Epithelioid Osteosarcoma of the Scapula

Epiteloidní osteosarkom lopatky

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SUMMARY

Epithelioid and epithelial neoplasms of bone are rare. They include different epithelioid variants of vascular lesions, osteoblastoma, chondroblastoma and most importantly metastatic carcinoma. Up to now, only few cases of epithelioid osteosarcoma were described.

In this case the authors report a 53-year-old patient presented with a medical history of chronic shoulder pain for 3 years. Magnetic resonance imaging (MRI and computed tomography (CT) showed a destructive, partially calcified osseous lesion of the scapula with expansion into the surrounding soft tissue, suggestive of a primary bone tumor. Histologically, the tumor consisted of epithelioid cells with expression of cytokeratine and the lesion was primarily diagnosed as metastatic carcinoma. With regard to the MRI morphology untypical for metastatic disease the histopathologic slides were re-evaluated and detection of tumor osteoid led to the diagnosis of epithelioid osteosarcoma. Chemotherapy was initiated, however follow-up imaging studies showed rapidly progressive disease of both primary tumor and lung metastases.

In conclusion, epithelioid neoplasms of the bone are extremetumourly rare and must be distinguished from metastatic carcinoma. Despite the presence of cytokeratine positive cells a thorough histological evaluation is mandatory and osteoid detection is essential in order to establish the correct diagnosis and further treatment.

Key words: osteosarcoma, epithelioid, aneurysmal bone cyst, chondrosarcoma, pathology, immunohistochemistry.

INTRODUCTION

Among malignant bone tumours the osteosarcoma (OS) is the most common, although its absolute incidence is low (1, 2, 9, 15). Its characterizing feature is the production of osteoid matrix (1, 2, 9). The epithelioid osteosarcoma is a very rare variant of conventional (intramedullary) osteosarcoma that consists of tumor cells that look like epithelium and are admixed with typical osteosarcomatous cells (7, 9, 14), first described in 1974 by Adler (1). Imaging as well as histopathology and its correct interpretation play a crucial role in the diagnosis (11).

In this case we report the clinical, radiological and pathologic features of an epithelioid osteosarcoma of the scapula in a fifty-year-old woman initially misdiagnosed as an aneurysmal bone cyst and outline the diagnostic difficulties including differential diagnoses.

The patient was informed that data concerning this case would be submitted for publication, and she provided consent.

CASE REPORT

A fifty-year-old woman presented at an orthopedist's practice with pain in the left shoulder. She recalled a trauma. Physical examination revealed slight swelling and a moderate limited range of motion. Plain radiographs showed an osteolytic lesion in the glenoid. Magnetic resonance imaging (MRI) demonstrated an expansive lobulated tumour and lesion was interpreted as an incidental finding in terms of an aneurysmal bone cyst (ABC) (Fig. 1). The patient was diagnosed with a contusion of shoulder and physiotherapy was initiated.

3-years later, the now fifty-three-year-old patient presented to our department for the first time. Clinical examination showed a painful swelling in the left deltoid area and a severely limited range of shoulder motion.

The follow-up imaging demonstrated an increased destructive osteolytic lesion of the glenoid. In conventional radiographs a small amount of fluffy mineralization was

seen, periosteal reaction was absent (Fig. 2). On CT images an asymmetric expansion, geographic lysis of bone, and an aggressive growth pattern with cortical destruction could be detected (Fig. 3). The follow-up MRI showed a polylobulated lesion with an extensive soft tissue mass with high signal intensity in the T2-weighted images and smaller foci of low signal intensity representing calcified matrix. Noticeably contrast enhancement was seen, except for necrotic area(s) with marginal contrast enhancement (Fig. 4).

A biopsy was performed. After interdisciplinary discussion in the Tumor Board the conclusive diagnosis of a primary epithelioid osteosarcoma of bone was made on radiological and pathologic examination.

The additionally performed F-18-FDG PET/CT revealed hypermetabolic activity of the tumour (Fig. 5); further on lung and vertebral (Th1) metastases were detected and investigation did not reveal another lesion which has to be suspected as the primary tumour.

With respect to the metastatic disease chemotherapy according to the EURO-B.O.S.S. Study was initiated. The intended surgical therapy following neoadjuvant chemotherapy was not indicated for rapidly progressive disease with bilateral malignant pleural effusion and respiratory insufficiency. Instead, the patient opted for best supportive care.

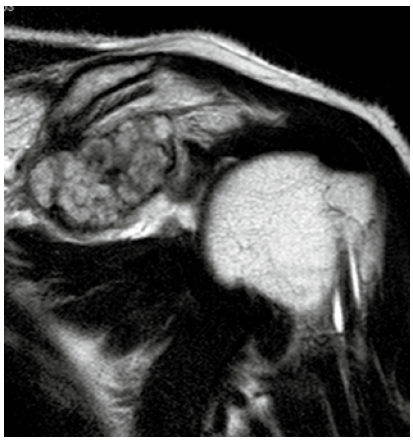

Fig. 1. Magnetic resonance image of the left shoulder is showing expansive lobulated tumour of the glenoid with iso- to high signal intensity compared to muscle signal on T2W_TSE weighted images (TE 100, TR 3759). Focal calcifications are evident as foci of signal loss. Initial diagnostic in 2010.

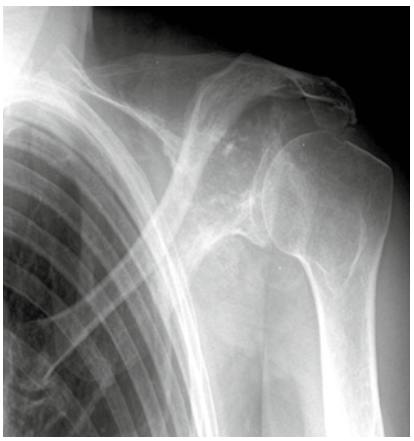

Fig. 2. Anteroposterior radiograph shows a destructive osteolytic lesion of the glenoid-region with a small amount of fluffy mineralization.

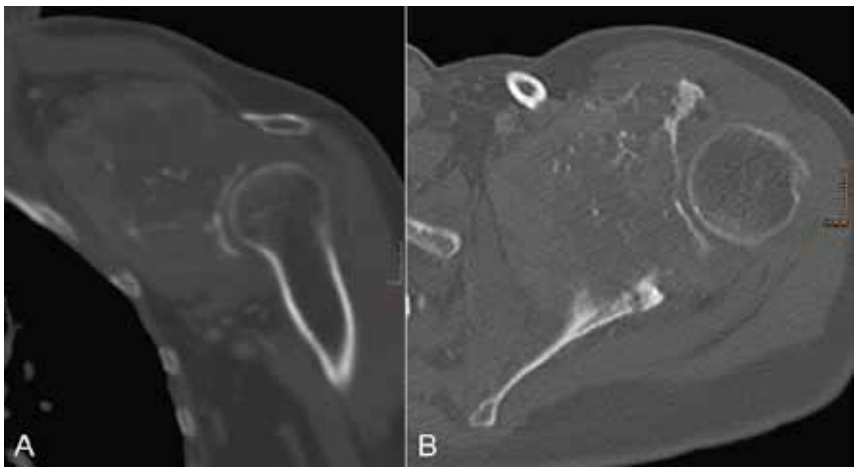

Fig. 3. The coronar (A) and axial (B) computed tomographic (CT) image of the left shoulder shows an expansive honeycomb-like tumour of the glenoid with cortical destruction and now predominantly soft tissue mass with small areas of ossification.

DISCUSSION

Epithelioid morphology in osteosarcomas is uncommon and represents a diagnostic challenge (1, 2, 9). Generally, epithelioid and epithelial neoplasms seen in bone are rare and include epithelioid variants of vascular lesions, osteoblastoma, chordoma, chondroblastoma, adamantinoma and metastatic carcinoma (4).

The epithelioid osteosarcoma has been predominantly reported to occur in long bones and in younger population with a male to female ratio of 2:1 (8, 10, 11). But the age range may be broad and bimodal, including patients from the second to the seventh decades (4).

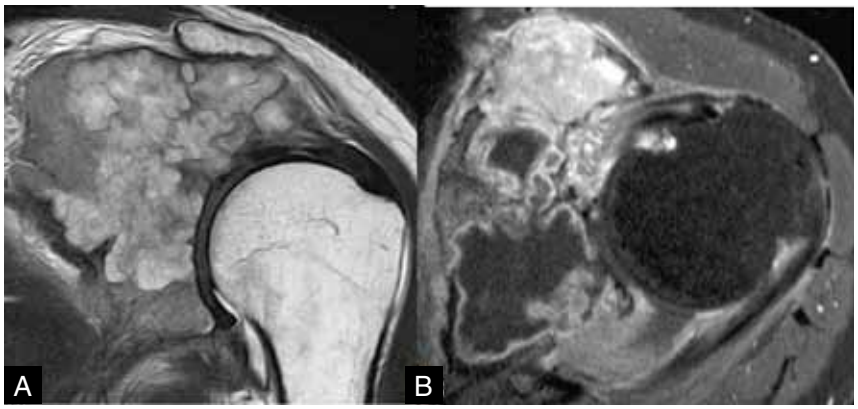

Fig. 4. Coronar T2-weightes magnetic resonance imaging shows a lobulated tumour with mainly high-signal intensity (A). The transversal T1-weighted image (B) obtained after intravenous administration of contrast material reveals the epithelioid osteosarcoma and the extent of soft-tissue and joint-space involvement; note the necrotic area within the tumour without contrast enhancement (arrows).

However, clinically nearly half of the cases of epithelioid osteosarcoma have occurred in adults older than 40 years, in whom metastatic lesions are common (12). Moreover, metastatic tumours of breast, prostate, and other sites can elicit osteoblastic activity with evident calcification in imaging studies (12).

Radiologically, the tumour presents as an expansive osteolytic lesion with a lobulated appearance and focal necrosis. Fluffy mineralization may be present. Besides metastasis the differential diagnoses mainly include ABC, chondrosarcoma and chondroblastic osteosarcoma.

The ABC can be hyper-vascularized and usually demonstrates an osteolytic bone expansion and haemorrhage with fluid-fluid levels on MR imaging (13). It typically shows a contrast enhancing in peripheral rim and septae without nodularity (13, 16). No (osteoid) matrix mineralization, best seen in the CT, is evident, which is in contrast to our case. Furthermore, the pattern of growth is frequently less aggressive, with expansile remodelling and a well-defined encapsulated margin as opposed to cortical destruction (17).

In MRI chondrosarcoma as well as chondroblastic osteosarcoma may have significant similarity with this epithelioid osteosarcoma. These lesions appear as polylobulated masses with high signal intensity in the T2- and PD-weighted sequences, and may have foci of mineralization (3, 5, 6, 16). In these cases the histopathological examination is essential to make the diagnosis.

And, lytic metastases may mimic (epithelioid) osteosarcoma at radiography but can mostly be distinguished at cross-sectional imaging, because of absence of a lobulated tumour mass, which was evident in demonstrated case.

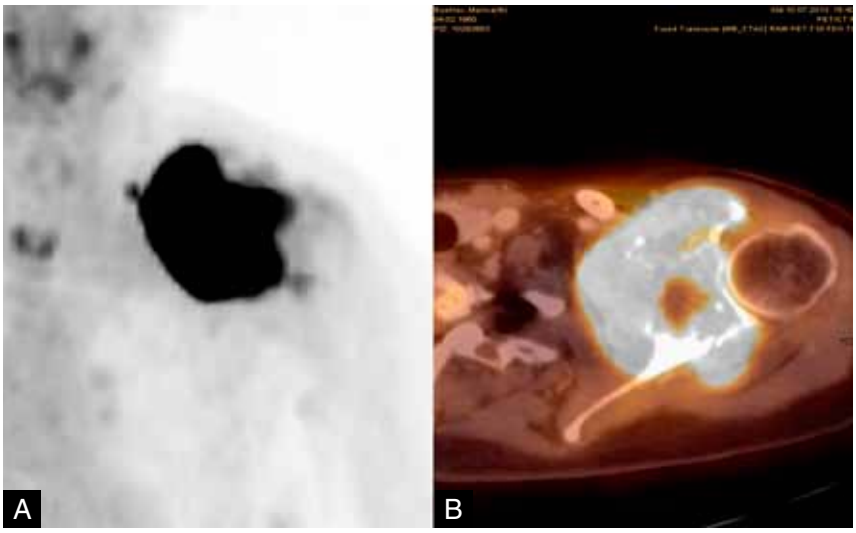

Fig. 5. The coronar (A) and axial (B) F-18-FDG PET/CT images obtained a region of hypermetabolic activity corresponding to biopsy-proved epithelioid osteosarcoma.

On biopsy, the tumour showed an inhomogeneous reticular matrix with associated clusters and sheets of morphologic malignant epithelioid cells with hyperchromatic atypical nuclei. The H&E morphology and the Elastica van Gieson stain revealed that the heterogenic reticular matrix was characteristic for tumour osteoid (Fig. 6). No chondroid matrix was evident. Immunohistochemistry (commercial available antibodies, DAKO®, protocols according to the manufacturer's instructions) showed expression of vimentin and pancytokeratin, whereas epithelial membrane antigen (EMA) was not

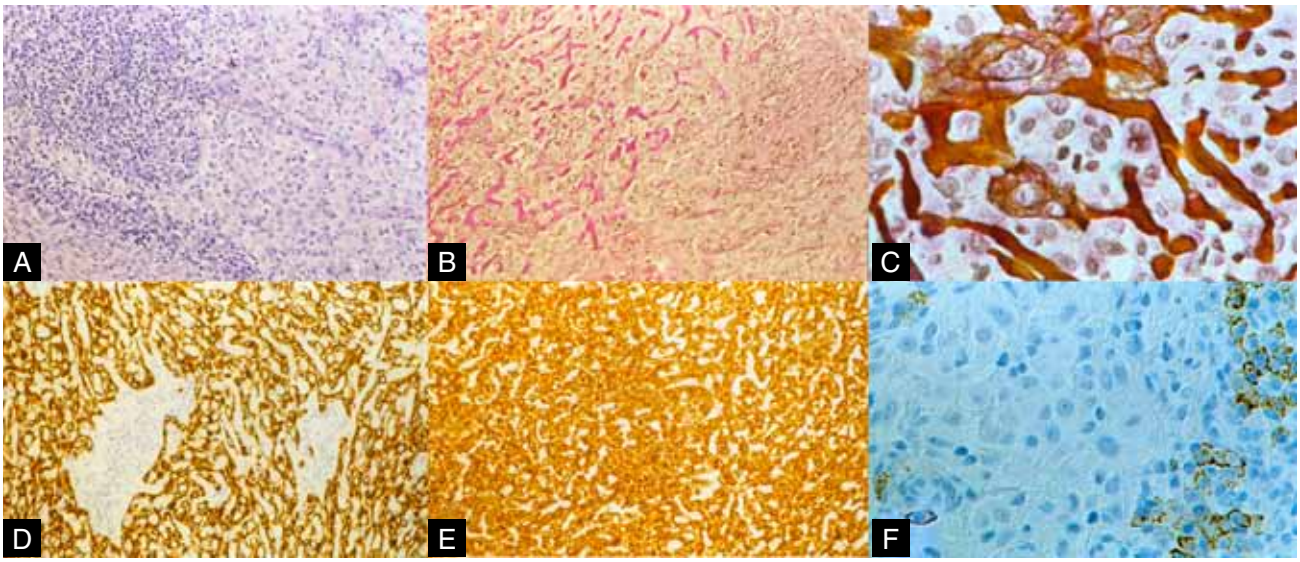

Fig. 6. Epithelioid osteosarcoma with (A) areas of solid sheets of epithelioidtumour cells with poor matrix and rim of inflammatory infiltrate composed of lymphocytes and plasma cells (HE, x20). Other areas present a typical lattice-like homogenous matrix characteristic for tumour osteoid (B: van Gieson, x20, C: Reticulin, Normarski-contrast, x(B) 63). Immunohistochemistry revealed pancytokeratin (D, x20) and vimentin expression (E, x20). Epithelial membrane antigen (EMA) was not expressed in the epitheloidtumour cells (EMA, x63, Nomarski contrast), while plasma cells served as positive internal control (F).

expressed (Fig. 6). However, in the current literature coexpression of EMA and cytokeratin in epithelioid osteosarcoma is inconsistent: Okada et al. showed coexpression of EMA in 0 of 6 cytokeratin-positive cases (11), whereas 2 other studies found EMA coexpression in 5 tumours (8, 10).

In conclusion, the epithelioid OS is a high grade malignant mesenchymal tumour with pseudoepithelial differentiation. Epithelioid morphology and possible expression of epithelial markers (e.g. pancytokeratin, sometimes EMA) could lead to misinterpretation of the tumour as epithelial neoplasm particularly as carcinoma metastasis. The sarcomatous stroma with scanty polymorphous spindle cells and the presence of tumour osteoid in varying quantity characterize the tumour as OS.

Treatment of choice is the wide resection of the tumour. The effectiveness of (preoperative) chemotherapy may be poor like in the presented case. In a collective of 5 patients the tumour necrosis rates were less than 90% (11). But further studies should be undertaken to evaluate the relation between the effect of chemotherapy and clinical outcome of this subtype of osteosarcoma.

The prognosis is poor. In a review of 131 patients with conventional nonmetastatic osteosarcoma at presentation, 18 patients had rosette formation and experienced a 5-year survival of 13.5% versus 45.8% for all other osteosarcomas (8, 11).

The case was presented as a Poster at the “Süddeutscher Orthopädenkongress” in Baden-Baden in May 2014.

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