

Splenic amyloidosis: a rare cause of spontaneous splenic rupture

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ABSTRACT

A 62 year-old woman who presented with an atraumatic acute abdomen was discovered to have haemoperitoneum with splenic rupture on urgent computed tomography and was immediately referred for life-saving emergency splenectomy. Histopathological examination revealed secondary splenic amyloidosis. The patient was later found to be suffering from infective endocarditis secondary to her permanent cardiac pacemaker. This report describes a patient who could have suffered from a long-standing infected vegetation on a permanent cardiac pacemaker, which led to splenic amyloidosis and spontaneous splenic rupture.

Keywords: amyloidosis, pacemaker vegetations, splenic rupture

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INTRODUCTION

Spontaneous rupture of the spleen without a history of trauma is very uncommon and mostly occurs with haematological disorders.⁽¹⁾ Spontaneous splenic rupture due to splenic amyloidosis secondary to infective endocarditis, although recognised, is extremely rare.⁽²⁾ We report a patient who presented with acute abdomen as the first manifestation of spontaneous splenic rupture secondary to splenic amyloidosis. She was later found to be suffering from infective endocarditis due to a permanent cardiac pacemaker. This case report highlights spontaneous splenic rupture as an important differential diagnosis of acute abdomen, and amyloidosis as a differential diagnosis of spontaneous splenic rupture. It also illustrates an extraordinary manifestation of infective endocarditis in a patient with a permanent cardiac pacemaker.

CASE REPORT

A 62-year-old Indian woman presented with a four-day history of worsening acute abdominal pain. She was known to have hypertension, sick sinus syndrome and fast atrial fibrillation, with a permanent cardiac pacemaker *in*



Fig. 1 Contrast-enhanced axial CT image shows ill-defined hypodense areas within the splenic parenchyma with an irregular splenic margin (black arrowheads). Perisplenic and perihepatic free fluid is seen (white arrowheads).

situ for more than ten years. She described the abdominal pain as generalised, with maximal intensity at the left hypochondrial region. She denied any history of trauma, fever or antecedent bowel symptoms.

On examination, the patient was slightly tachypnoeic and tachycardic, with a pulse rate of 100 beats per minute, blood pressure of 120/50 mmHg and Glasgow Coma Scale score of 15. She was afebrile and anicteric. Her abdomen was distended, with marked guarding and tenderness mostly in the left hypochondrium. Her bowel sounds were sluggish. Auscultation of her chest was unremarkable.

Bedside ultrasonography demonstrated free fluid in the Morrison's pouch. Initial laboratory investigations revealed haemoglobin 10 g/L and total white count $16 \times 10^9/L$ with neutrophilia. Supine and left lateral decubitus abdominal radiography revealed dilated small and large bowel loops but failed to demonstrate free intraperitoneal air. A clinical diagnosis of upper gastrointestinal bowel perforation was made, and urgent abdominal computed tomography (CT) was arranged.

CT of the abdomen demonstrated an enlarged spleen, with heterogeneous parenchymal attenuation and an irregular margin at the hilum. There was free fluid in the left hypochondrium and in both the paracolic gutters and pelvis. There was a hyperdense component within the free fluid, indicating haemoperitoneum. A radiological diagnosis of splenic rupture was made (Figs. 1 & 2).

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Fig. 2 Coronal CT images show (a) ruptured splenic capsule at the hilum (arrows), with fluid of heterogeneous attenuation in the perisplenic region (arrowhead) and (b) in the left paracolic gutter and pelvis (arrowheads), suggestive of haemoperitoneum.

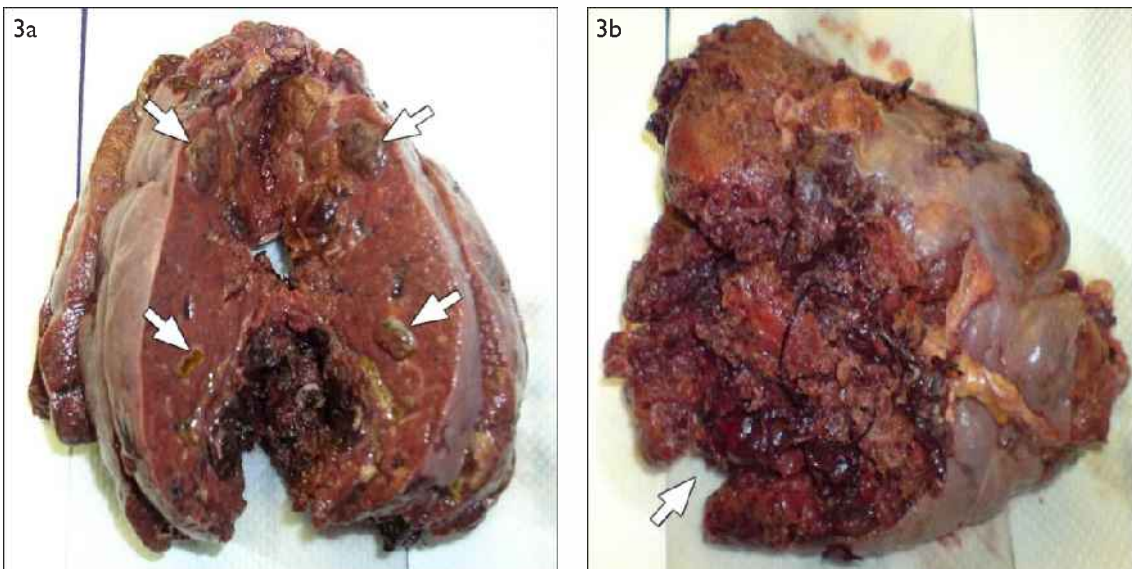


Fig. 3 Photographs of the gross specimen of the enlarged and congested spleen show (a) multiple circumscribed parenchymal nodules measuring 0.5-2.0 cm (arrowheads); and (b) the ruptured splenic hilum (arrowhead) with a lobulated splenic surface.

The patient underwent emergency laparotomy. Intraoperative findings revealed a macerated spleen with capsular disruption at the hilum and 3 L of blood in the peritoneal cavity. The rest of the abdominal viscera were grossly normal. Based on these intraoperative findings, splenectomy was performed. Gross pathological examination of the splenectomy specimen revealed an enlarged spleen weighing 330 g and measuring 13 cm × 9 cm × 5 cm. The splenic surface was lobulated, and there was a capsular tear at the splenic hilum. The cut section of the spleen appeared to be waxy, with parenchymal congestion. There were multiple circumscribed, yellowish to brownish parenchymal nodules measuring 0.5–2.0 cm across, with necrotic areas within some of the nodules (Fig. 3).

Histopathological examination revealed pinkish amorphous deposition surrounding the blood vessels and throughout the splenic parenchyma, with scattered haemosiderin-laden macrophages. The pinkish amorphous substance stained salmon pink on Congo red stain and demonstrated an apple-green birefringence under polarised light. Amyloid AA stain revealed scattered positive staining at the pinkish amorphous areas, confirming the diagnosis of AA amyloidosis of the spleen. No malignant cells were observed on the repeated histopathological examination performed by two histopathologists (Fig. 4).

Blood cultures were obtained from multiple sites and grew Gram-positive *Corynebacterium* spp. Transoesophageal echocardiography demonstrated

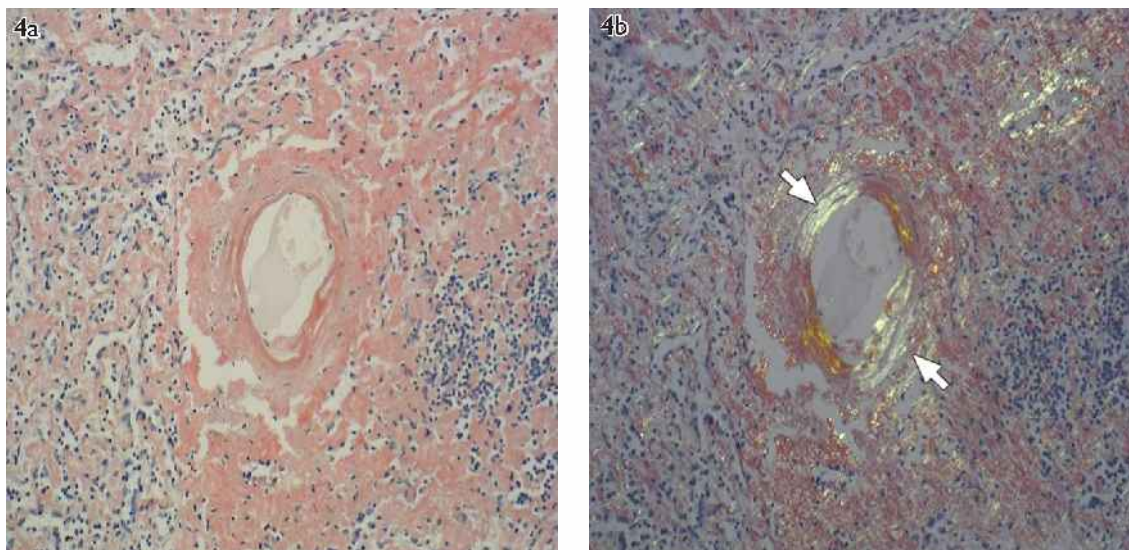


Fig. 4 Photomicrographs show (a) salmon pink amorphous substance surrounding the blood vessels and throughout the splenic parenchyma (Congo red stain, $\times 10$); and (b) apple-green birefringence (arrowheads) under polarised light, which was diagnostic for amyloidosis.

vegetation on the pacemaker lead. Thus, a diagnosis of infective endocarditis was made. The cardiac pacemaker was subsequently removed, and the patient was treated with parenteral antibiotics. The combination of radiological, surgical, pathological and microbiological findings confirmed the diagnosis of spontaneous splenic rupture secondary to AA splenic amyloidosis as a result of underlying infective endocarditis originating from the permanent cardiac pacemaker lead. The patient recovered gradually under intensive care and was extubated on postoperative Day 20.

DISCUSSION

Non-traumatic rupture of the spleen is very rare.^(1,3) Clinical presentations include severe upper abdominal pain with distension, guarding, tenderness, radiating pain to the left shoulder and haemorrhagic shock.^(1,3) The clinical presentation of an acute abdomen often leads clinicians to the diagnosis of more common differentials such as perforated viscus, pancreatitis, ruptured aortic aneurysm or acute coronary syndrome.⁽¹⁾ Peritoneal tapping, ultrasonography, CT and exploratory emergency laparotomy are the commonly employed diagnostic measures in cases of acute abdomen. A literature review by Pietro revealed that atraumatic splenic rupture was diagnosed by laparotomy in 42.3% of cases, CT in 32.4%, ultrasonography in 18.6%, scintigraphy in 0.7%, laparoscopy in 0.5%, angiography in 0.3% and autopsy in 5.2% of all cases.⁽⁴⁾ Despite the limited evidence regarding the optimal initial imaging, early diagnosis of splenic rupture is crucial for prompt surgical intervention, as mortality of nearly 100% has been associated with untreated cases.⁽¹⁾

The incidence of spontaneous splenic rupture is two times higher in males than females, and patients commonly present during their mid-fifties.⁽⁴⁾ More than 80% of reported cases had occurred with a pathological spleen, and only a small minority of the cases were idiopathic with a normal spleen and no identified predisposing factors.⁽⁴⁾

Five major groups of splenic pathology have been defined for the aetiologies of spontaneous splenic rupture.^(1,4) The biggest aetiological group is haematological malignancies (16.4%),^(1,4) of which acute leukaemia constitutes the majority, followed by lymphoma and chronic leukaemia.⁽¹⁾ Primary splenic tumour (8.1%), splenic metastases (3.8%) and non-malignant haematological disorders (2%) have also been reported.⁽⁴⁾ The second largest aetiological group constitutes infections associated with Epstein-Barr virus, malaria and human immunodeficiency virus.⁽⁴⁾ The third largest group includes inflammatory disorders such as pancreatitis (11%), amyloidosis (3.8%), vascular diseases (2.2%), genetic diseases (1.7%) and autoimmune diseases (1.4%).⁽⁴⁾ The fourth and fifth largest groups consist of drug-induced disorders (9.1%) and mechanic disorders in pregnancy (4.3%), respectively.⁽⁴⁾

Amyloidosis is an uncommon disease. It results from extracellular deposition of amorphous fibrillar protein, which compresses and replaces the normal tissue, leading to eventual organ dysfunction.⁽⁵⁾ Amyloidosis can be primary, secondary or familial, and systemic involvement is common in amyloidosis.⁽⁵⁾ However, up to 20% of amyloidosis is localised, as in our case.⁽⁵⁾ Due to the wide spectrum of organ involvement and pathological manifestations, the clinical presentation of amyloidosis is nonspecific, as are the radiological findings.⁽⁵⁾

Splenic involvement is relatively common (5%–10%) in both primary and secondary amyloidosis.^(5,6) It is usually asymptomatic.⁽⁷⁾ Spontaneous splenic rupture secondary to amyloidosis is extremely rare, with only 31 cases reported until March 2009.⁽⁶⁾ In the majority of these patients (71%), spontaneous splenic rupture was the first clinical manifestation, as was in our case.⁽⁶⁾ Only a minority of patients (29%) were known to have amyloidosis.⁽⁶⁾ A total of 25 patients had primary (AL) amyloidosis and four had secondary (AA) amyloidosis.⁽⁶⁾ Our patient had AA amyloidosis secondary to infective endocarditis.

Moderate splenomegaly, coagulopathy and autologous stem-cell transplantation were considered to be predisposing factors for spontaneous splenic rupture.⁽⁶⁾ However, the actual mechanism of splenic rupture in amyloidosis is yet unknown.⁽¹⁾ Postulations of splenic enlargement, increased rigidity and vascular fragility have been made.⁽³⁾ Spontaneous splenic rupture in amyloidosis has been associated with a high 30-day mortality.⁽⁶⁾ Splenomegaly, age > 40 years and underlying neoplastic diseases are associated with increased mortality.^(1,6)

On imaging, moderate splenomegaly has been described in 68% of cases with spontaneous splenic rupture secondary to amyloidosis.⁽⁶⁾ Other CT findings include calcification and poor contrast enhancement.^(5,7) High T1-weighted and low T2-weighted signals on magnetic resonance imaging reflect splenic hypovascularity secondary to parenchymal infiltration.^(5,7) No current imaging technique is able to demonstrate the presence of amyloid.⁽⁵⁾ As in our case, CT showed nonspecific splenomegaly and splenic rupture, but was unable to demonstrate generalised or focal amyloid infiltration. Diagnosis of amyloidosis is therefore dependent on tissue study to confirm the presence of amyloid deposits.⁽⁵⁾

Amyloid proteins stain positive with Congo red, exhibit apple-green birefringence under polarised microscopy and demonstrate 10-nm wide fibril aggregations on electron microscopy.⁽⁵⁾ Amyloidosis is biochemically classified into amyloid light chain (AL), amyloid A protein (AA) and β 2-microglobulin amyloidosis.⁽⁵⁾ AA amyloidosis is mainly secondary, and is associated with chronic inflammatory disorders and chronic infection such as rheumatoid arthritis,

tuberculosis, pyelonephritis, osteomyelitis and neoplasm, particularly renal cell carcinoma.⁽⁵⁾ Infective endocarditis as a cause of secondary amyloidosis has rarely been documented.⁽⁵⁾

Up to 35% of patients with infective endocarditis develop splenic abscess or infarctions.⁽²⁾ *Corynebacterium* endocarditis is a recognised but uncommon condition that is associated with high mortality.⁽⁸⁾ Spontaneous splenic rupture secondary to infective endocarditis has been reported in a patient with *Listeria* endocarditis, with pyogenic wall necrosis of mycotic aneurysm postulated to be the provoking factor.⁽²⁾ To our knowledge, spontaneous rupture of an amyloid spleen secondary to endocarditis has not yet been reported. This is also the first case of AA amyloidosis as a result of pacemaker-associated *Corynebacterium* endocarditis.

In conclusion, we highlighted a rare case of atraumatic acute abdomen due to the spontaneous rupture of an AA amyloid spleen secondary to pacemaker-associated *Corynebacterium* endocarditis. Prompt CT was essential in the early diagnosis of splenic rupture, which enabled life-saving emergency splenectomy to be performed. However, retrospectively, there was no clinical sign or imaging finding that could have pointed to the final diagnosis of splenic amyloidosis secondary to infective endocarditis. Therefore, splenomegaly in a patient with known prosthetic heart valves should prompt suspicion of amyloidosis and infective endocarditis.

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