LETTER / Thoracic imaging

Pulmonary metastasis of uterine leiomyosarcoma presenting as centrilobular nodules with ‘‘tree-in-bud’’ pattern

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Clinical case report

A 59-year-old woman had a chest and abdominal CT scan as part of a staging assessment for uterine cancer. The investigation was negative except for a small cluster of micronodules in the left upper lobe centred around branched linear opacifications in continuity with the peripheral pulmonary arteries (Fig. 1). The sub-pleural space was preserved. These were therefore centrilobular micronodules with a ‘‘tree-in-bud’’ appearance suggesting a respiratory cause such as bronchiolitis. The patient was immunocompetent and had no respiratory symptoms however, and her laboratory tests showed no signs of inflammation. A PET-CT scan was performed and showed moderate hyperintensity at this point with a max standardized uptake value (SUV) of 4.75 (Fig. 2a). In view of the context of malignancy, a transthoracic lung needle biopsy was performed (Fig. 2b) at 6 weeks using an 18 Gauge Coaxial system (Quick-Core, Cook\textsuperscript{®}). The procedure was uncomplicated and histological examination (Fig. 3) showed a proliferation of fusiform cells with a high mitotic index. By immunohistochemistry these tumour cells expressed smooth muscle markers including alpha-actin and were negative for epithelial markers. This analysis therefore confirmed a metastatic site of the uterine cancer, a high-grade leiomyosarcoma.

Discussion

Centrilobular micronodules with a ‘‘tree-in-bud’’ appearance are the pathological representation of centrilobular bronchioles, whose diameter when normal (< 1 mm) prevents...
them being visualised by computed tomography. These nodules reflect a spectrum of diseases resulting either in dilatation of the bronchiolar lumen (liquid, mucus, pus), or thickening of their wall, or as a result of peribronchiolar inflammation [1].

By high-resolution chest CT, these micronodules are centred around branched linear opacifications giving a "tree-in-bud" appearance. The nodules have variable but usually clear outlines. The sub-pleural space is preserved as it is for any centrolobular nodule.

This presentation almost always reflects respiratory disease, the leading cause being infectious. "Tree-in-bud" appearances can also be seen in sarcoidosis and in bronchial alveolar carcinoma [2]. Presentation may more rarely be due to metastatic lesions, particularly tumour microemboli in the arterial circulation. The presentation with "tree-in-bud" micronodules generally reflects the presence of tumour cell emboli or intimal thickening of the arterials reacting to the emboli themselves [3]. Many malignancies can give rise to this presentation: breast cancer, hepatocellular carcinoma, pancreatic, renal, prostatic or colonic adenocarcinoma, and an abdominal desmoplastic tumour [3—6]. Endobronchial metastases and thymus cancer have also been reported [7]. In our case, the uterine leiomyosarcoma had significant vascular tropism with invasion of the peri-uterine arterials on the hysterectomy specimen. The arteriolar tropism was more difficult to demonstrate on examination of the transthoracic needle biopsy.

As a result, whilst "tree-in-bud" centrolobular nodules usually reflect bronchiolar disease, particularly in infectious bronchiolitis, a metastatic cause is always possible. The appropriate maximal intensity projection (MIP) reconstructions must be performed to increase detection of the "tree-in-bud" appearance. If malignancy is present, the possibility of metastases must be considered and confirmed histologically if this changes the management.
Tree-in-bud pattern revealing uterine leiomyosarcoma metastasis

Figure 3. Histological features. Infiltration of pulmonary tissue by sarcomatous cells similar to uterine leiomyosarcoma. a: at low magnification, tumoral proliferation of fusiform cells (arrow) near normal pulmonary alveoli (*); b: at higher magnification, sarcomatous cells proliferation with nuclear atypia (arrow) and many abnormal mitosis (arrowhead); c: immunostaining for smooth muscular actin is strongly positive.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References