of the splenic parenchyma. Their classic management consists of laparotomy and splenectomy. However, due to important immunologic functions of the spleen and to the advent of laparoscopic splenectomy the approach has become less invasive and their management more conservative, aiming to preserve enough splenic parenchyma to ensure protection against overwhelming infection with encapsulated germs. Correct assessment of the nature of the splenic cyst during preoperative diagnosis and intraoperative exploration is also mandatory to choose the adequate surgical approach for the safety of the patient.

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Our purpose is to present two cases of splenic cysts located in the upper pole of the spleen, managed successfully by laparoscopic approach, aiming to identify the most important issues related to the location, preoperative and intraoperative diagnosis and options for laparoscopic management.

## CASES PRESENT

### Case 1

A 17 years old female sex patient was admitted to our surgical unit complaining from pain in the left hypochondria and plenitude for a couple of weeks. There was no particular history of personal and familial diseases. There was no recall of an abdominal trauma or fall. An ambulatory abdominal ultrasonography prior to the admission showed a 7 cm hypoechoic, homogenous cyst in the upper pole of the spleen and no other abnormality. Upon admission, the physical examination was normal, with a BMI of 25. Serum levels of hemoglobin, urea, glycemia were normal, the coagulation profile was also normal, serology for hydatidosis was negative. Pulmonary x-ray didn't show any abnormality. A CT-scan was performed that confirmed the cyst with thin well-defined walls but couldn't distinguish the nature of the cyst. No other visceral anomaly was detected. The patient was considered ASA II and approach by laparoscopy in the right lateral decubitus with the table broken at the level of the flank to increase the space between the ribs and the iliac crest. The optical trocar was placed 2-3 cm left from the umbilicus, on a horizontal line, and a 30<sup>0</sup> laparoscope was inserted. Peritoneal cavity was inspected and then other trocars were inserted along the inferior margin of the costal ridge – a 5 mm trocar in the epigastrium, 10 mm trocar on the anterior axillary line and a 5 mm trocar on the posterior axillary line. Inspection of the spleen revealed at its upper pole a cystic formation with transparent walls with clear yellowish fluid. A puncture using a fine needle introduced percutaneously removed a serous fluid. The diagnosis of a simple serous cyst was made and the decision of a partial cystectomy was made. Using the Ligasure Atlas<sup>TM</sup> system the cystic wall was incised, the fluid aspirated and much of the cyst removed (Fig. 1). As only 1/3 of it was visible outside the splenic parenchyma it necessitated mobilization of the upper pole of the spleen from its attachments to the diaphragm and removal of some part of the surrounding splenic parenchyma that was in fact reduced to a thin layer (Fig. 1).

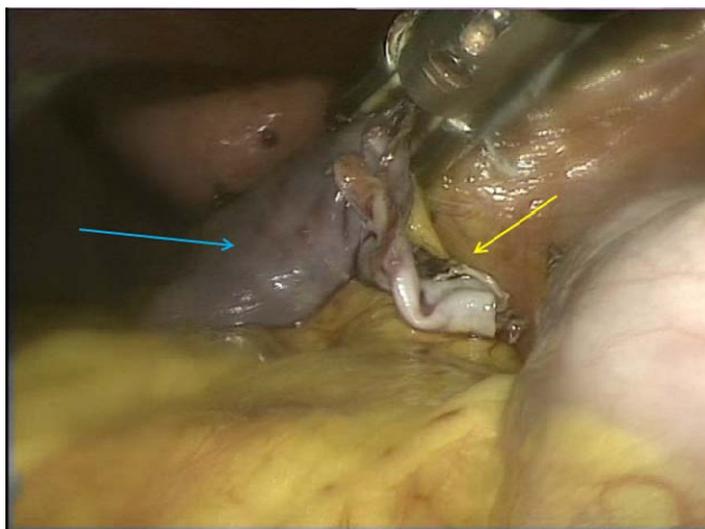


**Fig. 1** Intraoperative view: incision of the cyst after puncture and eviction of fluid (left); partial pericystectomy including a part of the splenic parenchyma (yellow arrow) using Ligasure Atlas<sup>TM</sup> (right)

The postoperative course was simple. The patient was discharged in the 6<sup>th</sup> postoperative day with recommendation of surveillance of platelet count and vaccination against encapsulated germs.

### Case 2

A 23 years old female sex patient, complaining from unspecific abdominal pain, plenitude, left lumbar pain was admitted to our surgical unit. She was under antibiotic treatment from her physician for an urinary tract infection. An ambulatory ultrasonography discovered a voluminous splenic cyst of 12 cm located in the upper pole and the patient was immediately referred to surgery. There was no recall of an abdominal trauma or fall or any history of personal or familial diseases. Upon admission there was no peculiar finding in her physical examination, a BMI of 26. Laboratory tests indicated normal levels of the hemoglobin, glycemia, blood urea, normal white blood cell and platelet counts. Serology for hydatidosis was negative. Pulmonary X-ray was normal. A CT-scan was performed showing a 12 cm splenic cyst located in the upper part of the spleen, homogenous, low density content, thin walls. There was no other cystic lesion to detect in the liver or kidneys and no other abnormality. The patient was considered ASA II and approach by laparoscopy using the same setup as in the first case. The exploration of the peritoneal cavity didn't find any other associated disease. The spleen was enlarged, especially at the level of its superior pole but there was no visible cyst (Fig. 2).



**Fig.2** Intraoperative view: extraction of the resected cyst (yellow arrow) with a part of the splenic parenchyma (blue arrow)

A posterior mobilization of the spleen was performed but there wasn't any part of the cyst that we could see and appreciate. As it was impossible to establish the nature of the cyst, the splenectomy was decided. This was performed by step by step sealing and dividing of the splenic vessels in the hilum using the Ligasure Atlas<sup>TM</sup>. The spleen was extracted into a plastic bag by a 5 cm horizontal incision in the left hypocondrium. Upon morcellation and extraction it became evident that the cyst was again a simple serous cyst with no vegetations inside.

The postoperative course was uneventful and the patient was discharged in the 7<sup>th</sup> postoperative day with the same recommendations of vaccinations and surveillance of her platelet count.

## DISCUSSIONS

Splenic cysts classify are classified as: parasitic and non-parasitic that can be primary (epithelial:epidermoid, dermoid, mezothelial; endothelial: hemangioma, lymphangioma) or secondary (pseudocyst: post-traumatic, hemorrhagic;infectious, degenerative) [1-4].

Splenic cysts represent a rather rare disease with around 800 cases reported in the literature [5,6]. Most of those cases are parasitic cyst, non-parasitic cyst representing thus only 300 cases [6]. The majority (50-75%) are pseudocysts, secondary to trauma [7,8]. The rest, representing 30% to 40%, are primary splenic cysts [9,10]. From them, true non-parasitic cysts (with an epithelial lining) account for no more than 10% [7,8].

Splenic cysts may remain asymptomatic in 30-60% of the cases and their discovery may be incidental on radiographs if calcifications are present and on abdominal ultrasonography or CT-scan. They may induce local or referred pain, often postural. In case of large cyst, the patient may present abdominal distension, early satiety, vomiting, dysphagia, atelectasis or left lower lobe pneumonia [11]. In both our cases, the patients presented unspecific abdominal pain in the left hypocondria, early satiety and fullness that imposed imagistic investigation that ended up in the discovery of the cyst.

The true nature of the cyst is generally difficult to establish preoperatively. In developing countries, like ours, the most frequent is the parasitic aetiology. Differential diagnosis should include cystic lesions of adjacent organs, as pancreas, liver and omentum, intrasplenic aneurysm and benign and malignant splenic tumors [11].

Patient history (age, gender, and history of trauma, acute or chronic pancreatitis) could be of some help but is not very reliable. Both our patients excluded trauma and pancreatitis but both came from the countryside and stated having domestic animals at home, situation that expose her to risk of contamination with echinococcus granulosis.

Both our cases had complete abdominal and thoracic plain radiographs, abdominal ultrasonography and CT-scan. Ultrasound or CT scan may help in determining the cyst type but they cannot be 100% precise. Parasitic cysts have some radiographic and sonographic characteristics but preoperative differentiation between epithelial-lined and pseudocysts is not reliable [12].

Ultrasonographic and CT appearances of splenic hydatidosis are not specific, similar aspects being seen in other splenic cystic lesions, such as an epidermoid cyst, splenic abscess, pseudocyst, or cystic neoplasm of the spleen.

Splenic cysts are usually located entirely within the spleen, contrary to hepatic or renal cysts which may have a consistent part outside the parenchyma. Calcifications in the walls are more related to a pseudocyst, that could have also debris and echoic contents due to infection or hemorrhage. Internal septation is more frequent in true cysts [13]. The presence of daughter cysts in a large cystic lesion or concomitant cystic lesions in the liver or other organs is highly suggestive of hydatid cyst. In patients with negative serology and determinant US and CT examinations, recent publications advocate the role of MRI. It seems that this diagnostic tool may help differentiate between parasitic, non-parasitic, traumatic or other unilocular cysts. Newer application

of functional MRI could be even more effective in differentiating parasitic from non-parasitic cysts [14] but it wasn't performed.

Serology for hydatidosis was negative in both cases but this not a reliable test to exclude because of its low sensibility and specificity [15].

The final diagnosis was postponed for intraoperative exploration. Generally, more informations could be obtained intraoperatively when we can assess the macroscopic aspect of the cyst, we can obtain cyst fluid to analyse and samples from the cyst wall to perform a frozen section.

The most exact diagnosis can be established only postoperatively, when pathologic examination of the entire cyst wall can be performed [16].

Indications for therapy are not very precise in the literature, but are grounded on symptoms and dimensions. Most of the authors consider that a symptomatic splenic cyst presents a high risk for rupture and therefore an absolute indication for therapy [9]. A cyst larger > 5cm is considered at risk for rupture and hemoperitoneum [5] and less suitable for spontaneous resolution [8] and therefore constitutes an indication for therapy. Others consider that a minimum of 4 cm in the greater diameter should mandate immediate therapy [17]. However, there is a contradictive report in the literature by a congenital epithelial cyst of the spleen of 3x6 cm that underwent progressive regression in a period of 10 years of follow-up [18].

Formal objectives of the therapy are eradication of the cyst and the prevention of the recurrence. Modalities of the treatment are represented by traditional laparotomy, laparoscopy and percutaneous aspiration guided by the US/CT scans.

Simple percutaneous aspiration guided by US/CT-scans has a relapse risk rate of 100% [19]. Lopez Cano et al [20] report percutaneous aspiration of an epithelial splenic cyst and sclerosing with alcohol with no recurrence at 4 years follow-up. Anon et al [21], using also alcohol, obtain no recurrence at 1 year follow-up. Shimanuki et al [22] report no recurrence at 1 year follow up using minocycline chloride. In a review, percutaneous aspiration and sclerosing with alcohol or tetracycline did not result in long term control [23].

The reference in the elective treatment of any splenic cyst, including epithelial cysts, was considered laparotomy + splenectomy [9,24]. The alternative are conservative methods [10,24] consisting in partial splenectomy, cystectomy or fenestration of minimal 3 cm diameter [25], that are indicated in children and young adults because avoid the risk of fulminant sepsis.

Both splenectomy and the conservative procedures could be applied through laparoscopy, whether is pure laparoscopy or hand-assisted. The advantage of laparoscopy is already known and generally accepted in better cosmetic, quicker recovery, reduced postoperative pain and immune depression, lower parietal morbidity.

Kum et al [26] in 1993 reported a laparoscopically assisted splenectomy for a wandering splenic cyst.

Decapsulation or deroofing of the splenic cyst is by far the simplest method to treat the splenic cysts. Its feasibility and safety was shown in many reports. Posta et al [27] in 1994 reported on a splenic cyst treated laparoscopically with aspiration of the cyst contents and excision of a portion of external cyst wall. In 1995, Targarona et al [28] reported on a similar laparoscopic approach to treatment of a splenic cyst. In 2010, the same author published a similar technique using single incision laparoscopic surgery with access through the umbilicus [29]. Seshadri et al [30] reported the decapsulation of a symptomatic 10-cm epithelial cyst by needlescopic instruments (3 mm or smaller).

Three trocars were used: one 12-mm umbilical and two 3-mm subcostal ports. The cyst was punctured by a Veress needle, and after drainage of straw-colored fluid, circumferential decapsulation with 5-mm laparoscopic shears through the umbilical port site was done.

In those reports the decapsulation was done with monopolar scissors, bipolar or harmonic scalpel [31]. Sellers et al [8] report on using a laparoscopic GIA device. He stated that the use of such device reduces the risk of intraoperative and postoperative bleeding from the resected cyst wall, especially in a vascularized epithelial lined cyst. In our experience this was easily and safely done by using Ligasure Atlas™ of 10 cm. It was possible to go even through a part of the splenic parenchyma to resect more of the cystic wall.

There is no exact evidence about how much to resect from the cystic wall to prevent recurrence. Morgenstern et al [7] did not differentiate between a near-total cystectomy and decapsulation, and the message seems to be that as much of the cystic wall as possible should be resected to prevent reclosure. There is also less evidence about what should be done in case of important remnant cavity. Some authors advocate plication [32] but this is difficult and dangerous in laparoscopy.

In a study by Mertens et al [16] decapsulation (resection of the cystic wall outside the splenic parenchyma) with omental flap packing of the remnant cavity performed by laparotomy was followed by recurrence in 4 patients of 7 in a long term-follow up 37,5 months. Only one needed treatment the other 3 with a diameter of less than 3 cm and asymptomatic were not considered for therapy.

Partial splenectomy preserves more than 25% of splenic parenchyma, which is the minimal splenic tissue to preserve immunologic protection without increasing the risk of recurrence. Partial splenectomy can be performed safely with the laparoscopic approach [2,31,33].

In the first case we were able to establish the true nature of the cyst intraoperatively based on the aspect of the cysts' walls and cysts' fluid. Almost one third of it was located outside the splenic parenchyma but near half of it was resected after mobilising the upper pole of the spleen and cutting through the parenchyma.

In the second case we couldn't see the cyst, not even after posterior mobilization of the splin, because it was completely surrounded by the splenic parenchyma. In this case we decided that the safest attitude for the patient was the splenectomy.

This is supported by the following arguments:

- suspicion of a hydatid cyst incompletely excluded; increased use of laparoscopic techniques and spillage of cystic fluid during carelessly-performed operations results in the increase in the recurrence of hydatid disease.
- if the cyst was to be a hydatid cyst, Ahmad et al [34] maintain that splenectomy remains the procedure of choice in cases of splenic hydatidosis and Durgun et al [35] sustain that splenectomy without the puncture of the cyst is preferable.
- any type of conservative procedure is difficult to perform, if the cyst is very large, or is covered completely by the splenic parenchyma (intrasplenic cyst). In these cases, Macheras et al [6] recommend complete splenectomy.

## CONCLUSIONS

Non-parasitic splenic cysts are a rare pathology. Choice between laparoscopic conservative procedures or splenectomy is made upon reliable preoperative and intraoperative diagnosis of the true nature of the cyst.

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