Splenic metastasis usually dose not occur in the absence of disseminated metastatic disease. Isolated splenic metastasis secondary to thymic carcinoma, which rarely metastasizes extrathoracically, has never been documented in the literature. We present a 74-years-old man with an isolated splenic metastasis secondary to thymic carcinoma. The imaging findings and pathogenesis of the splenic metastasis were discussed and the literature was reviewed.

Key words: Spleen, CT; Spleen, metastases, Spleen, US; Thymus, neoplasms

Thymic carcinomas are rare tumors, usually demonstrating malignant features histopathologically and clinically with local invasion to adjacent organs. Extrathoracic metastasis is rare and predominantly to bone, liver, and kidney. Metastatic disease involving the spleen is uncommon, and isolated metastasis to the spleen without involvement of other visceral organs is extremely rare. Common origins of splenic metastases include lung, breast, prostate, and melanoma. To our knowledge, isolated metastasis to the spleen secondary to the thymic carcinoma has not been reported in any English literature. Herein we report a 74-year-old man of thymic carcinoma who has an isolated metastasis to the spleen.

CASE REPORT

A 74-year-old man was admitted to our hospital because of persistent productive cough and low-grade fever for two weeks. He was diagnosed as thymic carcinoma one year ago and has undergone chemotherapy and radiotherapy.

After admission, physical examinations revealed rales over bilateral lung bases while laboratory examinations demonstrated no remarkable abnormality. Chest radiographs showed patchy opacities over bilateral lower lung zones with marked pleural effusion. In addition to the thymic carcinoma accompanied with areas of pneumonic patches over bilateral lungs, contrast-enhanced chest computed tomography incidentally disclosed an ovoid soft-tissue mass in the spleen (Fig. 1a). The ill-defined mass, measured $5.6 \times 5.2 \times 4.8$ cm in size, showed moderate contrast enhancement which was slightly lower than that of the adjacent normal splenic parenchyma. Besides, there was no remarkable lymph node enlargement intrathoracically. On sonography, there was a well-demarcated mass with heterogeneous hyperechogenicity in the spleen (Fig. 1b). There was no evidence of abdominal lymphadenopathy or mass in the rest of abdominal organs.

As the patient experienced dyspnea with the
marked pleural effusion, thoracentesis was performed. Considering possible pleural involvement from the thymic carcinoma, we performed pleural biopsy as well. However, pathological examinations of both the pleural fluid and biopsied pleura revealed no evidence of malignancy. Although bacterial cultures of the pleural effusions yielded negative result, pseudomonas aeruginosa was noted in the sputum cultures. Under the impression of bacterial pneumonia with parapneumonic effusion, the patient undertook antibiotics for treatment.

Ultrasound-guided biopsy of the splenic mass was performed and revealed cohesive cell clusters composed of mainly pleomorphic epithelial cells and some matured small lymphocytes (Fig. 2), which was consistent with thymic metastasis. For further investigation, whole-body bone scan was obtained and it manifested no evidence of bony metastasis. The patient recovered from the pneumonia after the antibiotics treatment and then underwent another course of chemotherapy with stationary status in the following 3 months.

**DISCUSSION**

Metastatic disease occurring in the spleen is uncommon. Most patients with splenic metastases have widely disseminated metastatic disease [1-3]. Isolated metastasis to the spleen is exceedingly rare and the patients are usually asymptomatic unless marked splenomegaly is present. Splenic metastases appear more frequently in tumors with a strong metastatic potential, especially those that have metastasized to several organs via a hematogenous route.

The primary sites of isolated splenic metastasis include ovary, breast, endometrium, lung, skin, prostate, and colon [1, 4-9]. In the extensive literature review, we found no case with thymic carcinoma was reported to have isolated splenic metastasis without the involvement of other organs.

Tumors may spread to the spleen via the splenic artery, retrograde via the splenic vein, or via the lymphatics [9]. Although no definite reason has been given, some hypotheses have been proposed to explain the rarity of the splenic metastasis. Anatomically, lack of afferent lymphatics and the acute angle of the splenic artery from the celiac artery may prevent large clumps of tumor cells from getting access to the spleen [10]. Besides, the spleen itself serves the
Splenic metastasis secondary to thymic carcinoma


Thymic carcinoma is a malignant thymic epithelial neoplasm that possesses cytologic features of nuclear atypia, significant mitotic activity, and necrosis. They have been reported to account for only 0.06% of all thymic neoplasms [13] and generally infiltrate contiguous structures. It is unusual for metastasis, either hematogenous or lymphogenous, to be found in the extrathoracic organs. The predominant extrathoracic metastatic sites are bone, liver, and kidney [14-16]. Just as other tumors that metastasize to the spleen, a thymic carcinoma has been reported to present with widespread metastases when splenic involvement was evident [17].

In the study of Yamakawa et al, lymphogenous metastasis was considered to progress from anterior mediastinal lymph nodes to intrathoracic and then to extrathoracic lymph nodes while no particular characteristics were observed in hematogenous metastasis [18]. In our case, there was no remarkable intrathoracic lymph node enlargement to suggest the lymphogenous nature of the metastasis.

Lymphomas and hemangiomas are the most common primary malignant and benign splenic tumors, respectively. In contrast, metastasis of the spleen is uncommon and may be solitary or multiple. In computed tomography, metastases usually appear as round or ovoid areas with lower attenuation than the adjacent normal splenic parenchyma [19]. Following contrast administration, most splenic metastases will not increase much in attenuation but rim enhancement may be seen [20]. On sonography, hypo- and hyperechoic patterns have been observed without a reliable relationship to the nature of the primary tumor [21]. Since the imaging findings are nonspecific, biopsy is often necessary with clinical suspicion of splenic metastasis.

In summary, although it is extremely rare, isolated splenic metastasis should be taken into consideration in the patients of thymic carcinoma with the presence of splenic tumor. ◆

REFERENCES
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在沒有瀰漫性轉移的情況下，脾臟通常不會發現轉移性病灶。胸腺癌原本就很少造成胸腔外的轉移，而以單獨脾臟轉移的病例，在文獻上並沒有被報告過。本病例是一位74歲男性，患有胸腺癌且單獨轉移至脾臟，我們討論其影像表現，並回顧文獻說明可能的病理機轉。

關鍵詞：脾臟，電腦斷層；脾臟，轉移；脾臟，超音波；胸腺腫瘤