

Fluid-fluid levels detected on MRI and mimicking primary aneurismal bone cysts in a case of spinal bone metastasis

S. COLANGELI, G. ROSSI¹, R. GHERMANDI, E. RIMONDI¹

Department of Oncological and Degenerative Spine Surgery, Rizzoli Orthopedic Institute, Bologna, Italy

¹Department of Radiology, Rizzoli Orthopedic Institute, Bologna, Italy

Abstract. – **INTRODUCTION:** Spinal bone metastases may be lytic or sclerotic lesions. Sometimes aneurismal bone cyst (ABC)-like areas (also called “secondary ABC”) can be found in giant-cell tumors, osteoblastomas and chondroblastomas but are rare in metastatic tumors.

CASE REPORT: A retrospective study on 518 patients surgically treated for metastatic lesions of the spine from 1995 to 2012 was performed to evaluate the radiographic presentation. We propose a case report of a metastatic lesion associated with imaging features suggestive of aneurismal bone cyst. The patient was treated by intralésional surgery, after embolization of the lesion.

CONCLUSIONS: Fluid-fluid levels detected on imaging can be found in bone metastases and may be similar to a primary aneurismal bone cyst. Embolization of metastatic tumor was useful to help the surgeon.

Key Words:

Spinal metastasis, Fluid-Fluid levels MRI, Bone tumors, Aneurismal bone cyst, Embolization.

Introduction

Spinal metastases typically present on CT-scan or MRI as osteolytic (kidney or breast carcinoma) or osteosclerotic lesions (prostate carcinoma) with or without a pathological fracture of the vertebral body and possible hematoma. Secondary ABC is frequent in some benign tumors (giant cell tumor, osteoblastoma, chondroblastoma) and also in some malignant tumors, as in telangiectatic osteosarcoma¹⁻⁶, but very rarely reported in bone metastases. Sometimes radiographic features of fluid-fluid levels detected on MRI mimic primary ABC in spine. The treatment of primary ABC of the spine consists, about our experience and opinion, in a series of embolizations without surgical treatment, with the exception of cases in which neurological deficits ap-

pear because these are considered a surgical emergency. The treatment of spinal metastasis depends on many factors: responsive or resistance to oncological therapy, prognosis and appearance of neurological deficit (surgical emergency)^{7,8}. The surgical treatment of spinal metastasis is strongly recommended to be preceded by embolization of the lesion in order to reduce intraoperative bleeding.

Case report

This 55-years-old female was admitted in March 2012. She had complained of worsening back pain for two months. MRI revealed a mass in the posterior arch of T12, sectors 9 to 3, layers A to D (WBB classification) and fluid-fluid levels on T2 weighted images suggestive of ABC, with compression and contralateral dislocation of the dural sac and roots (Figure 1 A, B). CT scan revealed a wide lytic poorly limited lesion of the posterior arch of T12. A thoracic CT scan performed during the hospitalization showed a 2.5 cm nodule in the upper lobe of the right lung (Figure 2), while abdominal sonography and bone scan were negative for other lesions. A CT-guided biopsy was performed. The analysis of the histological specimens indicated a metastasis of pulmonary origin. The final treatment was surgical decompression, curettage and stabilization, following embolization of the lesion. Angiography revealed a pathological neo-vascularization of the lesion running from the twelfth intercostal left artery. Complete embolization of the lesion was performed through a trans-femoral access and super selective catheterization, with micro-catheter, of the twelfth intercostal left artery and of the first lumbar right artery, by means of Glubran. The final histological diagnosis was lung adenocarcinoma metastasis with areas of secondary ABC.

The patient had no intraoperative and post-operative complications and a good pain control; at

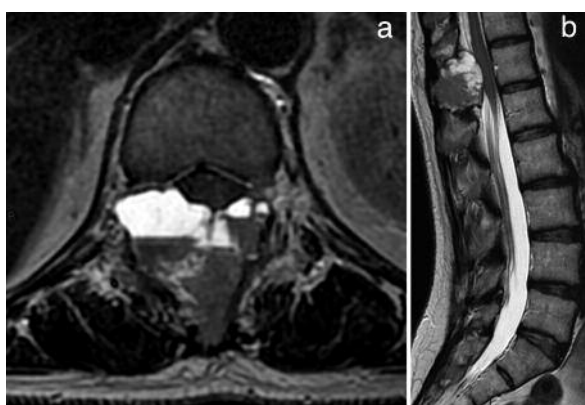


Figure 1. A-B, C.L., 55 years old patient. MRI in the axial and sagittal views show a solid component inside the tumor mass which can be associated to a cystic component with fluid-fluid level.

six months of follow up she was under chemotherapy and at one year follow up she had no signs of active disease in the spine.

Discussion

Spinal bone metastases typically occur during the sixth-seventh decades of life. Radiographic presentation is different according to histopathology diagnosis: as an osteolytic sclerotic lesion especially in breast carcinoma or in renal cell carcinoma, as a sclerotic lesion in prostate carcinoma. Sometimes ABC-like areas (so called “secondary ABC”) can be found inside some benign tumors,



Figure 2. C.L., 55 years old patient. Thoracic CT scan in axial view. The presence of a nodular formation of 2.5 cm diameter located at the upper lobe of the right lung oriented the diagnoses for a secondary ABC in metastasis from carcinoma of pulmonary origin.

such as giant-cell tumors, osteoblastomas and chondroblastomas, or malignant tumors especially telangiectatic osteosarcoma but they are rare in bone metastases¹⁻⁶. Primary aneurysmal bone cyst is a locally aggressive osseous lesion that typically occurs during the first two decades of life. The precise nature and histogenesis of ABC remained uncertain for many years. In 1950³ and again in 1962⁴, Jaffe hypothesized that an ABC might sometimes represent a secondary “blowout” in some preexisting bone lesions. The idea of secondary ABC arising in some pre-existing lesions was subsequently confirmed by other authors⁹. Recent cytogenetic data have shown clonal rearrangements of chromosomal bands 16q22 and 17p13, indicating a neoplastic basis in at least some primary ABCs¹⁰⁻¹². ABC are composed of blood-filled, anastomosing, cavernous spaces separated by cyst-like walls. Correct imaging is a prerequisite to treatment: ABC is a lytic lesion, which expands the contour of the host bone. The margin of the lesion is well defined on CT scan, while on MRI the margin of the lesion is delineated by a rim of low-signal intensity and ABC presents typical fluid-fluid levels without contrast medium. The contents of the cystic cavities show a wide range of signal intensity on both T1-weighted and T2-weighted images, probably reflecting intracystic hemorrhage of different ages¹³⁻¹⁵. MRI better identifies the extension of the lesion in the adjacent anatomical structures, particularly in the joints and in the spine. Bone scan may be indicated to evaluate the activity of the lesion (cold in the center, hot in the periphery). Moreover, CT-PET scan or other imaging investigations, such as dynamic MRI, can provide more information about the aggressiveness. DSA (Digital Subtraction Angiography) can be used in the treatment of ABC if embolization is considered^{16,17}. The case of spinal metastasis reported present peculiar rare imaging appearance. The secondary ABC in metastases often presents a solid component in association with a cystic component with fluid-fluid levels (well visible on MRI), moreover at standard stadition with bone scan or PET scan and thoracic CT scan, it’s possible to see others localizations of the disease making the differential diagnosis with a primary ABC fairly easy.

Most authors assume that when an ABC occurs in association with another condition, it represents a secondary change of a preexisting lesion (3-6). This view is largely based on the interpretation of the occasional clinical and radiological observation of the sudden expansion of a

previously relatively quiescent lesion. An alternative view is that the aneurismal cystic element is an inherent part of the lesion, and that it has been present from the beginning (5,6). In patients with metastatic tumors of the spine, presenting a neurological compression, the surgical treatment is curettage to relieve neurological compression, stabilization and embolization of the lesion to reduce intraoperative blood loss¹³. In the case reported, where the metastatic lesions were associated to ABC-like areas, embolization did not only play an important role in reducing intra-operative blood loss, as in other common metastatic lesions, but it reduced the extension of the mass, thereby helping the surgical procedure to achieve good healing of the ABC like areas. The fact that embolization helps reduce the lesion mass has been well established^{16,17}. In the literature only Collet et al¹⁸ described 6 cases of pseudo-aneurismal bone cyst in metastasis.

In conclusion, the diagnosis of secondary ABC must be based on radiographic documentation (X-ray, CT scan, MRI) and histological examination. When radiographic examination documents a lytic lesion with a typical fluid-fluid level on MRI in an adult patient with suspected metastatic disease or at least multiple lesions the possibility of a metastatic lesion with secondary ABC have to be considered. In any case, when X-ray, CT scan and MRI reveal ABC areas in a tumor, embolization of the lesion is indicated to reduce intra-operative blood loss, facilitate the surgical procedure and optimize the final clinical result.

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Conflict of Interest

The Authors declare that there are no conflicts of interest.

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