Metastatic Embryonal Carcinoma Mimicking Locally Advanced Non-small Cell Lung Cancer

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Abstract

A 50-year-old man with a history of smoking of 45 pack-years underwent right lower lobectomy after neoadjuvant chemoradiotherapy for locally advanced non-small cell lung cancer diagnosed on a bronchial biopsy and standard imaging examinations, including chest-abdominal contrast-enhanced computed tomography (CT) and whole-body F-18 fluorodeoxyglucose positron emission tomography/CT. Left orchiectomy was performed simultaneously to treat the slightly swollen left testis, which had remained unchanged for over five years. The thoracic tumor was proven to be in pathological complete remission and the testicular lesion was pathologically diagnosed as an embryonal carcinoma. Furthermore, a pathological reevaluation of the preoperative bronchial biopsy specimen revealed the lung tumor to be a metastatic embryonal carcinoma.

Key words: embryonal carcinoma, non-small cell lung cancer, positron emission tomography (PET)

Case Report

A 50-year-old man with a 45 pack-year smoking history consulted our department for the treatment of a lung tumor initially detected on a mass-screening chest X-ray. A subsequent chest X-ray and contrast-enhanced computed tomography (CT) scan (Fig. 1A, B) revealed a bulky lung mass in the right lower lobe with lymphadenopathy in the right hilum and mediastinum. Whole-body F-18 fluorodeoxyglucose (FDG) positron emission tomography (PET) showed strong metabolic activity in the lung tumor, right hilum and mediastinal lymph nodes, although no significant FDG uptake was noted in other areas (Fig. 1C). The maximum standardized uptake values were 26.38 and 8.82 in the lung tumor and subcarinal lymph node, respectively. A bronchial biopsy of the lung tumor showed the sheet-like spread of large atypical epithelial cells with large eccentric nuclei, prominent nucleoli and areas of necrosis (Fig. 2A). Therefore, a diagnosis of non-small cell lung cancer was made (not otherwise specified, cT2N2M0, stage IIIA, International Association for the Study of Lung Cancer, version 6). The patient then underwent right lower lobectomy following two courses of neoadjuvant chemoradiotherapy with cisplatin plus docetaxel and 40 Gy of concurrent chest irradiation. After receiving the initial diagnosis, he reported slight and stable swelling of the left testis that had persisted over the preceding five years. At that time, the left testis measured approximately 7 cm × 4 cm. However, because the whole-body PET/CT machine scanned to only 3 cm below the pubic symphysis (Fig. 1C, black arrow), the bilateral testes had not been properly included in the images. The levels of serum tumor markers (carcinoembryonic antigen, squamous cell carcinoma antigen, sialyl stage-specific embryonic antigen-1, pro-gastrin-releasing peptide, α-fetoprotein and β-human chorionic gonadotropin) measured prior to the ad-
The patient further underwent left orchiectomy at the time of the chest surgery.

No viable cancer cells were detected in the resected lung tumor, indicating a pathological complete response. The resected testis contained a solid tumor measuring 4.5 cm in diameter that was largely comprised of white-yellowish necrotic tissue. Microscopically, viable atypical epithelial cells showed marked cellular pleomorphism, including bizarre tumor cells. However, no infiltration of lymphocytes or histiocytes, a typical feature of seminomas, was observed (Fig. 2B). The tumor cells were positive for placental alkaline phosphatase, CD30, AE1/AE3 (pan-cytokeratin), cytokeratin 7 and cytokeratin 20 and negative for thyroid transcription factor 1, α-fetoprotein and human chorionic gonadotropin. These microscopic characteristics were diagnostic of testicular embryonal carcinoma (2). The initial bronchial biopsy specimen was then reexamined using immunohistochemistry, which showed a staining pattern identical to that observed in the testicular tumor, indicating that the lung tumor was a metastatic embryonal carcinoma.

Discussion

Testicular germ cell tumors of both seminomatous and nonseminomatous histological types primarily affect young men. Embryonal carcinoma is the most frequently observed and most undifferentiated cell type among nonseminomatous germ cell tumors and often presents as a rapidly progressing aggressive tumor (3). FDG-PET displays high accuracy in discriminating malignant from non-malignant lesions in patients exhibiting testicular tumors, with reported positive and negative predictive values of 67-100% and 90-100%, respectively (4-6). In the present case of embryonal carcinoma, a middle-aged man with a history of heavy smoking showed strongly positive PET results for the thoracic metastases; however, the scanned PET/CT volume did not include the whole testes, and he was preoperatively diagnosed with locally advanced primary non-small cell lung cancer. We discussed this issue with the radiologists at the department of...
radiology, and, in our hospital, the scan volume on whole-body FDG-PET now routinely includes the bilateral testes.

Regarding the pathological findings of the tumor at the time of the initial staging, hematoxylin and eosin staining of the bronchial biopsy specimen suggested a diagnosis of poorly differentiated non-small cell carcinoma, possibly poorly differentiated adenocarcinoma or large cell carcinoma. Considering the clinical characteristics of bulky lung tumors with hilar and mediastinal lymph node metastasis and no apparent distant metastases from the lung tumor in a middle-aged man with a history of heavy smoking, as well as the lack of information of testicular swelling, the pathological results appeared to be sufficient to diagnose the tumor as non-small cell lung cancer (NSCLC). The details of this rare case of a relatively small and stable primary testicular tumor and bulky lung and mediastinal metastases suggest the importance of setting the FDG-PET volume to routinely include the testes as a possible primary site of “cancer of unknown primary.” Although the lungs are a common site of distant metastasis originating from germ cell tumors, the presence of a single bulky pulmonary metastatic lesion is a very unusual manifestation (7). Based on the scope of our literature search, this is the first report to describe a case of single bulky lung metastasis associated with lymph node metastases of testicular embryonal carcinoma masquerading as locally advanced non-small cell lung cancer.

The authors state that they have no Conflict of Interest (COI).

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References