Watchful waiting for large primary nonparasitic splenic cysts

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Background: Primary nonparasitic splenic cysts (NPSC) are typically diagnosed incidentally. The management of large (≥ 5 cm) asymptomatic cysts remains controversial; there is a lack of evidence guiding management. The purpose of this study was to describe the outcomes of nonoperative management of large NPSC.

Methods: Patients diagnosed with NPSC between January 2004 and December 2019 were identified at our academic institution. Adult patients with an NPSC of at least 5 cm who had at least 1 additional hospital visit were included. Data are presented as medians with interquartile ranges (IQR).

Results: We identified 512 medical records that included the term splenic cyst during the study period. Sixty-eight of the patients had no reported cyst size, 410 had cysts smaller than 5 cm, 1 patient underwent an elective splenectomy at another institution and 12 patients were excluded for other reasons; 21 patients with cysts of at least 5 cm were included in the study. Eight symptomatic patients underwent surgery at our institution. Of these, 2 presented acutely: 1 with hemoperitoneum who required admission for transfusions and later underwent elective laparoscopic splenectomy and 1 with increasingly severe abdominal pain who underwent laparoscopic cyst unroofing. The remaining 6 symptomatic patients had elective surgery for pain (4 cyst unroofing, 1 total splenectomy, 1 partial splenectomy). Thirteen patients were asymptomatic (10 female, median age 49.2 [IQR 38.1 to 64.6] yr). Two of these patients chose to undergo elective surgery. The remaining 11 asymptomatic patients, with a median initial cyst size of 8.0 (IQR 5.3 to 10.8) cm, were followed for a median of 31.0 (IQR 23.5 to 71.0) months. There was no change in median cyst size (0 [IQR –1 to 0] cm), and none of these patients underwent intervention for their NPSC.

Conclusion: Asymptomatic patients managed nonoperatively for large NPSC did not become symptomatic or require intervention during the study period. This supports watchful waiting with serial radiologic and clinical monitoring for asymptomatic large NPSC.

Contexte : Les kystes spléniques non parasitaires primaires (KSNPP) sont généralement découverts fortuitement. La prise en charge des kystes volumineux (≥ 5 cm) asymptomatiques ne fait pas l'unanimité; les données probantes manquent pour orienter le traitement. Cette étude avait pour but de décrire les résultats d'une prise en charge non chirurgicale des KSNPP.

Méthodes : Nous avons identifié les patients ayant reçu un diagnostic de KSNPP entre janvier 2004 et décembre 2019 dans notre établissement universitaire. Nous avons inclus les patients adultes porteurs d'un KSNPP d'au moins 5 cm qui avaient consulté au moins 1 autre fois à l'hôpital. Les données sont présentées sous forme de médianes et d'écarts interquartiles (ÉI).

Résultats : Nous avons recensé 512 dossiers médicaux incluant le terme kyste splénique durant la période de l'étude. Chez 68 patients, la taille du kyste n'était pas indiquée; 410 avaient un kyste de moins de 5 cm; 1 patient a subi une splénectomie non urgente dans un autre établissement et 12 ont été exclus pour d'autres raisons; 21 patients porteurs d'un kyste d'au moins 5 cm ont été retenus pour l'étude. Huit patients symptomatiques ont subi une chirurgie dans notre établissement. Parmi eux, 2 étaient des cas urgents : 1 cas d'hémopéritoine pour lequel le patient a dû être hospitalisé pour des transfusions et a ensuite subi une splénectomie laparoscopique non urgente, et 1 cas d'intense douleur abdominale croissante pour lequel le patient a subi une fenestration laparoscopique. Les 6 autres patients

symptomatiques ont subi une chirurgie non urgente pour la douleur (4 fenestrations, 1 splénectomie totale, 1 splénectomie partielle). Treize patients étaient asymptomatiques (10 femmes, âge médian 49,2 [écart interquartile (ÉI) de 38,1 à 64,6] ans). Deux d'entre eux ont opté pour la chirurgie non urgente. Les 11 patients asymptomatiques restants, dont la taille médiane des kystes initiaux était de 8,0 (EI de 5,3 à 10,8) cm, ont été suivis pendant une durée médiane de 31,0 (ÉI de 23,5 à 71,0) mois. On n'a noté aucun changement de la taille médiane des kystes (0 [ÉI de –1 à 0] cm) et aucun de ces patients n'a subi d'intervention pour son KSNPP.

Conclusion : Les patients asymptomatiques traités non chirurgicalement pour un KSNPP volumineux ne sont pas devenus symptomatiques et n'ont pas été obligés d'être opérés pendant la période de l'étude. Cela milite en faveur de l'attente vigilante, avec suivi radiologique et clinique, pour les cas de KSNPP volumineux asymptomatiques.

Hydatid cysts are the most common subtype of splenic cysts worldwide.[1] However, in North America, splenic cysts are relatively rare, given the low prevalence of echinococcal disease. In fact, autopsy studies have shown that the incidence of splenic cysts is only 0.07% in North Americans.[2] Splenic cysts have been classified in various ways. Historically, Fowler's and Martin's classifications were most commonly used.[3] More recently, Morgenstern's classification of nonparasitic splenic cysts (NPSC) has been widely adopted. In this classification, splenic cysts are classified as congenital, neoplastic, traumatic or degenerative.[3]

Congenital, or primary, splenic cysts are considered to be true cysts, as they have a mesothelial, transitional or epidermoid epithelial cell lining, in contrast to other subtypes of NPSC.[3] As their name implies, they are thought to be congenital in origin and comprise roughly 10% of NPSC, making them a rare entity.[2] They are typically found incidentally on abdominal imaging requested for other indications.[1] Imaging is typically diagnostic, as they are usually simple in nature with homogeneous contents and thin walls.[4] Rarely, these cysts present with compressive symptoms or pain due to their size or due to cyst rupture or hemorrhage.[5,6]

Given their rarity, the management of primary splenic cysts is based entirely on case series and expert opinion. In patients with cysts that are symptomatic at presentation, expert consensus supports surgery.[7] For patients with small (< 5 cm), asymptomatic splenic cysts, nonoperative management is accepted, and patients may be followed with serial imaging.[8] If the cyst increases in size or if it is 5 cm or larger at initial presentation, expert opinion currently recommends surgical intervention.[7,8] This recommendation is based on the theoretical risk of spontaneous rupture or malignant conversion of the cyst.

However, given the lack of evidence-based guidelines, a watchful waiting approach for patients with large asymptomatic primary splenic cysts may be considered. The objective of this study was to describe the natural history and outcome of nonoperative management of large NPSC.

Methods

Study population

The data warehouse of a university-affiliated academic health network including 3 hospitals was queried, and all patients with an electronic diagnosis of "splenic cyst" between January 2004 and December 2019 were identified. The study population included adult patients with NPSC at least 5 cm in size diagnosed at any time during the study period. To be included in the study, patients needed to have at least 1 subsequent imaging or clinic appointment recorded in the data warehouse. Patients who were younger than 18 years, who had nonprimary splenic cysts, who had noncystic splenic masses or who had cysts smaller than 5 cm for the duration of the study period were excluded.

Variables and outcomes

After institutional ethics board approval was obtained, electronic medical records were reviewed to collect demographic, clinical, pathologic and radiologic data, as well as information about any surgical procedure or radiology-guided intervention. Variables included date and age at first diagnosis; indication for first imaging; initial and subsequent imaging type (ultrasonography, computed tomography [CT] or magnetic resonance imaging [MRI]); height, width and diameter of cyst on initial and all subsequent imaging; presence of multiple cysts; age and date of final follow-up; referral (if any) to a general surgeon at 1 of our institutions; and surgical intervention (if any) performed. If a patient had a cyst with an initial diameter less than 5 cm that later grew, they entered the cohort when the cyst reached 5 cm in size, as this is when they would meet the criteria for intervention according to expert opinion.

All patients referred to general surgery were seen by a single surgeon with an interest in splenic disease (L.S.F.). For initial nonoperative management to be considered, patients had to be asymptomatic and have a simple cyst

with a sharply demarcated thin wall and a homogeneous, hypoattenuating core on imaging. Patients were also routinely referred to our health network's tropical medicine clinic to rule out echinococcal disease.

The primary outcome was whether patients required unplanned surgical or radiologic interventions for cyst management. Surgical management (cyst unroofing, partial splenectomy or total splenectomy) was guided by patient preference and the location of the cyst.[9] Other outcomes were the change in size of the splenic cyst during the follow-up period and the development of symptoms. Data are reported as medians (with interquartile ranges [IQR]) or percentages.

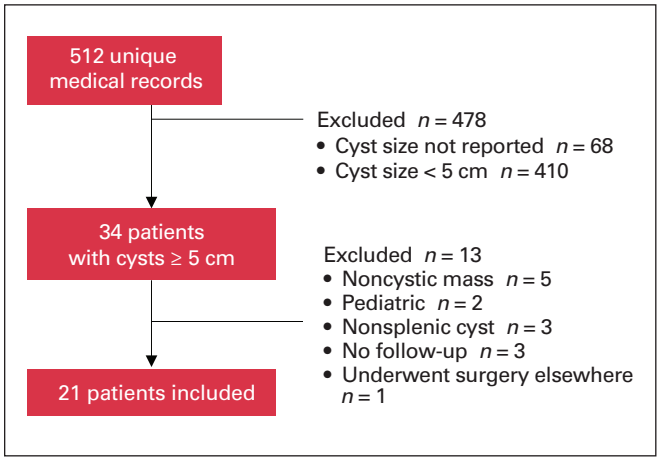

Fig. 1. Flow chart of the patient selection process.

Results

A total of 512 unique medical records included the term "splenic cyst" and were reviewed (Figure 1). Of these, 68 patients had no reported cyst size on imaging and 410 patients had cysts that were smaller than 5 cm. Of the remaining 34 patients, 5 had noncystic masses of the spleen, 2 were pediatric patients, 2 had nonsplenic cysts, 3 had a single image with no follow-up at our institution and 1 returned to our institution many years after an elective open total splenectomy performed at another institution for an unknown indication. Therefore, 21 patients with primary splenic cysts at least 5 cm in size were included in this study.

Symptomatic patients

Eight of the 21 patients (38%) were symptomatic at initial presentation (Figure 2). The median age at diagnosis for these 8 patients was 37.4 (IQR 28.0 to 45.1) years, 4 patients were female (50%) and the median cyst size at diagnosis was 10.3 (IQR 9.2 to 10.7) cm. Two of the

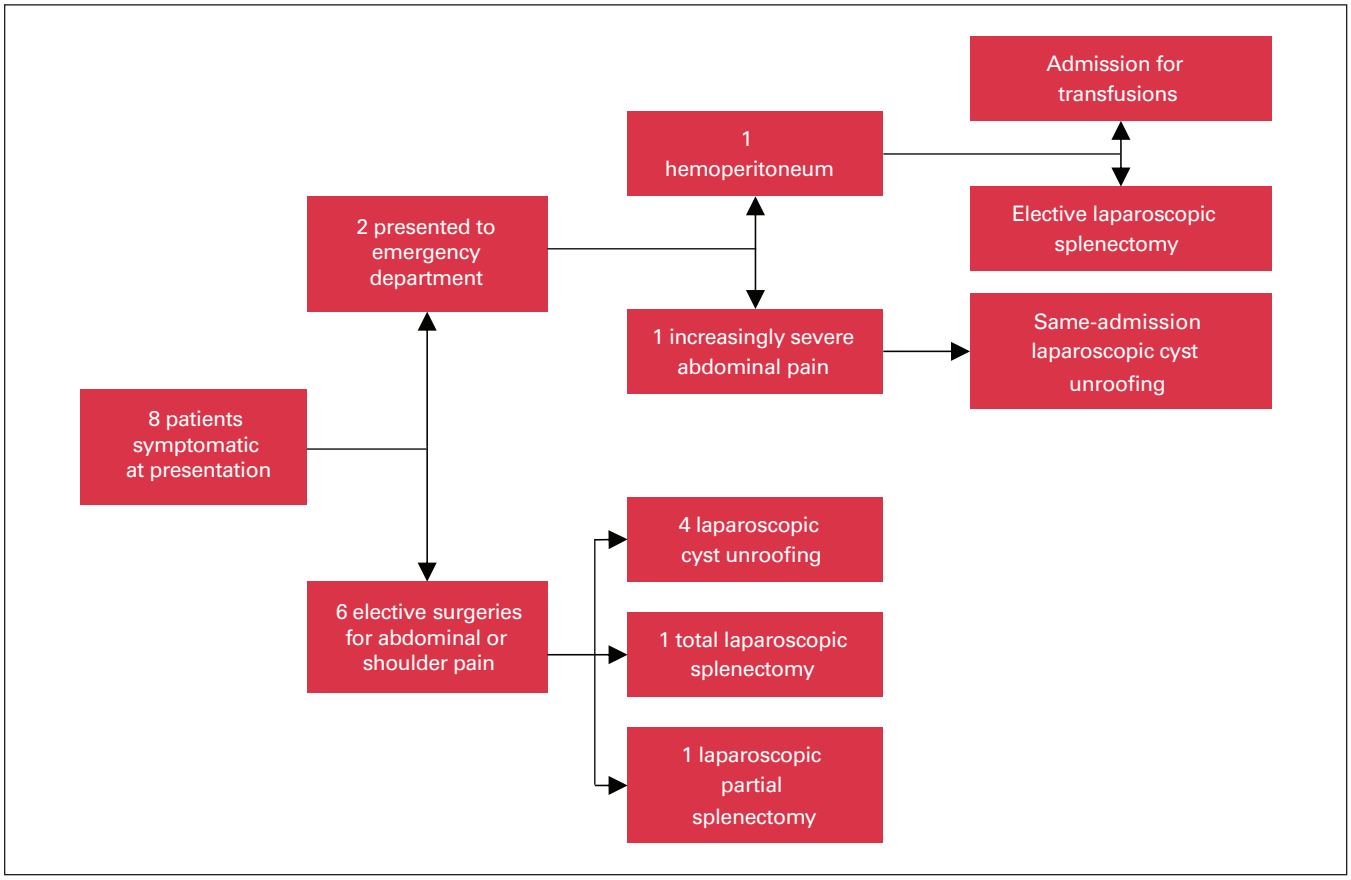

Fig. 2. Flow chart of the management of symptomatic patients.

symptomatic patients presented initially to the emergency department. One patient with a 6.7 cm cyst presented with hemoperitoneum from a ruptured cyst in the context of trauma and required admission for transfusions. This patient underwent elective laparoscopic splenectomy 82 days later. The other patient presented with increasingly severe abdominal pain attributable to their splenic cyst, which was 13.1 cm in size at the time of presentation. This patient underwent same-admission laparoscopic cyst unroofing. The remaining 6 symptomatic patients all underwent elective surgery for either abdominal or shoulder pain attributable to the presence of the splenic cyst. Four of these patients underwent laparoscopic cyst unroofing, 1 underwent laparoscopic total splenectomy and 1 underwent laparoscopic partial splenectomy. The median time from diagnosis to surgery was 72.0 (IQR 40.8 to 103.5) days for symptomatic patients.

Asymptomatic patients

The remaining 13 patients with incidentally diagnosed primary splenic cysts at least 5 cm in size were asymptomatic (Table 1). Their median age at initial imaging was 49.2 (IQR 38.1 to 64.6) years, 10 patients were female (77%) and median initial cyst size was 8.8 (IQR 5.4 to 11.0) cm. After a discussion of the risks, benefits and alternatives to watchful waiting, 2 patients chose to undergo an elective operation (1 because of concerns of rupture, the other because of an increased CA19-9 measurement from cyst fluid aspirated at their referring hospital). The first patient underwent laparoscopic cyst unroofing and the second underwent laparoscopic partial splenectomy.

The 11 remaining asymptomatic patients underwent a watchful waiting approach. Their median age at diagnosis was 49.2 (IQR 36.5 to 65.3) years and the median cyst size at diagnosis was 8.0 (IQR 5.3 to 10.8) cm. Over a median follow-up of 31.0 (IQR 23.5 to 71.0) months, 5 cysts increased in size (range 0.1 to 1.3 cm), 2 decreased in size (range –1.1 to –0.4 cm) and 4 remained unchanged. The overall median change in cyst size during the study period was 0 (IQR –1 to 0) cm. None of these patients underwent any surgical or radiologic intervention during follow-up.

Discussion

Nonparasitic splenic cysts are rare and remain poorly studied. Although their incidence is low on autopsy studies,[10] the number of asymptomatic NPSC being diagnosed may be increasing in the context of increasing use of various abdominal imaging modalities for diagnosis and follow-up of abdominal pathologies. Historically, experts have recommended that surgical or radiologic interventions be offered for symptomatic NPSC and that asymptomatic NPSC management be tailored on the basis of the size of the cyst.[7,8] If an NPSC is 5 cm or larger in diameter at the time of diagnosis or during the follow-up period, the consensus is that surgical interventions be offered.[7,8] However, we did not observe any adverse events in 11 asymptomatic patients with large NPSC undergoing a watchful waiting approach after a median follow-up of 31 months.

The recommendation to offer surgery for large NPSC probably originated from early pediatric studies and was then incorporated into Morgenstern's landmark paper on the management of splenic cysts.[3] It is largely based

Table 1. Characteristics of asymptomatic patients with splenic cysts at least 5 cm in size

Patient ID	Sex	Age at study inclusion, yr	Largest cyst dimension at study inclusion, cm	Maximum cyst dimension during follow-up, cm	Final largest cyst dimension, cm	Duration of follow-up, yr	Underwent intervention
A	F	74.2	5.7	5.7	5.7	0.9	No
B	F	66.0	4.9	5.1	5.1	5.4	No
C	F	64.6	1.6	6	5.8	9.2	No
D	F	63.7	8.0	8	8	2	No
E	F	30.9	5.4	9.5	5	11.6	No
F	F	47	11.0	12.3	11.3	6.6	No
G	F	72.7	5.0	5	5	0.3	No
H	M	31.5	9.0	9.1	9.1	2.6	No
I	F	41.4	15.9	17	16	2.4	No
J	M	49.2	10.5	10.5	10.5	1.6	No
K	F	25.2	15.0	15.1	13.9	6.5	No
L	F	51.8	11.0	11	8.8	8.3	Yes (laparoscopic cyst unroofing)*
M	M	38.1	8.8	9.4	9.4	1.6	Yes (laparoscopic partial splenectomy)*

F = female; ID = identification; M = male.
*Patient preference.

on the theoretical increased risk of spontaneous cyst rupture, conversion to malignancy or spontaneous infection beyond the 5 cm diameter cut-off.[5,11] However, there is a lack of evidence to support this recommendation. Case series including patients presenting with splenic cyst rupture are typically reported in the context of blunt trauma,[5,12,13] in which it is plausible that a cyst of any size may rupture; this risk is not limited to a specific size cut-off, and of course blunt trauma most often leads to splenic bleeding in the absence of cysts. The concern for malignancy is related to a few case reports of increased serum or cyst fluid CA19–9 or carcinoembryonic antigen (CEA) levels or both, although the significance of this remains unknown.[2,14–18] We could not identify any case report of a NPSC converting to a malignant lesion nor a case of primary infection of the cyst outside of the context of widespread sepsis.

Large NPSC are rare and recommendations are guided by small case series, which often confound NPSC with other kinds of splenic pathology. In addition, most case series include only patients who underwent surgery and cannot provide evidence about watchful waiting. In a review of the literature, Chen and colleagues included 115 cases of splenic epidermoid cysts, but the authors did not specify the number of cysts that were at least 5 cm in size, and all patients had surgery.[19] Morgenstern's landmark 2002 case series in which he proposed his new classification of splenic cysts included 21 cases of NPSC at least 5 cm in size that he had operated on.[3] We identified 3 studies published after Morgenstern's classification that included more than 10 patients with "splenic cysts." Adas and colleagues published a series of 24 splenic cysts at least 5 cm in size; most were parasitic, with only 6 patients having "simple cysts" or "epithelial cysts," and all patients underwent surgery.[1] A second series included 14 cysts at least 5 cm and size, of which only 4 were epithelial cysts, and only 2 cases were managed nonoperatively.[20] Kenney and colleagues published the largest series to date of nonoperative management of large NPSC. Using a similar methodology to ours, they identified 115 cases of NPSC, of which 29 were at least 5 cm in size; of these, 22 patients underwent nonoperative management.[8] Although 6 were lost to follow-up, the remaining 16 patients did not undergo an intervention. Consistent with our study, the mean age of the study patients was 55.4 years and 69% were female. After a mean follow-up interval of 64 months, there was a 95-year-old patient who ruptured an asymptomatic cyst after a fall at home and subsequently died from urosepsis.[8]

With the paucity of data to guide management, we adopted a watchful waiting approach for patients with large asymptomatic NPSC and typical imaging findings. In this cohort of 21 patients diagnosed over a 16-year period, 8 patients were symptomatic, of whom 2 had acute presentations leading to urgent or elective surgery after stabilization of hemoperitoneum. The remaining 6 underwent electively planned surgery. After we excluded 1 patient who underwent urgent surgery for increasingly severe abdominal pain, the median time to surgery was 72.0 days; no patients presented to the emergency department or required emergent intervention during this time.

Thirteen patients with large asymptomatic NPSC were offered a watchful waiting approach. All of these patients were evaluated by the same surgeon and were carefully counselled regarding the risks and benefits of this approach. Two requested elective intervention after counselling. The remaining 11 patients were managed nonsurgically with serial imaging for a median follow-up time of 31 months. Although the cysts were relatively large in diameter, no patients in this group developed symptoms, none required emergency or elective intervention, and cyst sizes remained relatively stable. Although limited by the relatively short follow-up period, these findings support the notion that a watchful waiting approach may be a safe alternative to the current recommendation to offer surgery to patients with large asymptomatic NPSC.

This series has several strengths. First, to our knowledge this is one of the largest case series describing the natural history of large NPSC. Additionally, patients were managed by a single surgeon, which allowed for a consistent approach over the course of the study period. Furthermore, this study included patients from a hospital network of 3 university-affiliated hospitals. The radiologic diagnosis was also consistent across patients, resulting in one of the few cohorts to exclusively include patients with true NPSC.

Limitations

This study has several limitations. NPSC are rare and we could identify only a small number of patients. Ahtough watchful waiting appeared to be safe for this cohort, there may be patients who later develop acute complications with longer follow-up. In this retrospective review, we excluded 1 patient who underwent elective splenectomy at another institution, presumably for patient preference, but returned to our institution for treatment of another condition. Although it is unlikely, we cannot be certain that other patients have not done the same thing. Our approach to the surgical management of NPSC has evolved over time. We now offer laparoscopic partial splenectomy for operative management of anatomically amenable large NPSC; however, we previously favoured cyst unroofing, which is associated with a lower risk of complications but higher risk of recurrence. Given these trade-offs, a shared decision-making approach when deciding between nonoperative and various operative management options is particularly valuable. Finally, the retrospective nature of this

study limited the availability of potentially relevant data and precluded more detailed analysis of the evolution of cyst size over time.

Conclusion

This study suggests that watchful waiting with serial radiologic and clinical follow-up may be a safe approach for large asymptomatic NPSC, with low risk of size progression, rupture or unplanned intervention.

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Contributors: É. Di Lena and L. Feldman conceived the study. S. Rahman and P. Kaneva acquired the data, which N. Safa analyzed. É. Di Lena wrote the article, which N. Safa, S. Rahman, P. Kaneva and L. Feldman critically revised. All authors gave final approval of the version to be published.

References

1. Adas G, Karatepe O, Altiok M, et al. Diagnostic problems with parasitic and non-parasitic splenic cysts. *BMC Surg* 2009;9:9.
2. Ingle SB, Hinge Ingle CR, et al. Epithelial cysts of the spleen: a minireview. *World J Gastroenterol* 2014;20:13899-903.
3. Morgenstern L. Nonparasitic splenic cysts: pathogenesis, classification, and treatment. *J Am Coll Surg* 2002;194:306-14.
4. Thut D, Smolinski S, Morrow M, et al. A diagnostic approach to splenic lesions. *Appl Radiol* 2017;46:7-22.
5. Hansen MB, Moller AC. Splenic cysts. *Surg Laparosc Endosc Percutan Tech* 2004;14:316-22.
6. Res LC, Knook MTT, Hazelbag HM, et al. Spontaneous rupture of a non-parasitic splenic cyst. *BMJ Case Rep* 2019;12:e231473.
7. Karfis EA, Roustanis E, Tsimoyiannis EC. Surgical management of nonparasitic splenic cysts. *JSLS* 2009;13:207-12.
8. Kenney CD, Hoeger YE, Yetasook AK, et al. Management of non-parasitic splenic cysts: Does size really matter? *J Gastrointest Surg* 2014;18:1658-63.
9. Feldman LS, Munshi A, Al-Mahroos M, et al. The spleen. In: Zinner MJ, Ashley SW, Hines OJ, editors. *Maingot's abdominal operations.* 13th ed. New York (NY): McGraw-Hill Education; 2019.
10. Robbins FG, Yellin AE, Lingua RW, et al. Splenic epidermoid cysts. *Ann Surg* 1978;187:231-5.
11. Gianom D, Wildisen A, Hotz T, et al. Open and laparoscopic treatment of nonparasitic splenic cysts. *Dig Surg* 2003;20:74-8.
12. Tassopoulos A, Wein M, Segura A. Traumatic rupture of a giant congenital splenic cyst presenting as peritonitis. *Radiol Case Rep* 2017;12:401-4.
13. Sinha CK, Agrawal M. Nonparasitic splenic cysts in children: current status. *Surgeon* 2011;9:49-53.
14. Brauner E, Person B, Offir BI, et al. Huge splenic cyst with high level of CA 19-9: The rule or the exception? *Isr Med Assoc J* 2012;14:710-1.
15. Decker D, Bollmann R, Hirner A, et al. [Increased CA-19-9 caused by a splenic cyst: a rare differential diagnosis]. *Zentralbl Chir* 1998;123:855-7.
16. Uludag M, Yetkin G, Citgez B, et al. Giant true cyst of the spleen with elevated serum markers, carbohydrate antigen 19-9 and cancer antigen 125. *BMJ Case Rep* 2009;2009:bcr03.2009.1691.
17. Shinkawa N, Horinouchi H, Shinkawa N, et al. Carbohydrate antigen 19-9-producing splenic cyst: a case report. *Radiol Case Rep* 2021;17:19-22.
18. Kang SI, Jeon SY. Primary non-parasitic splenic cyst: a case report. *Korean J Hepatobiliary Pancreat Surg* 2013;17:139-41.
19. Chen YY, Shyr YM, Wang SE. Epidermoid cyst of the spleen. *J Gastrointest Surg* 2013;17:555-61.
20. Golmohammadzadeh H, Maddah G, Shams Hojjati Y, et al. Splenic cysts: analysis of 16 cases. *Caspian J Intern Med* 2016;7:217-21.