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Emergency splenectomy for trauma in the setting of splenomegaly, axillary lymphadenopathy, and incidental B-cell chronic lymphocytic leukemia: A case report

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ABSTRACT

INTRODUCTION: The spleen is the most commonly injured intra-abdominal solid organ following blunt trauma. B-cell chronic lymphocytic leukemia (CLL) is the most common leukocytic dyscrasia affecting adults in Western countries. Splenomegaly with axillary and retroperitoneal lymphadenopathy are common physical findings. This case investigates an emergency splenectomy in a community hospital involving a 45-year-old man with blunt abdominal trauma following an assault with incidental splenomegaly and axillary lymphadenopathy, with surgical pathology findings of B-cell CLL.

PRESENTATION OF CASE: A 45-year-old man without past medical or family history who was the victim of an assault presented to the emergency department 6 h later with left upper quadrant pain and radiation to the left flank and a positive Kehr sign. An elevated absolute lymphocyte count above 7×10^9 and CT confirmation of a Grade V splenic laceration with splenomegaly, axillary lymphadenopathy, with hemodynamic compromise led to an exploratory laparotomy and emergency splenectomy regardless of the potential for malignancy.

DISCUSSION: Hemoperitoneum with blunt splenic injury (BSI) caused by abdominal trauma with hemodynamic instability should be treated with exploratory laparotomy and splenectomy even in the face of potential malignancy with splenomegaly and axillary lymphadenopathy. An appropriate oncologic work up and treatment can be provided after the emergency intervention.

CONCLUSION: An emergency splenectomy is an appropriate operative intervention for a grade V splenic laceration with hemoperitoneum, splenomegaly, and axillary lymphadenopathy regardless of the potential for a neoplastic process such as B-cell CLL. Post-splenectomy vaccinations and oncologic follow-up for systemic chemotherapy should be facilitated after recovery.

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1. Introduction

The spleen is the most commonly injured solid organ in blunt abdominal trauma. It represents 31%–50% of cases [1]. The prevalence of isolated splenic injury in blunt abdominal trauma decreases with age. The mechanism of splenic trauma and the grade of splenic injury are directly correlated. The most common mechanisms for blunt splenic injury (BSI) include motor vehicle accidents (MVA), falling, assault, and sports injuries [2]. The spleen is predisposed to injury due to its fragile structure and position immediately beneath the left ribcage. The treatment is determined by the grade

of the injury, the patient's hemodynamic stability, and a focused history and physical examination. The American Association for the Surgery of Trauma (AAST) has published specific criteria outlining the severity of splenic hematomas and capsular laceration for each splenic injury, which is referred to as the "grade" of splenic trauma [3].

The difficulty of diagnosis results from vague signs and symptoms that accompany BSI. A history of left upper quadrant trauma, a left flank injury, or a left ribcage impact should increase suspicion. The chief complaints may include left upper abdominal, chest wall, or left sub-scapular shoulder pain (Kehr sign). Computerized topography scans are 92% sensitive [4]. CT findings that indicate splenic trauma include hemoperitoneum hypodensities around the splenic parenchymal distribution (intraparenchymal hematoma), and IV contrast extravasation.

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Fig. 1. Abdominal computerized tomography (CT) axial view with Grade V splenic laceration and hemoperitoneum, and splenomegaly.

The treatment of choice for a grade V splenic injury with hemodynamic compromise is an exploratory laparotomy with splenectomy, with only a few laparoscopic sporadic cases in the literature. Surgical management is imperative in approximately 20%–40% of cases, and this number increases in patients who are in hemorrhagic shock with massive hemoperitoneum. An emergency splenectomy involves placement in the supine position, exposure of the peritoneal cavity and achievement of temporary hemostasis. The spleen should be mobilized from its ligamentous attachments, with ligation of the splenic pedicle, achievement of hemostasis, complete resection, and abdominal closure [5].

B-Cell proliferative Chronic Lymphocytic Leukemia (CLL) is the most common leukemia. The diagnosis is usually based on the incidental finding of an asymptomatic lymphocytosis with lymphadenopathy and splenomegaly. Confirmatory diagnosis is made via peripheral blood flow cytometry that will identify positive CD20, CD5, and CD23 positivity [6]. Smudge cells are also visualized on peripheral smear and are pathognomonic. Treatment entails anti-neoplastic pharmacologic intervention, and prophylactic splenectomy if indicated.

This work has been reported in line with the SCARE criteria [7].

2. Case presentation

A 45-year-old man without significant medical or family history presented to the emergency department with hemoperitoneum from a significant splenic laceration with rib fractures via blunt abdominal trauma after an assault six hours earlier. His chief complaint included left upper quadrant pain with radiation to the left flank and sub-scapular region. Initial vital signs included a blood pressure of 117/69, temperature of 36.5 Celsius, heart rate of 115, and a respiratory rate of 17. Initial lab values included lymphocytosis with an absolute lymphocyte count of 7×10^9 , a hemoglobin of 8.8 g/dL, and hematocrit of 26.0%. Due to unstable hemodynamics and physical exam it was determined that non-operative (observation) management was inappropriate.

Before he became hemodynamically unstable an hour prior to surgical consultation, he had a CT scan of the abdomen and pelvis with IV contrast that revealed a grade V splenic capsular and hilar laceration with hemoperitoneum. The spleen was grossly enlarged with incidental bilateral axillary and retroperitoneal lymphadenopathy, since the chest was included based on left ribcage pain (Figs. 1–3). The possibility of lymphoma that needed to be addressed at some point was noted. However, his hemody-

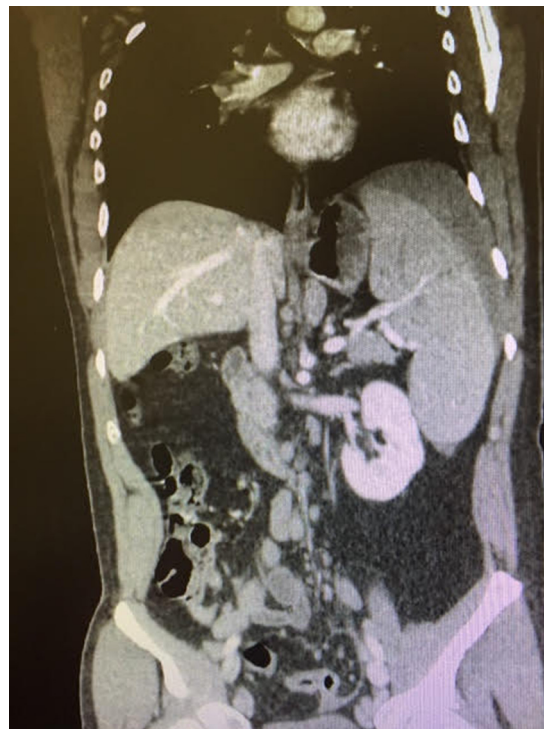


Fig. 2. Abdominal CT coronal view with Grade V splenic laceration, hemoperitoneum, and splenomegaly.

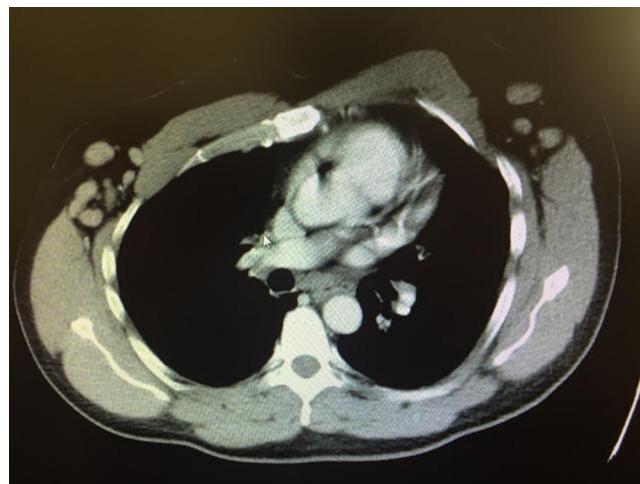


Fig. 3. Chest CT axial view with bilateral axillary lymphadenopathy in the setting of splenomegaly.

amic instability and ongoing peritonitis required an exploratory laparotomy for trauma with splenectomy regardless of the potential for malignancy. Intra-operatively, approximately 2 L of blood were evacuated. The splenic vein revealed active hemorrhaging at the hilum. There was evidence of splenomegaly with a significant grade V laceration to both the splenic capsule and splenic hilum (Figs. 4 and 5). The spleen was resected in spite of its pathologic enlargement. Two liters of packed red blood cells were transfused during the operation. The Clavien-Dindo classification does not apply, since there were no complications. Subsequent referral to a medical oncologist followed his recovery with post-splenectomy vaccinations two weeks later and systemic chemotherapy a month after that.



Fig. 4. Surgical specimen with Grade V splenic laceration and capsular hematoma, with splenomegaly.

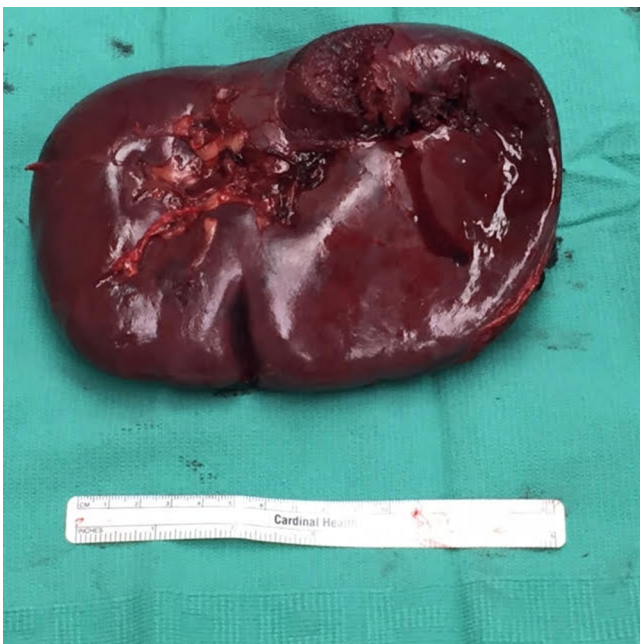


Fig. 5. Surgical specimen with Grade V splenic laceration and hilar injury, with splenomegaly.

3. Discussion

The challenge of this case arose from a complex clinical presentation which warranted an emergency splenectomy for a grade V splenic laceration from blunt trauma in a patient with splenomegaly and a suspected neoplastic process. Minor splenic injuries can usually be treated conservatively, yet high-grade injuries have a better prognosis with operative intervention. Although a splenectomy may be done laparoscopically, in an emergent situation the most common approach worldwide is an exploratory laparotomy [3].

The patient's comorbid splenomegaly likely predisposed him to a more severe splenic injury than would have been caused by blunt trauma alone. The normal spleen of an adult male weighs 150–200 g [8]. Upon pathological evaluation of the spleen, it was found to weigh 803.5 g which is consistent with splenomegaly.

CLL is the most common leukemia diagnosed in Western countries, and it represents up to 30% of all leukemias diagnosed within the United States [9]. Although CLL usually is a disease of geriatric populations, some patients develop it in the ranges of 30–45 years of age [10]. Patients are diagnosed via specific physical and laboratory abnormalities. CLL is usually an incidental diagnosis with a complete blood count revealing an out of range absolute lymphocytosis. This was the case with our patient, as he had no clinical complaints at the time of his emergency presentation. The most abnormal sign on physical exam is lymphadenopathy present within 50–90% of patients [11]. Splenomegaly represents the second most frequently enlarged lymphoid organ present within 25–50% of cases. The pathognomonic laboratory abnormality is lymphocytosis in the peripheral blood and bone marrow. The threshold for diagnosing CLL is an absolute B-lymphocyte count greater than 5000/mcL on a peripheral blood smear.

One month after splenectomy, the patient underwent a thorough oncologic evaluation for his lymphocytosis including bone marrow biopsy, flow cytometry, and cytogenetics. His bone marrow revealed a hypercellular bone marrow with trilineage hematopoiesis and 30% patchy nodular involvement by CLL. Flow cytometry evaluation revealed a positive CD20, CD23, and CD 19 antigen, which are all key components of CLL [12]. Rai staging is based on clinical findings, and is a prognostic determinant. The patient had a Rai Stage II CLL, which is defined by lymphocytosis with hepato- or splenomegaly with or without lymphadenopathy. This carries an intermediate prognosis [13]. He received systemic chemotherapy with Rituxan and Bendamustine, which resolved the patient's adenopathy and peripheral lymphocytosis. Side effects included fatigue and myalgias, but he eventually tolerated his treatment well.

The major complications of CLL include immunological defects to both cellular and humoral mediated immune systems, and infection is a significant cause of death [14]. Post-splenectomy, there is an increased risk of infection by encapsulated bacteria. Prophylactic vaccinations for encapsulated bacteria are the standard of care. The patient received Prevnar, HIB vaccine, and Menactra vaccinations for prophylaxis against *Streptococcus pneumoniae*, *Hemophilus Influenza* type B, and *Neisseria meningitidis*, respectively, two weeks post operatively. Patients are also at risk for developing secondary malignancies of both the blood and solid organs. The most common are the same found in non-CLL populations which include lung, colon, and breast neoplasms. Continued outpatient visits to oncology and primary care should include chest x-rays, CBC with differential, complete metabolic profiles, and thorough physical exams.

The most important lesson learned from this case is that, regardless of the possibility of a neoplastic process on initial presentation suggested by splenomegaly and axillary lymphadenopathy, a splenectomy should be performed for a grade V laceration with hemodynamic instability from blunt trauma. Having delayed a splenectomy for the sake of a detailed staging work up would have put the patient's life in danger. In an emergency situation such as this, we have learned that the ABC algorithm for Advanced Trauma Life Support (ATLS) is always the most effective therapy to save a life no matter the circumstances. Certainly, B-cell CLL should and must be treated with evidenced-based modalities and guidelines, but the suspicion for a neoplastic process should never delay an emergency trauma operation. Although other studies have discussed the topic of subtotal splenectomy for CLL, an extensive literature review has not revealed any previous case reports that present an emergency

splenectomy in the context of blunt trauma with incidental CLL [15]. Thus, the lessons from this case are valuable to the surgical community since they reinforce the basic trauma principles that constitute the international standard of care.

4. Conclusion

An emergency splenectomy is the appropriate therapy for a patient with a Grade V splenic laceration and hemodynamic compromise in the setting of splenomegaly and axillary lymphadenopathy, regardless of the potential for malignancy such as B-cell CLL. Once the patient's survival from trauma is ensured, post splenectomy vaccinations and systemic chemotherapy are necessary for infection prophylaxis and for B-cell CLL treatment.

Conflicts of interest

There are no conflicts of interest.

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Ethical approval

Our hospital's IRB Committee (Capital Regional Medical Center, Tallahassee, FL, USA) has approved this manuscript and its publication in the scientific literature.

Consent

The patient has not been available to answer any phone calls or letters sent to him after several attempts for the last 2 months. Thus, we do not have consent from the patient, but we have tried to obtain it numerous times. However, our IRB Committee has given written authorization to proceed with the writing and publication of our manuscript.

Author contribution

Rodolfo J. Oviedo, MD, FACS: Manuscript design, writing, editing
Andrew A. Glickman, MS: Manuscript writing.

Guarantor

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