



## **The Mangement of Splenic Cysts in Children**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Case Report**

### **ABSTRACT**

**Introduction:** Tumors of the spleen are rare in children, but they present a wide range of diagnostic, histological and radiological appearance. Splenic cysts are far more common than solid lesions. Cysts may be congenital (epidermoid cysts), infectious (abscess or hydatid cyst), or neoplastic (lymphangioma or angioma with tumor necrosis). They are most often asymptomatic. Diagnosis can usually be established with the clinical context and radiology (ultrasound, CT, MRI). Different options for the management of splenic cysts are available to the pediatric surgeon, ranging from simple monitoring to surgical excision. Minimally invasive surgical techniques and spleen conservative surgery have made splenic surgery less aggressive.

The aim of the study was to describe the clinical and paraclinical characteristics of splenic cysts in children, and to assess their management.

**Patients and Methods:** In a retrospective study within the pediatric surgery department in tunis, Tunisia, we have collected five children with a diagnosis of splenic cyst during the last decade. We specified for each patient the functional signs and physical examination data, ultrasound and CT were done for the patients, specifying the location and the size of the cysts. Hydatid serology was done when the parasitological origin was suggested. After surgical management and histological confirmation, the follow-up was based on clinical examination and abdominal ultrasound.

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**Results:** They were three girls and two boys. The average age is ten and a half years. All patients were symptomatic with abdominal pain. The size of the cysts was significantly increased in all patients with an average of 11 cm. Surgery was indicated for all cases. Three patients had cystic resection and two had partial splenectomy. The histology objectified epithelial cyst for three patients and hydatid cyst of the spleen for the other two cases. The subsequent outcome was favorable for all patients with a current mean follow-up of three years.

**Conclusion:** Splenic cysts are rare in children and their management is still controversial. In splenic cysts, imaging can give clues to the diagnosis, but it often requires pathological examination of the part. Resection should be as limited as possible in order to avoid the risk of total splenectomy.

**Keywords:** Splenic cyst; diagnosis; management; partial splenectomy; cyst resection.

## 1. INTRODUCTION

Splenic cysts are benign lesions, the frequency of which in the general population is very low (around 1000 published cases). Often asymptomatic, they can be revealed by pain or a palpable mass, or present as complications: cyst rupture, intracystic hemorrhage or cyst infection. Surgical techniques have evolved a lot over the past three decades. Initially, total splenectomy by laparotomy was the treatment of reference. The development of conservative splenic techniques, has made it possible to reduce immediate postoperative complications, as well as medium and long term complications (recurrence, immune deficiency). Through this work, we described the clinical and paraclinical characteristics of splenic cysts in children and evaluated these cysts management.

## 2. CASE PRESENTATION

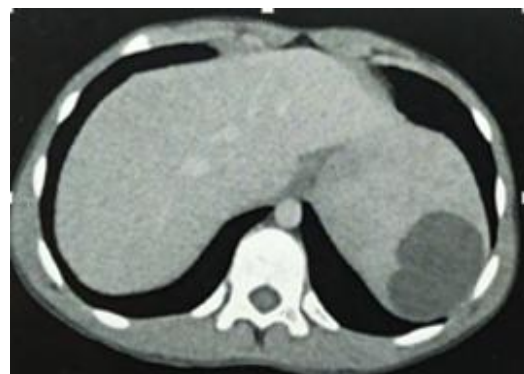
### 2.1 Observation 1

A 14-year-old boy, with no pathological history, has presented for intermittent progressive abdominal pain in the left hypochondrium. On clinical examination, he presented with painless splenomegaly. Radiological explorations (ultrasound and computed tomography (CT)) (Fig 1) were in favor of a homogeneous cystic mass, rounded, well limited without clean wall, located at the level of the superior pole of the spleen of 5 cm long axis, of non-specific look. He had an upper polar partial splenectomy removing the cyst. Histological examination resulted in an epithelial cyst of the spleen. The surgical outcomes were simple with a current follow-up of four and a half years. The patient was monitored regularly by ultrasound. The latter was always in favor of the absence of splenic abnormality.

### 2.2 Observation 2

An 11 year old boy, with no pathological history, suffered chronic abdominal pain for one year, in

the left hypochondrium with a recent aggravation two months ago associated with abdominal distension. On clinical examination, he presented with splenomegaly with a splenic arrow estimated at 10 cm from the left costal ledge. On palpation, he had a slightly tender abdomen in the left hypochondrium. Radiological explorations (ultrasound and CT) (Fig 2) were in favor of a cystic mass of the spleen, well limited without clean wall, 18 cm long axis, associated with a perisplenic and intrapelvic effusion, first evoking an epidermoid cyst of the probably cracked spleen. He had an upper polar partial splenectomy removing the cyst (Fig 3). The anatomopathological examination concluded to an epidermoid cyst of the spleen. The operative outcomes were simple with a current follow-up of three months. The patient was monitored by ultrasound. It did not found any splenic abnormalities.

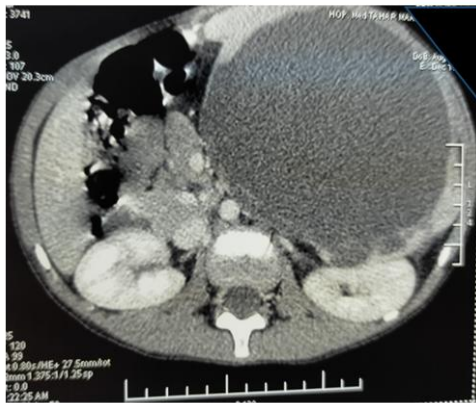


**Fig. 1. CT: Limited cystic mass at splenic upper pole**

### 2.3 Observation 3

A 14-year-old girl with no medical history. She had presented with abdominal pain in the left hypochondrium associated with abdominal distension. On clinical examination, she presented on palpation a painful left subcostal

mass of 10 cm long axis, poorly limited, fixed in relation to the deep plane. Hydatid serology was negative. Radiological investigations (ultrasound and CT) (Fig 4) were in favor of a voluminous splenic cyst, well limited without clean wall, 14 cm long axis, of non-specific appearance. Surgical exploration revealed a large splenic cyst without membrane 15 cm long axis. She had an aspiration of the contents of the cyst which was brownish with resection of the protruding dome with drainage of the residual cavity by a drain. Histological examination resulted an epithelial cyst of the spleen. The operative consequences were simple with a current follow-up of two and a half years. This patient was followed by ultrasound, which still remains without abnormality.



**Fig. 2. CT: Cystic splenic mass, pushing back the neighboring organs**



**Fig. 3. Preserved part of the spleen after partial splenectomy removing the cyst**

#### 2.4 Observation 4

A 9-year-old girl with no medical history, presented with intermittent abdominal pain in the

left hypochondrium that had progressed for 7 months, associated with abdominal distension. On clinical examination, she presented on palpation a splenomegaly with a splenic arrow 4cm from the left costal rebort. Hydatid serology was negative. Radiological investigations (ultrasound and CT) (Fig 5) were in favor of a cystic mass in the spleen, well limited with clean wall, 10 cm long axis, the appearance of which suggests an epidermoid cyst or a hydatid cyst. Surgical exploration revealed a hydatid cyst of the upper pole of the spleen, 10 cm in diameter. She had aspiration of the contents of the cyst with resection of the protruding dome and extraction of the proligerous membrane with resection of the pericyst and drainage of the residual cavity by a redon( Fig 6).Histological examination confirmed the diagnosis of hydatid cyst of the spleen. The operative consequences were simple with a current follow-up of one and a half years. This patient was followed regularly by an ultrasound, which always remains without abnormality.

#### 2.5 Observation 5

A 5-year-old girl with no medical history, presented with a skin rash associated with acute abdominal pain in the left hypochondrium following a benign abdominal trauma. The physical examination was without abnormality with a supple abdomen depressible and painless on palpation with a preserved general condition. Hydatid serology was negative. She had a discreet biological inflammatory syndrome. Radiological investigations (ultrasound and CT) (Fig 7,8) were in favor of a cystic mass of the spleen, well limited with a clean wall, multi-compartment with membrane detachment, measuring 8 cm from the major axis associated with an effusion of low abundance. The appearance of which suggests a hydatid cyst of the fissured spleen. Surgical exploration revealed an hydatid cyst of the superior pole of the spleen, with adhesions between the cyst and the diaphragm and between the cyst and the omentum. She had a release of these adhesions with aspiration of the contents of the cyst with resection of the protruding dome and extraction of the proligerous membrane and drainage of the residual cavity by a drain. Histological examination confirmed the diagnosis of hydatid cyst of the spleen. The operative consequences were simple with a current follow-up of six years. This patient was followed regularly by an ultrasound, which always remains without abnormality.

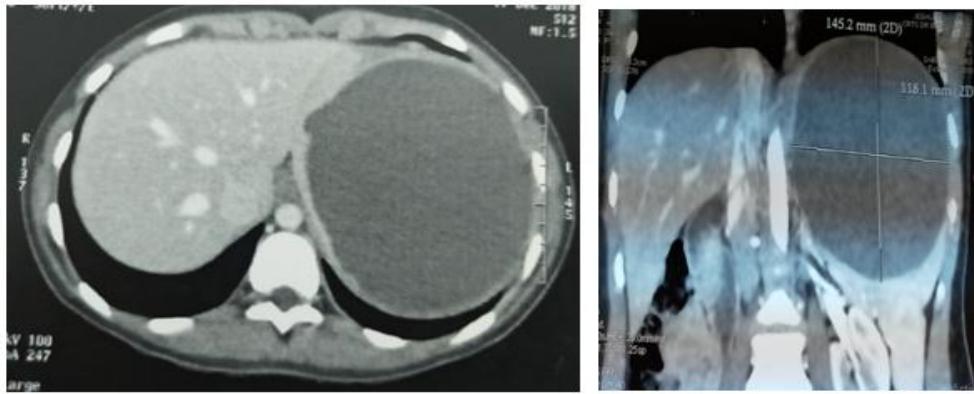


Fig. 4. CT: Non-specific in appearance voluminous splenic cyst

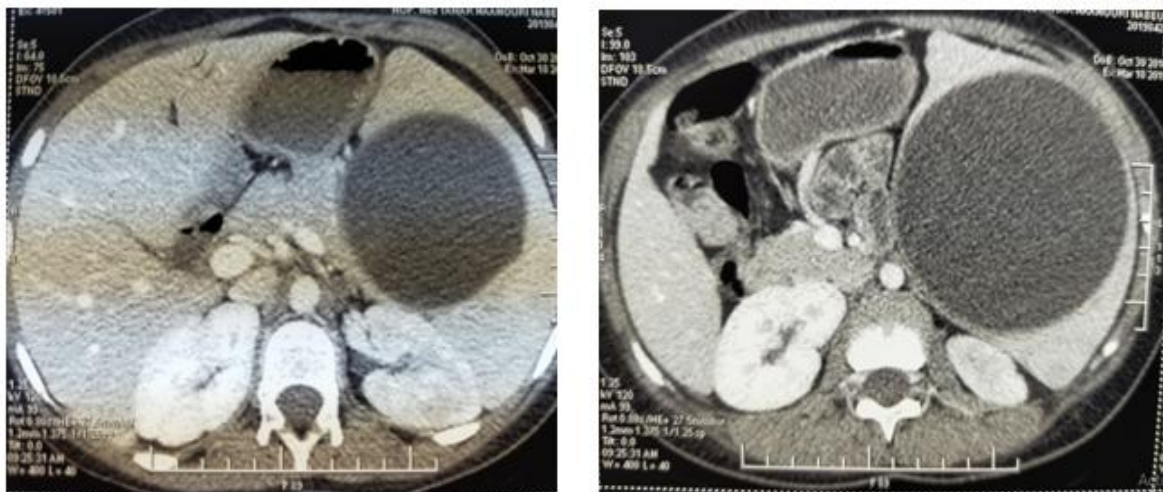


Fig. 5. CT: A large splenic cystic mass of the spleen, suggesting an epidermoid cyst or a hydatid cyst

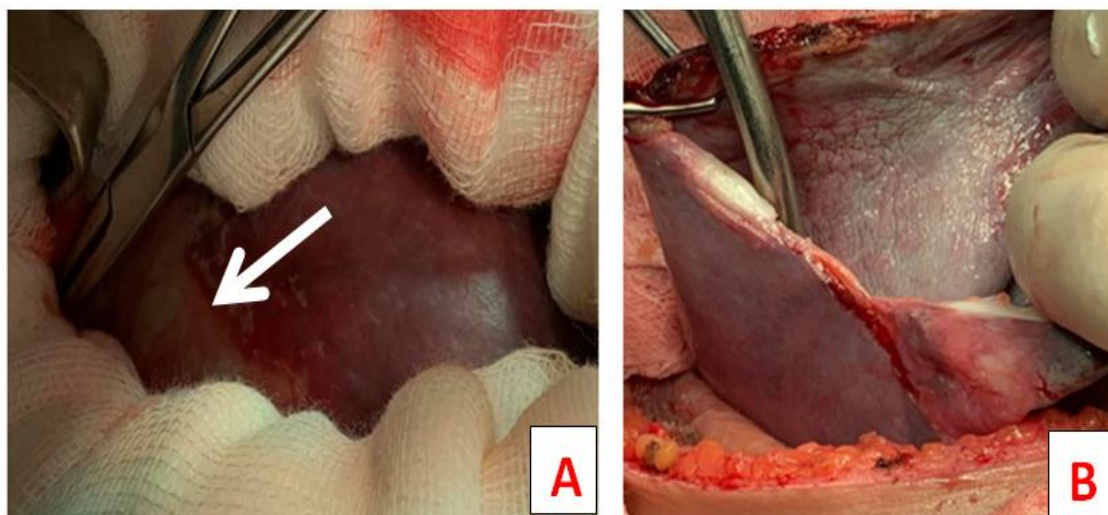
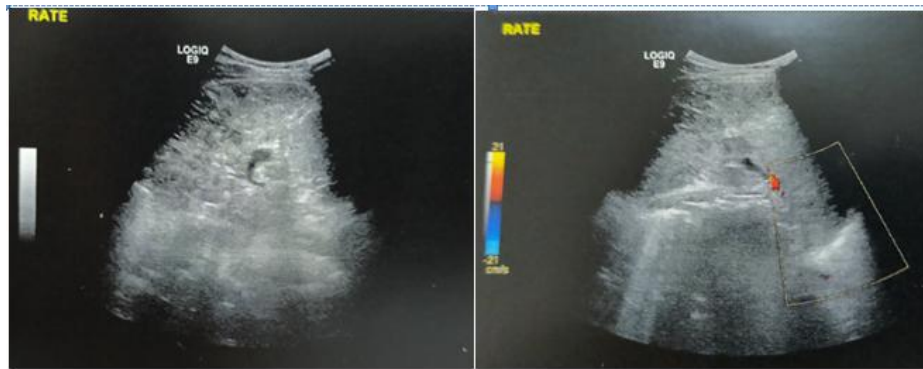
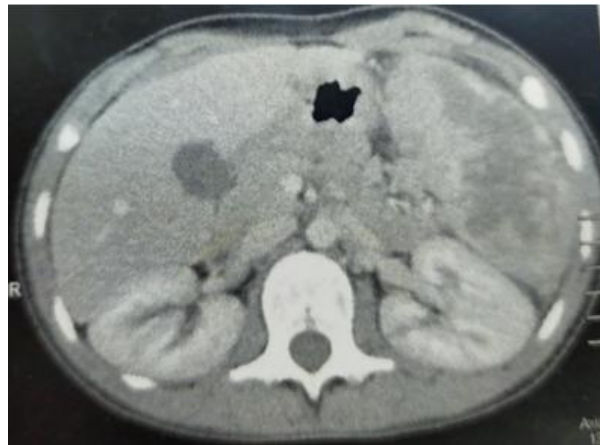


Fig. 6. A: aspect of a hydatid cyst of the superior pole of the spleen; B: aspiration of the cyst and resection of the protruding dome



**Fig. 7. Ultrasound : Mediosplenic cystic, multi-compartment with membrane detachment**



**Fig. 8. CT: Multi-compartment splenic cystic mass with membrane detachment and effusion**

### 3. DISCUSSION

Splenic cysts are uncommon. There are classified as primary or secondary cysts [1]. The primary cysts are subdivided into parasitic and nonparasitic. There are a relatively rare clinical entity in children [2,3]. Non-parasitic cysts are most seen in children and young adults [1,2]. Parasitic cysts seem to be more common in endemic countries for echinococcus infection like the Mediterranean Zone [4,5].

Splenic cysts are usually asymptomatic. Most of these cysts were discovered accidentally during a physical exam or imaging [1, 3, 4]. The symptoms are usually vague. A painless abdominal mass as well as a typical splenomegaly represent the most frequent clinical signs [6,7,8]. Some patients have abdominal pain on the left side. The pain is due to a distension of the capsule, or the mass effect of the cyst on adjacent organs [5, 7, 8]. In our study, all of our patients reported abdominal pain in the left hypochondrium. This pain was chronic

in four patients and an acute onset in the fifth patient. The splenomegaly was found in four patients on clinical examination. This splenomegaly was painless in two cases.

Concerning radiological exploration, ultrasound and CT and/or MRI are helpful in determining whether the cyst is multi- or unilocular, the location in the spleen, and its relationship to the surrounding structures. Furthermore, these imaging modalities can help plan the optimal operative approach [2, 4, 6]. All of our patients were explored by ultrasound and computed tomography.

The treatment of splenic cysts is a difficult challenge to surgeons and physicians. This treatment varies according to size, number, pathogenesis, and location. Therapeutic options include observation, cystectomy, partial or total splenectomy, and percutaneous aspiration with or without sclerotherapy [1, 2, 8, 9]. Current literature recommends splenectomy or cystectomy with very rare use of aspiration with or without sclerotherapy [8,9].

<b>Patients</b>	<b>Patient 1</b>	<b>Patient 2</b>	<b>Patient 3</b>	<b>Patient 4</b>	<b>Patient 5</b>
Sex	A boy	A boy	A girl	A girl	A girl
Age	14-year-old	11-year-old	14-year-old	9-year-old	5-year-old
Medical history	Nothing to report	Nothing to report	Nothing to report	Nothing to report	Nothing to report
Functional symptoms	-Abdominal pain in the left hypochondrium	-Abdominal pain in the left hypochondrium - Abdominal distension	-Abdominal pain in the left hypochondrium - Abdominal distension	-Abdominal pain in the left hypochondrium -Abdominal distension	- Skin rash -Acute abdominal pain in the left hypochondrium
Clinical examination	Painless splenomegaly	- Splenomegaly - On palpation: a slightly tender abdomen in the left hypochondrium	On palpation a painful left subcostal mass	Splenomegaly	-A supple abdomen depressible and painless on palpation
Hydatid serology	Not done	Not done	Negative	Negative	Negative
Radiological investigation (ultrasound + CT scan)	A homogeneous cystic mass, rounded, well limited without clean wall, of 5 cm long axis	A cystic mass of the spleen, well limited without clean wall, 18 cm long axis, associated with a perisplenic and intrapelvic effusion	A voluminous splenic cyst, well limited without clean wall, 14 cm long axis	A cystic mass in the spleen, well limited with clean wall, 10 cm long axis	A cystic mass of the spleen, well limited with a clean wall, multi-compartment with membrane detachment, measuring 8 cm from the major axis associated with an effusion of low abundance
Surgery	Upper polar partial splenectomy	Upper polar partial splenectomy	- Aspiration of the contents of the cyst Resection of the protruding dome -Drainage of the residual cavity	-Aspiration of the contents of the cyst -Resection of the protruding dome -Extraction of the proligerous membrane -Resection of the pericyst -Drainage of the residual cavity	-Release of adhesions -Aspiration of the contents of the cyst -Resection of the protruding dome -Extraction of the proligerous membrane -Drainage of the residual cavity
Histological examination	Epithelial cyst	Epithelial cyst	Epithelial cyst	Hydatid cyst	Hydatid cyst
Evolution	Simple	Simple	Simple	Simple	Simple
Current follow-up	Four and a half years	Three months	Two and a half years	One and a half years	Six years

A nonoperative approach is the generally accepted treatment of choice if the diameter of the cyst is less than 5 cm, because these cysts often resolve. If the cyst is larger than 5 cm in diameter or symptomatic, it is generally accepted that a surgical intervention should be performed [1,2,8,9]. This non-operative approach has little place in the case of hydatid cyst of the spleen. It is mainly indicated in the event of a calcified cyst or in the event of a sick patient who cannot be operated on [5].

Historically, the open surgical approach to splenic cysts has been total splenectomy. Today, a spleen-preserving minimally invasive approach is recommended due to the fact that the spleen plays an important role in several functions: regulation of the circulating blood volume, hematopoiesis and immunity [1,10]. Sometimes it is necessary to perform complete splenectomy. This technique is recommended for polycystic cases, inaccessible cysts, if the cyst is very large and almost completely covered by splenic parenchyma. In these cases a complete splenectomy is recommended because of the risk of the spleen bleeding [2].

Partial splenectomy is recommended if the cyst is localized at the upper or lower pole of the spleen [10]. For all our patients, the splenic cyst was enormous, the size of which exceeds 5 cm with an average size of 11cm. Our therapeutic attitude was conservative in all cases, with partial splenectomy in two cases and resection of the protruding cyst dome in three cases.

Laparoscopic treatment of splenic cysts, seems to offer the benefits of minimally invasive surgery: reduced morbidity and mortality, a shorter hospital stay, faster recovery, less postoperative pain, a more satisfying cosmetic outcome, and fewer wound-related complications [5,11]. All our patients were operated by laparotomy.

The most feared complication of splenic cysts is rupture. However, the true incidence of rupture of splenic cysts is unknown. Hemoperitoneum, peritonitis, abscess, anaphylactic shock, and empyema are some of the complications to a rupture [8,10,12]. In our study, only one patient presented a clinical picture suggesting a fissured cyst.

Splenic cysts are a rare pathology in children and their management is not consensual. When symptomatic, they must be treated surgically with a conservative technique when it's possible.

## 4. CONCLUSION

Splenic cysts are uncommon in children and their management is still controversial. If the cyst, is placed in one of the poles or in superficial, the treatment of choice is a partial splenectomy. The surgeon should attempt to preserve as much of spleen parenchyma as possible.

## CONSENT

Not applicable.

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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