

Case Report

Pulmonary rhabdomyosarcoma complicated with pulmonary artery extensive embolism

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Abstract: Rhabdomyosarcoma (RMS) is an uncommon type of soft-tissue malignancy which mainly influences children. Primary pulmonary RMS (PPR) is extremely uncommon. Here, we describe a case of PPR complicated by pulmonary artery extensive embolism. A 41-year-old Chinese woman characterized of repeating cough complained of chest congestion. Despite first diagnosis of pulmonary infection, antibiotic therapy did not improve clinical symptom. The diagnosis of pulmonary artery extensive embolism was made by using computed tomography angiography (CTA). In addition, computed tomography (CT) scan showed a soft tissue mass in the left lung field. Positron emission tomography-CT (PET-CT) further revealed lung nodules with active metabolism. The diagnosis was finally made by aspiration biopsy guided by CT. These findings accounted for repeating cough and chest congestion. We should suspect lung malignancy when we see a patient with pulmonary shadow complicated by pulmonary artery embolism.

Keywords: Pulmonary rhabdomyosarcoma, pulmonary embolism, CT scan, immunohistochemical staining, metastasis

Introduction

RMS is a very uncommon type of soft-tissue malignancy which is considered to result from the malignant transformation of primitive mesenchymal cells and shows varying degrees of skeletal muscle differentiation. The head, neck, and limbs are the principal locations of RMS. Primary pulmonary rhabdomyosarcoma (PPR) is seldom-seen and is frequently misdiagnosed as small cell lung cancer.

Thrombosis is a common complication in cancer patients, with 15% of all cancer patients developing thrombosis [1]. Systemic coagulopathy underlies the thrombosis in patients with malignant disease. Hypercoagulability of malignancy could represent a clinical spectrum ranging from abnormal coagulation tests to migratory thrombophlebitis, arteriovenous thrombosis, disseminated intravascular coagulation, and nonbacterial thrombotic endocarditis [2].

Pulmonary artery embolism is an extremely uncommon event for the initial manifestation of

RMS, which would evoke medical disputes in China with elevating lawsuits and medical negligences [3]. Thus, it is very important to report the case that developed PPR complicated with pulmonary artery embolism.

Materials and methods

Case report

A 47-years-old Chinese woman presented with a 1-month history of repeating cough complained of chest congestion. Patient visited the First Affiliated Hospital of Zhengzhou University in October, 2013, because she did not benefit from the antibiotic therapy. Physical examination, haemogram, chemistry profile and urinalysis suggested no abnormalities. During hospitalization, her systemic arterial pressure was 116/70 mmHg and electrocardiogram were normal, but echocardiogram revealed mitral valve insufficiency. Biopsy specimen was collected from patient in the First Affiliated Hospital of Zhengzhou University and fixed in 10% neutral formalin, then dehydrated. Sections of the

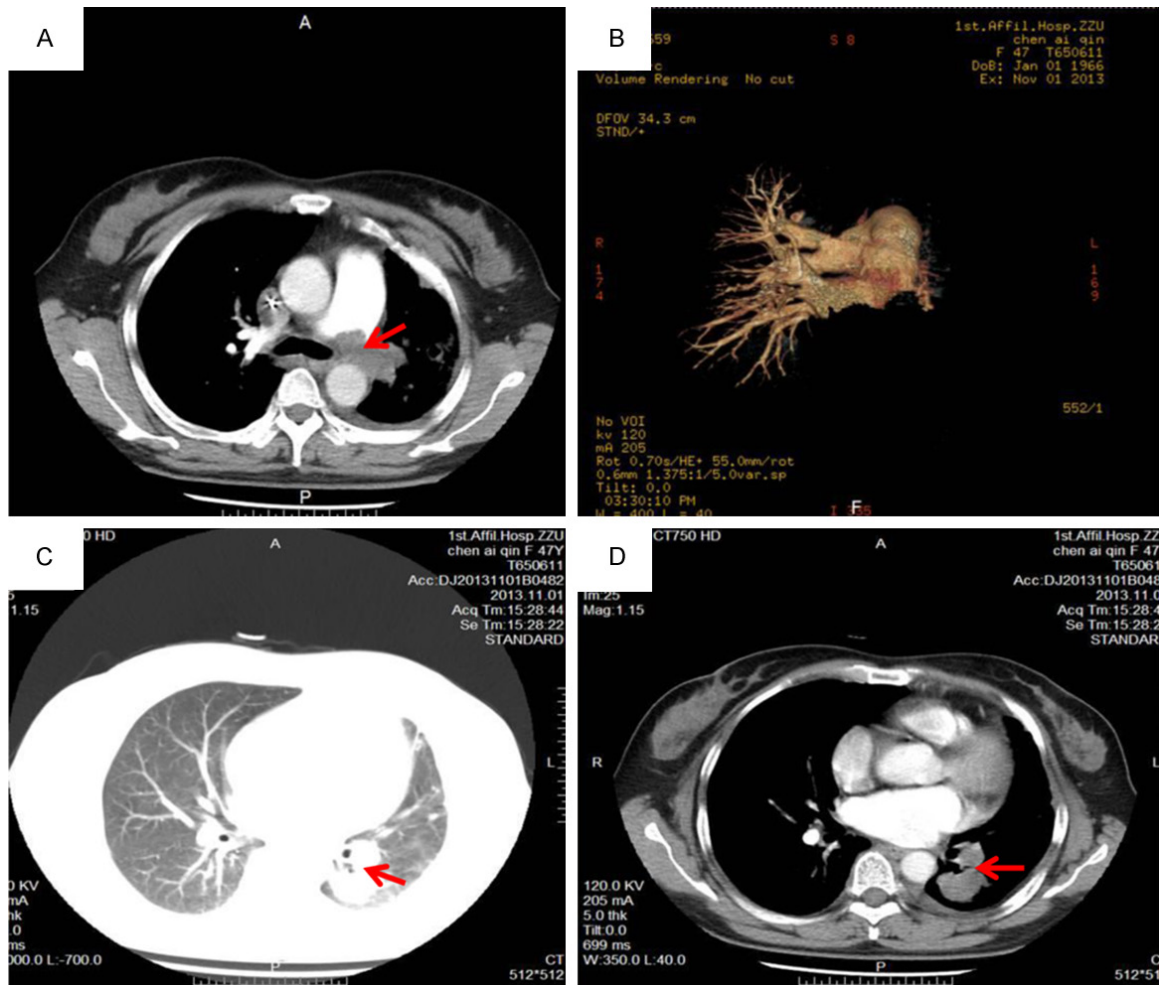


Figure 1. Computed tomography angiography (CTA) of the patient. A, B. CTA shows pulmonary artery embolism (arrow). C, D. CT scan shows a soft-tissue mass (30.40 mm × 31.54 mm) (arrow) in the lower left lung near the hilum.

excised mass were embedded in paraffin and stained with haematoxylin and eosin (HE) and immunohistochemistry (IHC). Pathological examination was done under light microscopy.

Results

Computed tomography angiography (CTA) and fiberoptic bronchoscopy

CTA revealed pulmonary artery extensive embolism (**Figure 1A** and **1B**), space-occupying lesion (30.40 mm × 31.54 mm) in the left lower lobe (**Figure 1C** and **1D**), and mediastinal multiple swollen lymph nodes, suggesting lung cancer and lymph node metastasis. CTA also confirmed multiple pulmonary infections, especially in the left lung field. However, fiberoptic bronchoscopy showed no abnormalities in windpipe and bronchial (**Figure 2**).

Positron emission tomography-CT (PET-CT)

PET-CT further revealed soft tissue mass with active metabolism in lower lobe dorsal segment near the hilum, confirmed the earlier finding as well as multiple metabolic dense nodules in the left lung field being noted (**Figure 3**). PET-CT imaging showed several metabolic lymph nodes in the mediastinum, left hilum and axillary, indicating lung cancer and metastasis. But there were no other metastatic sites (**Figure 3D**).

Aspiration biopsy and pathological changes

We applied aspiration biopsy guided by CT and resected a part of the mass from the patient. Histologic sections from tumor showed spindle cell arranged in diffuse sheets. The cells have high nucleocytoplasmic ratio and prominent

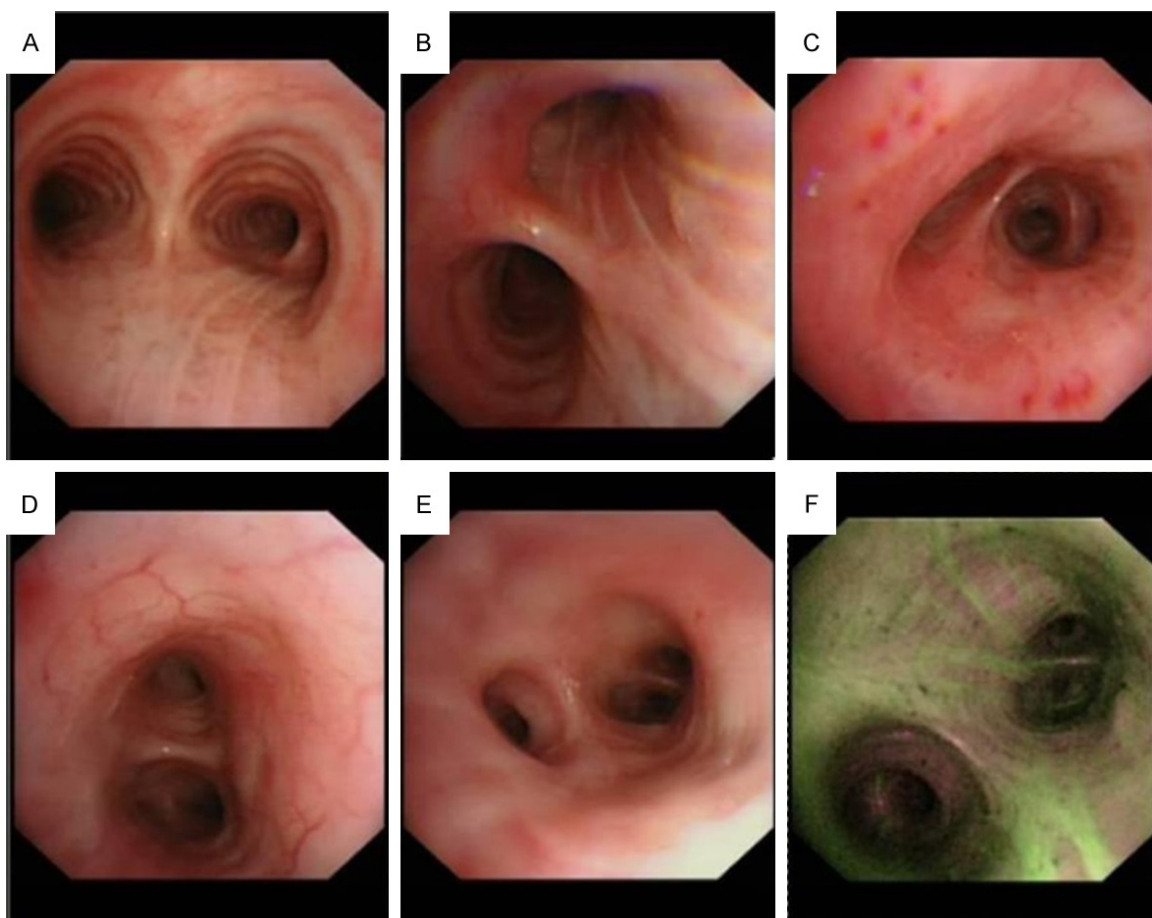


Figure 2. Fiberoptic bronchoscopy of the patient. Bronchoscopic images and fluorescence bronchoscopy showed no abnormalities in bronchus.

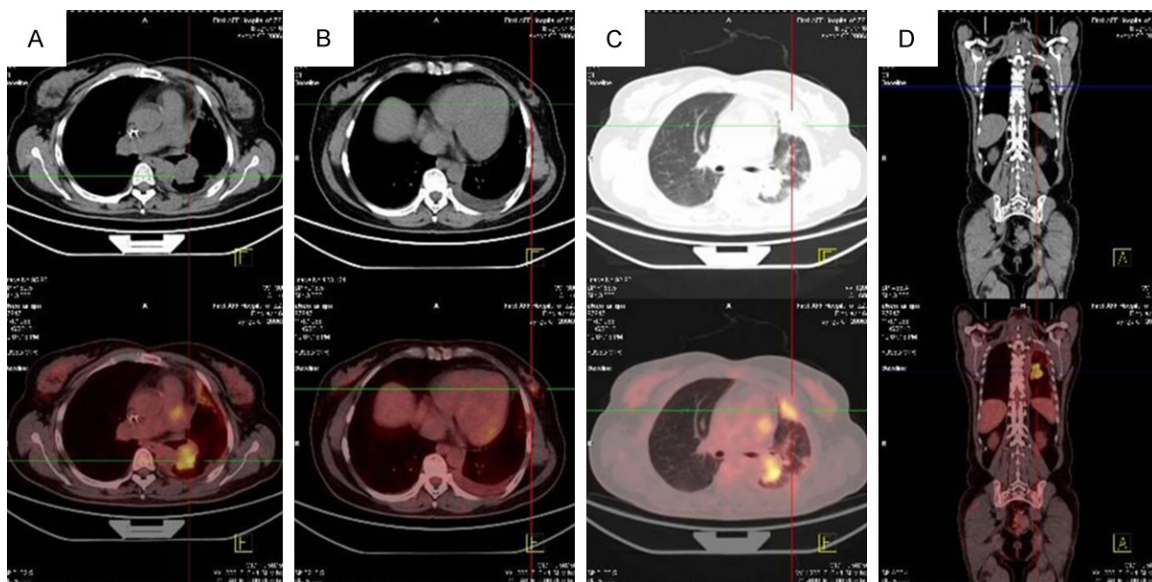


Figure 3. Positron emission tomography-CT (PET-CT) of the patient. PET-CT scans showing an abnormality with increased uptake at the left lung field and lymph node.

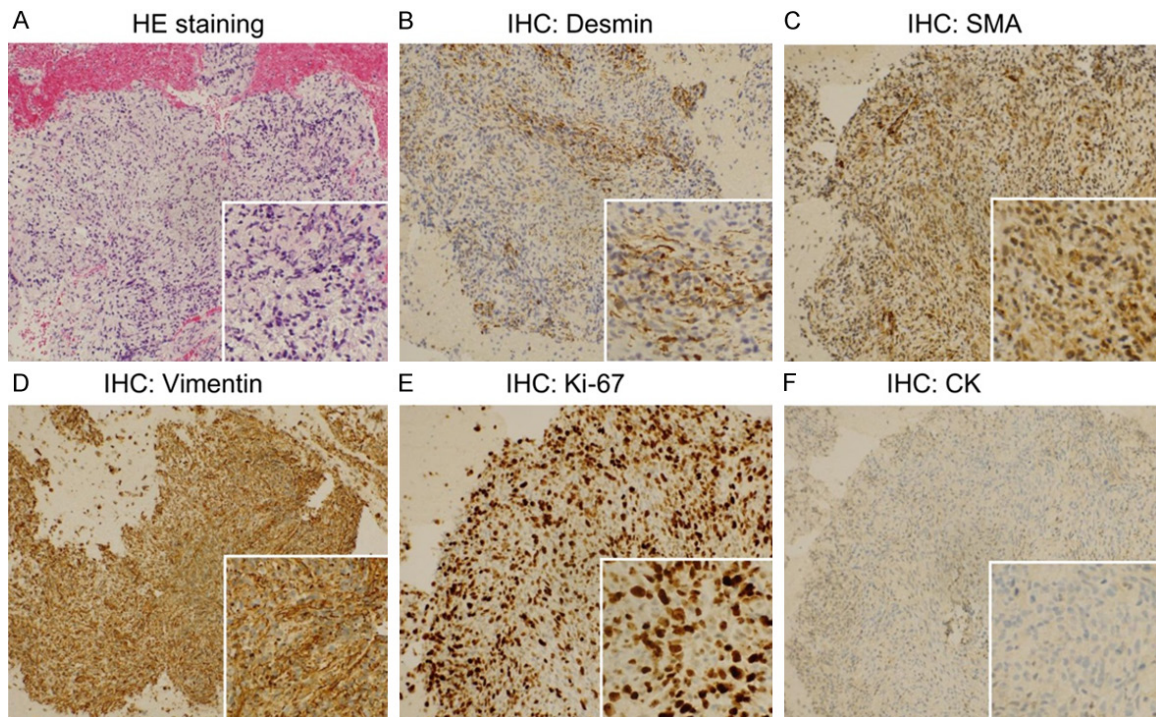


Figure 4. HE staining and immunohistochemical staining. (A) Photomicrograph showing eccentric nuclei, prominent nucleoli and occasional giant cells. Immunohistochemical stains showed positivity for desmin (B), SMA (C), Vimentin (D), Ki-67 (E), while negativity for CK (F).

nucleoli. Mitotic figures were high. Multinucleated tumor giant cells were present (**Figure 4A**). Immunohistochemical examination of the biopsy specimen showed that the neoplasm was an RMS, as the cytoplasm of the tumor cells was diffusely positive for desmin and the nuclei were partially positive for SMA, while the tumor cells were negative for CD34 and S-100 (**Figure 4**) [4, 5]. In addition, vimentin and Ki-67 were highly expressed in the tumor tissue (**Figure 4**). The rest examined markers, including cytokeratin (CK), epithelial membrane antigen (EMA), TTF, CD117, were negative.

Discussion

RMS predominantly presents in children aged less than 7 years and in adolescence. Its incidence subsequently decreases in older people [6]. RMS is very uncommon in individuals aged more than 45 years. RMS causes local symptoms associated with mass lesions, infiltration and destruction of adjacent tissues [7]. It has diverse, nonspecific clinical manifestations and is therefore easily misdiagnosed. It relies mainly on pathologic, immunohistochemical, and molecular biological studies to diagnose RMS.

Histological examination is the foundation stone in making the diagnosis and consequential therapy in PPR. However, it is still very difficult to diagnose PPR. Based on morphology of the present case, a list of differential diagnosis were included, such as PPR, epithelioid sarcoma, malignant melanoma and anaplastic lymphoma. Immunohistochemistry was suggested for confirmatory diagnosis. The tumor cells were diffusely and positive for desmin and vimentin. Myo D1 was focally positive. The tumor cells were immuno-negative for CK, EMA, CD34, S100. Thus, we excluded the possibilities of malignant melanoma (S100-), anaplastic lymphoma (EMA-), epithelioid sarcoma (CK-, EMA-, CD34-). However, tumor cells were positive for desmin and vimentin. Hence; a final diagnosis of PPR was established.

RMS originates from the embryonal mesenchyme which eventually develops to striated skeletal muscle [8]. RMS can occur in various locations, but primary RMS is rarely found in the lungs or brain which lacks striated muscle [7]; However, how does it occur in lung parenchyma, remains unclear as in our case. The mechanisms underlying the development of

RMS remain to be determined. Analysis of recurrent cytogenetic alterations in solid tumors showed that chromosomal translocations are associated with sarcomas [9]. Cloning studies have demonstrated that in-frame fusion of the coding sequences of rearranged genes, leading to fusion transcripts that encode oncogenic chimeric proteins [9]. Researchers revealed that rhabdomyoblastic cells can “assume the guise and function of fibroblasts”, but the presence of many monster giant cells validate that the tumor is not a fibrosarcoma [10].

Currently, there was no effective therapeutic regimen for RMS. Further studies are required to analyze the histological features, prognostic factors, and molecular biological characteristics of RMS, which are either controversial or unknown.

Over 90% of cancer patients develop laboratory evidence of coagulation abnormalities [11]. Increased platelet aggregation, tumor-cell procoagulants, and increased levels of coagulation factors are the mechanisms of paraneoplastic hypercoagulability [12]. Tumor necrosis factor and interleukins that are released from cancer cells can also cause endothelial damage, resulting in a thrombogenic surface [13].

In case of a malignancy, procoagulant activity increases and fibrinolytic activity decreases. The treatment includes anticoagulation and antitumor therapy. Local control with radiation therapy, surgery or both, and chemotherapy should be administrated, except those patients exhibited disease progression [14]. Metastasis occurs in most RMS patients as well as in the present case, leading to inoperability. Our patient received subcutaneous injection of heparin for one week, and subsequently oral administration of warfarin.

Cancer patients sometimes do not response to routine anticoagulant treatment. Clinicians and oncologists should react faster than usual when dealing with primary oncological cases that have thrombotic conditions. When the hypercoagulable status could not be totally cured in cancer patients by standard anticoagulation therapy, treatment of the underlying neoplasms would help control the hypercoagulability disorders [15]. As the patient and her family members lack clinical experience and knowledge and they have low confidence in

doctors, our patient strongly refused either chemotherapy or radiotherapy after recognizing the malignant tumor with poor prognosis. Unfortunately, the patient was reported deceased of respiratory failure after 2 years at home.

In conclusion, diagnosis of PPR was established. PPR is extremely rare. The diagnosis of PPR should be made on the basis of clinical manifestations, imaging tests, and pathological examination. Oncologists should react promptly to break the circle of cancer, thrombosis, and inoperability.

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Disclosure of conflict of interest

None.

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