Tzu Chi Medical Journal 2025; 37 (3): 348-349

Pathology Page

Pulmonary tumor with osteosarcomatous and chondrosarcomatous components: The differential diagnosis

A 72-year-old woman with underlying disease of essential hypertension, type 2 diabetes mellitus, osteoporosis, and traumatic ruptured intervertebral disc of L4/5 status post microdiscectomy presented dyspnea, general weakness, and poor intake for 2 weeks and chest tightness for 2 days. She was brought to the emergency room by her family for help.

The chest X-ray revealed a large pleural effusion on the right side along with a collapse of the right middle lobe. Thoracocentesis was performed, and 1200 mL of fluid was drained. The cytology showed negative for malignancy. However, chest computed tomography (CT) revealed multiple nodules with varying sizes in the left and right lungs and thickening pleura with nodules and effusion, favoring cancer metastases [Figure 1]. Therefore, she received a biopsy of the right lung and decortication of the pleura.

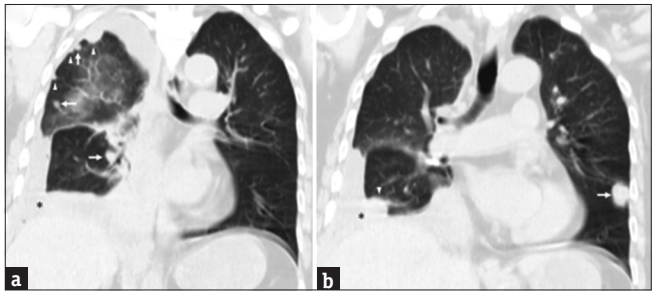

Figure 1: Chest computed tomography (CT) revealed multiple nodules (arrows) with varying sizes in the left and right lungs and thickening pleura with nodules (arrowheads) and effusion (asterisks). (a) A coronal view of chest CT. (b) Another coronal view of chest CT

Pathology showed a tumor composed of malignant spindle cells with pleomorphism and increased mitotic activity admixed with osteoid and chondrosarcomatous elements [Figure 2]. Immunohistochemical stains showed the neoplastic cells were focally positive for cytokeratin (<5%) and negative for TTF-1, p40, p63, calretinin, D2-40, PAX8, desmin, myogenin, S100, and CD34. The differential diagnoses for the morphological picture are pulmonary sarcomatoid carcinoma with mesenchymal differentiation [1], sarcomatoid mesothelioma with heterologous elements [2], metastatic metaplastic carcinoma of breast [3], metastatic carcinosarcoma from uterus [4], and primary or metastatic osteosarcoma arising from bone [5,6] [Table 1].

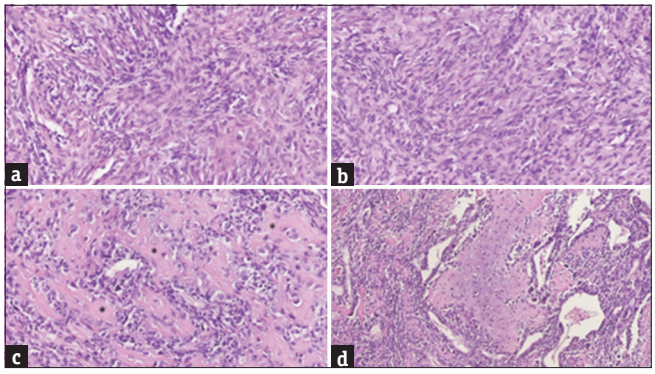

Figure 2: Pathology showed the tumor was composed of malignant spindle cells with pleomorphism (a and b) admixed with osteoid ([c], asterisks, the eosinophilic intercellular materials) and chondrosarcomatous elements (d). (All pictures with H and E stain and in the same magnification of × 200)

Immunohistochemical stains for pulmonary sarcomatoid carcinomas typically show expression of epithelial markers (EMA and cytokeratin), TTF-1, or p40 [1]. Sarcomatoid mesotheliomas are positive for D2-40 and podoplanin [2]. Usually, metaplastic carcinomas of the breast are triple-negative breast cancer that does not express estrogen receptor, progesterone receptor, or human epidermal growth factor receptor 2 [3]. High-molecular-weight keratins such as 34βE12, CK5/6, CK14, and CK17 are useful for identification of epithelial differentiation in metaplastic carcinomas of breast, and p63 has proven to be a diagnostic marker for metaplastic carcinoma of breast [3]. Uterine carcinosarcoma characteristically expresses PAX8 markers, although that is less frequent in the sarcomatous component than the carcinomatous component [4]. Osteosarcomas are positive for osteoblastic lineage biomarkers, including osteocalcin and osteonectin [5]. Importantly, there is a diagnostic pitfall as these tumors may also express cytokeratin and EMA [6].

A subsequent abdomen-to-pelvis CT scan revealed a bulky osteolytic tumor in the left hemipelvis (measuring up to 15.1 cm in size) with necrosis, and destroying bone and surrounding tissue [Figure 3]. The uterus was small, and there was no imaging sign of gynecological-related tumor lesion. No tumor lesion was seen over bilateral breasts on chest CT.

Figure 3: Abdomen-to-pelvis computed tomography revealed a bulky osteolytic tumor mass, measuring up to 15.1 cm in size, arising from the left hemipelvis with necrosis and destruction of bone and surrounding tissue. No gynecological-related tumor lesion is seen

Table 1: The differential diagnosis for pulmonary tumor with osteosarcomatous and chondrosarcomatous componentstable [1-6]

Differential diagnosis	Immunohistochemical stains
Pulmonary sarcomatoid carcinoma with mesenchymal differentiation	Typically shows expression of epithelial markers (EMA and cytokeratin], TTF-1, or p40
Sarcomatoid mesothelioma with heterologous elements	Positive for D2-40 and podoplanin
Metastatic metaplastic carcinoma of breast	Negative for ER, PR, and HER2; positive for high-molecular-weight keratins (such as 34βE12, CK5/6, CK14, and CK17) and p63
Metastatic carcinosarcoma from uterus	Positive for PAX8 (less frequent in the sarcomatous component than the carcinomatous component)
Primary or metastatic osteosarcoma arising from bone	Positive for osteoblastic lineage biomarkers, including osteocalcin and osteonectin; A diagnostic pitfall that these tumors may also express cytokeratin and EMA

EMA: Epithelial membrane antigen, TTF-1: Thyroid transcription factor-1, ER: Estrogen receptor, PR: Progesterone receptor, HER2: Human epidermal growth factor receptor 2

A final diagnosis of primary osteosarcoma arising from the left hemipelvis with pulmonary and pleural metastases was made.

In conclusion, a clinicopathological correlation is essential to make an appropriate diagnosis for pulmonary tumors with osteosarcomatous and chondrosarcomatous components in addition to pathological morphology and immunohistochemical stains.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Data availability statement

All data generated or analyzed during this study are available with rationale requestion.

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Conflicts of interest

There are no conflicts of interest.

*Pau-Yuan Chang[a], Bing-Ru Chung[b,c], Yen-Chang Chen[d,e]**

[a]Department of Radiology, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien, Taiwan, [b]Division of Thoracic Surgery, Department of Surgery, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien, Taiwan, [c]Department of Surgery, School of Medicine, Tzu Chi University, Hualien, Taiwan, [d]Division of Digital Pathology, Department of Anatomical Pathology, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien, Taiwan, [e]Department of Pathology, School of Medicine, Tzu Chi University, Hualien, Taiwan

***Address for correspondence:**
Dr. Yen-Chang Chen, Division of Digital Pathology, Department of Anatomical Pathology, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, 707, Section 3, Chung-Yang Road, Hualien, Taiwan.
E-mail: s92312129@gmail.com

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