Radiology Case Reports 16 (2021) 2742–2745

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case report

Post-traumatic intrathoracic splenosis and role of Tc-99m Sulfur colloid scintigraphy in confirmation ☆,☆☆

Harpreet Sawhney, MD[a], *Darshan Gandhi, MD*[b,*], *Gaurav Parmar, MD*[c], *Muhamad Serhal, MD*[d], *Frank H. Miller, MD FACR*[e], *Michael Magnetta, MD, MS*[f]

[a] *Department of Diagnostic Radiology, Bridgeport Hospital at Yale New Haven Health, Bridgeport, CT, USA*
[b] *Department of Diagnostic Radiology, Northwestern Memorial Hospital, Northwestern University Feinberg School of Medicine, 676 N St. Clair St, Suite 800, Chicago, IL 60611, USA*
[c] *Department of Diagnostic Radiology, Bridgeport Hospital at Yale New Haven Health, Bridgeport, CT, USA*
[d] *Department of Medicine, Lebanese University Faculty of Medical Sciences, Hadath, Lebanon*
[e] *Department of Radiology Northwestern Memorial Hospital, Northwestern University Feinberg School of Medicine, Consulting Editor, Radiologic Clinics of North America, Editor, Advances in Clinical Radiology, Chicago, IL, USA*
[f] *Division of Abdominal Imaging, Northwestern Memorial Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL, USA*

ARTICLE INFO

Article history:
Received 8 June 2021
Revised 18 June 2021
Accepted 21 June 2021

Keywords:
Intrathoracic splenosis
Ectopic spleen
Splenic trauma
Tc99 Sulfur colloid

ABSTRACT

Splenosis is acquired ectopic splenic tissue, usually a sequela of trauma. Its imaging appearance is can be deceiving, and at unusual locations may be mistaken for an alternate cause mass lesion. We present one such unusual case of splenosis in a 53 year-old man with history of heart failure involving the thoracic cavity identified as splenosis on nuclear medicine imaging and suspicion was raised given the remote history splenectomy after splenic rupture during trauma. We will discuss the imaging appearances of splenosis on CT, MRI and nuclear medicine studies, with emphasis on using nuclear medicine as a modality of choice to avoid biopsy. We will also go on to include a brief review of literature on this topic in this article. The key facts are role of detailed clinical history and requirement of high index of suspicion to avoid unnecessary intervention in the case of splenosis.

☆ Competing Interests: The authors declare that they have no competing or conflicts of interests.
☆☆ Patient consent: Verbal consent was obtained from patient during his hospital stay.

* Corresponding author.
E-mail address: darshangandhi7@gmail.com (D. Gandhi).

https://doi.org/10.1016/j.radcr.2021.06.069

Introduction

Ectopic splenic tissue can be congenital or acquired. Splenosis is defined as auto transplantation or implantation of the normal splenic tissue at a site different from the usual site of spleen [1,2]. The incidence of splenosis is estimated with a long range from 16 to up to 65% in patients with history of splenic trauma/ rupture from various etiologies [1–4]. Spleen is the most frequently and often the only injured organ of blunt abdominal trauma. It is usually asymptomatic, however may sometimes present with nonspecific pain, bleeding (including hemoptysis), and anemia due to red blood cell sequestration [1,2]. Ectopic splenic tissue can traverse the diaphragm through acquired or congenital defects and seed the pleural space leading to intrathoracic masses identified on imaging studies sometimes years after the initial trauma. The correct diagnosis of thoracic splenosis is difficult, but crucial. Surgical Guidelines recommend nodular lesions of unknown origins within the thoracic cavity should be removed; however, removal of intrathoracic splenic tissue is not recommended [5]. The congenital anomaly of the acquired splenosis counterpart is called wandering spleen. It is an extremely rare situation where spleen migrates to unusual position in lower abdomen or pelvis most likely due to congenital absence or laxity of its suspensory ligaments.

Case history

We present the case of a 53-year-old man with a history of heart failure, who underwent cardiac stress MRI for evaluation of cardiac ischemia and myocardial viability. The MRI showed normal myocardial perfusion with severe right ventricular dysfunction and dilatation of the pulmonary trunk consistent with pulmonary hypertension and secondary right heart strain. Incidentally noted were enhancing pleural based masses in the left lower thorax measuring up to 3.5 cm.

Relevant past medical history includes morbid obesity, chronic obstructive pulmonary disease (COPD), severe right ventricle dysfunction secondary to portal hypertension and coronary artery disease. Cardiac MRI was performed to evaluate for cardiomyopathy and right ventricle dysfunction which showed homogenously enhancing masses in left lung base and left upper quadrant of the abdomen (Fig. 1).

A chest CT was obtained for further characterization. IV contrast was not administered due to an unrelated acute kidney injury. The CT showed multiple left thoracic pleural masses measuring up to 3.5 cm (Fig. 2). The spleen was not seen but small splenules were present in the left upper quadrant. The thoracic lesions were similar in density to the left upper quadrant splenules. Further detailed history from the patient was obtained and he reported a remote history of splenectomy status post splenic rupture after a car accident.

Thoracic splenosis was suspected based on the imaging appearance and the clinical history and the patient underwent a Tc-99m filtered Sulfur Colloid scintigraphy for confirmation (Fig. 3).

Discussion

Intrathoracic splenosis is a rare condition and important to correctly identify on imaging to avoid unnecessary biopsy or surgical exploration [1,2]. Careful image characterization based on location, size, capsule, internal characteristics and feeding arteries can help distinguish between accessory splenule and splenosis [1,2,4]. Accessory spleens are usually found in the region of splenopancreatic or gastro-splenic ligaments and on the left side dorsal mesogastrium. Post traumatic ectopic splenic tissue is often in unpredictable locations and can be found in the peritoneum, along the serosal surface of the bowel, greater omentum, pelvic or thoracic cavities, and sometimes in other viscera such as liver or pericardium [1,2,4].

Accessory spleens are usually round, well defined, well encapsulated, contain normal hilum and supplied by small branches of the splenic artery. It is more common than splenosis and often discovered incidentally on imaging studies, during autopsy or surgery for an unrelated pathology. Accessory spleens are a result of failure of fusion of normal splenic tissue during embryology and usually measure between 1.5–6 cm whereas, ectopic splenic tissue in the setting of splenosis is usually un-encapsulated or poorly capsulated and have no characteristic shape. Splenosis recruit vascular supply from

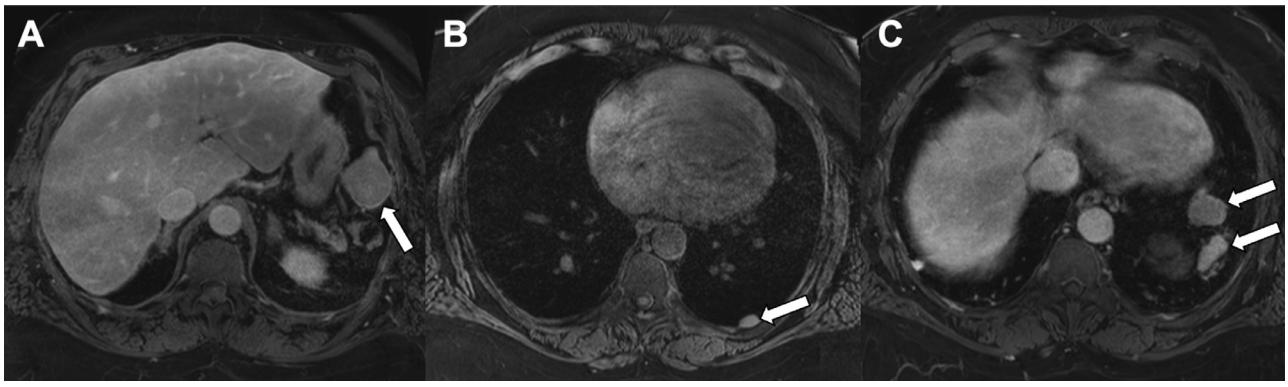

Fig. 1 – T1 fat saturated post contrast sequence during Cardiac MRI show homogenously enhancing masses in left lung base and left upper quadrant of the abdomen (A, B, and C) (white arrows).

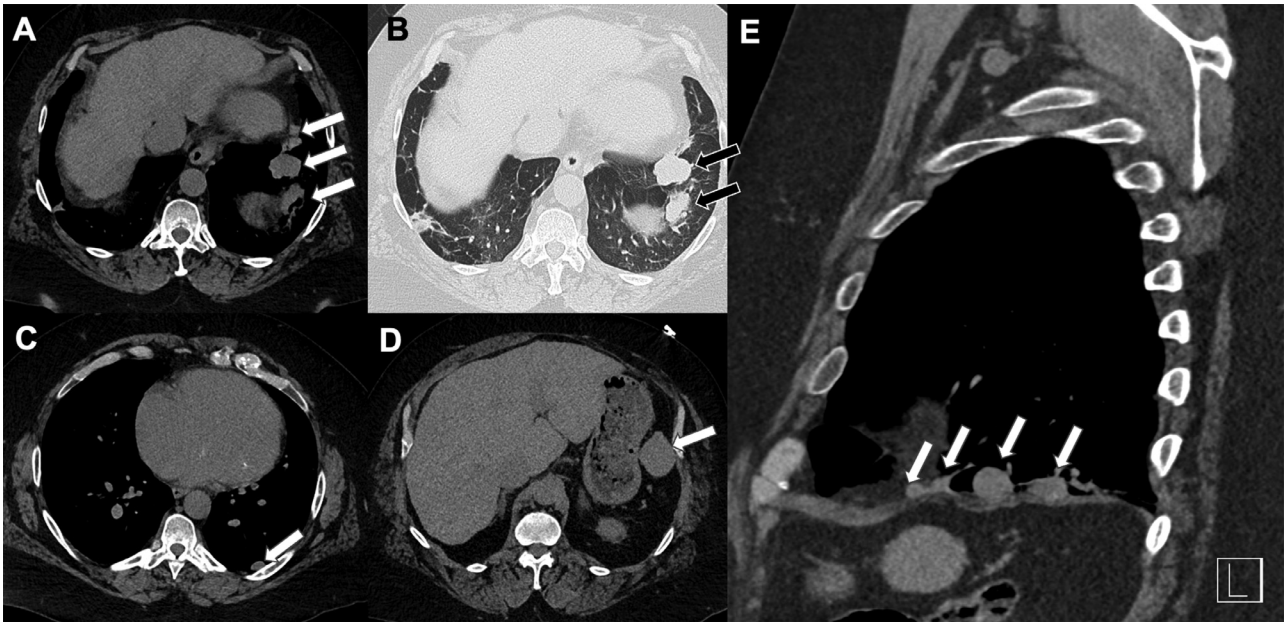

Fig. 2 – CT Chest noncontrast axial soft tissue window (A and C) and axial lung window (B) shows a few well-defined soft tissue nodules and masses in left lower lung parenchyma abutting left parietal pleura and left hemidiaphragm (black and white arrows). Upper abdomen in CT Chest noncontrast axial soft tissue window (D) shows small remnant splenic tissue in left upper quadrant in patient with remote history of splenic trauma. The soft tissue nodules also seen abutting left hemidiaphragm in CT Chest sagittal soft tissue window (E) (white arrows).

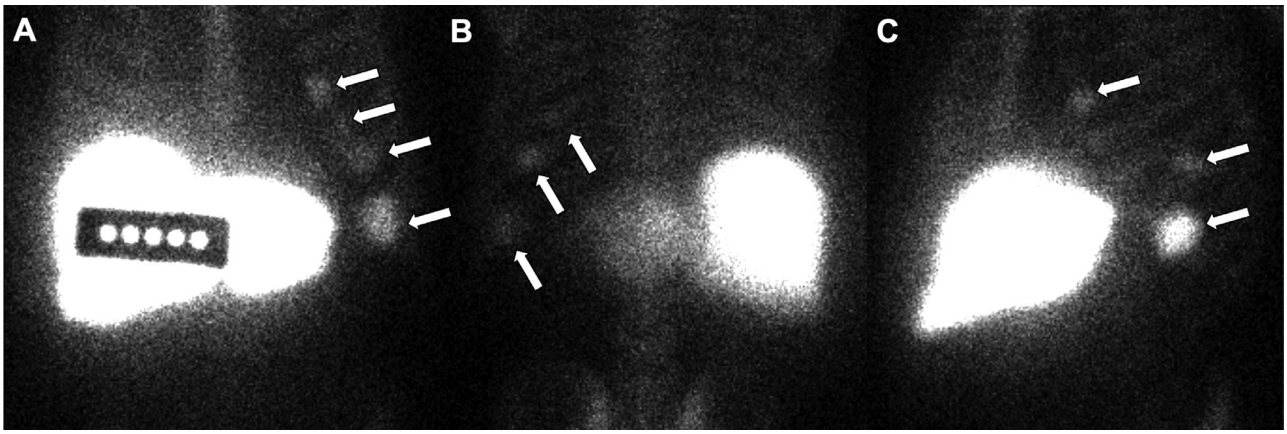

Fig. 3 – Tc-99m filtered Sulfur Colloid scintigraphy scan in anteroposterior view (A), posteroanterior view (B) and left posterior oblique view (C) show focal areas of tracer uptake in the region of left lung base and left upper quadrant of the abdomen suggests component of intrathoracic splenosis with remnant splenic tissue in left upper abdomen (white arrows).

adjacent vasculature and can measure anywhere ranging from few centimeters upto reported 12 cm [1,2,6,7]. They can be a single mass or multiple lobulated masses.

One such rare location for ectopic splenic tissue is within the thoracic cavity, mimicking a lung or pleural mass. It is almost always described in the left hemithorax, resulting from injuries to the spleen and left diaphragm that occur simultaneously. The time interval between the injury to the abdomen and discovery of thoracic splenosis ranges from several years to decades, in our case the interval was about seven years. The majority of cases are asymptomatic, although chest pain, hemoptysis and cough have been reported. These are usually the result of mechanical compression or irritation [5].

A detailed history and clinical examination are very helpful to aid the diagnosis. Physical examination findings such as a scar in the left upper quadrant and midline laparotomy should raise suspicion for possible etiology [5].

Asymptomatic cases present as incidental findings on CXR or CT scans as a solitary nodule or multiple pleural based masses. CT scans help with exact localization as well as shape/ size of the lesions, however, cannot distinguishing ectopic splenic tissue from other differentials such as lung cancer, mesothelioma, solitary fibrous tumors or lymphoma [5]. CT findings of asplenia if present can offer important clues to include thoracic spenosis within differential for a thoracic nodular lesion/s. Hematologic marker such as absent Howell-Joly Bodies or siderocytes in peripheral blood post splenectomy, indicate presence of functional splenic tissue. Diagnosis of splenosis can be easily ruled in or out via a nuclear medicine splenic study such as heat denatured RBC scan (Gold Standard), or a Tc99m WBC Sulphur colloid scan. Tc99m RBC imaging is more specific and is performed with re-injecting patient's own RBCs after labelling them with with TC. 90% of Tc-99m labelled autologous RBCs are taken by reticuloendothelial cells, which is helpful to identify the ectopic splenic tissue (i.e. Splenosis). Another less common scintigraphy agent In-111 labeled platelets are more sensitive than Tc-99m sulfur colloid scintigraphy, as they have also higher predilection toward reticuloendothelial cells in the liver, spleen, and bone marrow [2,8]. In literature review by Yammine et al, among the 38 cases with splenosis, 13 of them undergone the radionuclide imaging with confirmed diagnosis however there is no published large-scale data to evaluate for false positives or false negatives for splenosis for radionuclide imaging [9].

MRI can also be helpful for diagnosis of splenosis. On T1 weighted sequences, ectopic splenic tissue will appear hypointense with a thin hypointense rim. On T2WI, it may appear as an iso-hyperintense structure and would restrict diffusion on diffusion weighted imaging [1,2,8]. Superparamagnetic iron oxide (SPIO) contrast-enhanced MRI is rarely performed, however, can be used to differentiate between splenosis and other thoracic masses. SPIO particles are taken up by the normal reticuloendothelial cells including the splenic tissue and cause signal loss on the T2WI, making splenosis T2 hypointense on SPIO-enhanced MRI [1,2,6]. Chemical shift imaging is another less commonly used sequence for diagnosing splenosis, where hemosiderin deposition in the normal splenic tissue causes signal to drop and hypointensity on in-phase T1 imaging as compared to out of phase imaging [2,10].

Conclusion

Thoracic splenosis is a rare condition that should be diagnosed and managed non-surgically, without need for biopsy. Detailed clinical history, physical examination, and asplenia offer important diagnostic clues for the presence of this entity and can be easily confirmed via nuclear medicine studies.

Ethical statement

The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

[1] Menth M, Herrmann K, Haug A, Raziorrouh B, Zachoval R, Jung CM, et al. Intra-hepatic splenosis as an unexpected cause of a focal liver lesion in a patient with hepatitis C and liver cirrhosis: a case report. Cases J 2009;2:8335 Published 2009 Aug 19. doi:10.4076/1757-1626-2-8335.

[2] Gandhi D, Sharma P, Garg G, Songmen S, Solanki S, Singh T. Intrahepatic splenosis demonstrated by diffusion weighted MRI with histologic confirmation. Radiol Case Rep. 2020;15(5):602-606. Published 2020 Mar 19. doi:10.1016/j.radcr.2020.02.022.

[3] Li S, Gupta N, Kumar Y, Mele F. Splenic laceration after routine colonoscopy, a case report of a rare iatrogenic complication. Transl Gastroenterol Hepatol 2017;2:49 Published 2017 May 16. doi:10.21037/tgh.2017.04.11.

[4] Li S, Goyal B, Cooper JD, Abdelbaki A, Gupta N, Kumar Y. Splenic rupture from babesiosis, an emerging concern? A systematic review of current literature. Ticks Tick Borne Dis. 2018;9(6):1377–82 Epub 2018 Jun 12. PMID: 29954722. doi:10.1016/j.ttbdis.2018.06.004.

[5] Tulinský L, Ihnát P, Mitták M, Guňková P, Zonča P. Intrathoracic splenosis - lesson learned: a case report. J Cardiothorac Surg 2016;11(1):72 Published 2016 Apr 26. doi:10.1186/s13019-016-0474-3.

[6] Imbriaco M, Camera L, Manciuria A, Salvatore M. A case of multiple intra-abdominal splenosis with computed tomography and magnetic resonance imaging correlative findings. World J Gastroenterol 2008;14(9):1453–5. doi:10.3748/wjg.14.1453.

[7] Izzo L, Caputo M, Galati G. Intrahepatic accessory spleen: imaging features. Liver Int 2004;24(3):216–17 PMID: 15189272. doi:10.1111/j.1478-3231.2004.00915.x.

[8] Tsitouridis I, Michaelides M, Sotiriadis C, Arvaniti M. CT and MRI of intraperitoneal splenosis. Diagn Interv Radiol 2010;16(2):145–9 Epub 2009 Oct 19. PMID: 19838993. doi:10.4261/1305-3825.DIR.1855-08.1.

[9] Yammine JN, Yatim A, Barbari A. Radionuclide imaging in thoracic splenosis and a review of the literature. Clin Nucl Med 2003;28(2):121–3. doi:10.1097/01.RLU.0000048681.29894.BA.

[10] Choi GH, Ju MK, Kim JY, Kang CM, Kim KS, Choi JS, et al. Hepatic splenosis preoperatively diagnosed as hepatocellular carcinoma in a patient with chronic hepatitis B: a case report. J Korean Med Sci 2008;23(2):336–41. doi:10.3346/jkms.2008.23.2.336.