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**Title: Splenic Hematoma Following Acute Pancreatitis, and the role of Conservative Management: A Case Report**

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**Abstract**

Splenic hematoma following acute pancreatitis is a rare complication that is thought to be due to the distribution of pancreatic exudates to the spleen. We presented a case of a 44-year-old patient with acute pancreatitis who developed a splenic hematoma. He responded well to conservative management and the hematoma was resolved.

**Clinical key message:** We reported a unique case in which the patient developed splenic hematoma following acute pancreatitis, the condition responded well to conservative management without any surgical intervention.

**Keywords:** Acute pancreatitis, splenic hematoma, conservative treatment, splenic artery

**Introduction**

Acute pancreatitis is a common inflammatory disease found in patients with heavy alcohol intake. The tail of the pancreas lies close to the splenorenal ligament that extends to the hilum of the spleen [1]. Patients with acute pancreatitis are susceptible to the penetration of pancreatic exudate which can lead to splenic injury or splenic hematoma [2]. Due to the high arterial vascularity of the spleen, minor damage can cause a significant hemoperitoneum and sometimes rupture the spleen [3, 4]. This phenomenon is otherwise known as an atraumatic splenic rupture, a rare complication of acute pancreatitis whose etiology is unclear in the literature [1]. An atraumatic hematoma of the spleen secondary to other pathologies or illnesses can also occur [5]. Most of the time secondary splenic injuries go unnoticed leading to asymptomatic splenic masses. Timely recognition and diagnosis of these masses are difficult due to the absence of specific signs and symptoms [6]. Those who are symptomatic, however, can present with referred abdominal and shoulder pain warranting the use of CT and MRI for further exploration [3, 4]. Early assessment of these hematomas and careful monitoring can decrease the chances of splenic rupture and the need for invasive surgical intervention. The management of these hematomas is ultimately decided by the patient's condition, taking into consideration the patient’s hemodynamic stability status, risk of rupture, and grading of their hematomas [1, 5]. The work has been done in accordance with CARE guidelines.[6]

Here we present a unique case of a splenic hematoma in a patient secondary to acute pancreatitis who was treated successfully through conservative management. Through an analysis of the patient’s labs, namely a stark drop in hemoglobin count following acute pancreatitis, the care team was able to identify a rupture of an asymptomatic acute splenic hematoma.

**Case Presentation**

A 43-year-old male patient was brought to the emergency unit of a tertiary care hospital with left upper quadrant abdominal pain for one day. Records of the patient revealed a history of diabetes mellitus, hypertension, and dyslipidemia. The patient described the pain to be severe in intensity, radiating to the back, and reported no relief with over-the-counter painkillers. The patient was vitally stable, displayed a Glasgow coma scale (GCS) was 15/15, and maintained oxygen saturation on room air. On physical examination, the abdomen was soft, and tender and had sluggish bowel sounds. Initial laboratory investigations revealed increased white blood cell count, and elevated serum lipase and amylase levels (Table 1).

**Table.1: Initial laboratory investigations.**

|  |  |  |
| --- | --- | --- |
| Investigations | Results | Normal Range |
| Hemoglobin | 12.1 g/dl | (12.3-16.6) |
| WBC | 18,600 cells/L | (4.8-11.3) |
| Platelet count | 434,000 cells/L | (154-433) |
| Lipase | 723 U/L | (6-51) |
| Amylase | 298 U/L | (28-100) |
| Albumin | 4.2 gm/dl | (3.5-5.2) |
| CRP | 184.51 mg/L | (0-10) |

WBC: white blood cell, CRP: c reactive proteins, g/dl: gram per deciliter, mg/L: milligram per liter. U/L: units per liter.

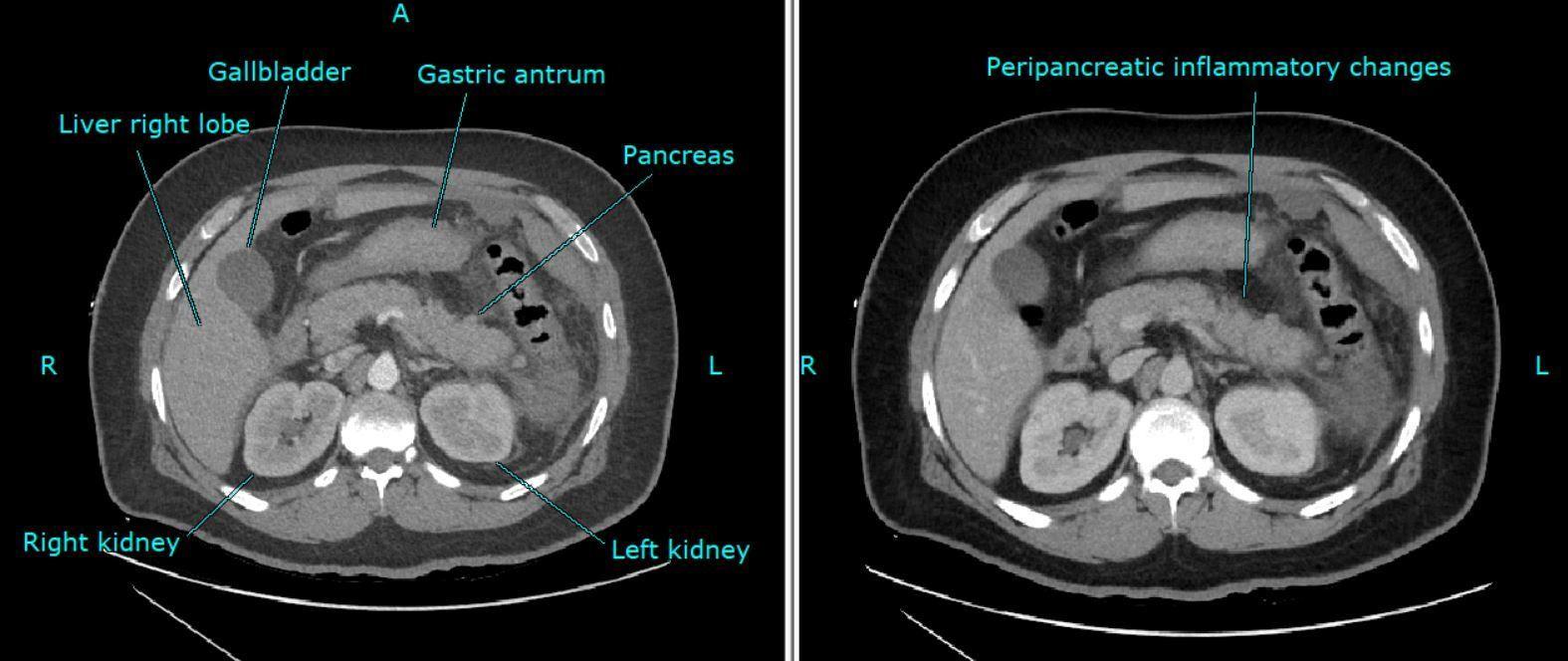
A computed tomographic (CT) scan of the abdomen was ordered and displayed distal pancreatitis with associated fat stranding and mild ascites (Figure 1). The imaging showed no evidence of pancreatic necrosis, cholelithiasis, or ductal dilation.

Figure 1. Computed tomographic (CT) scan of the abdomen showing peripancreatic inflammatory changes in the distal pancreas.

Based on the CT scan and clinical findings, the patient was diagnosed with acute pancreatitis and was resuscitated with intravenous (IV) normal saline. Ketorolac tromethamine, and omeprazole. On day one of hospital admission, the patient’s hemoglobin dropped from 12.7 gm/dl to 8.1 gm/dl with no signs of active bleeding from any site. The general surgery team was promptly paged for the surgical management of pancreatic collection and possible drainage but, upon further evaluation, the team advised supportive care and close monitoring of the patient be done in the event of any future bleeding complications. A second abdominal CT scan with contrast was suggested for the review and comparison with previous scan findings and for the identification of the underlying pathology. The CT scan finding showed a splenic hematoma with extracapsular distension and mass effect over the stomach, most likely representing the sequelae of acute pancreatitis (Figure 2).

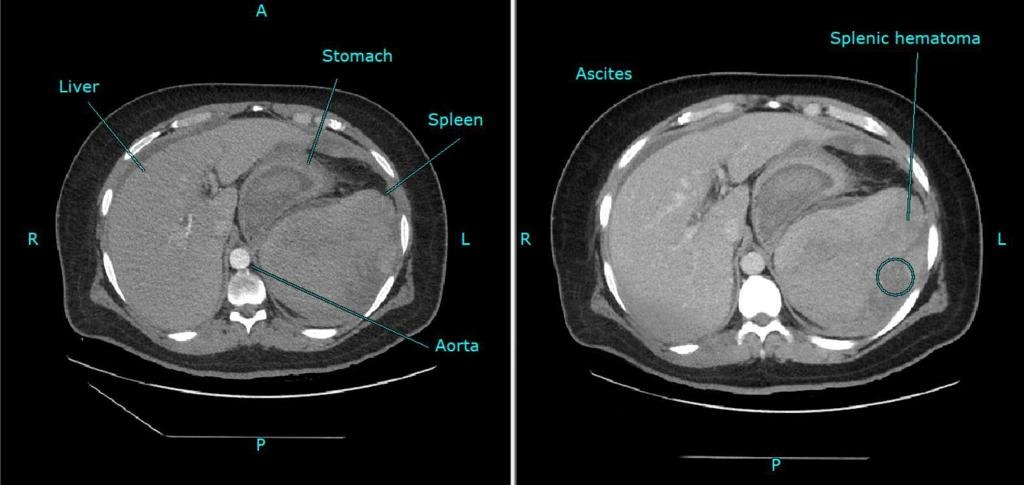


Figure 2. Computed tomographic scan of the abdomen representing splenic hematoma represented by a blue circle with extracapsular distension and mass effect over the stomach.

On day two of the patient's admission, a significant drop in hemoglobin count (Hb 7.7 gm/dl) was noted, prompting a packed cell transfusion, a CT angiogram, and elective intubation. A total of three packed red blood cells were transfused. An angiogram of the splenic artery and left inferior phrenic artery was done, showing no vascular malformation or active bleeding (Figure 3).



Figure 3. Computed Tomographic (CT) Angiogram displaying a splenic artery without any vascular malformation nor active bleeding.

After the angiogram proved negative for arterial bleeding and the patient achieved hemodynamic stability, successful extubation was done. Gradual improvement in the symptoms was observed allowing for the transfer of the patient to a special care unit for close observation. After a progressive recovery, the patient was shifted to the general ward. A decrease in the splenic hematoma was observed in the subsequent CT scans and the patient was ultimately discharged on oral medicines that included Syrup Antacid 10 ml oral before meals, Capsule Dexlansoprazole 60 mg oral before breakfast and dinner, Tablet ondansetron HCL 8 mg oral before breakfast and dinner, tablet tramadol + paracetamol 50 mg oral two times a day. Regular follow-ups with subsequent CT imaging were suggested to the patient and the patient remained symptoms free at four weeks of follow-up.

**Discussion**

Acute and chronic pancreatitis can have deleterious effects on the spleen, as the organ lies near the pancreas [1]. The diseases of the pancreas can progress to affect the spleen leading to complications such as pseudocysts, splenic hematomas, splenic ruptures, and hemorrhagic spleens. Subcapsular hematomas, of note, are commonly seen in patients with chronic pancreatitis [4].

The spleen is more commonly affected by diseases involving the distal part of the pancreas, as anatomically these structures abut one another [5]. The distal part of the pancreas has the possibility of coming into contact with the hilum of the spleen (enclosed by splenic vessels) in times of swelling. The swelling, in pancreatitis, can rupture the pancreas leading to a leak of fluid rich in enzymes that may gain access to the spleen. This fluid, once inside, leads to the rupture of splenic veins and arteries.

Patients with subcapsular splenic hematomas may present with diffuse left upper quadrant pain, possible abdominal guarding, and referred pain in the left shoulder. Elevation of the left diaphragm, tachycardia, hypotension and decreased hemoglobin can raise suspicion of splenic complications [7]. The clinical presentation of patients varies with early or delayed rupture of the pancreas. Patients with early rupture are more likely to present with intra-abdominal bleeding whilst patients with delayed rupture (i.e. those still in the initial stages of the pathology with an intact splenic capsule) can present within an asymptomatic interval (days to weeks before showing signs). This delayed presentation is commonly seen in central or subcapsular hematoma and is evident in our case.

Imaging and vitals analysis plays an important role in aiding the diagnosis of asymptomatic splenic hematomas and their detection. The CT scan and CT angiogram findings displayed no open splenic rupture as the hematoma was confined to the splenic capsule. The patient remained asymptomatic, but the dropping of hemoglobin suggested splenic complications. Previous studies have reported that splenic hematomas and ruptures are mainly present in patients with histories of chronic pancreatitis [8], whilst our patient had no prior history of pancreatitis or any pancreatitis-specific symptoms.

The management of splenic hematomas following acute or chronic pancreatitis remains controversial. Conservative approach or surgical interventions depend on the patient’s hemodynamic status, size and grading of hematoma, persistent symptoms, and risk of rupture. Some studies have suggested that the splenic hematomas caused by acute pancreatitis can be managed through non-surgical means and that, if necessary, their surgical indication is based on relevant clinical findings [2]. Conservative treatment includes observation and/or embolization (requiring strict follow-up with ongoing ultrasound or CT scans to observe the reduction in the size of the hematoma). Surgical options include laparotomy splenectomy, and percutaneous drainage [3].

Given the fact that our patient was hemodynamically stable, had no active bleeding, and had no vascular malformations seen on the angiogram, a conservative approach was followed. Splenic hematomas less than 5 cm can be treated conservatively whilst splenic hematomas larger than 5 cm caused by pancreatitis should be managed surgically through percutaneous drainage or laparotomy as early as possible to reduce pressure and avoid future splenic rupture [9].

**Conclusion**

Splenic hematoma secondary to acute pancreatitis is a rare phenomenon that can be treated conservatively when diagnosed early. Conservative measures prove to be effective for patients who are hemodynamically stable and who do not require emergent surgical intervention. Early diagnosis of this splenic complication with acute pancreatitis needs to be further explored in the literature as it can be life-threatening to patients.

**Authors contribution**

Z.A., M.M.K., and M.J. conceived the idea. Z.A and M.M.K collected the patient data, Q.A.K, C.F, D.Z, P.A, M.A wrote the manuscript, M.F, A.K, and B.G reviewed and did the final editing of the manuscript. All the authors read and approved the manuscript.

**Consent for publication**

Written informed consent was obtained from the patient to publish this case report and any accompanying images and can be available upon editor’s request.

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**Conflict of interest**

The author declares no competing conflict of interest.

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**Data availability statement**

Data can be available upon reasonable request to the corresponding author.

**References**

1. Cengiz, F., Yakan, S., & Enver, İ. (2013). A rare cause of acute abdomen: splenic hematoma and rupture resulting from pancreatitis. *Turkish Journal of Surgery*, *29*(2), 81–83. https://doi.org/10.5152/UCD.2013.20
2. Agarwal, P., & Moirangthem, G. S. (n.d.). Rare Case of Spontaneous Splenic Hematoma Following Chronic Pancreatitis-A Case Report. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN*, *17*, 45–47. <https://doi.org/10.9790/0853-1702054547>
3. Hernani, B. L. (2015). Acute pancreatitis complicated with splenic rupture: A case report. *World Journal of Gastrointestinal Surgery*, *7*(9), 219. <https://doi.org/10.4240/wjgs.v7.i9.219>
4. Heider, R., & Behrns, K. E. (2001). *Pancreatic Pseudocysts Complicated by Splenic Parenchymal Involvement: Results of Operative and Percutaneous Management*.
5. Mortelé, K. J., Mergo, P. J., Taylor, H. M., Ernst, M. D., & Ros, P. R. (2001). *Splenic and Perisplenic Involvement in Acute Pancreatitis: Determination of Prevalence and Morphologic Helical CT Features*.
6. Agha RA,Franchi T,Sohrabi C,Mathew G,for the SCARE Group.The SCARE 2020 Guideline: Updating Consensus Surgical Case REport (SCARE) Guidelines,

International Journal of Surgery 2020;84:226-230.

1. Martelo, R., Morais, J. C., Rábago, A., Borges, I. C., & Rodrigues, F. (2021). A Rare Case of Atraumatic Splenic Rupture Due to Chronic Pancreatitis. *Cureus*. https://doi.org/10.7759/cureus.19936
2. H. R. Toussi, K. S. Cross, S. J. Sheehan, D. Bouchier Hayes, & A. L. Leahy. (1996). Spontaneous splenic rupture: a rare complication of acute pancreatitis. *British Journal of Surgery*, *83*(632).
3. Zhang, S., Liu, F., Buch, H., Xu, G., & Wang, L. (2017). Large Subcapsular Splenic Hematoma with a Large Pancreatic Pseudocyst Was Successfully Treated with Splenic Arterial Embolization and Ultrasound-Guided Percutaneous Drainage of Pancreatic Pseudocyst. *Case Reports in Medicine*, *2017*. https://doi.org/10.1155/2017/6381