A 60-year-old woman was evaluated for a mass lesion shown on a radiograph of the thorax. The patient had been well until 6 weeks before, when progressive shortness of breath, coughing and left-sided chest pain, and pain between her shoulders developed. Her medical history revealed rheumatoid arthritis for 30 years, for which she received prednisolone, 10 mg/d. In 1994, breast-conserving surgery was performed because of a metaplastic carcinoma of the right breast. After surgery, she received adjuvant radiotherapy. No lymph node metastases were found. During follow-up, no signs of metastasis or relapse were observed. There was no history of smoking.

Physical examination showed normal vital signs. The right breast showed a scar, but there were no palpable abnormalities in either breast. There was no lymphadenopathy. Percussion and auscultation of the chest were normal. Her extremities showed malformations matching her rheumatoid arthritis.

Laboratory examination revealed an erythrocyte sedimentation rate of 52 mm/h, and a microcytic and hypochromic anemia (hemoglobin, 11.4 g/dL; hematocrit, 36%). The alkaline phosphatase level was 1,494 U/L (normal range, 70 to 150 U/L), with an elevated bone fraction. The other liver function test results were normal. The calcium and albumin levels were normal, and the parathyroid hormone was slightly raised (110 pg/L; normal range, 0 to 100 pg/L).

Chest radiography showed a widened mediastinal silhouette, especially around the aortic arch, and a shadow at the posterobasal side of the left lung (Fig 1, top, and bottom). A CT scan revealed an abnormal calcified mass in the mediastinum and left lower lobe. The calcified mass in the mediastinum showed encasement of the descending aorta, with displacement of the trachea toward the left hemithorax (Fig 2, top). The calcified consolidated left lower lobe was continuous with the mediastinal mass. Left-sided pleural fluid was also present (Fig 2, bottom). A radionuclide bone scan showed pathologic uptake in the soft tissue of the left hemithorax. There were no signs of any bone metastases. Fiberoptic bronchoscopy revealed a stenotic left main bronchus, narrowed by pathologic tissue. Eventually, CT-guided biopsy was performed to obtain sufficient material for histologic examination.

What is the diagnosis?
Figure 1. Chest radiographs showing widened mediastinum and consolidated left lower lobe.

Figure 2. Top: Thoracic CT scan showing a calcified mass in the mediastinum around the descending aorta, which gives a shift of the trachea to the left. Bottom: Thoracic CT scan demonstrating a consolidated left lower lobe, which is continuous with the mediastinal mass. Left-sided pleural fluid is also present.
Diagnosis: Metastasis of a metaplastic breast carcinoma

Histologic examination of the bronchoscopic biopsy showed only bone and acellular material largely made out of calcium, but no malignant cells. Therefore, new specimens were obtained during a second bronchoscopic procedure and yielded few malignant-appearing submucous cells with a high mitotic activity. Estrogen and progesterone receptor staining were negative in the malignant cells. Additional immunohistochemical staining was technically not possible because of lack of adequate specimens. Subsequently, a CT-guided biopsy sample was obtained from the tumor, which showed a bone-forming tumor with a high number of malignant cells with a moderate amount of cytoplasm and highly polymorphous nuclei with large nucleoli (Fig 3). A high mitotic activity with atypical mitosis was seen. Immunohistochemical staining for keratin was negative. The histologic pattern was concordant with an extraosseous osteosarcoma. Review of the slides of the breast tumor from 1994 showed a metaplastic carcinoma without an osteosarcoma component. The final pathologic diagnosis of the pulmonary mass was metastasis of a metaplastic carcinoma of the right breast.

Discussion

Our patient had a massive calcified tumor in the left lung and mediastinum. Calcifications in the lung are not rare and may occur in benign as well as in malignant lesions. The differential considerations of a calcified lesion include calcified granuloma, pulmonary hamartoma, carcinoma, metastasis from an osteosarcoma or chondrosarcoma, or a primary pulmonary carcinoma. In solitary nodules, calcification is mostly a sign of benignity, although it may occur in malignant lesions as well. Different patterns of calcification can be distinguished. When it has the appearance of lamination, it is most certainly a granuloma, where as a ‘popcorn-ball’ appearance is considered pathognomonic for a hamartoma. Calcification in malignant lesions can result from several processes, such as calcified scar tissue or cartilage engulfed by tumor, dystrophic calcification in necrotic tumor, or primary tumor calcification.

Our patient was treated for a metaplastic breast carcinoma 5 years earlier. The metaplastic differentiation of an epithelial duct carcinoma may have various patterns. This differentiation includes squamous, spindle cell, chondroid, or osseous elements. Mostly, a tumor contains more than one of these metaplastic components, but it is possible that only one element is present.

Metaplastic carcinoma of the breast is a rare entity that constitutes only 0.2% of all breast carcinomas. It generally metastasizes to regional lymph nodes, pleura, lung, liver, bone, and brain. In our patient, histologic specimens showed a bone-forming tumor with a high number of malignant cells, concordant with an osteosarcoma. For this reason, a primary osteosarcoma or a metastatic lesion was considered. Primary osteosarcoma of the lung, however, is very rare, and there were no signs of a primary bone osteosarcoma (no bone metastasis on the radionuclide bone scan). It is known that bone tissue in metaplastic carcinomas frequently shows a high mitotic index and a malignant appearance identical to that seen in osteosarcoma.

In this case, the primary tumor was an epithelial ductal carcinoma without osseous elements. However, in patients with metaplastic carcinoma it is possible that, even though an element is not present in the primary tumor, any or all mesenchymal or epithelial components may be present in a metastasis of such lesion. In our case, in contrast to the primary tumor where no osteosarcoma components were present, the metastasis showed only osseous components. The diagnosis can be difficult in those samples in which only one component of the tumor is noted; in our case, this almost led to a false diagnosis of osteosarcoma.

References


Figure 3. Material of the tumor biopsy showing pleomorphic tumor cells and osteoid (arrowhead) [hematoxylin-eosin, original × 200].
8 Gupta RK. Cytodiagnostic patterns of metaplastic breast carcinoma in aspiration samples: a study of 14 cases. Diagn Cytopathol 1999; 20:10–12

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