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Autoimmune manifestation in splenic atrophy presented with toxic shock syndrome: a case report

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ABSTRACT

Splenic atrophy is an uncommon diagnosis, associated with autoimmune gastrointestinal disorders and other well-characterized connective tissue diseases. We would like to contribute a case report to support the association evidence of the real-world data. To our best knowledge, there is no similar case of splenic atrophy with the presentation of streptococcal toxic shock syndrome reported. Our patient was initially detected with atrophic spleen via CT scan and subsequently diagnosed with systemic sclerosis. Hyposplenism should be suspected in patients with adult-onset infections caused by encapsulated bacteria, especially if autoantibodies are present. Our patient received her pneumococcal vaccination before discharge and was followed in the clinic for further vaccination education and health check-up. Learning points: 1) Acquired splenic atrophy is a rare condition that may be suspected from persistent isolated thrombocytosis after the resolution of sepsis and Howell-Jolly bodies from peripheral blood film; 2) The pathophysiological mechanism of splenic atrophy in the context of autoimmune disorders remains unknown; 3) A high index of suspicion towards the evaluation of splenic function is required if a patient presented with community-acquired encapsulated organism bacteraemia; 4) Vaccination against encapsulated bacterial agents should be performed in patients with hyposplenism.

INTRODUCTION

The most frequent causes of adult-onset recurrent infections in Asia are primarily secondary states of immunodeficiency, such as human immunodeficiency virus (HIV) infection, Hepatitis infection, malignancy, and autoimmune diseases. Acquired, non-surgical, functional asplenia is a rare cause.[1] By definition, functional asplenia or hyposplenism occurs when splenic tissue is present but does not work well, and splenic atrophy is where there's evidence of acquired diminution of the size of the spleen which can lead to functional asplenia.

This condition is characterised by the impairment of the reticuloendothelial and immune functions of the spleen. Consequently, patients with hyposplenism are at risk of developing life-threatening infections. Defective spleen function has already been reported in several haematological, immune-mediated, infectious and gastrointestinal disorders, including sickle cell disease, coeliac disease (CD), inflammatory bowel disease, systemic lupus erythematosus, Sjögren's syndrome and other primary eosinophilic disorders. To the best of our knowledge, no case of toxic shock syndrome in a patient with acquired splenic atrophy and autoimmune disease has previously been reported in Asia.

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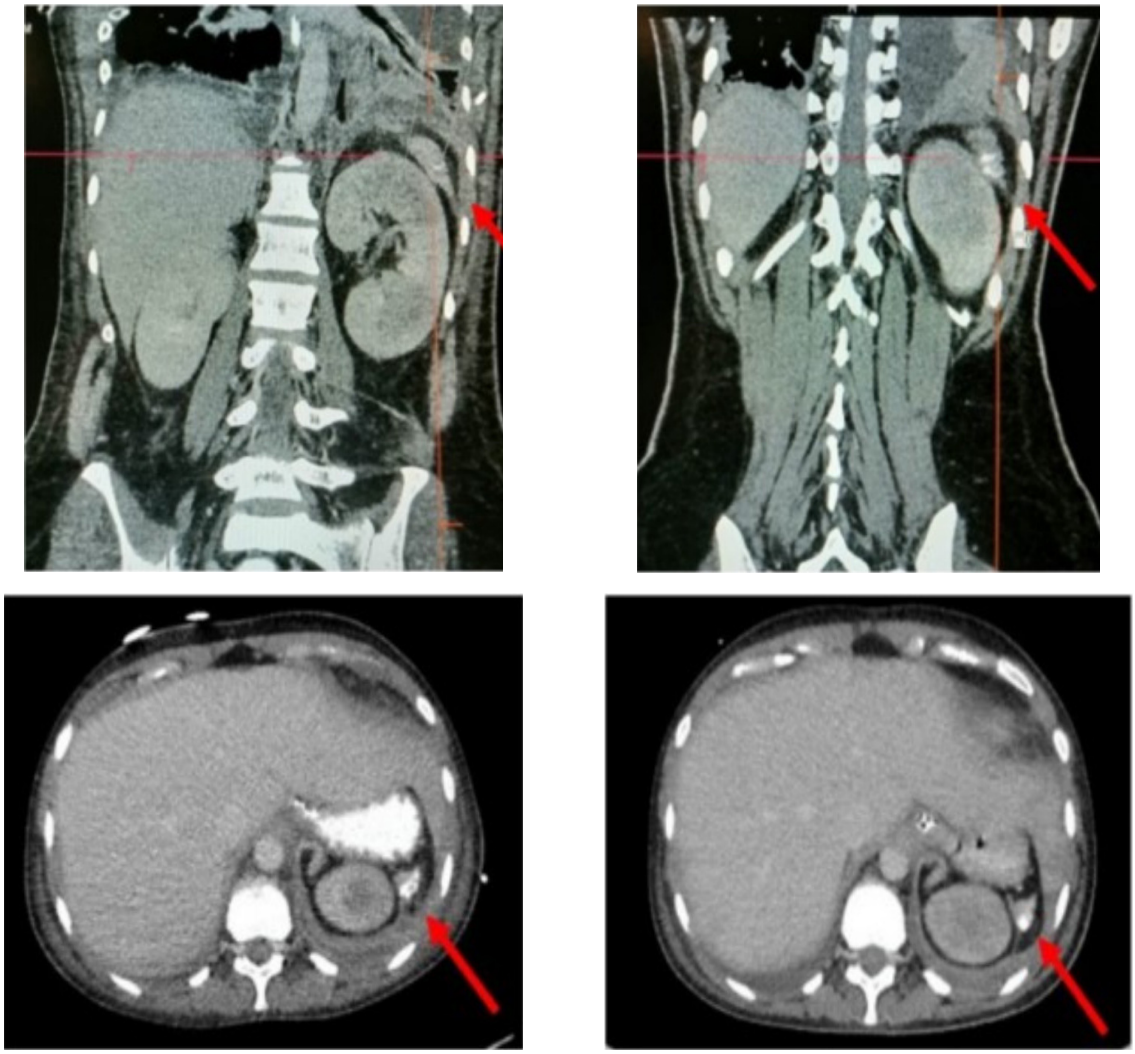

FIGURE 1. Coronal and axial view of patient's CT abdomen pelvis

CASE

We report a case of a 25 y.o. Indian woman, Miss I with no known medical illness, who presented to us with progressive worsening of lower abdominal pain for 3 d associated with clinical sepsis of fever, lethargy, vomiting and diarrhoea. Initial assessment and investigations showed that she had septic shock secondary to leaking tubo-ovarian abscess. She was rushed for early surgical source control of intraabdominal sepsis after prompt resuscitation. Intraoperative findings include drainage of 100mL turbid yellowish peritoneal fluid, pus drainage from Tubo-ovarian site with Fitz-Hugh-Curtis syndrome. Post-surgery, she was nursed in the intensive care unit. Primary microbiology assessment from blood and peritoneal pus cultures consistently revealed *Streptococcus pyogenes* as the culprit organism.

Initial and subsequent CT scans revealed the finding of the atrophic spleen (FIGURE 1) which prompted us for further evaluation. Her autoimmune panel of antinuclear antibody (ANA) and AntiSc1 70 were positive on day 14 of ICU admission and was subsequently referred to the rheumatology team with the impression of systemic sclerosis. Other autoimmune serology markers including antineutrophil cytoplasmic antibodies (pANCA & cANCA), anti-

cardiolipin antibody (IgM & Ig G), anti-beta 2- glycoprotein-1 (IgG & Ig M) were negative. Her blood trends in ICU revealed persistent thrombocytopenia ranging from 410-520 (10^9/L) and serial peripheral blood picture showed Howell-Jolly Bodies.

Her stay in ICU was complicated with distal right upper limb compartment syndrome likely secondary to septic emboli of *S. pyogenes*, left pyelonephritis with lobar nephronia and left pectineus intramuscular abscess. Despite her arduous journey in ICU, she was able to be discharged from the hospital and subsequently decannulated from tracheostomy. She received a dose of PPV23 vaccination prior to discharge.

The summary timeline of patient's progress is presented in TABLE 1.

TABLE 1. Summary timeline of our patient's progress

Date	Events and progress
26/4/2022	Miss I presented to our Emergency Department with progressive worsening of lower abdominal pain for 3 d associated with clinical sepsis of fever, lethargy, vomiting and diarrhoea.
27/4/2022	She was rushed to operation theatre for source control of intraabdominal sepsis where initial CT abdomen pelvis has reported left tubo-ovarian abscess with evidence of free fluid collection. Intraoperative findings include drainage of 100mL turbid yellowish peritoneal fluid, Fitz-Hugh-Curtis syndrome, and significant pus drainage from Tubo-ovarian site. Post op, patient is admitted to ICU.
1/5/2022	She developed progressive swelling of right distal upper limb complicated by compartment syndrome likely secondary to septic emboli from *Streptococcus* bacteraemia. Orthopaedic and vascular surgery teams were onboard timely for surgical decompressive management.
10/5 /2022	Rheumatological consult was obtained in view of the physical examination suggestive of cutaneous scleroderma at bilateral hands MTP joints with suspicious features of sclerodactyly (FIGURE 2). Autoimmune panel workup positive for ANA and AntiSc1 70. A preliminary impression of systemic sclerosis was made by the rheumatological team.
14/5/2022	A repeated CT thorax abdomen pelvis was performed due to the persistence of patient's clinical and laboratory sepsis where disseminated infectious seeding is our major concern. Left pyelonephritis with lobar nephronia and left pectineus intramuscular abscess were detected. Interventional radiology and surgical team was consulted for source control of targeted percutaneous drainage. At this time, the recurrent term of atrophic spleen which was reported has caught our interest of critical thought and management (FIGURE 1).
3/6/2022	She underwent tracheostomy in view of recurrent intubation in ICU, prolonged weaning.
28/6/22	She was discharged from ICU to the general ward after successfully weaned off from mechanical ventilation and remained stable for 1 week. Rehabilitation, tracheostomy care and post-ICU recovery interventions were main goals of management in the GW.
1/8/22	Miss I received her vaccination dose of PPV23 prior to discharge. Follow-up appointments has be given for tracheostomy decannulation, outpatient rehabilitation and respective clinical subspecialties which included rheumatology, infectious diseases, and obstetrics & gynaecology.

DISCUSSION

Throughout history, the spleen has been regarded as a fascinating and mysterious organ with distinctive functions. The anatomical study of spleen was first discovered by Malpighi[1] in De liene in 1965, which reported the "splenic cap" and of the trabeculae "that accompany the distributions of vessels, collected in bundle to tube shape". The spleen is a secondary lymphoid organ, located in the upper left part of the abdomen, sheltered by the ribcage. The spleen possesses two main functions, which are blood filtering, which is necessary for removing old erythrocytes (haemocatheresis) and other blood cells in the red pulp, and mounting immune responses against pathogens through both the innate and adaptive immune system branches in the white pulp.[2,3]

Acquired splenic atrophy is a rare condition that is usually detected incidentally via abdominal scans. Although spleen size does not necessarily correlate with spleen function, hyposplenism should be excluded in patients with incidentally found small spleen (length <8 cm in men and <7.5 cm in women).[4] In our patient who presented with sepsis, reactive thrombocytosis was our initial explanation to her high platelet count. However, her baseline platelet count has consistently been more than 410 (10^9/L) from the day of post-surgery till the day of ICU discharge opposing the decreasing trend of inflammatory markers (C-reactive protein & Pro-calcitonin), which prompted to us evaluate other causes of reactive thrombocytosis aside of sepsis- related. In our case of hyposplenism, decreased platelet sequestration is the main pathophysiology for thrombocytosis.[5]

Our patient also fulfilled the ACR-EULAR Criteria for the classification of systemic sclerosis which includes bilateral hands sclerodactyly with right-hand fingertip lesion which results in gangrenous transformation and positive AntiScl 70 (FIGURE 2).[6] The pathophysiological mechanism of splenic atrophy in the context of autoimmune disorders remains uncertain.[7,8] Severe lymphocyte depletion in the spleen in association with severe fibrosis has been reported. It was hypothesized that self-reactive lymphocytes produce factors that directly or indirectly induce splenic fibrosis, which results in lymphocyte depletion and atrophy.[9] Alternatively, functional hyposplenism secondary to Fc-receptor blockage by circulating immune complex saturation has been described in SLE and systemic vasculitis.[10,11] Acquired asplenia or hyposplenism increases an individual's susceptibility to infections with encapsulated bacteria such as *S. pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis*. In our case of *S. pyogenes* bacteraemia, most clinical isolates of *S. pyogenes* elaborate a capsular polysaccharide, which is composed of hyaluronic acid, a high-molecular-mass polymer of alternating residues of N-acetyl glucosamine and glucuronic acid.[12] Therefore, a high index of suspicion towards the evaluation of splenic function is required if a patient presented with community-acquired encapsulated organism bacteraemia.

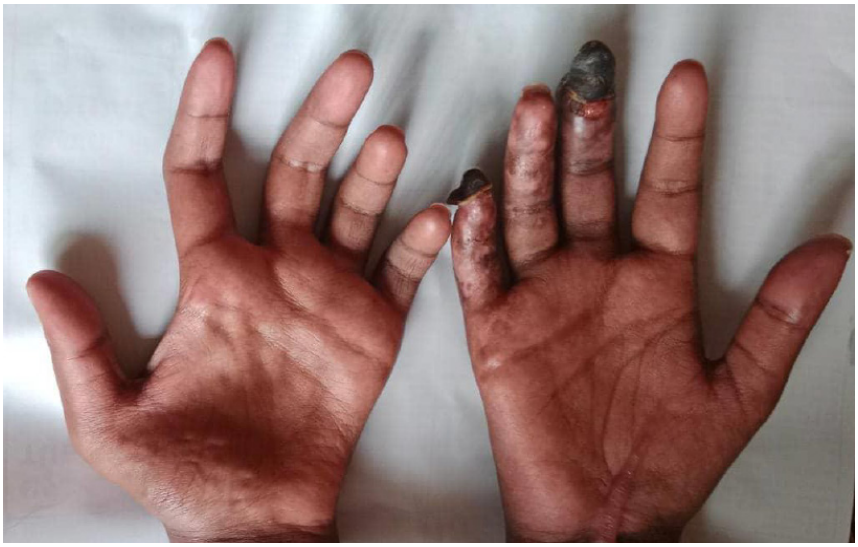

FIGURE 2. Bilateral hands sclerodactyly with fingertip lesion.

Thromboembolism is another clinical manifestation that may occur in patients with asplenia or hyposplenism, but available data on epidemiology and risk factors are very limited.[13] An increased risk of thromboembolic events has been noted in patients who have undergone splenectomy, and this increased risk appears to be at least partially independent of the typical reactive thrombocytosis noted in these patients.[14] In patients with hyposplenism, the contribution of impaired splenic function to thrombotic events is still unclear.

Prophylactic measures with immunizations are necessary for individuals with asplenia to prevent disastrous infection. It is recommended to ensure patients with functional asplenia to receive their *Pneumococcal, Meningococcal, Haemophilus influenzae* (HiB), tetanus, diphtheria, pertussis (DTaP), measles, mumps, rubella, varicella (MMRV) and Influenza vaccinations.[15,16] Individuals with hyposplenism or asplenia should be advised to present to their nearest hospital for prompt treatment in the event of fever.[17]

CONCLUSION

We describe a case of a patient with splenic atrophy and its possible association with systemic sclerosis. Hyposplenism should be suspected in patients with adult-onset infections caused by encapsulated bacteria, especially if autoantibodies are present. Early diagnosis and prompt vaccination can help to prevent potentially life-threatening sepsis. Puzzling associations between splenic atrophy and autoimmune disorders still requires more evidence and pathophysiology studies.

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