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Case Report

Isolated Splenic Metastasis from Non-Small-Cell Lung Cancer: A Case Report and Review of the Literature

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Keywords
Non-small-cell lung cancer · Isolated splenic metastasis · Splenectomy

Abstract
Metastases to the spleen are rare but have been reported for different tumor entities, including breast cancer, lung cancer, colorectal cancer, ovarian cancer, and melanoma. As an isolated event, splenic metastasis from non-small-cell lung cancer (NSCLC) is exceedingly rare. Until now, only 28 cases have been reported in the medical literature. We report the case of a 66-year-old woman with NSCLC (adenocarcinoma) who presented with a synchronous, isolated splenic metastasis. Operative removal of both primary tumor and metastasis was not possible due to multiple comorbidities. Therefore, treatment was limited to combined systemic chemotherapy and simultaneous radiation of the primary tumor, which led to partial remission of the disease. Isolated metastasis to the spleen in NSCLC has been reported only 28 times in the medical literature, most often in male patients with right-sided lung tumors, most of which were adenocarcinomas. The majority of patients were asymptomatic with respect to splenic metastasis. About half of the reported cases were isolated metachronous

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splenic metastases. Splenectomy seems to confer a survival advantage. We review the pertinent medical literature.

Introduction

Non-small-cell lung cancer (NSCLC) is the most common type of pulmonary cancer and accounts for 85–90% of lung cancers [1, 2]. Histological subtypes of NSCLC are adenocarcinoma (50% of cases), squamous cell carcinoma (40% of cases), large-cell carcinoma (almost 10% of cases), and rarely adenosquamous carcinoma. The most common sites of metastasis in NSCLC are the central nervous system, bones, liver, contralateral lung, adrenal glands, and lymph nodes. Almost 50% of lung cancers are metastatic at diagnosis. Rarely, NSCLC metastases have been reported in soft tissue, kidney, peritoneum, spleen, pancreas, intestine, bone marrow, eye, ovary, thyroid, heart, breast, nasal cavity, and tonsils [3]. Generally, metastases to the spleen from solid tumors are uncommon. The prevalence of splenic metastasis ranges from 2.3 to 7.1% for all solid cancers [4]. Although splenic metastasis from breast cancer, lung cancer, colorectal cancer, ovarian cancer, and melanoma (commonest site of splenic metastases per primary tumor) have been reported [4–6], isolated splenic metastasis from lung cancer is an extremely rare complication, and, to our knowledge, only 28 cases have been reported in the medical literature. We report the case of a 66-year-old woman with a primary isolated splenic metastasis from adenocarcinoma of the lung (NSCLC).

Case Presentation

A 66-year-old woman presented in June 2016 with acute dyspnea and chest pain. A computed tomography (CT) scan revealed a right-sided lung tumor with ipsilateral enlarged mediastinal lymph nodes. Fine-needle aspiration showed moderately (G2) differentiated bronchial adenocarcinoma. A CT of the abdomen demonstrated a low-density cystic lesion in the spleen which measured 3.6 cm in diameter, in keeping with primary splenic metastasis. Therefore, the tumor was staged as cT2a cN2 cM1b. The primary tumor did not express EGFR or ALK mutations. The patient had several comorbidities, including chronic obstructive lung disease (Gold IV), obesity, diabetes mellitus type II, elevated blood pressure, and a recent episode of bilateral central pulmonary embolism. Operative removal of the primary tumor and synchronous or metachronous splenectomy were deemed impossible due to multiple comorbidities. We proceeded with combination chemoradiotherapy of the primary tumor using cisplatin and vinorelbine. We later substituted carboplatin for cisplatin due to renal insufficiency. In October 2016, after 6 courses of therapy, a follow-up CT scan demonstrated partial remission of the primary tumor and shrinkage of the splenic metastasis to a maximum diameter of 1.6 cm. Further best supportive care was offered to the patient because of her severely limited overall condition.

Discussion

The reported incidence of splenic metastasis from primary lung cancer is 1.2–5.6% [7–9], and in this setting, splenic metastasis is mainly seen in the terminal stage as part of a diffuse metastatic process, where an average of 3–6 other organs are usually involved [7, 10, 11]. We found only 28 cases of isolated splenic metastasis from lung cancer in the literature (Table 1). In these cases, a strong male predominance (58%) was recorded (patients ranging in age from 49 to 82 [mean 62.3] years). In most reports, the primary tumor was located in the right lung. The most common histopathological subtype of lung cancer with isolated splenic metastasis was adenocarcinoma (44% of cases), followed by squamous cell cancer (17% of cases) and large-cell lung cancer (17% of cases). Surprisingly, there is no report of isolated splenic metastasis in small-cell lung cancer, although splenic metastasis in the context of multiple metastatic sites is well recognized in small-cell lung cancer [12–14]. One case of carcinoid with isolated spleen deposits has been reported. Including our report, splenic metastasis was synchronous in 12 cases and metachronous in another 17 cases. In the 17 cases of metachronous isolated splenic metastasis, the median interval between the diagnosis of the primary tumor and isolated splenic metastasis was 22.2 (range 2–96) months. The majority of cases were asymptomatic (62% of cases), and the diagnosis was serendipitously made at follow-up exams. Some patients presented with splenic rupture (12% of cases), abdominal pain (21% of cases), and fever (3% of cases).

The early detection of metastasis to the spleen is challenging, since most cases of splenic metastasis are asymptomatic, and most of them are detected incidentally. CT scan of the abdomen remains the gold standard to detect splenic metastasis, including in the case of primary lung cancer. Some studies have also mentioned the significance of FDG-PET/CT in the detection of splenic metastasis from lung cancer [4, 6, 15–17]. By CT imaging, splenic metastases can appear in 3 patterns: (1) as a solid lesion, (2) as a cystic lesion (as in our case), and (3) as a solid-cystic lesion [7]. In histopathology, splenic metastases appear in 3 macroscopic patterns: macronodular, micronodular, and diffuse [6]. Iguchi et al. [14] mentioned that the micronodular and diffuse type might not be detectable on abdominal CT scan, although FDG-PET/CT may detect the diffuse type of splenic metastasis. In case of a macronodular pattern, the metastasis can either present as solitary or multiple nodules; the micronodular pattern can be diagnosed by the presence of scattered uniform miliary nodules, and in case of a diffuse pattern, the splenic parenchyma is completely occupied by tumor cells [7]. The rarity of splenic metastases could be explained by anatomic factors and the high-quality immunological equipment of the spleen, which ensures an inhibitory effect on the growth of metastatic cells [5]. The differential diagnosis of a splenic mass includes splenic metastasis, hemangioma, hamartoma, non-Hodgkin lymphoma, Hodgkin lymphoma, sarcoidosis, tuberculosis, and histoplasmosis [6].

The majority of patients underwent a surgical resection of the primary tumor (65% of cases). In most cases, the patients underwent a splenectomy (83% of cases). Considering the therapeutic principle of oligometastatic disease for solitary brain or adrenal metastasis, splenectomy should be considered a therapeutic option for these patients. Systemic chemotherapy after splenectomy or after double surgical resection (splenectomy followed by resection of the lung lesion or vice versa) can be considered since it can provide a prolonged progression-free survival and overall survival [4]. The vast majority of patients died 1–49

months after splenectomy, with rare cases of prolonged survival up to 96 months, as reported by Sardenberg et al. [6].

Statement of Ethics

The authors have no ethical conflicts to disclose.

Disclosure Statement

The authors have no conflicts of interest to declare.

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Table 1. Isolated splenic metastasis from lung cancer

First author [ref.]	Histology (primary lung lesion)	Lung lesion side	Time to splenic metastasis	Sex	Age, years	Metastasis symptoms	Treatment of primary tumor	Treatment of splenic metastasis	Follow-up at the time of the report
Klein [18]	Bronchioalveolar carcinoma	Right	20 months	F	57	Abdominal pain	Right lower and middle lobectomy	Splenectomy	Died 49 months after splenectomy
Edelman [19]	Poorly differentiated adenocarcinoma	Left	0 months	F	63	Asymptomatic	n.a.	n.a.	n.a.
Macheers [20]	Large-cell undifferentiated carcinoma	Left	0 months	n.a.	n.a.	Asymptomatic	n.a.	Splenectomy	Died 1 month after splenectomy
Gupta [21]	Squamous cell carcinoma	Right	0 months	n.a.	n.a.	Splenic rupture	n.a.	Splenectomy	Died 8 weeks after splenectomy
Kinoshita [9]	Squamous cell carcinoma	Left	14 months	M	72	Asymptomatic	Surgical removal of primary tumor	Splenectomy	Died 27 months after splenectomy
Takada [22]	Bronchopulmonary carcinoid tumor	Right	96 months	M	49	Abdominal pain	Right upper lobectomy	Splenectomy	Disease free after 8 years
Tomaszewski [23]	Lung cancer	Left	0 months	M	68	Asymptomatic	Upper left lobectomy	Splenectomy	n.a.
Massarweh [24]	Poorly differentiated adenocarcinoma	Left	0 months	M	68	Splenic rupture	Palliative chemotherapy	Splenectomy	n.a.
Schmidt [25]	Moderately differentiated adenocarcinoma	Left	25 months	M	72	Asymptomatic	Surgical removal of primary tumor	n.a.	Disease free after 2 years
Pramesh [26]	Squamous cell carcinoma	Left	2 months	M	55	Asymptomatic	Combined radiochemotherapy	Palliative chemotherapy	n.a.
Lachachi [27]	Poorly differentiated carcinoma	Right	0 months	n.a.	n.a.	Splenic rupture	n.a.	Splenectomy	n.a.
Sánchez-Romero [28]	Adenocarcinoma	Left	0 months	M	73	Abdominal pain	Left lung resection	Splenectomy	n.a.
Van Hul [29]	Adenocarcinoma	Left	24 months	M	67	Asymptomatic	Surgical removal of primary tumor	Splenectomy	n.a.
Ando [30]	Squamous cell carcinoma	Right	10 months	M	71	Asymptomatic	Combined radiochemotherapy	Splenectomy	n.a.
Chloros [31]	Squamous cell carcinoma	Right	0 months	M	59	Asymptomatic	Surgical removal of primary tumor	Splenectomy	n.a.
Tang [4]	Large-cell undifferentiated carcinoma	Right	4 months	F	49	Fever	Lobectomy of the right middle and lower lobe	Splenectomy	n.a.
Scnitu [34]	Large-cell anaplastic carcinoma	n.a.	0 months	n.a.	n.a.	Asymptomatic	Pulmonary lobectomy	Splenectomy	Disease free after 41 months
Yen [15]	Adenocarcinoma	Left	24 months	M	56	Asymptomatic	Left pneumonectomy	Splenectomy	n.a.
Fujii [16]	Poorly differentiated adenocarcinoma	Left	3 months	M	58	Asymptomatic	Left upper lobectomy	Splenectomy	n.a.
Assouline [33]	Large-cell undifferentiated carcinoma	Right	21 months	M	77	Abdominal pain	Right pneumonectomy	Splenectomy	Disease free after 2 years
Oussama [35]	Non-small-cell lung cancer, further histology n.a.	Left	0 months	M	58	Abdominal pain	Chemotherapy	Splenectomy	n.a.
Eisa [36]	Adenocarcinoma	Right	0 months	F	53	Abdominal pain	Surgical removal of primary tumor	Splenectomy	Disease free at the time of the report
Belli [37]	Large-cell carcinoma	Right	60 months	M	65	Asymptomatic	Right pneumonectomy	n.a.	n.a.
Sardenberg [6]	Adenocarcinoma	Right	7 months	F	49	Abdominal pain	Right upper lobectomy	Splenectomy	Disease free after 96 months
Dias [32]	Squamous cell carcinoma	Right	16 months	M	82	Asymptomatic	Right bilobectomy	Splenectomy	Disease free after 12 months
Cai [7]	Adenocarcinoma	Right	17 months	F	56	Asymptomatic	Right lower lobectomy	Splenectomy	n.a.
Soussan [17]	Adenocarcinoma	n.a.	0 months	M	52	Asymptomatic	n.a.	n.a.	n.a.
Iguchi [14]	Adenocarcinoma	Left	12 months	F	63	Asymptomatic	Left lower lobectomy	Splenectomy	n.a.
Present report	Adenocarcinoma	Right	0 months	F	66	Asymptomatic	Combined radiochemotherapy	Chemotherapy	Still alive at the time of the report

n.a., not available.