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Case Report

Metastatic pulmonary pleomorphic carcinoma involving the jejunum: a case report and review of the literature

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Abstract: We present a case report of a pulmonary pleomorphic carcinoma that metastasized to the jejunum in an 80-year-old woman. The patient was admitted to the hospital with symptomatic anemia and melena that had been ongoing for several months. In 2021, non-small cell carcinoma was diagnosed by fine-needle aspiration. In 2022, a computed tomography (CT) scan revealed an enormous mass in the small bowel. The tumor was resected and showed pleomorphic neoplastic cells with giant and spindle cell morphology. These neoplastic cells were positive for thyroid transcription factor 1 (TTF1). Next-generation sequencing of the secondary tumor revealed 97% genomic similarities to the lung tumor and high expression of programmed cell death ligand 1 (PD-L1). The patient may benefit from immune checkpoint therapy.

Keywords: Pulmonary pleomorphic carcinoma, small bowel, jejunum, metastasis

Introduction

Pleomorphic carcinoma of the lung accounts for less than 1% of lung cancer and is classified as high-grade non-small cell carcinoma despite presence of sarcomatous features. The diagnosis of pleomorphic carcinoma essentially relies on histologic features, including significant cytologic atypia and nuclear pleomorphism, with at least 10% spindle cell and/or giant cell components. The epithelial component may account for 10-85% of the tumor and usually shows poorly a poorly differentiated adenocarcinoma or squamous cell carcinoma component, which can be determined by immunohistochemical staining. As such, the diagnosis of pleomorphic carcinoma cannot be made from small biopsy or cytology specimens, and resected tumor is required for diagnosis [1].

Pleomorphic carcinoma is highly aggressive and frequently metastasizes to lymph nodes. Clinical presentations can vary, but common symptoms include cough, chest pain, and dyspnea, depending on the location of the tumor. There are no specific laboratory tests for this tumor. Treatment options include surgical resection, chemotherapy and radiation therapy, with dosages similar to those used for other types of non-small cell carcinoma. However, response rates to these treatments vary, and the prognosis is generally poor. The stage of the tumor is a significant predictor of prognosis, with higher-stage tumors having poorer outcomes. In one study, the median progression-free survival for first-line chemotherapy was 1.5 months and overall survival was 7.2 months [2].

In this case study, the patient had undergone fine-needle aspiration (FNA) of a lung nodule which was diagnosed as non-small cell carcinoma. The patient underwent chemotherapy; however, one year later, she was found to have a metastatic tumor in the small bowel. The resected secondary tumor showed histologic features consistent with pleomorphic carcinoma, with TTF1 positivity indicating a lung origin. This is a rare case of metastatic pulmonary pleomorphic carcinoma involving the jejunum.

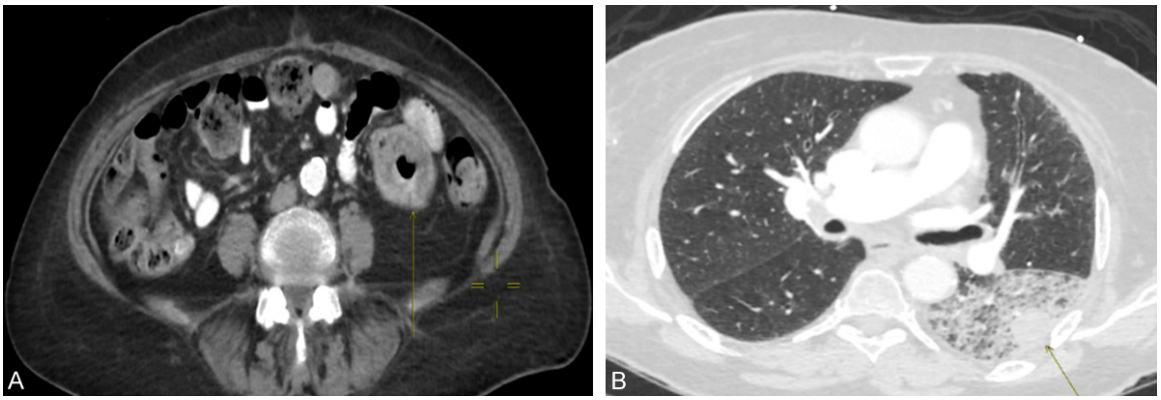

Figure 1. Abdomen and chest scan by computed tomography. A. Marked thickening of the small bowel loop in left mid-abdomen (arrow). B. Large left lower lobe subpleural mass with surrounding airspace consolidation (arrow).

Case report

An 80-year-old female presented with fatigue, shortness of breath, and dizziness. She had melena for several months. She had a history of Sjogren syndrome, coronary artery disease, aortic stenosis, and abdomen aortic aneurysm. She used to smoke 1 pack per day and quit 15 years ago. She had FNA of a lung nodule in January 2021, which was diagnosed as non-small cell carcinoma, favor adenocarcinoma based on TTF1 positivity. Then she was treated with chemotherapy but one year later, a mass in the small bowel was discovered by CT scan that was suspicious for a metastatic tumor. Her digital examination tested positive for melena. Her initial abnormal laboratory results included hemoglobin (Hgb) 6.3 g/dl, hematocrit (Hct) 20.2%, red blood cell (RBC) 2.06 M/cumm, white blood cell (WBC) 23.4 K/cumm, calcium 7.7 mg/dl, albumin 1.9 g/dl, and urinary creatinine 1.2 mg/dl. She was given 2 units of packed red blood cell transfusion prior to the surgery. CT scan of the abdomen revealed marked thickening of the small bowel loop in left mid-abdomen which represented a malignant intestinal tumor (**Figure 1A**). CT scan of the chest showed a large left lower lobe subpleural mass with surrounding airspace consolidation (**Figure 1B**). The resection of the small bowel was performed and the tumor was identified in the jejunum. The macroscopic finding of resected tumor showed a red-tan friable and fungating mass measuring 11.0 × 6.0 × 1.7 cm, which invaded into the serosa. The microscopic findings showed the characteristics of polygonal pleomorphic neoplastic cells with spindle cell and multinucleated giant cell morphology as well as brisk mitotic activity and geographic necrosis. The tumor cells were positive for pan-cytokeratin and TTF1, and focally positive for cytokeratin 7 (CK7). They were negative for synaptophysin, napsinA, protein 40 (P40), neural cell adhesion molecule (CD56), cytokeratin (CK20), caudal-type homeobox 2 (CDX2), gata binding protein 3 (Gata3), Wilms' tumor 1 (WT1), discovered on GIST1 (Dog1), KIT proto-oncogene receptor tyrosine kinase (CD117), paired box gene 8 (Pax8), S-100, human melanoma black 45 (HMB45), podoplanin (D2-40) and desmin. A diagnosis of metastatic pulmonary pleomorphic carcinoma was rendered (**Figure 2**). The next-generation sequencing (NGS) showed the Kirsten rat sarcoma viral oncogene (KRAS) p. G12F mutation, tumor protein (TP53) and PBRM1 (Polybromo-1) mutations with high level of PD-L1 expression (90% positivity) and high tumor mutational burden with a density of 13 mut/Mb. A genomic prevalence score from the secondary tumor identified 97% similarity as the lung tumor. This further confirmed it was a case of metastatic pulmonary pleomorphic carcinoma to the jejunum.

Discussion

Pleomorphic carcinoma of the lung is an uncommon entity. It is high-grade carcinoma and tends to metastasize to regional lymph nodes and distant organs. The current treatments for pleomorphic carcinoma include surgical resection, chemotherapy, and radiation therapy. In the current case, the patient had a lung nodule in 2021 that was diagnosed as non-small cell carcinoma on a cell block of FNA tissue. The

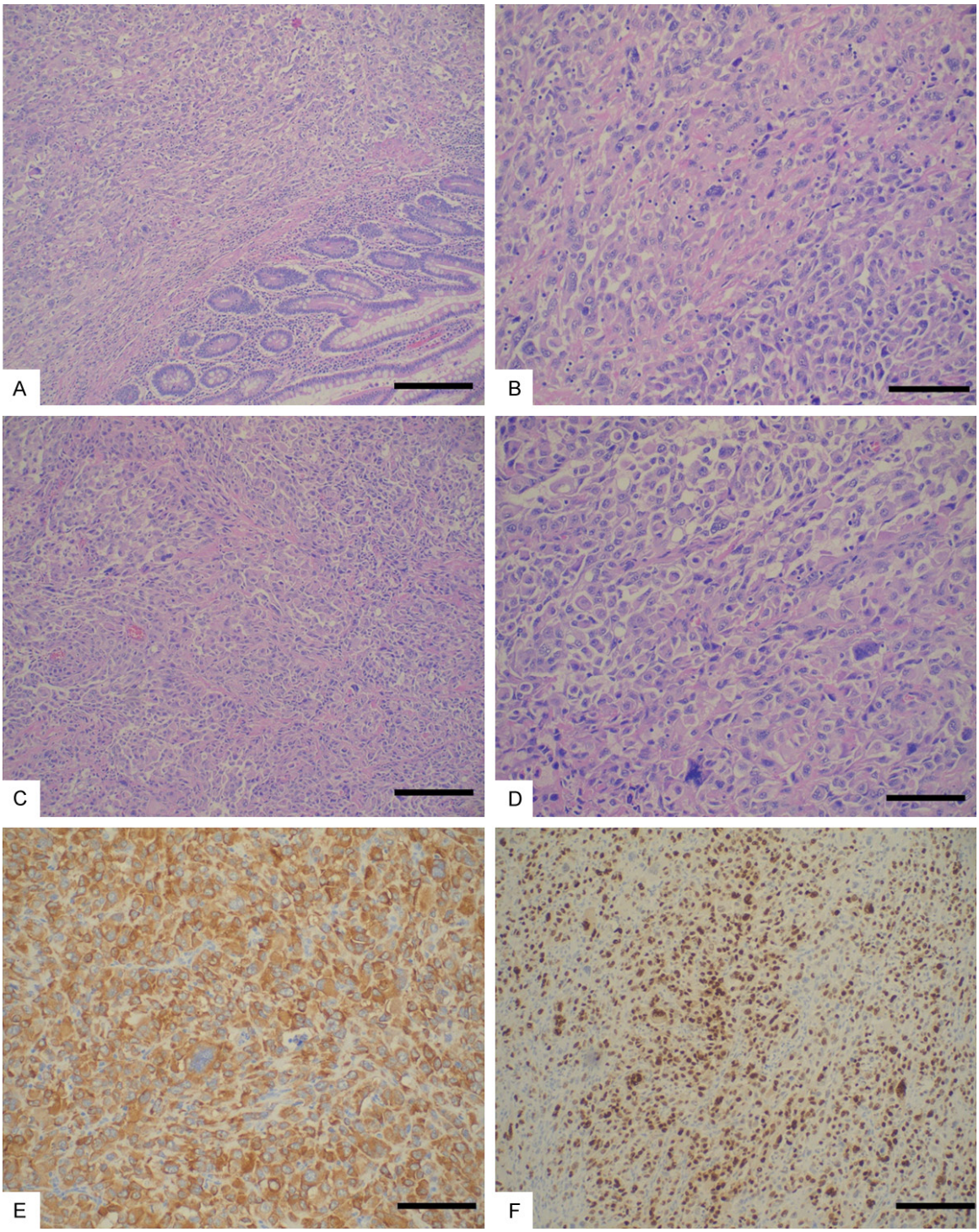

Figure 2. Histology of hematoxylin and eosin stain and immunohistochemical stains. (A) Tumor is in the submucosa extending to the serosa. 4X. (B) Higher magnification shows polygonal pleomorphic cells with giant cells. 20X. (C) Lower and (D) higher magnification show spindle and giant cell morphology. 10X, 20X. (E) Immunohistochemical stain for pan-cytokeratin. The tumor cells show membranous and cytoplasmic staining. 10X. (F) Immunohistochemical stain for TTF1. The tumor cells show nuclear staining. 10X. The scale bars represent 100 μm.

patient underwent chemotherapy but one year later, an enormous mass in the small bowel was discovered, and the histologic features and immunoprofile suggested pulmonary pleo-

morphic carcinoma metastasizing to the jejunum.

Several studies have reported a metastatic pulmonary pleomorphic carcinoma to the gastrointestinal tract. Fujii et al. [3] reported a case of jejunal metastasis of a giant cell carcinoma of the lung. In his study, a patient had a 36 mm sized mass on the left upper lung lobe and a mass forming wall thickness in the upper jejunum. FNA of the lung mass showed histologic features resembling rhabdomyosarcoma, melanoma, or poorly differentiated carcinoma. The secondary tumor in the jejunum revealed similar histologic feature as the primary tumor, and TTF1 positivity was supportive of metastasis from the lung. The patient refused chemotherapy and had been recurrence-free for 11 months since the surgery. Ustaoglu et al. [4] reported a case of duodenal metastasis of pulmonary pleomorphic carcinoma. In their study, the patient had brain metastasis and a 3 cm mass was discovered in the duodenum. A diagnosis of metastatic pulmonary pleomorphic carcinoma was rendered, and the patient died two weeks later. Shoji et al. [5] reported a case of splenic and small intestinal metastasis of pulmonary pleomorphic carcinoma. The patient had 3 years of recurrence-free survival after undergoing surgical resection of primary and secondary tumors and chemotherapy. Hara et al. [6] reported a case of multiple cytokine-producing pleomorphic carcinoma of the lung with metastasis to the small intestine. In that study, the patient underwent surgical resection of primary and secondary tumors, and the secondary tumor was positive for granulocyte colony stimulating factor (G-CSF) and tumor necrosis factor (TNF-α) as well as increased level of serum G-CSF and TNF-α. The patient died 4 months after surgical removal of the intestinal metastasis. Suzuki et al. [7] reported a case of jejunal and peritoneal metastasis of pleomorphic lung carcinoma. The patient underwent resection of primary and secondary tumors and treated with immune checkpoint inhibitor pembrolizumab after the abdominal surgery. The patient remained cancer-free state for 26 months since the surgery. Other studies showed that pulmonary pleomorphic carcinoma metastasized to other organs including adrenal glands [8], mandibular gingiva [9], and peritoneum [10].

A study about comprehensive molecular profiling of pulmonary pleomorphic carcinoma demonstrated high PD-L1 expression and high tumor mutation burden in both epithelioid and sarcomatous components [11]. The next-generation sequencing of our case also showed high PD-L1 expression and a high tumor mutation burden as well as KRAS and TP53 mutations. This indicates the patient may benefit from immune checkpoint therapy. To date, the patient has had 4 months of recurrence-free survival after the intestinal surgery. Further follow-up is needed on the efficacy of treatment.

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Disclosure of conflict of interest

None.

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