

## Amoebic splenic abscess: a case report

### *Abscesso esplênico amebiano: um relato de caso*

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**ABSTRACT:** *Objective:* Report a clinical case of amoebic splenic abscess and discuss its clinical characteristics, its difficult diagnosis, its clinical and surgical management. *Case presentation:* A 39-year-old male patient was admitted complaining of abdominal pain in the left flank region, nausea and lack of appetite, denying fever, vomiting and changes in bowel habits. Physical abdominal examination showed a tense, reactive abdomen, with pain on palpation of the left flank, with a sign of positive sudden decompression and a positive Giordano on the left. In admission, a computed tomography scan of the abdomen was performed, which showed hypodense collections in the spleen and the presence of free fluid in the abdominal cavity, with a hypothesis of splenic abscess. Splenectomy and caudal pancreatectomy were performed, and ceftriaxone and metronidazole were started. After the surgery, a secretion culture with a positive result was requested on July 05<sup>th</sup>, 2019 for direct research of *Entamoeba histolytica*, defining the diagnosis of splenic abscess by amoeba. The patient was discharged on July 07<sup>th</sup>, 2019 with a prescription for metronidazole to end up treatment. *Conclusion:* The amoebic splenic abscess is a rare pathology with few data in the literature, with difficulty and delay in the diagnosis and treatment of this pathology, which directly affects the patient's prognosis. Therefore, it is necessary that more cases on the pathology be reported for a better understanding of the diagnosis and management of amoebic splenic abscess.

**Keywords:** Abscess; Amebiasis; Spleen.

**RESUMO:** *Objetivo:* Relatar um caso clínico de abscesso esplênico amebiano e discutir suas características clínicas, seu difícil diagnóstico, seu manejo clínico e cirúrgico. *Apresentação do caso:* Paciente masculino 39 anos foi admitido com queixa de dor abdominal em região de flanco esquerdo, náuseas e inapetência, negando febre, vômitos e alterações do hábito intestinal. Ao exame físico abdominal evidenciou um abdome tenso, reativo, com dor à palpação de flanco esquerdo, com sinal de decompressão brusca positiva e Giordano positivo à esquerda. Na admissão foi realizada tomografia computadorizada de abdome que evidenciou coleções hipodensas no baço e presença de líquido livre na cavidade abdominal, com hipótese de abscesso esplênico. Foram realizadas esplenectomia e pancreatectomia caudal e iniciado ceftriaxona e metronidazol. Após a cirurgia foi solicitada cultura da secreção com resultado positivo no dia 05/07/2019 para pesquisa direta de *Entamoeba histolytica*, definindo o diagnóstico de abscesso esplênico por ameba. Paciente recebeu alta no dia 06/07/2019 com receita de metronidazol para término do tratamento. *Considerações finais:* O abscesso esplênico amebiano é uma patologia raríssima com poucos dados na literatura, havendo uma dificuldade e demora no diagnóstico e no tratamento dessa patologia o que implica diretamente no prognóstico do paciente. Portanto, é necessário que mais casos sobre a patologia sejam relatados para melhor entendimento sobre o diagnóstico e manejo do abscesso esplênico amebiano.

**Palavras-chave:** Abscesso; Amebíase; Baço.

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## INTRODUCTION

Amoebiasis is a parasitic disease caused by the protozoan *Entamoeba histolytica* that can manifest as an intestinal and extra-intestinal form, with splenic abscess being a very rare manifestation of the extra-intestinal form<sup>1,2,3</sup>. Splenic abscess in general is caused by bacteria, and the amoebic etiology is considered rare<sup>4,5</sup>. The most frequent symptoms are fever, abdominal pain in the upper left quadrant and splenomegaly<sup>5,6,7</sup>. Complications include bacterial invasion that can progress to sepsis and extension of the lesion to adjacent structures such as the diaphragm, pleura, pericardium, lungs and peritoneal cavity. The diagnosis of splenic abscess is made through imaging exams, such as ultrasound and computed tomography of the total abdomen<sup>6,7,8</sup> and the sure etiological diagnosis for amoebiasis is made with the demonstration of *Entamoeba histolytica* trophozoites in the pus or in the biopsy performed at the edges or bottom of the lesion<sup>1,9,10</sup>. The treatment of choice is splenectomy, but guided percutaneous drainage can be performed in specific cases and both must be associated with antibiotic therapy, preferably with metronidazole<sup>1,5,6,7</sup>. The mortality of this pathology varies between 39.3 to 70% and the prognosis depends mainly on the time elapsed from the beginning of the formation of the splenic abscess to the definitive surgical therapy<sup>4</sup>.

There are few case reports about amoebic splenic abscess in the literature, and so far, it is the first case described in our country. In this article, we report the clinical, radiological and laboratory characteristics of an amoebic splenic abscess in a 39-year-old man and the management with surgical treatment after this diagnosis.

## CASE REPORT

Male patient, 39 years old, was admitted to the Santa Casa de Misericórdia (Holy House of Mercy) Hospital in Franca city, in the São Paulo State, on July 02<sup>nd</sup>, 2019 at midnight and 18 minutes, complaining of abdominal pain in the left flank region with irradiation to the umbilical region and region epigastric, lasting 15 days and worsening pain on the day of admission. Associated with pain, she also reported nausea and lack of appetite, denying fever, vomiting and changes in bowel habits. The patient denied comorbidities, has no confirmed history of HIV or tuberculosis and has a previous history of renal lithiasis confirmed by abdominal US.

In the physical examination the patient was conscious, oriented, in good general condition, with pain, ruddy, hydrated, acyanotic and anicteric; cardiac auscultation with regular 2-beat rhythm and absence of murmurs; respiratory auscultation with physiologically distributed breath sounds without adventitious sounds; and the abdomen exam showed a tense, reactive abdomen,

with pain on diffuse superficial and deep palpation, but more intense in the left flank region, without bulging or retraction, without visceromegaly, with a sign of positive sudden decompression and positive Giordano on the left.

On admission, laboratory tests and serology were performed with the following results: blood count with hemoglobin of 12.2 g/dl, hematocrit of 37.8%, leukocytes of 10800 mm<sup>3</sup> with 4% of rods and 72% of segmented ones, and platelets of 861000 mm<sup>3</sup>; urea of 17 mg/dl, creatinine of 0.9 mg/dl, sodium of 137 mEq/L, potassium of 5 mEq/L; Negative HBs-Ag of 0.3; 0.4 anti-HIV anti-HIV; 0.075 nonreactive anti-HCV; 0.06 nonreactive anti-HBc; and negative HBeAg of 0.3. An acute abdomen x-ray was also performed, finding opacity at the base of the left lung and slight gas distension in intestinal loops, and computed tomography of the total abdomen was performed, which showed hypodense collections in the spleen and the presence of free fluid in the abdominal cavity, with hypothesis of abscess splenic.

On July 2<sup>nd</sup>, 2019 in the morning, it was decided to perform exploratory laparotomy with findings of adhesions in the region of the spleen involving a large omentum, greater omentum, posterior stomach lining, parietal peritoneum and without a cleavage point with the pancreas tail. It was also observed the presence of fibrin and necrotic areas in the spleen and palpable tumor with calcified and inflammatory aspect, involving the region of splenic vessels and the tail of the pancreas. In addition to these findings, there was also a large amount of chocolate-colored secretion in the peri-splenic region that was blocked. Due to these findings, monobloc splenectomy and caudal pancreatectomy were performed using a 75mm linear stapler, raffia of dissersivity in the posterior lining of the gastric body and placement of a drain in a splenic store, close to the tail of the pancreas. Secretion culture was requested for bacteria, fungi, tuberculosis, amoebiasis and the anatomopathological of the surgical specimen. After surgery, ceftriaxone 1g was started every 12 hours and metronidazole 500mg / 100ml every 8 hours, both intravenously.

The result of the secretion culture with direct *Entamoeba histolytica* was positive on July 5<sup>th</sup>, 2019 with the presence of trophozoites, that defining the diagnosis of splenic abscess by amoeba. In the culture, there was no growth of bacteria after 7 days or fungi after 21 days.

The patient evolved well, with a low drain flow that was placed in a splenic store on the days following the operation, with 150 ml of blood serum fluid on the first postoperative day, 50 ml of blood serum fluid on the second postoperative day, 10 ml of blood serum fluid on the 3<sup>rd</sup> postoperative day and on the 4<sup>th</sup> postoperative day there was no more liquid coming out of the drain.

On July 6<sup>th</sup>, 2019 the patient was discharged from the hospital, with the permanence of the drain due to the risk of pancreatic fistula and with early return on July 9<sup>th</sup>, 2019 for reassessment. A 400mg metronidazole prescription of

8/8 hours for 14 days was completed to end the treatment and 1200000 benzathine penicillin 1 dose every 15 days for 3 months for post splenectomy prophylaxis. The patient was referred to the health strategy family for serology repeat every 3 months for hepatitis B, C and HIV, and vaccination for meningococci, pneumococcus and Haemophilus with 3 doses schedule of 0, 3 in 6 months and vaccination influenza annually.

The anatomical-pathological result came out on July 9<sup>th</sup>, 2019, showing in the macroscopic study whitish areas around the pancreatic segment, suggestive of fatty necrosis and in the peripancreatic tissue, an absent cystic formation in close relationship with the splenic surface was evidenced, in the hilum of the spleen showed venous thrombosis. On microscopic examination, the pancreas exhibited an acute, exudative inflammatory process, associated with foci of necrosis of the parenchyma, of the peripancreatic tissues and the formation of an abscessed pseudocyst; in the spleen there was lymphoid hyperplasia, exudative splenitis and venous thrombosis in the splenic hilum; adjacent lymph nodes exhibited reactional hyperplasia; in the epiploon there were foci of fibrosis, hemorrhage, chronic exudative inflammation and granulation tissue.

The patient returned on July 9<sup>th</sup>, 2019 without complaints, the drain was removed, and the patient was referred for outpatient follow-up.

## DISCUSSION

Amoebiasis is a parasitic disease caused by the protozoan *Entamoeba histolytica*, being more common in tropical and subtropical regions<sup>1,9</sup>. It is more frequent in men, with a 3: 1 ratio and is among the main causes of death among parasitic diseases, behind only malaria and schistosomiasis<sup>1,10</sup>. The form of transmission is fecal-oral, with infected patients disseminating cysts through the feces that contaminate water and food and when ingested they become trophozoites that invade the colon mucosa. The incubation period varies between 1-14 weeks<sup>1,9</sup>.

Around 80-90% of infected individuals are asymptomatic, being only carriers of the parasite<sup>1,11</sup>. However, amoebiasis can manifest as an intestinal form, causing amoebic dysentery, or less commonly as an extra-intestinal form<sup>1</sup>.

The most frequent form of extra-intestinal amoebiasis is amoebic liver abscess, affecting mainly young male adults (20-50 years)<sup>11</sup>. Other sites of less frequent involvement are retroperitoneal, splenic, cardiac, lungs, skin, brain and intraperitoneal region<sup>1,2,3</sup>. Juimo et al.<sup>2</sup> published a study with 188 patients with extra-intestinal amoebiasis and the site of involvement was intraperitoneal in 185 patients (98%), being hepatic in 183, splenic in one and peritoneal also in one; thoracic in two patients (1%), being pulmonary in one and pericardial in the other patient; and retroperitoneal in only one patient (1%).

The splenic abscess is usually caused by an infection in the splenic parenchyma or in the subcapsular space that goes through a suppurative process until it becomes a collection. It is a rare disease, with a frequency of 0.14% to 0.7% reported in autopsy series, associated with high mortality (40 - 100%)<sup>6,7,8</sup>, with splenic abscess due to amoebiasis even rarer.

The main cause of splenic abscess is sepsis, but it can be secondary to splenic trauma, some hematological diseases or contiguous infection<sup>7</sup>. In the pre-antibiotic era, splenic abscess was mainly related to typhoid fever, malaria and amoebic dysentery, currently the greatest relationship is with bacterial endocarditis and urinary tract infection<sup>7</sup>. The pathogens most commonly involved in abscess formation are mostly aerobic species, more often gram-positive cocci like *Staphylococcus aureus*, *Streptococcus viridans* and less frequent gram-negative bacilli like *Klebsiella species*, *Salmonella enteritidis*, *Escherichia coli* and *Proteus sp.* less frequently other microorganisms are also involved, such as anaerobic bacteria, fungi, *Entamoeba histolytica*, among others<sup>6,8</sup>.

A study by Ferraioli et al.<sup>5</sup> with 16 cases of splenic abscess showed that the etiology was bacterial in ten cases (62.5%), amoebic in two (12.5%) and fungi in four (25%). Chun et al.<sup>4</sup> performed a literature review with 173 patients with splenic abscess and showed that only one case was caused by *Entamoeba histolytica*.

The physio pathogenesis of the amoebic splenic abscess is not yet known, but it is believed that the parasite can pass through the liver without causing an abscess and reach the heart through the inferior vena cava, and then spread by hematogenous route, thus reaching the spleen and forming the abscess<sup>1,2</sup>.

Most splenic abscesses are unique and unilocular, with a diameter ranging from 1-18cm<sup>8</sup>. The most frequent symptoms are fever, abdominal pain and splenomegaly, and are present in half of the patients. The pain is located in the upper left quadrant, in the region of the left hypochondrium and left hemithorax and may radiate to the left shoulder. Some symptoms may be associated with chills, nausea, vomiting and a feeling of abdominal mass<sup>5,6,7</sup>. Splenic abscess can be complicated when it ruptures in the peritoneal cavity causing acute peritonitis, when it drains into the colon, stomach or pleura or when it causes bacteremia that can lead to septic shock<sup>7</sup>.

Complications of liver abscess which is the most common form of extra-intestinal amoebiasis depend on the size, number and location of the lesions. When the lesions are extensive multiple bacterial invasion may occur, due to aerobic and anaerobic enterobacteria, which may progress to sepsis. There may be an extension of the lesion to adjacent structures, such as diaphragm, pleura, pericardium, lungs, which can progress to lung abscess and peritoneal cavity which can lead to the formation of abscess of the subphrenic space or can cause generalized

peritonitis<sup>1,10</sup>. Waheed et al.<sup>12</sup> reported a case of splenic abscess due to amoeba that complicated with perforation of the diaphragm and leakage of the abscess fluid into the left pleural cavity, requiring drainage, but the patient developed severe respiratory discomfort and went into cardiorespiratory arrest and died.

For diagnosis it was used imaging tests such as ultrasound and computed tomography of the total abdomen. Ultrasonography can be used in the initial evaluation, but the sensitivity of computed tomography is approximately 100%, being higher than that of ultrasonography, which ranges from 75-93%. Thus, computed tomography has become the main complementary exam in the diagnosis, being able to demonstrate the number, location of abscesses and associated abdominal diseases<sup>6,7,8</sup>. On ultrasonography, splenic abscesses appear as rounded, hypoechoic lesions with well-defined edges, and on computed tomography as rounded, well-defined, hypodense, homogeneous lesions with liquid inside them that do not change with intravenous contrast injection<sup>1,7,8</sup>. The differential diagnosis includes splenic heart attack, primary or secondary necrotic tumors, infected hematomas and lymphomatous masses<sup>10</sup>.

The sure diagnosis of amoebic splenic abscess is made with the demonstration of *Entamoeba histolytica* trophozoites in the pus or necrotic material obtained by needle biopsy, performed at the edges or bottom of the lesion, however the amoeba is not always found and the diagnosis it can be performed based on imaging exams and serologies<sup>1,9,10</sup>. Serological studies allow the detection of circulating antibodies against *Entamoeba histolytica*, being useful for detecting extraintestinal amebiasis, but they remain in the blood for years and do not differentiate an old infection from a recent one<sup>1</sup>. Among the serological tests available, indirect hemagglutination is very sensitive, being positive in 90-100% of infected patients, and the ELISA immunoenzymatic assay is the most sensitive, with a sensitivity of 98%<sup>1</sup>. However, anti-amoebic antibodies are not present in the first week of infection, which can lead to false-negative results<sup>10</sup>.

In the studies carried out by Chun et al.<sup>4</sup>, Waheed et al.<sup>12</sup> and Goret et al.<sup>9</sup>, the diagnosis of amoebic splenic abscess was performed by demonstrating *Entamoeba histolytica* trophozoites in the smear of the abscess lining even after not being seen in secretion culture. Gupta et al.<sup>13</sup> and Kaushik et al.<sup>3</sup> confirmed the amoebic etiology by examining the abscess secretion, which demonstrated *Entamoeba histolytica*. Lawford et al.<sup>14</sup> and Mujahid et

al.<sup>15</sup>, on the other hand did not visualize amoeba under microscopy or secretion culture, however serologies were positive, thus making the diagnosis of splenic abscess by amoeba. Frank<sup>16</sup> did not find any microorganisms in the pus or smears, however *Entamoeba histolytica* cysts were found in the feces of patient making a probable diagnosis.

The treatment of choice is splenectomy but guided percutaneous drainage can be performed as an alternative method in cases of single abscesses, without septations and with fluid content, in patients at high surgical risk for splenectomy, due to comorbidities and clinical instability<sup>6,7,5</sup>. This treatment has some contraindications such as abscess rupture with bleeding, multiple abscesses, coagulopathy and some other associated abdominal condition that requires surgical repair<sup>6</sup>. However, regardless of the surgical risk, splenectomy is mandatory if it has not been successful with percutaneous drainage<sup>7</sup>. Surgical treatment or drainage should be associated with antibiotic therapy. The drug of choice for the treatment of amoebic abscess is metronidazole 500 mg by intravenous infusion every 8 hours, for 5 or 10 days or orally the dose should be 750-800 mg three times a day, for 10 days to adults and 50mg/kg/day for children<sup>1,10</sup>. Another drug that can be used is tinidazole 2g orally once a day for 5 days. The response to treatment with reduction of fever and abdominal pain should occur between 72-96 hours<sup>1</sup>.

Splenectomy increases the risk of potentially serious infections, in which the most common pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Neisseria meningitidis*. The administration of vaccine and prophylactic antibiotic therapy does not eliminate the risk but reduces the rate of infection and mortality<sup>5</sup>.

The mortality of this pathology varies between 39.3 to 70% and the prognosis depends mainly on the time elapsed from the beginning of the formation of the splenic abscess to the definitive surgical therapy<sup>4</sup>.

## CONCLUSION

It is a very rare pathology and the lack of data in the literature, there is a difficulty and delay in the diagnosis and treatment of this pathology, which directly affects the prognosis of the patients. Therefore, it is necessary that more cases on the pathology be reported for a better understanding of the diagnosis and management of amoebic splenic abscess.

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## REFERÊNCIAS

1. Gil Manrique LF, Soler Morejón C, Crespo Acebal L, Villa Valdés M, Alfonso Alfonso L, Contreras Rojas IC. Absceso esplênico amebiano. *Rev Cubana Cir.* 201;50(4):560-9. Disponível em: [http://scielo.sld.cu/scielo.php?script=sci\\_arttext&pid=S0034-74932011000400018&lng=es](http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0034-74932011000400018&lng=es).
2. Juimo AG, Gervez F, Angwafo FF. Extraintestinal Amebiasis. *Radiology.* 1992;181-3. <https://doi.org/10.1148/radiology.182.1.1727279>.
3. Kaushik M, Mahajan S, Raina R, Babu S, Raghav S, Sood S, Guleria R. Isolated amoebic abscess of spleen. *Online J Health Allied Scs.* 2013;12(1):5. Disponível em: URL: <http://www.ojhas.org/issue45/2013-1-5.html>.
4. Chun CH, Raff MJ, Contreras L, et al. Splenic abscess. *Medicine.* 1980;59(1):50-65. doi: <http://dx.doi.org/10.1097/00005792-198001000-00003>.
5. Ferraioli G, Brunetti E, Gulizia R, et al. Management of splenic abscess: report on 16 cases from a single center. *Int J Infect Dis.* 2009;13(4):524-30. doi: <http://dx.doi.org/10.1016/j.ijid.2008.08.024>.
6. Martins ACA, Vieira LFDF, Ferraz ÁAB, Santos Júnior MA, Ferraz EM. Abscesso esplênico: mudanças nos fatores de risco e nas opções de tratamento. *Rev Col Bras Cir.* 2005;32(6):337-41. <https://doi.org/10.1590/S0100-69912005000600011>.
7. Alonso Cohen MA, Galera MJ, Ruiz M, et al. Splenic abscess. *World J Surg.* 1990;14(4):513-6; discussion 516-7. doi: <http://dx.doi.org/10.1007/bf01658678>.
8. Villamil-Cajoto I, Lado FL, Van den Eynde-Collado A, Díaz-Peromingo JA. Abscesos esplênicos: presentación de nueve casos. *Rev Chil Infectol.* 2006;23(2):150-4. <http://dx.doi.org/10.4067/S0716-10182006000200008>.
9. Goret NE, Goret CC. Splenic abscess is extremely rare after amoebic dysentery. A case report and review of the literature. *Annali Italiani Chir.* 2019;8. Disponível em: [https://www.annaliitalianidichirurgia.it/wp-content/uploads/2019/05/2932\\_12\\_04\\_2019\\_ep\\_b.pdf](https://www.annaliitalianidichirurgia.it/wp-content/uploads/2019/05/2932_12_04_2019_ep_b.pdf)
10. Salles JM, Salles MJ, Moraes LA, Silva MC. Invasive amebiasis: an update on diagnosis and management. *Expert Review of Anti-infective Therapy.* 2007;5(5):893-901. doi: <http://dx.doi.org/10.1586/14787210.5.5.893>.
11. Ximénez C, Morán P, Rojas L, Valadez A, Gómez A. Reassessment of the epidemiology of amebiasis: state of the art. *Infect Genet Evolution.* 2009;9(6):1023-32. doi: [10.1016/j.meegid.2009.06.008](https://doi.org/10.1016/j.meegid.2009.06.008).
12. Waheed A, Saleemi MS, Ashraf RM. Amoebic abscess of spleen. *J Pakistan Med Assoc.* 1986;36(4):93-5. Available from: <https://jpma.org.pk/PdfDownload/6040>
13. Gupta RK, Pant CS, Ganguly SK. Ultrasound demonstration of amoebic splenic abscess. *J Clin Ultrasound.* 1987;15(8):555-7. doi: <http://dx.doi.org/10.1002/jcu.1870150810>.
14. Lawford R, Sorrell TC. Amoebic abscess of the spleen complicated by metronidazole-induced neurotoxicity: case report. *Clin Infect Dis.* 1994;19(2):346-8. doi: <http://dx.doi.org/10.1093/clinids/19.2.346>
15. Mujahid S, Ahmed A, Siddiqui, M. N. Amoebic splenic abscess. *Tropical Doctor.* 1993;23(3):136-8. <https://doi.org/10.1177/004947559302300323>
16. Frank JR. Amoebic Abscess of Spleen. *Br Med J.* 1944;1:458. doi: <http://dx.doi.org/10.1136/bmj.1.4343.458>.

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