

Dedifferentiated Chordoma: A Case Report

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Abstract

Sarcomatous transformation (dedifferentiated chordoma) in chordoma is a very rare condition and has been emphasized as a distinct entity because of its more aggressive clinical course. Here we describe a case of dedifferentiated chordoma arising from the sacrococcygeal region of a 60-year-old man, in third tumor recurrence. This tumor showed features of sarcoma with areas more typical of chordoma. The chordoma-like areas expressed cytokeratin, epithelial membrane antigen and S-100 protein in all tumor cells and the spindle-cell component exhibited vimentin positivity in all of them but negative for other markers. The results showed that the sarcomatous areas as seen in the recurrent chordoma lack epithelial cell features of chordoma and suggest the possibility of altered differentiation pathway of the tumor stem cell or emergence of a new malignant cell population within the recurrent tumor.

Keywords: Chordoma; Dedifferentiated; Sacrococcygeal

Introduction

Chordoma is a rare bone tumor arising in notochordal rests and occurs most commonly in the sacrum and the second most common location is the skull base. This is a slow-growing and often recurrent neoplasm being composed of various cell types (physaliferous, epitheloid, etc.). Chordoma is generally regarded as tumors of low malignant potential. They typically have a relatively indolent, prolonged course of local recurrences, usually leading to the patient's death. Metastases have been reported in some cases, but metastatic potential cannot be predicted based on histological features of conventional chordoma.¹

Sarcomatous transformation in chordoma (dedifferentiated chordoma) is a very rare condition and about 30 cases were reported in the literature. Some of these sarcomas have occurred de novo with conventional (Non-chondroid) chordoma or in recurrences; others have followed radiation therapy.²⁻⁷

Case Report

A 60-year-old man was examined because of pain and

weakness in the right lower extremity and was operated in June 1999 because of sacrococcygeal mass. The tumor resection was considered to be complete, and patient did not receive any chemotherapy or radiation. After 3 years, the tumor had local recurrence and finally in May 2005, the third local recurrence was operated, 6 years after the first surgery. The tumor mass was 10 cm in diameter and also extended into the surrounding soft tissues but had no distant metastasis. The tumor material was fixed in 4% buffered formalin, processed in a routine manner and embedded in paraffin. The histological features were examined in sections stained with hematoxylin and eosin. The sections were immunostained by streptavidin-biotin method with following panel of antibodies: Vimentin, S100, EMA and Cytokeratin A1/A3 (DAKO; Denmark).

In light microscopy, both the primary tumor and recurrences showed areas of typical chordoma with essentially identical histological features. The tumor cells formed cords of polygonal cells with small nuclei and slightly eosinophilic cytoplasm with pools of mucin between the cellular cords. Most of the cells were cuboidal to polygonal with abundant clear vacuolated cytoplasm. Physaliferous cells were also present. The chordoma like areas displayed nodular pattern of growth. In some areas, dense lymphocyte cell infiltration was present between sheets of epithelial cells that in these areas the amount of mucin material decreased (Figure 1). Malignant spindle cells

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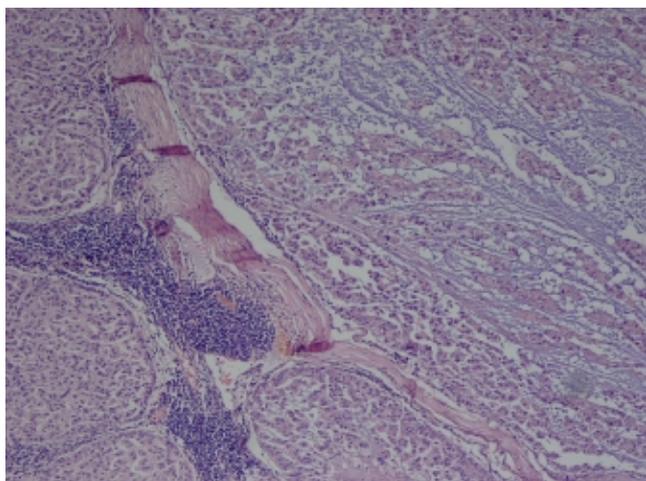


Fig. 1: Cords of small epitheloid cells with lymphocytic infiltration (H&E×40).

were arranged in large fascicles and vaguely a storiform pattern was noticed (Figure 2). They had eosinophilic cytoplasm and contained bizarre, hyperchromatic nuclei and showed 6 mitosis per ten high-power field, whereas the chordoma-like areas virtually lacked mitoses. The sarcomatous area was adjacent to, but distinctly demarcated from areas of conventional chordoma with abrupt transition from the conventional chordoma. Sarcomatous tissue comprised about 20% of the entire tumor specimen, as judged by the gross description and the hematoxylin and eosin tissue sections. The results of immunohistochemical stain in the chordoma were strong positive for Cytokeratin (Figure 3), epithelial membrane antigen and weak staining for S-100 protein. The spindle and giant cells of malignant sarcoma were negative for cytokeratin S-100 and epithelial membrane antigen, but strong positive for vimentin.^{8,9}

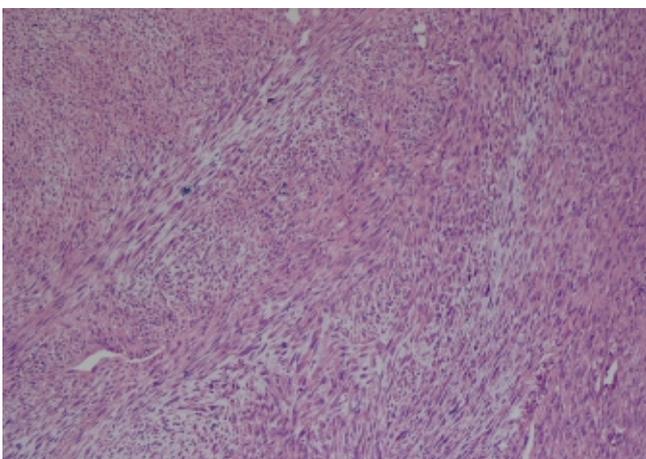


Fig. 2: Malignant spindle cells in fascicle without any merging from chordoma (H&E×40).

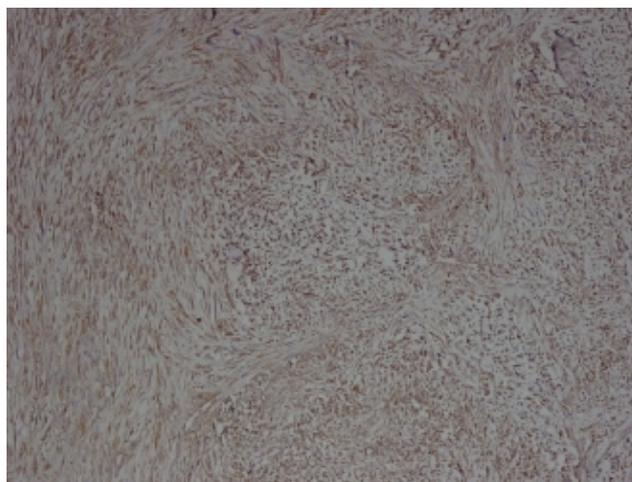


Fig. 3: Tumor cells are strongly positive for cytokeratin (Immunohistochemistry, ×40)

Discussion

We report another case of chordoma that during recurrences developed de novo sarcomatous change and unassociated with a history of radiation therapy. The pathogenesis of the sarcomatoid change within an epithelial tumor, such as chordoma, remained enigmatic. The etiology of these recurrences has been the primary focus of many authors with three main theories being proposed:^{4,6,10} i) Collision of two distinct, independent tumors; ii) Transformation of a chordoma to a sarcoma (Apparently spontaneous); iii) Transformation via radiation induction (Postirradiation sarcoma); iv) Derivation from a stem cell like parenteral cell with a capacity to multidirectional differentiation and v) Arise from mesenchymal stromal cells that normally are found in septae or vessels of tumor.

In our case, the patient did not receive any radiotherapy, so was not considered a case of postradiation sarcoma. However, the sharp demarcation between the chordoma tissue and the sarcomatous growth might be interpreted to suggest the stromal cell or stem cell like parenteral cells to be considered as the cell origin of the sarcomatous component.

The presence of an undifferentiated or “dedifferentiated” component in a chordoma suggests that the patient will have an accelerated or more fulminant clinical course. This is true for most “dedifferentiated” liposarcomas and chondrosarcomas.

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Conflict of interest: None declared.

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