Clinical Case Report

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Primary pulmonary myoepithelial carcinoma in a young woman

A case report and review of literature

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Abstract

Rationale: Myoepithelial carcinoma mainly occurs in the salivary glands, but myoepithelial carcinoma of the lung is extremely rare neoplasm whose biological behavior and clinical course still remain to be fully elucidated. Although considered as low-grade carcinoma, these tumors have a high rate of recurrence or distant metastasis.

Patient concerns: To date there are only 11 cases of pulmonary myoepithelial carcinoma reported in the English literature. We report a case of a 24-year-old woman diagnosed with primary pulmonary myoepithelial carcinoma. Informed consent was obtained from the patient.

Diagnoses: The tumor derived from superior lobe of left lung and exhibited only myoepithelial differentiation without any ductal formation by histopathological and immunohistochemical analysis.

Interventions: The patient underwent the left superior lobe resection. In addition, we first introduce second-generation sequencing technology as a novel strategy for primary pulmonary myoepithelial carcinoma, and these tumors should be included in the differential diagnosis of thoracic neoplasms.

Outcomes: The patient was alive with no evidence of disease for up to 12 months.

Lessons: Individualized treatment is the promising clinical strategy for thoracic neoplasms, and the underlying molecular events should be investigated to find the potential therapeutic targets.

Abbreviations: CT = computed tomography, LLL = left lower lobe, LUL = left upper lobe, RLL = right lower lobe, RML = right middle lobe, RUL = right upper lobe.

Keywords: myoepithelial carcinoma, next-generation sequencing, pulmonary neoplasm, salivary-type lung tumors

1. Introduction

Myoepithelial tumors are mainly occurred in the salivary glands and breast, which are extremely rare in the lung. The primary pulmonary myoepithelial carcinoma is considered to arise from the submucosal bronchial glands in lower respiratory tract, with only 11 known prior cases reported in the English literature to date. Myoepithelial carcinoma shows myoepithelial differentiation and lack a ductal component.[1–3]

This report describes the case of a young Chinese female, presenting a primary myoepithelial carcinoma in the lung, and reviews the limited literature. Furthermore, we analyzed 56 thoracic cancer-related genes using the next-generation sequencing technology in this case.

2. Case report

A 24-year-old Chinese woman was admitted to our institution for the treatment of cough and hemoptysis. She denied other symptoms such as fever, fatigue, nausea, or weight loss. The patient had no history of cigarette smoking. She was diagnosed with tuberculosis at the local hospital but did not respond to antituberculosis medicines. The Eastern Cooperative Oncology Group (ECOG) performance status was 0, and her vital signs were normal with a heart rate of 98 bpm, respiratory rate of 20, blood pressure of 105/74 mm Hg, temperature of 36.8°C. Respiratory sounds were normal without any rales. Results of routine laboratory tests were normal, including blood routine examination, liver and kidney function, serum electrolyte levels, and blood coagulation function. Chest computed tomography (CT) indicated a 45×41 mm nodular shadow located in anterior segment of left upper lung (Fig. 1). Preoperative biopsies were carried out and the histological examination indicated the diagnosis of salivary-type lung tumors. Real-time PCR assay for the detection of mycobacterium tuberculosis DNA was negative. The left upper lobectomy was therefore performed concomitantly.

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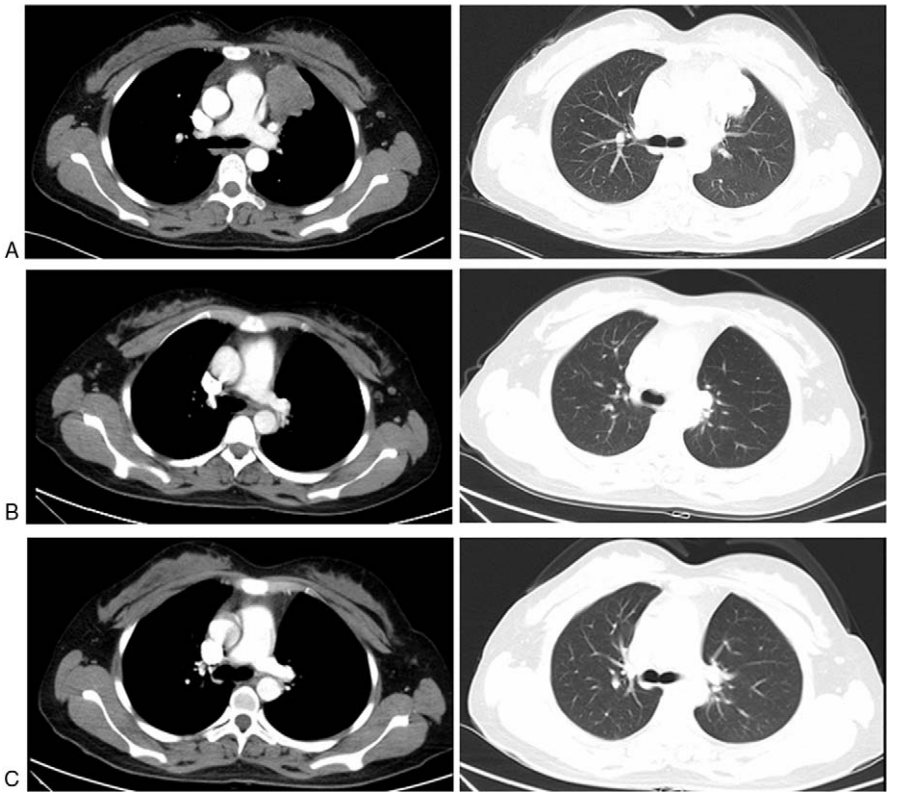

Figure 1. CT scan imaging of the tumor. (A) Solid mass is present at the upper lobe of the left lung; (B) 2 months after the surgery, there was no sign of recurrence; (C) 9 months after the surgery, there was no sign of recurrence.

The tumor was elastic-hard measuring 50×50 mm, which involved phrenic nerve and visceral pleura, but no lymphatic or vascular invasion. The histological findings showed the tumor cells were continuous, which composed both of spindle cells and round cells with clear cytoplasm. These cells mainly have oval nuclei without significant macronuclei and multinucleated cells. Immunohistochemical staining showed the tumor cells were positive for P63, P40, CD34, PCK (partially), CK7 (partially), EMA (partially), Ki67/MIB-1 (40%) but negative for Desmin, SMA, S-100, Syna, CgA, NapsinA, and TTF-1 markers (Fig. 2). There was no EWSR1 or SS18 gene translocation detected in the tumor tissue by FISH analysis. The diagnosis retained was pulmonary myoepithelial carcinoma, which was made after excluding epithelial–myoepithelial carcinoma, myoepthelioma, sarcomatoid carcinoma, neuroendocrine tumors, large cell lung cancer, and solitary fibrous tumor.

We also analyzed 56 thoracic cancer-related genes including *EGFR, ALK, ERBB2, BRAF, MET, RET, ROS1, KRAS*, and other protooncogene, tumor suppressor gene, genes related to drug metabolism by using the targeted next-generation sequencing. There was no mutation, translocation, or amplification in 56 important genes (Table 1).

No chemotherapy or radiotherapy was carried out after the surgery. The patient is alive without any sign of recurrence at 12 months follow-up (Fig. 1).

3. Discussion

Primary salivary gland-type lung tumors are rare and represent less than 1% of all lung tumors, which include mucoepidermoid carcinoma, adenoid cystic carcinoma, epithelial–myoepithelial carcinoma and other extremely rare variants.[4,5] For treatment options of primary salivary gland-type lung tumors, complete surgical resection is associated with a longer overall survival time. Furthermore, postoperative radiotherapy could be recommended if the resection margin is proved to be positive.[4]

In cases of advanced metastatic disease, systemic chemotherapy is also needed, but the standard chemotherapy regimen for primary salivary gland-type lung tumors remains to be fully elucidated.[5]

Primary pulmonary myoepithelial carcinoma is thought to originate from submucosal bronchial glands in the lower respiratory tract, which has morphologic features similar to those of the salivary gland counterparts. Since it was first described in 1998, we have identified only 11 cases in the English literature.[1–3,6–12] Because of the low incidence, relatively little is known about their precise pathological and clinical characters.

There are no markers or imaging characteristics which allow the preoperative diagnosis in pulmonary myoepithelial carcinoma. The diagnosis is mainly based on histopathological and immunohistochemical analysis. Morphologically, it is easily confused with other thoracic neoplasms. Primary pulmonary myoepithelial carcinoma and epithelial–myoepithelial carcinoma are distinguished by the absence or presence of ductal cells. Separation of pulmonary myoepithelial carcinoma from myoepithelioma is mainly based on cellular abnormalities, infiltrative growth or distant metastasis.[12]

Clinical data from 12 patients are summarized in Table 2. Most patients were male smokers aged more than 45 when diagnosis was confirmed. Most patients had preoperative biopsies of neoplasm, and subsequently underwent anatomic resections of the lesions. There were seldom local recurrences, but

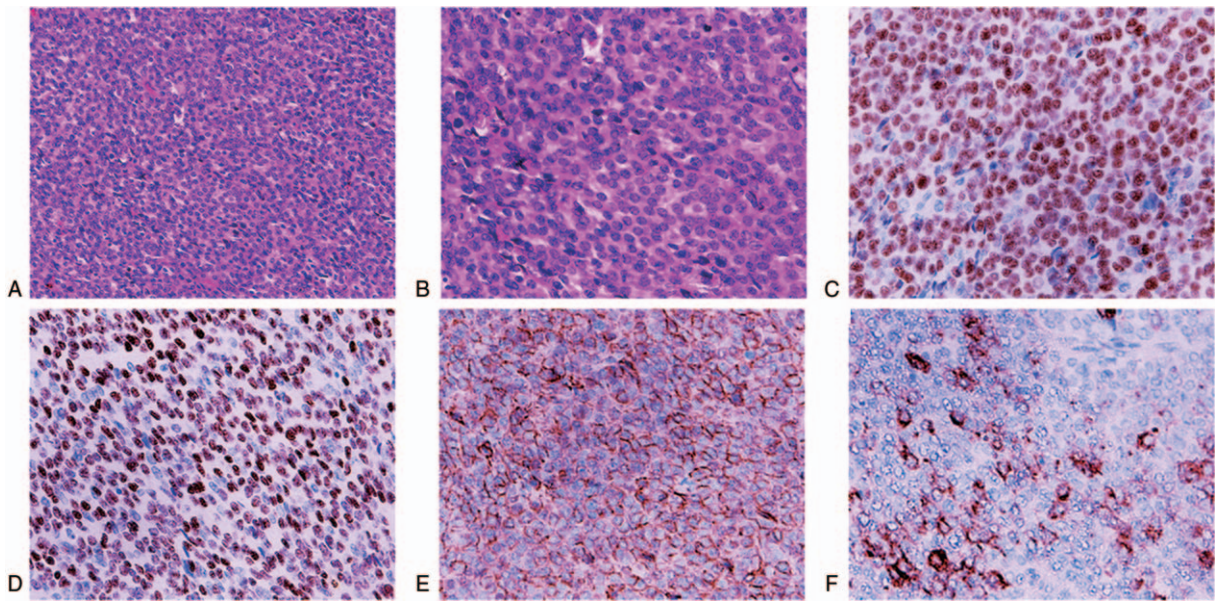

Figure 2. Histopathological and immunohistochemical analysis of pulmonary myoepithelial carcinoma. (A) Tumor cells were continuous, which composed both of spindle cells and round cells. Hematoxylin and eosin stain, original magnification ×100; (B) Tumor cells mainly have oval nuclei without significant macronuclei and multinucleated cells. Hematoxylin and eosin stain, original magnification ×200; Immunohistochemical staining showed positivity for P63 (C), P40 (D), CD34 (E), and EMA (F), original magnification ×200.

Table 1

56 Thoracic cancer-related genes were analyzed by using the targeted next-generation sequencing.

Protooncogene in thoracic cancer for targeted therapy						
ALK	*BRAF*	*EGFR*	*ERBB2*	*MET*	*RET*	*ROS1*
Protooncogene						
AKT1	*ARAF*	*CCND1*	*CDK4*	*CDK6*	*CTNNB1*	*DDR2*
ERBB3	*ERBB4*	*FGF3*	*FGF4*	*FGF19*	*FGFR1*	*FGFR2*
FGFR3	*FLT3*	*HRAS*	*JAK1*	*JAK2*	*KDR*	*KIT*
KRAS	*MAP2K1*	*MTOR*	*MYC*	*NRAS*	*NRG1*	*NTRK1*
NTRK2	*NTRK3*	*PDGFRA*	*PIK3CA*	*PTCH1*	*RAF1*	*SMO*
Tumor suppressor gene						
ATM	*BIM*	*BRCA1*	*BRCA2*	*CDKN2A*	*PTEN*	*RB1*
STK11	*TP53*	*TSC1*	*TSC2*			
Genes related to drug metabolism						
CYP2D6	*DPYD*	*UGT1A1*				

Table 2

Clinical characteristics of reported cases.

References	Age/Gender	Smoking	Location	Tumor size, mm	Treatment	Metastasis	Survival, months
Higashiyama et al[6]	58/M	Yes	RUL, endobronchial	38	Sleeve bilobectomy (RUL, RML)	Forearm and hip muscles	14 (died of other causes)
Higashiyama et al[6]	58/M	Yes	LUL, endobronchial	60	LUL sleeve lobectomy	Liver	60 (died of disease)
Sekine et al[7]	NA	NA	NA	NA	NA	Yes	NA
Miura et al[8]	46/M	NA	Right main bronchus, endobronchial	65	Right pneumon-ectomy	LLL	7 (alive with disease)
Masuya et al[9]	48/M	Yes	LLL, peripheral	15	LLL resection	None	15 (alive without disease)
Tanahashi et al[10]	76/M	Yes	LLL, peripheral	22	LLL wedge resection	Brain	11 (dead of disease)
Sarkaria et al[11]	63/F	No	RLL, pleural, peripheral	130	RLL wedge resection, excision	Liver and diaphrag-ma	36 (alive with disease)
Hysi et al[12]	60/F	No	LLL, peripheral	25	LLL, RLL resection	RLL	10 (alive without disease)
Rosen et al[1]	72/F	Yes	RUL, endobronchial	15	RUL wedge resection	None	7 (alive without disease)
Wei et al[2]	47/M	Yes	LLL, peripheral	65	LLL resection	None	6 (alive without disease)
Zhang et al[3]	51/F	NA	RLL peripheral	20	RLL wedge resection	None	36 (alive without disease)
Present case	24/F	No	LUL peripheral	50	LUL resection	None	12 (alive without disease)

RUL = right upper lobe, RML = right middle lobe. LUL = left upper lobe, LLL = left lower lobe, RLL = right lower lobe, NA = not available.

some patients had metastatic disease. Follow-up for most patients was less than 5 years. Two patients were alive with disease, and 5 others were free of disease at relatively short follow-up intervals. Given the available data above, there are some unique characteristics for our case, including the only woman of childbearing age, as well as the seldom case with localized lesion in left upper lobe.

Primary pulmonary myoepithelial carcinoma is relatively low-grade malignant but show high rates of distant metastasis. Due to low incidence, no guideline on optimal therapeutic strategy is available. The surgical treatment is the only available therapeutic option. Further investigation will be necessary in order to clarify the relationship between chemotherapy/radiotherapy and clinical outcome.

To find the underlying molecular events and the potential therapeutic targets in pulmonary myoepithelial carcinoma, we analyzed 56 thoracic cancer-related genes by using the next-generation sequencing. Unfortunately, there was no mutation, translocation, or amplification in 56 important genes. More cases should be enrolled in the study to confirm the result, or whole-genome sequencing strategy should be applied to find the rare addicted oncogenes.

4. Conclusions

Primary pulmonary myoepithelial carcinoma should be included in the differential diagnosis of thoracic neoplasms. The surgical treatment is the only available therapeutic option. Given the rarity of these tumors, recommendations regarding chemotherapy or radiation are difficult to formulate. Individualized treatment is a promising clinical strategy for thoracic neoplasms,[13,14] and the underlying molecular events should be investigated to find the potential therapeutic targets.

5. Authorship

XZ was involved in drafting the manuscript and acquisition of data; MY and HZ were involved in preparing the figures; SZ designed and revised the manuscript. All authors have read and approved the final manuscript.

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