CASE REPORT

Solitary splenic metastasis from lung adenocarcinoma: A case report

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Abstract
Solitary splenic metastasis is extremely rare, with only 27 reported cases in the literature. An 81-year-old woman was referred to our hospital for treatment of pulmonary and splenic lesions. Chest computed tomography showed a small lung nodule in the right upper lobe, abdominal computed tomography showed an 8 cm splenic mass with abnormal accumulation, and positron emission tomography revealed a maximum standardized uptake value of 7.9. She had elevated serum cancer antigen 19-9 (1847 U/mL) and carcinoembryonic antigen concentrations (17.9 ng/mL). She underwent laparoscopic splenectomy. Pathological examination revealed poorly differentiated adenocarcinoma. We subsequently performed partial lung resection and diagnosed the small lung lesion as lung adenocarcinoma. Both lesions were positive for thyroid transcription factor 1. Thus, primary lung adenocarcinoma and solitary splenic metastasis were diagnosed. The patient was still alive without recurrence four years postoperatively. Herein, we report a rare case of lung adenocarcinoma with solitary splenic metastasis and review the literature.

Introduction
Splenic metastasis from lung cancer is very rare. In a recent study, splenic metastasis from lung cancer was found in 12 out of 997 patients, and all 12 patients had metastases in other abdominal organs.1 We herein report a case of solitary splenic metastasis from lung adenocarcinoma.

Case report
An 81-year-old woman was referred to our hospital for treatment of pulmonary and splenic lesions. Chest computed tomography (CT) showed a pulmonary nodule measuring 7 mm in diameter in the right upper lobe (Fig 1). Abdominal CT showed a splenic mass measuring 8 cm in diameter (Fig 2). Fluorodeoxyglucose positron emission tomography revealed abnormal accumulation with a maximum standardized uptake value of 7.9 (Fig 3). The pulmonary nodule showed no accumulation. She had elevated serum cancer antigen 19-9 (1847 U/mL) and elevated serum carcinoembryonic antigen concentrations (17.9 ng/mL). She underwent laparoscopic splenectomy. Pathological examination showed poorly differentiated adenocarcinoma. We subsequently performed partial resection of the right upper lobe for a possible diagnosis of primary lung cancer. Pathological examination revealed mixed-type lung adenocarcinoma. Immunohistochemical examination revealed positivity for thyroid transcription factor 1 in both the pulmonary and splenic lesions. We diagnosed the splenic lesion as solitary splenic metastasis from lung adenocarcinoma. The postoperative course was uneventful. The patient refused additional chemotherapy. At the time of this writing, the patient displayed no signs of metastatic recurrence (4 years postoperatively).

Discussion
Splenic metastasis from non-hematologic malignancies accounts for only 0.96% of metastatic carcinomas and 2.9–4.4% of autopsied carcinoma specimens.2,3 In most cases, the spleen is involved as a part of diffuse carcinomatosis with the presence of splenic metastases usually indicating widespread tumor dissemination.4,5 Very few splenic
metastases are observed as solitary splenic lesions either synchronous or metachronous to the primary tumor.

Only a few case reports and reviews have described solitary splenic metastasis from lung cancer. To date, 27 such cases (20 men, 7 women) have been reported in the published literature, as summarized in Table 1.6–28 The median follow-up period across all studies was seven months (range 1–96). The most frequent histological type of lung cancer with solitary splenic metastasis is adenocarcinoma (n = 13), followed by squamous cell (n = 7), and large cell carcinoma (n = 2). Twenty-four patients (85.7%) underwent splenectomy. Sixteen were diagnosed with splenic metastasis during the follow-up period after pulmonary resection. Eleven patients had synchronous lung cancer and splenic metastasis. We examined all 27 cases using Kaplan–Meier curves and log-rank test, which demonstrated a five-year survival rate of 41% and indicated that pathological stage NI–III cancer, tumor rupture, and synchronous disease were poor prognostic factors. In our case, the preoperative differential diagnoses of the solitary splenic tumor were angiosarcoma, malignant lymphoma, and a metastatic splenic tumor. We performed splenectomy to establish a definitive diagnosis and avoid splenic rupture. We also performed pulmonary partial resection because the patient was an elderly person with principally stage IV disease. Although she had synchronous disease, she achieved long-term survival.

In 24 reported cases of splenectomy, 12 (50%) patients underwent postoperative chemotherapy. No treatment

| Table 1 Reported cases of solitary splenic metastasis from lung cancer |
|---------------------------------------------------------------|
| Characteristics | N = 27 |
| --- | --- |
| Age (years) | Median (range) 63 (49–82) |
| Gender | Male/Female 20 / 7 |
| Pathological subtype |  |
| Adenocarcinoma | 13 (48.1%) |
| Squamous cell carcinoma | 7 (25.9%) |
| Large cell carcinoma | 2 (7.4%) |
| Other | 5 (18.5%) |
| Lung cancer pN factor | pN0/pN1/pN2/pN3 10/4/5/1 |
| Splenic metastasis size (cm) | Median (range) 7 (1.5–13) |
| Rapture | + / − 3/24 |
| Symptoms |  |
| Asymptomatic | 16 (59.3%) |
| Abdominal pain | 8 (29.6%) |
| High fever | 1 (3.7%) |
| No data | 2 (7.4%) |
| Timing | Synchronous/metachronous 11/16 |
guidelines for solitary splenic metastasis from lung cancer are currently available. Lee et al. recommended splenectomy because most splenic metastases appeared within the parenchyma, indicating probable hematogenous spread. Because the spleen is not a frequent organ in which lung cancer metastasis occurs, splenectomy is not discussed as a therapeutic strategy for splenic metastasis in the guidelines. If we follow the therapeutic principle of solitary brain or adrenal metastasis, splenectomy is also a good option for solitary splenic metastasis. Additionally, if clinical assessment before the initial treatment shows a resectable lung lesion and isolated splenic metastasis, surgical resection (splenectomy followed by resection of the lung lesion) could be recommended to avoid further metastatic disease, provide the potential for cure or extended survival, and avoid complications such as painful splenomegaly and splenic rupture. We consider pathological stage N0 cancer, non-ruptured tumors, and metachronous disease to be good surgical indications.

Systemic chemotherapy (adjuvant or neoadjuvant) is a reasonable option, although there is currently no supporting evidence of its efficacy. Of the 27 reported cases, 13 (48%) underwent chemotherapy; however, there was no significant difference in prognosis regardless of whether chemotherapy was performed.

Solitary splenic metastasis of lung cancer is extremely rare. We have herein reported such a case involving a patient who achieved long-term survival by lung resection and splenectomy.

Disclosure

No authors report any conflict of interest.

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