Primary Ewing's Sarcoma of the Thoracic Spine Presenting with Pulmonary Nodule

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Abstract

Primary ES of the spine may have a variety of appearances on imaging studies, and can mimic other diseases. A right thoracotomy and wedge resection was performed in a 28 year-old female patient with a pulmonary nodule. Pathological investigation showed this tumor to be Ewing's sarcoma. This diagnosis led us to perform a radionuclide bone scan and thoracic MR, and on the basis of all findings primary ES of the thoracic spine was diagnosed. Although quite rare, ES should be included in the differential diagnosis of pulmonary nodules.

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Introduction

The lung is an extremely common site for metastases. Large autopsy series of patients with extrathoracic malignancies reveal pulmonary metastases in 20%-54%. Among autopsy cases, breast, uterus, colon, kidney, head, and neck are noted as the most common primary tumour sites leading to pulmonary metastases (1). Osteosarcoma, choriocarcinoma, melanoma, and Ewing's sarcoma frequently metastasize to the lung, although the frequency of these primary tumors is relatively low (2).

Ewing's sarcoma (ES) is a member of the primitive neuroectodermal tumors (PNET) group that occur as either osseous or soft tissue tumors. ES usually involves the bones of the lower extremity and pelvis, but virtually any bone in the body can be affected (3). ES of the spine may be primary or metastatic. Approximately 3.5% of ES lesions are thought to arise primarily in the spinal column. Primary ES of the nonsacral spine, representing approximately 0.9% of cases is uncommon (4). At present ES is considered a systemic tumor, since 20 to 25% of patients have metastatic disease at the time of presentation. The lung is the most common site of metastatic disease, encountered in about one third of stage IV patients (5).

We report a 28 year old female patient with primary ES of the

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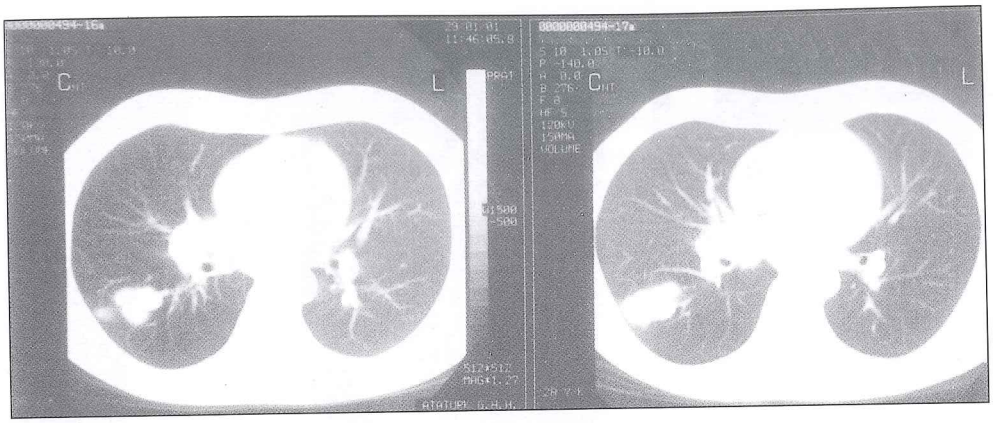

Figure 1. *Thorax CT showing a lobulated solid lesion in the right lower lobe.*

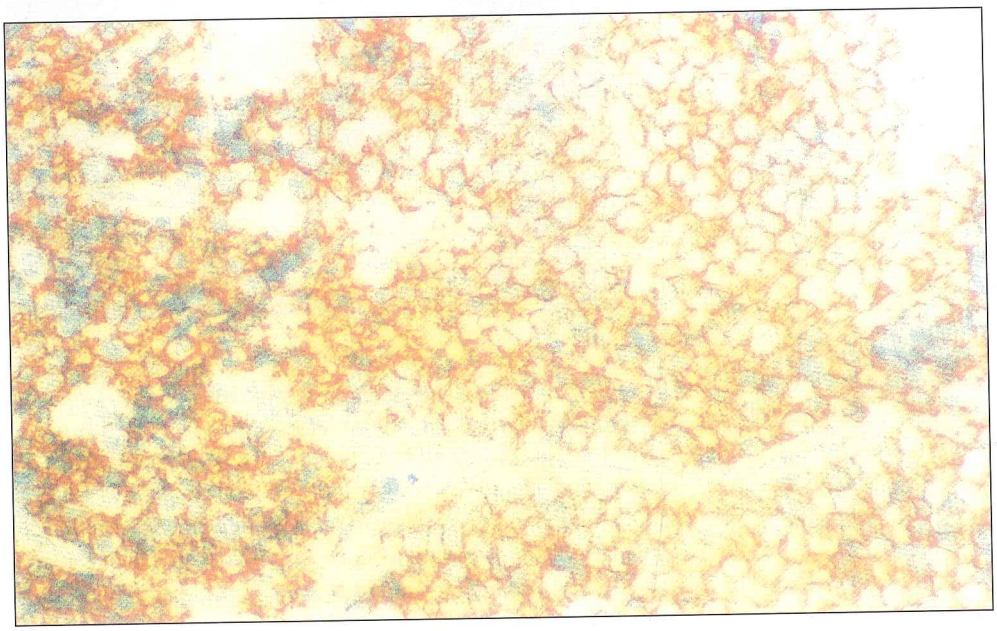

Figure 2. *Tumor cells showing positivity for O-13 (CD99) antigen.*

thoracic spine who was diagnosed by the detection of a pulmonary nodule mimicking a primary lung cancer.

Case report

A 28 year-old female patient was admitted with a history of intermittent right sided back and lumbar pain. The pain was initially partly relieved with acetaminophen and anti-inflammatory agents. Her physical examination results were within normal limits, except for a low grade (37.5°C) fever. Upright posteroanterior and lateral chest X-rays revealed a discrete nodule, 4x2.5 cm in diameter in the right lower pulmonary zone. Thorax CT revealed a lobulated solid lesion 4x2.5 cm in diameter in the right lower lobe which extended towards the pleura. In the right hilum, a tissue mass measuring 6x4x3 cm, surrounding the right bronchial system and extending towards the subcarinal region was detected (Fig. 1). Fiberoptic bronchoscopy results were normal. A percutaneous imaging guided fine needle aspiration of the lung mass was performed. The cytological findings of the smears were reported as normal, with no evidence of malignancy. Thus, despite the performance of fiberoptic bronchoscopy and transthoracic fine needle aspiration biopsy with the guidance of thorax CT, a conclusive diagnosis could not be obtained and our patient was scheduled for diagnostic thoracotomy. A frozen section was performed during the operation and the biopsy specimen led to the diagnosis of a malignant tumor. A wedge resection and because of the enlarged mediastinal lymph nodes, also a dissection of the lymph nodes were performed during the surgical intervention. Microscopic examination of the biopsy material displayed a homogenous, diffuse histological pattern composed of closely packed, small, round to poligonal cells with inconspicuous cytoplasms. The cells possessed round to oval nuclei with finely dispersed chromatin and one or two small nucleoli. Necrosis and hemorrhage were abundant. Rosette formation was seen in some areas. The neoplasm stained positively for cytoplasmic glycogen (Periodic Acid Schiff). Rosettes were weakly positive for chromogranin, S-100 protein, EMA and vimentin. O13 (CD99) showed strong and diffuse cytoplasmic positivity (Fig. 2). CD45, desmin, VEGF were negative.

These histopathological findings led us to perform a radionuclide bone scan and thoracic MR imaging for detecting the primary focus of disease. Whole body plane images after injection of technetium-99m methylene diphosphonate showed only slight focal area of increased activity at the level of Th7–Th9. The thoracic MR image showed a lesion in the

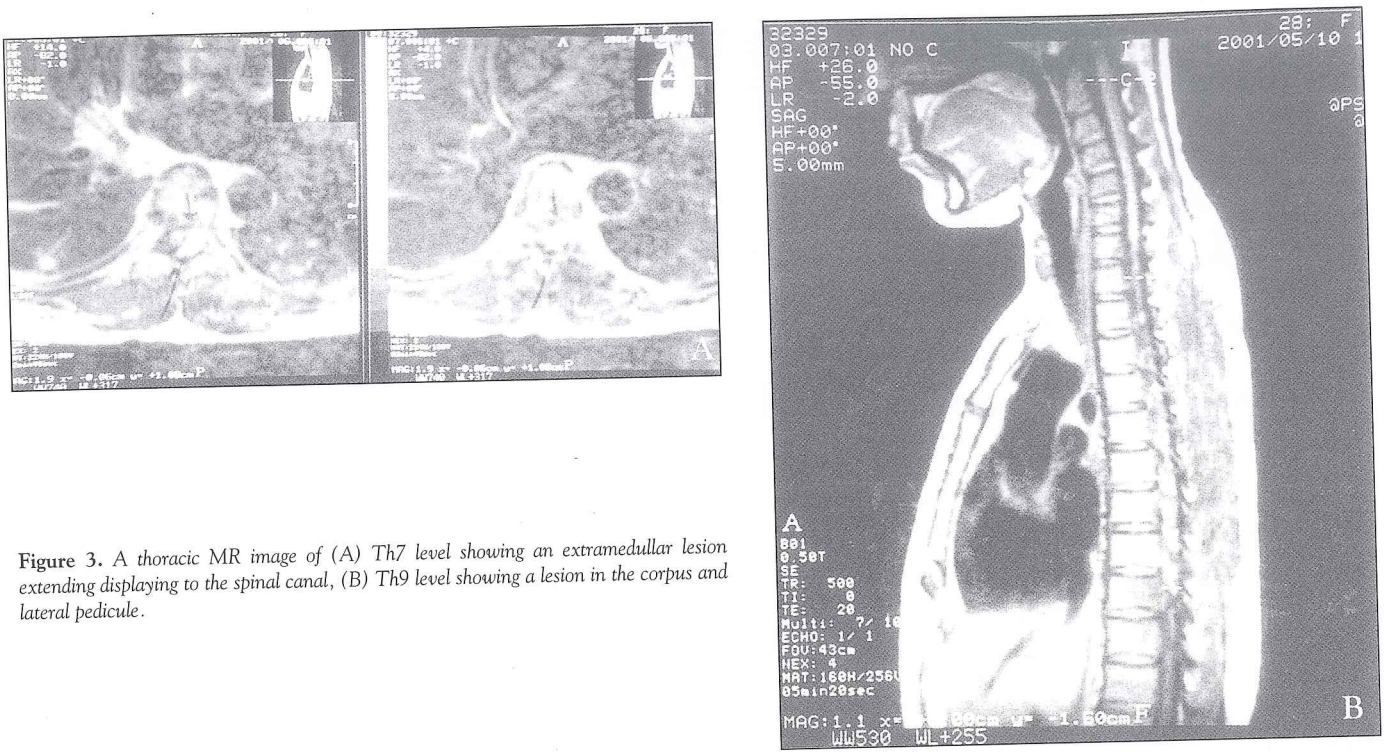

Figure 3. *A thoracic MR image of (A) Th7 level showing an extramedullar lesion extending displaying to the spinal canal, (B) Th9 level showing a lesion in the corpus and lateral pedicule.*

left lateral side of the Th9 corpus and lateral pedicule which was isointense in T1 weighted images and hypointense in T2 weighted images; in the Th7 level there was one extramedullary lesion measuring 2x1.5x1cm and extending to the spinal canal (Fig. 3).

Based on the above findings, a diagnosis of primary ES of the thoracic spine was reached. Treatment was planned jointly with medical oncologists and consisted of chemotherapy and radiation therapy.

Discussion

It is well known that the lung is a common site of metastatic disease. At autopsy, the frequency of presence of pulmonary metastases is greater than 25 percent in patients with melanoma, choriocarcinoma, renal cell carcinoma, osteosarcoma and Ewing's sarcoma. Early diagnosis of pulmonary metastases may be critical in the planning of effective therapy in patients with these tumours (6).

Radiological methods available to detect pulmonary metastases include conventional chest radiograms, computed tomography (CT), and magnetic resonance imaging (MRI). CT currently is accepted as the gold standard for the evaluation of pulmonary metastases. MRI is not as sensitive as CT for detecting lung nodules. However, MRI is superior to CT scanning in evaluating peripheral masses where a question exists as to whether the spine or a major vascular structure has been invaded (7,8). In this patient, the primary focus of ES lesion was detected by MRI.

Another imaging modality for discriminating between benign and malignant pulmonary nodules is positron emission tomography (PET). PET scanning has been shown to have good specificity for benign vs malignant etiologies (7). FDG-PET for detection of osseous metastases from ES is reported to be superior to bone scintigraphy. However, the specificity and sensitivity of spiral CT in the detection of pulmonary metastases from ES is higher than FDG-PET. Therefore, a negative FDG-PET cannot completely exclude the presence of lung metastases (9,10).

Sometimes it is difficult or impractical to obtain tissue and to establish a definitive diagnosis. Bronchoscopy has no major role in the diagnosis of a peripheral lung nodule. Percutaneous needle aspiration biopsy can be performed under fluoroscopic or CT guidance, and constitutes the most useful initial procedure in peripheral lesions. The sensitivity of this method for diagnosis of malignancy is 64-100% (11). Nodules should be considered to reflect malignancy until proven otherwise. Surgical resection is the ideal approach, as it is both diagnostic and therapeutic (12,13). In our case, bronchoscopy findings were normal, and transthoracic fine needle aspiration biopsy with the guidance of thorax CT did not yield conclusive results and thoracotomy was deemed necessary for the diagnosis.

Considerable difficulties exist in distinguishing ES from other malignant small round cell tumors involving bone such as lymphoma and neuroblastoma histologically (14). Desmin was used to detect mitogenic differentiation (rhabdomyosarcoma) and leucocyte common antigen (CD 45) to detect lymphoma in our case.

ES usually involves the bones of the lower extremity and pelvis but virtually any bone in the body can be affected (4). Primary ES of the nonsacral spine is uncommon (15). In a large series of ES cases, skeletal sites were pelvic in 35%, costal in 13%, and spinal in 9% of the patients (16). Primary ES of the spine can present with a clinical triad of back pain, neurological defect and palpable mass (15). But in many cases, as in our patient, ES shows a lack of specific symptoms and therefore stays inapparent for a long time. Our patient presented with only a right sided pain in the back and lumbar region. Neither a neurological defect nor a palpable mass were present. ES was diagnosed by detection of a pulmonary nodule incidentally.

ES is an agressive malignancy with a high local recurrence rate and a high metastatic rate. Patients with local resectable disease treated with multidrug chemotherapy have a 5 year survival rate of approximately 70%. Unfortunately 20-25% of patients will present with metastatic disease. About a third of these patients have lung metastases. For the patients who present with metastatic disease, the 5 year survival rate is 30%. Resection of lung metastases, if possible, does improve survival (17). Paulussen et al found a longer survival rate and a reduced rate of pulmonary metastases from ES when whole lung radiation was added to a regimen of conventional chemotherapy (5). We also planned a combination of systemic chemotherapy and radiation therapy in our case.

In conclusion, the presented patient is an example of an ES case characterized by an absence of clinical and radiological findings and who was diagnosed by the presence of a metastatic pulmonary nodule. Although quite rare, ES should be included in the differential diagnosis of pulmonary nodules.

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