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A Rare Inflammatory Myofibroblastic Tumor of the Spleen: A Case Report

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Abstract. *Background/Aim: Inflammatory myofibroblastic tumors (IMTs) are rare, solid, potentially malignant lesions of uncertain etiology. Histologically, IMTs exhibit a combination of lymphocytes and inflammatory cells within a fibroblastic myxoid layer. The diagnosis of IMTs poses a challenge for various medical specialties, including surgeons, pathologists, and oncologists, due to their non-specific clinical presentation. Furthermore, radiologists face difficulties in interpreting computed tomography (CT) or magnetic resonance imaging (MRI) results, which often yield polymorphic and inconclusive findings. Ultimately, histopathologists play a crucial role in reaching a definitive diagnosis based on the tumor's histological characteristics. They are detected in every system of the human body, most commonly in the lungs. Here, we report an uncommon occurrence of IMT in the spleen of a patient with nonspecific abdominal pain. Case Report: A 56-year-old Caucasian female presented to Konstantopouleio General Hospital of Nea Ionia, Athens, Greece, with abdominal pain and discomfort. The patient had no significant medical history and normal laboratory tests. An abdominal CT revealed a large mass in the spleen. A splenectomy was performed. Histopathological analysis of the tumor revealed IMTS. Conclusion: Splenic IMT is a rare benign tumor with moderate malignant potential. It lacks a distinct clinical presentation and is typically identified either incidentally or during the examination of abdominal pain.*

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Inflammatory pseudotumors are more prevalent among the pediatric and young adult populations (1, 2). Inflammatory myofibroblastic tumors (IMTs) are uncommon neoplasms, which can manifest in every site of the human body, mainly in the lung and orbit. Their composition consists of a combination of plasma cells and/or lymphocytes within a spindle cellular myxoid stroma. The complex and variable histology of these tumors has led to alternative names, such as IMT, plasma cell granuloma, xanthomatous pseudotumor, postinflammatory tumor, inflammatory myofibroblastic proliferation, myofibroblastoma, and pseudosarcomatous myofibroblastic proliferation, due to their complex and variable histology (3).

Clinical presentation varies, ranging from asymptomatic in smaller solitary masses to symptomatic in larger pseudotumors, with signs and symptoms depending on tumor location or nonspecific systemic symptoms. The preferred treatment is a complete surgical resection of the tumor (4, 5). Here, we present a rare case of an IMT of the spleen in a patient with nonspecific abdominal pain, and a free medical history. The patient provided written informed consent for the publication of this case report and any accompanying images.

Case Report

A 56-year-old Caucasian woman with a free medical record presented to the hospital complaining of abdominal pain in the left hypochondrium and discomfort. Clinical examination

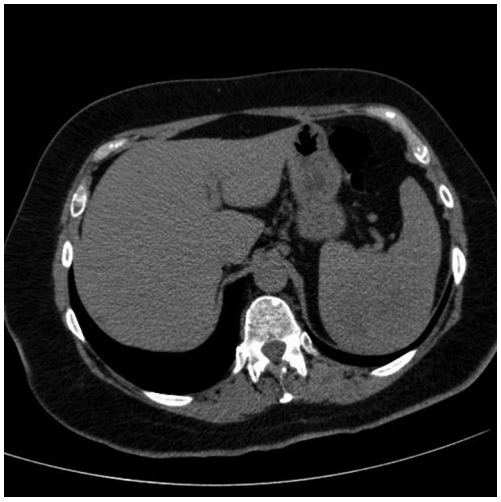

Figure 1. *Axial CT reveals an isoattenuated spleen lesion in the pre-contrast images.*

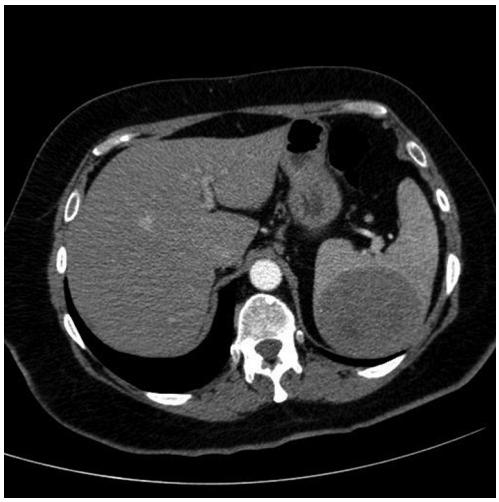

Figure 2. *During the arterial phase on post-contrast images, CT illustrates a clearly defined hypoattenuated lesion in the splenic parenchyma.*

revealed mild tenderness in the left hypochondrium. To investigate the cause of the abdominal pain, laboratory tests and an abdominal computed tomography (CT) scan were employed. Laboratory tests were normal. However, the CT scan with intravenous contrast depicted a large mass in the spleen. As shown in Figure 1, the CT scan depicts an ill-defined almost isoattenuated area of the spleen in the pre-contrast images. Following the intravenous contrast agent administration during the arterial phase, the CT revealed a distinct hypoattenuated lesion within the spleen parenchyma (Figure 2). Subsequently, as indicated in Figure 3, in the portal phase, cystic necrotic lesions were observed within this hypoattenuated area.

The patient underwent a splenectomy, and biopsies were taken. Histopathological analysis of the tumor revealed an IMT.

The spleen was mildly enlarged, weighing 437 g and measuring 13.5×7×9.6 cm. The obtained sections revealed a subcapsular, well-defined, and subrounded structure measuring 7.1×6.9×6 cm, displaying a whitish-green hue and localized necrotic areas (Figure 4). No macroscopic abnormalities were observed in the remaining splenic parenchyma.

Specifically, the histopathological examination unveiled a partially encapsulated lesion with a combination of mesenchymal and inflammatory components. The predominant inflammatory cells comprised lymphocytes and plasma cells, with notable presence of eosinophils, along with fewer mast cells and neutrophils. The mesenchymal component consisted of spindle cells that were arranged in more distinct short and thin bundles intersecting at acute angles (Figure 5). These spindle cells were mixed with inflammatory cells and showed a moderate amount of fibrillar cytoplasm and mild nuclear atypia, as illustrated in Figure 6.

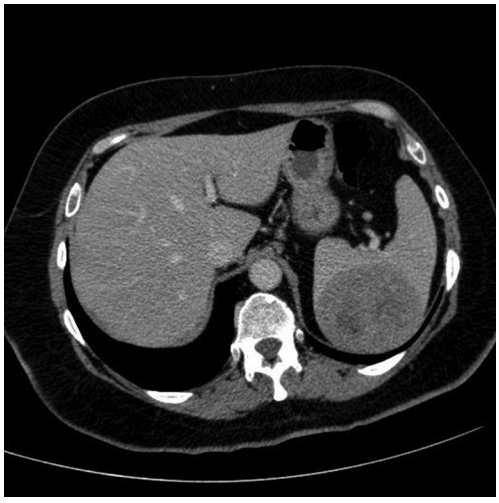

Figure 3. *In the portal phase on post-contrast images, CT displays a well-circumscribed hypoattenuated lesion in the splenic parenchyma, featuring central cystic necrotic and degenerative areas.*

Several regions of necrosis, constituting less than 15% of the total lesion area, and a few microabscesses were detected. The mitotic count in the most active areas was 2/10 High Power Fields (HPF) without atypical forms. No acid-fast bacilli were identified on the Ziehl-Neelsen stain. Immunohistochemical analysis revealed that mesenchymal cells exhibiting a myofibroblastic phenotype tested positive for smooth muscle actin (SMA) and Vimentin (Figure 7), and negative for epithelial (AE1/AE3), myogenic (desmin, caldesmon), Langerhans cell (S100, CD1a), histiocytic

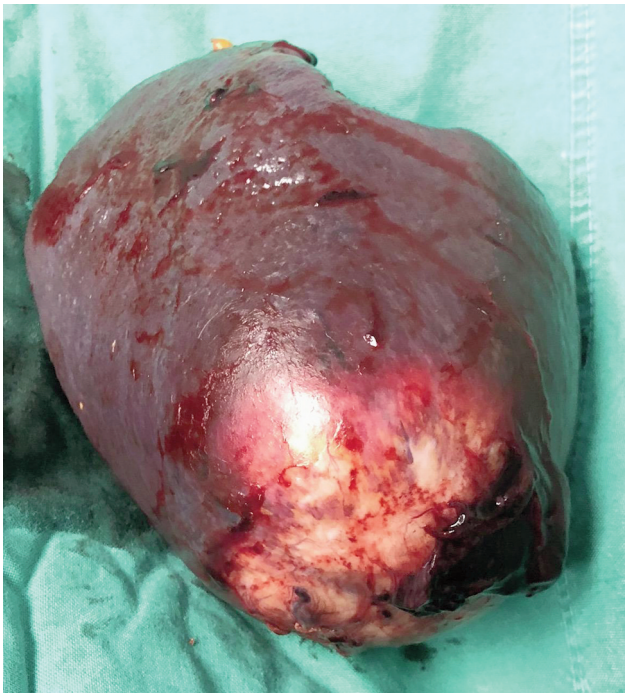

Figure 4. *Surgical specimen of the spleen. An area of the lesion with a white-greenish tinge and local presence of necrotic areas is visible.*

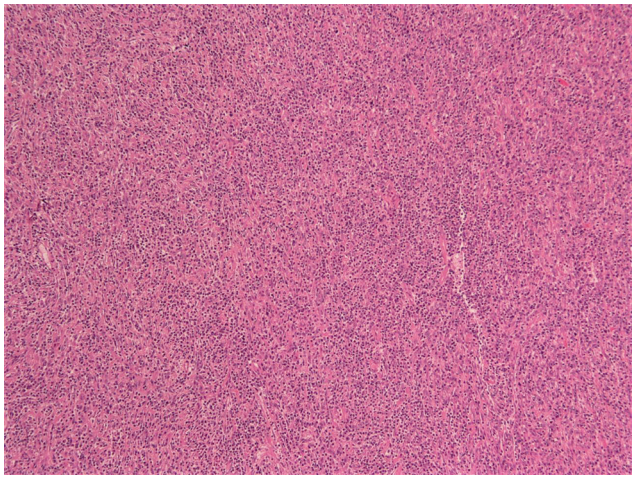

Figure 5. *Rough or more distinct short and thin bundles of spindle cells intersecting at acute angles, H&E 100×.*

(CD68), dendritic cell (CD23), and endothelial (CD34, CD31, FVIII) markers. No immunoreactivity to ALK was observed.

Discussion

IMT was first described in the lungs by Brunn, who initially termed it an inflammatory pseudotumor. Other names used to describe

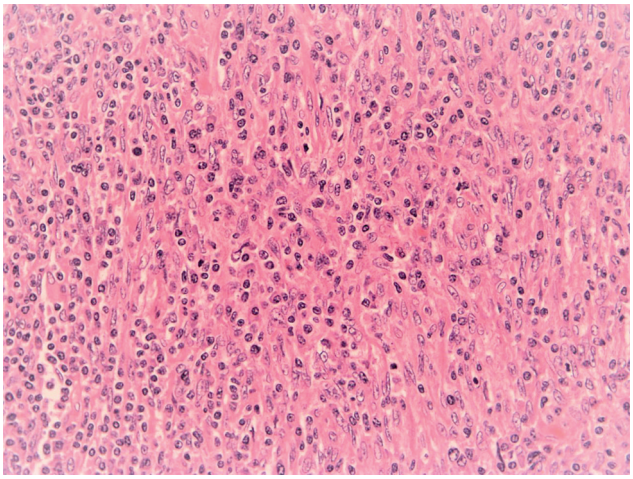

Figure 6. *Spindle cells with mild nuclear atypia and a moderate amount of fibrillar cytoplasm, along with inflammatory cells (mainly lymphocytes and plasma cells; numerous eosinophils and oligomeric mast cells and neutrophils, H&E 400×).*

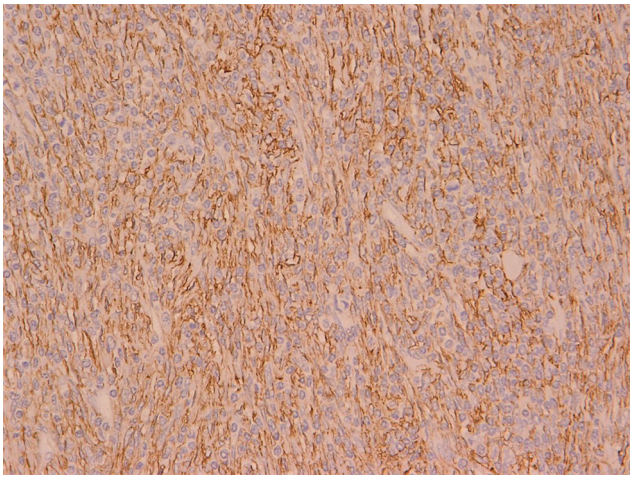

Figure 7. *Immunohistochemically, the mesenchymal cells that exhibit a myofibroblastic phenotype are positive for smooth muscle actin (SMA) and Vimentin stain 200×.*

IMT according to the international literature are IMT, plasma cell granuloma, xanthomatous pseudotumor, postinflammatory tumor, inflammatory myofibroblastic proliferation, myofibroblastoma, and pseudosarcomatous myofibroblastic proliferation (3, 6). However, the term 'inflammatory myofibroblastic tumor' is the official term for its description (7).

IMT is frequently observed in pediatric and adolescent populations. IMT occurs primarily in the lungs, but also in extrapulmonary sites throughout the body, with the most common being the liver, heart, orbit, central nervous system, and retroperitoneum (8-12).

The underlying pathophysiological mechanism remains unidentified. Possible pathogenic mechanisms for IMT include infections, trauma, previous surgeries, and chromosomal abnormalities, such as those involving the ALK gene (13-17). Viral infections caused by HIV, HHV 8, and EBV are known to be linked to the development of IMT (18-20). EBV RNA was detected in nearly 40% of the overall patient population. In these cases, IMT is usually detected in the spleen or liver, characterized by the presence of infected spindle-shaped cells, which are more likely to exhibit follicular dendritic markers rather than myofibroblastic markers.

The typical symptoms encountered by patients with IMT, such as pain, anemia, fatigue, and weight loss, mirror those of many malignancies. Thus, the differential diagnosis of IMT primarily encompasses other solid malignancies and poses challenges due to their comparable clinical presentations. CT scan and MRI are useful tools in the investigation of abdominal pain. In conclusion, the diagnosis of IMTs primarily relies on histopathological and immunohistochemical examinations.

On the CT scan, the mass appears as an ill-circumscribed hypoattenuated lesion, calcified or noncalcified, and exhibits mild enhancement. Following the administration of contrast medium, a diverse range of patterns becomes apparent. In the delayed phase, there may be a peripheral area displaying an iso- or hyperattenuated pattern (21, 22). Cellular elements are visualized on CT as hypoechoic and low-attenuated, while inflammatory elements are hypoattenuated (22). In our patient, the tumor exhibited cellular characteristics, resulting in hypodensity compared to the surrounding normal splenic parenchyma.

On Magnetic Resonance Imaging (MRI), IMT typically presents as a well-defined splenic mass exhibiting T1 iso- or hypo-intensity, while the T2 signal varies depending on the cellular content and presence of fibrotic elements, resulting in hyperintensity or hypointensity, respectively. In gadolinium-enhanced images, the lesion demonstrates early peripheral arterial enhancement, a low central stellate T2 signal, and delayed progressive enhancement. These findings are widely considered to strongly indicate the presence of IMT.

IMT consists of spindle-shaped cells with myofibroblastic features intermingled with inflammatory cells, such as plasma cells, lymphocytes, and eosinophils (6). IMT is classified into three distinct histopathological subcategories: xanthogranuloma, plasma granuloma, and sclerosing pseudoplasm. Each lesion may present a combination of these three subtypes (21).

Immunohistochemistry (IHC) is considered a useful tool to confirm the diagnosis. There are three histological patterns of IMTs, according to Coffin *et al*.: A myxoid vascular pattern, a low-cellularity collagenous arrangement, and a dense arrangement of spindle cells organized in either a fascicular or storiform pattern (7).

IMT is classified as a benign neoplasm with moderate biologic potential (6, 23). The assessment of its aggressiveness is particularly important in determining the most appropriate treatment. The aggressiveness of IMTs is determined by location, multinodularity, and proximity to vital structures. Studies suggest that tumors of the abdomen and retroperitoneum show the most aggressive behavior (24). In cases of malignant transformation, the IMT shows prominent, vesicular nuclei with mitosis. In our case, no atypical cells or mitosis were detected, and after a one-year follow-up, no metastases or local infiltration occurred.

The primary treatment approach typically involves a complete resection of the tumor. Systemic administration of corticosteroids can also lead to tumor regression (25). In cases of metastatic disease or where the IMT cannot be completely resected, chemotherapy is recommended. However, there is no definitive data on the effectiveness of chemotherapy. A total splenectomy was performed in our case.

Conclusion

IMTs are rare, solid tumors that can be found in any organ of the body. Their symptoms vary. They may appear asymptomatic, symptomatic associated with mass effect, or non-specific systemic symptoms. Their diagnosis is difficult and is not based on imaging tests since they cannot be differentiated from other entities, such as malignancies. Their final diagnosis is established by histological examinations. Their course is uncertain, although they are benign tumors of intermediate biological potential. The treatment of choice is their complete excision.

Conflicts of Interest

The Authors assert that they do not have any conflicting interests in relation to this study.

Authors' Contributions

FD and KM were the primary contributors to drafting the manuscript. KM is corresponding author. DS and CE conducted the surgical treatment. PK conducted the histopathological examination of the specimen. TC, CD, TT, and MP reviewed and endorsed the final version of the manuscript. All Authors have reviewed and approved the final manuscript.

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