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Delayed presentation of perisplenic abscess following arterial embolization

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ABSTRACT

INTRODUCTION: Splenic abscess formation is a rare but significant complication that may occur after non-operative management (NOM) of a blunt splenic injury (BSI). We describe an unusual case of perisplenic abscess formation nearly 4 months after splenic artery angioembolization for a grade III splenic laceration. **PRESENTATION OF CASE:** A 52-year-old male was transferred to the Emergency Department (ED) of our institution after falling off his bicycle. He was hemodynamically stable but complained of left upper quadrant pain. Computed tomography (CT) was notable for a Grade III splenic laceration. The patient underwent a successful splenic artery embolization on hospital day 1. He had an uneventful post-embolization course and was discharged 3 days later, afebrile, with a stable hematocrit. Four months after his initial presentation, the patient presented to the ED with fever, malaise, and left upper quadrant abdominal pain. A CT scan revealed a multiloculated perisplenic abscess. He underwent a splenectomy and drainage of peri-splenic abscess, received a course of antibiotics, and had an uneventful recovery.

DISCUSSION: NOM including splenic angioembolization (SAE) is the standard of care for blunt splenic trauma in hemodynamically stable patients. Known complications from SAE include bleeding, missed injuries to the diaphragm and pancreas, and splenic abscess. This report documents a delayed perisplenic abscess following NOM of blunt splenic trauma, a rare but potential complication of SAE.

CONCLUSION: Formation of a perisplenic abscess may occur several months after NOM of a blunt splenic injury. Prompt surgical management and antibiotic therapy are critical to avoid life-threatening complications.

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1. Introduction

Treatment for splenic injury includes both surgical and nonsurgical options. In hemodynamically stable patients, non-operative management (NOM) and splenic angioembolization (SAE) are utilized as an effective therapy for blunt splenic injury (BSI).^{1,2} Complications in patients who undergo SAE are rare, but range from bleeding, infarct, and abscess, to fever, pleural effusions, and coil migration.³

Recent studies investigating the incidence of splenic abscess formation in patients with BSI have documented rates up to 4.3%.^{4,5} Notably, the most delayed abscess formation was documented 6 weeks after embolization,³ and there were no reports of perisplenic abscess formation. In this report, we note the formation of a multi-loculated perisplenic abscess that developed 4 months after SAE. We hypothesize that this was due to spontaneous seeding of a resolving perisplenic hematoma. To our knowledge, this is the first documented report of delayed perisplenic abscess after BSI.

2. Presentation of case

A 52-year-old male with past medical history notable for hypertension was transferred to our institution after sustaining blunt abdominal injury after falling off his bicycle. Initially he was brought to an outside hospital, where a computerized tomographic (CT) scan was notable for a Grade III splenic laceration with associated hemoperitoneum (Fig. 1). He was transiently hypotensive with systolic blood pressures in the 70s, but stabilized after receiving 2L of intravenous fluids and 2 units of packed red blood cells. Upon arrival to our emergency department (ED), he was hemodynamically stable and had a hematocrit (Hct) of 36.8. He was transferred to the intensive care unit for monitoring and serial Hct checks. Over the following 24h, his Hct dropped to 30.6 and he became increasingly tachycardic, but remained normotensive with adequate urine output. Interventional radiology was consulted. The patient underwent splenic artery angiography that demonstrated no active extravasation or splenic artery pseudoaneurysm, followed by prophylactic Gelfoam (Pfizer) embolization of the splenic artery. Post-embolization, the patient remained hemodynamically stable and with a stable hematocrit, and was discharged 3 days later feeling well.

One month after discharge, the patient returned to the ED with left-sided abdominal fullness. He was afebrile, with a Hct of 37.0

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Fig. 1. Grade III splenic laceration with associated hemoperitoneum.



Fig. 2. Resolving hemoperitoneum; perisplenic hematoma; no evidence of splenic or perisplenic abscess.

and a white blood cell count (wbc) of 5.1 (reference range 4.0–10.0). A repeat CT scan demonstrated resolving hemoperitoneum and no evidence of splenic or perisplenic abscess (Fig. 2). He was admitted for monitoring but discharged home the following day feeling better. He returned to clinic 1 month after this visit, again with a sense of abdominal fullness and occasional discomfort. His vital signs were normal and repeat CT noted mostly resolved peri-splenic hematoma with some residual inflammatory changes and blood products adjacent to the spleen, but no evidence of abscess or infarct (Fig. 3).

The patient was asymptomatic until 4 months after his initial trauma when he developed low-grade temperatures and acute left-sided upper abdominal pain with radiation to his shoulder. He returned to the ED and was found to have a temperature of 100.7 F and a wbc of 20.4. Abdominal CT was once again performed,



Fig. 3. Resolving perisplenic hematoma.

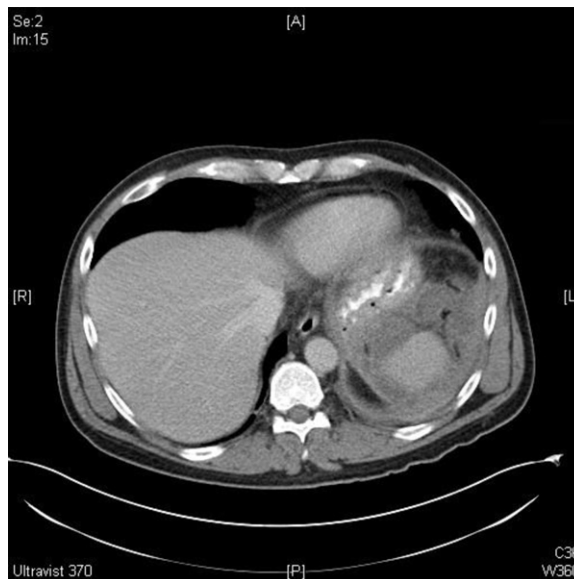


Fig. 4. Multiple, large, loculated fluid collections adjacent to the spleen and beneath the diaphragm, with enhancing thick walls and adjacent fat stranding.



Fig. 5. Multiple, large, loculated fluid collections adjacent to the spleen and beneath the diaphragm, with enhancing thick walls and adjacent fat stranding.

this time revealing multiple, large, loculated fluid collections adjacent to the spleen and beneath the diaphragm, with enhancing thick walls and adjacent fat stranding (Figs. 4 and 5). The patient was started on broad-spectrum antibiotics including vancomycin, ciprofloxacin, and metronidazole. In light of the multiloculated nature of the perisplenic abscess, the patient underwent an open splenectomy and abscess drainage the following day, which he tolerated well. One Jackson-Pratt drain was left in place, and was removed prior to the patient’s discharge home. Intra-operative cultures grew *Streptococcus intermedius* sensitive to penicillin, for which he completed a 7-day course of Ampicillin/Clavulanate. He was discharged home on post-operative day 5 after return of bowel function, tolerating a regular diet, and on oral pain medications. He was recently seen in clinic in follow-up, and has recovered well from his splenectomy.

3. Discussion

Non-operative management (NOM) of blunt splenic injuries (BSI) in hemodynamically stable patients became the standard of care for adults by the mid-1990s.¹ High-quality computerized tomographic (CT) scanning; increasing use of angio-embolization; and the recognition that laparotomies may cause significant morbidity all contributed to the adoption of NOM for blunt trauma patients with splenic injuries.^{6–11} The benefits of this approach

include preservation of splenic immune function and reduction of rates of overwhelming postsplenectomy infection (OPSI).^{12,13} To date, several retrospective studies have demonstrated the use of AE is a safe and effective adjunct to NOM of BSI, associated with a low incidence of complications and an acceptable failure rate.^{1,4,5,14,15} Currently, up to 80% of hemodynamically stable patients with BSI are successfully treated nonoperatively.¹⁵

Complications documented with NOM and use of SAE include bleeding, missed injuries to the diaphragm and pancreas, splenic abscess, splenic infarct, coil migration, and injury to the femoral artery caused by arterial puncture for the angiogram. In one recent meta-analysis, failure due to re-bleeding occurred at rates ranging from 4.7% to 9.0%, and was the most frequently documented complication.¹⁵ Abscess requiring splenectomy was the next most commonly observed complication, occurring in up to 4.3% of patients. There is a single reported case of splenic abscess following SAE in which the patient was treated with 1 month of intravenous antibiotics alone with successful resolution of the abscess.¹⁵ No studies included within the meta-analysis noted a perisplenic abscess, and the most delayed presentation occurred 6 weeks after SAE.³

Organisms associated with splenic abscess following SAE include *Clostridium perfringens* and alpha-hemolytic *Streptococcus*.⁵ In non-trauma literature, there is a case documenting a patient with non-Hodgkin's lymphoma and splenomegaly who was treated with SAE, who subsequently developed a perisplenic abscess that grew *Morganella morganii*.¹⁶ In patients with splenic abscesses who have not undergone SAE, the most commonly cultured organisms include gram-positive *Staphylococcus* and *Streptococcus*, gram-negative *Salmonella*, and fungal agents such as *Candida* and *Aspergillus*.¹⁷

Splenic abscesses are rare but highly lethal if untreated.¹⁷ Historically, mortality rates approached 100%, but with appropriate antibiotic and surgical therapy are now reduced to less than 15%.¹⁷ Hematogenous seeding from another primary septic focus (such as diverticulitis, endocarditis, or pyelonephritis) is the most common pathophysiology contributing to the formation of splenic abscesses in non-trauma patients. CT imaging is recommended as the best diagnostic study.¹⁷

Our patient is unique in that he developed a multiloculated perisplenic abscess 4 months after BSI, with intra-operative cultures notable for *Streptococcus intermedius*. *S. intermedius* is a member of the *Streptococcus anginosus* group (SAG), also known as the "*Streptococcus milleri*" group.¹⁸ It is a commensal of the mouth and upper respiratory tract, and has been associated with various pyogenic infections including abdominal or cerebral abscess, osteomyelitis, and endocarditis.^{18,19}

We postulate that the patient's perisplenic multiloculated abscess was due to spontaneous seeding of residual hematoma. We believe it is unlikely that the perisplenic hematoma was seeded during angiographic intervention, given that for several months following SAE, there was no abscess formation on imaging. Moreover, there was almost complete resolution of perisplenic hematoma, and there was no evidence of splenic infarct that could be seeded. There was no intra-parenchymal splenic abscess, but the multiloculated nature of the infection made it unamenable to CT-guided drainage, requiring open splenectomy.

4. Conclusion

We present the first case of a delayed perisplenic abscess following non-operative management for blunt splenic injury. Delayed perisplenic abscesses occurring several months after blunt splenic injury should be included in the potential complications following NOM, particularly in the presence of perisplenic hematoma.

Although perisplenic abscess is a rare complication of NOM for BSI, prompt diagnosis and treatment is imperative. The aim of this case report is to raise awareness of this important potential complication.

Conflict of interest

No competing interests exist.

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Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contributions

Nathaniel Johnson and Marisa Cevasco collected data and reviewed the patient's chart. Nathaniel, Marisa, and Reza Askari wrote and edited the case report.

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