

A rare case of Dedifferentiated chondrosarcoma with osteosarcomatous and fibrosarcomatous differentiation

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ABSTRACT

Introduction

Dedifferentiated chondrosarcoma (DDC) accounts for approximately 10% of chondrosarcomas. It demonstrates very aggressive behaviour with a high rate of local recurrence (LR) and systemic progression resulting in a median survival of 6 months. Very limited studies have highlighted and covered the cases of Dedifferentiated chondrosarcoma with osteosarcomatous differentiation.

Case Report

The present case was a 55-year-old male who presented to our hospital with complaints of shoulder pain, mild chest pain and dyspnea. A large chest wall mass was present with involvement of ribs and extending to left lung. The final histopathology revealed Dedifferentiated chondrosarcoma including low grade chondrosarcoma and high-grade sarcoma. High grade sarcomatous component included Osteosarcomatous and fibrosarcomatous differentiation. Patient was then given adjuvant RT.

Conclusion

We emphasize the importance of clinical, radiological and pathological investigations in the diagnosis of suspected dedifferentiated CS. Any high grade spindle cell sarcoma in a bone in an older patient should be thoroughly investigated to identify any hidden cartilaginous tumour as they carry very bad prognosis.

Key Words: dedifferentiated, chondrosarcoma, osteosarcoma, fibrosarcoma

Introduction

Primary Chondrosarcoma (CS) is the third most common primary malignant tumor of bone.[1] It's rare subtypes include clear-cell CS, mesenchymal CS, and dedifferentiated CS (DDCS). Dedifferentiated chondrosarcoma (DDC) accounts for approximately 10% of chondrosarcomas.[2] The dedifferentiation can be encountered in the initial lesion or in a locally recurrent tumour. Patients typically present with progressive pain or pathological fracture and frequently have advanced disease. Unlike most conventional chondrosarcomas, DDC demonstrates very aggressive behaviour with a high rate of local recurrence (LR) and systemic progression resulting in a median survival of 6 months.[3] The prognosis of the patients of DDCS remains poor and the five-year survival rate of DDCS ranges around 24% in the most series. [4,5] Because of its rarity, only a few large studies regarding the demographic data of DDCS have been reported. Very limited studies have highlighted and covered the case of Dedifferentiated chondrosarcoma with osteosarcomatous differentiation. The present case also belongs to this rare entity.

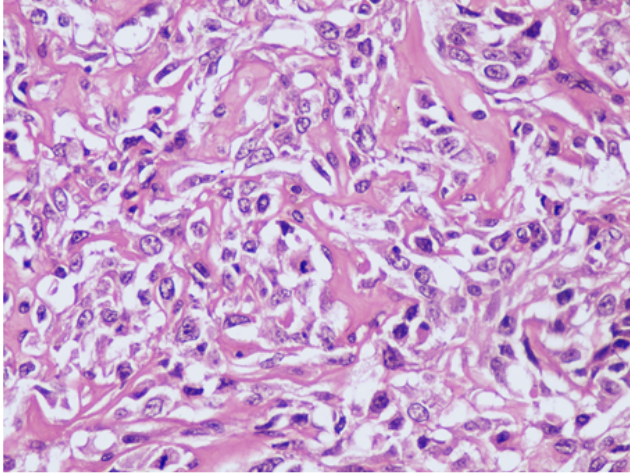
Case report

A 55-year-old male presented to our hospital with complaints of shoulder pain since 6 months. Mild chest pain and dyspnea were there. Patient had no weight loss and no weakness. Physical examination revealed a large 7X6X5.0cm chest wall mass along with involvement of ribs. The mass was firm and tender on palpation.

CECT thorax revealed expansile lytic lesion of 3rd rib with cortical erosion and associated large soft tissue mass. Mass was extending to left lung and was showing extrathoracic extension also. The soft tissue component showed arc like and flocculent calcification. Wide excision of tumor with part of 2nd, 3rd, and 4th rib was sent along with wedge resection of lung lesion in the department of surgical pathology. Grossly, nodular growth with grey white fleshy to shiny cut surface was identified. Tumour

was involving the 3rd rib, however 2nd and 4th ribs were spared (FIGURE 1).

Figure 1: Gross pathology showing nodular growth with grey white fleshy to shiny cut surface.



On microscopic examination, sheets of pleomorphic ovoid to spindle cells were present. In focal areas, showed laying down of malignant osteoid in between tumour cells was identified. Also sheets of pleomorphic spindle cells were seen arranged in storiform and herring bone pattern in focal areas. Adjacent to this high grade tumour was present low grade chondrosarcoma juxtaposed to it. Extensive areas of hyalinization and focal calcification are also seen.

Overall histomorphological picture favoured final diagnosis of Dedifferentiated chondrosarcoma which included low grade chondrosarcoma and high-grade sarcoma adjacent to each other. High grade sarcomatous component included Osteosarcomatous and fibrosarcomatous differentiation. Lung tissue showed high grade sarcoma without any osteoid or cartilaginous differentiation. All excised bony and soft tissue margins were negative for malignancy.

Patient was then given adjuvant RT (EBRT to thorax by IGRT @ 54 GY/27 cycles). Patient tolerated Radiotherapy well. Patient was then discharged with symptomatic treatment [Figure 2].



Figure 2: H/E (400x) - High grade sarcomatous component including fibrosarcomatous differentiation.

Discussion

Dedifferentiated CS was first described by Dahlin and Beabout in 1971. [2] It includes 1%–2% of all primary bone tumours. [6] The symptoms are pain, swelling, palpable tumour masses and even pathological fractures as in other CS cases but with a shorter duration due to the rapid growth of the tumour. The pelvis and the shoulder girdle are the most common sites to be involved. [7] The patients are 10 years older than conventional CS. Most of the dedifferentiated CS arise from central CS and rarely from peripheral CS.

The osteosarcomatous differentiation represents approximately one-third of the cases of DDC. Staals et al reported 123 cases of Dedifferentiated CS, 92 of which showed features of osteosarcoma with an average follow up of 33 months. [8] Femur was the most common site in this series. Another large series by Dhimsa showed 29% of dedifferentiated chondrosarcomas having OS differentiation. They also reported femur as most common site.

Radiological testing is important to identify underlying cartilaginous component. CT is one of the primary diagnostic imaging modalities, which is used to detect the characteristics of this lesion. It shows expansive, osteolytic, soft tissue mass, calcification, and irregularities with cystic low density areas. CT and MRI are especially useful in demonstrating this bimorphic pattern of tumour.

Surgery is the treatment of choice once malignancy is confirmed, and tumors should be completely resected whenever possible. [9]

Radiotherapy for chondrosarcoma is generally utilized as an adjuvant therapy in cases of residual disease rather than as the initial treatment as in the present case. [10] Chemotherapy as a neoadjuvant treatment inhibits tumor growth and progression. However, it is not beneficial for improving long-term survival or attenuating distant metastasis. [11] There is no convincing evidence of any benefit by chemotherapy.

Osteosarcomatous or MFH-components are accompanied by the worst prognosis. [5] Ching lie et al also suggested that histological subtype has effect on survival. [12]

Simultaneous cytogenetic and immunophenotyping studies as well as the finding that both the components harbor IDH1/2 mutations, suggest that both the differentiated and the “dedifferentiated” components originate from a common primitive mesenchymal cell progenitor. [13] Anaplastic transformation is accompanied by overexpression of TP53 and HRAS mutation. [14] The development of this component in chondrosarcoma is accompanied by a marked acceleration of the clinical course and a decidedly worsened prognosis.

Typically Dedifferentiated CS show bimorphic pattern in which low grade CS is juxtaposed to high grade sarcoma. Rarely cartilaginous component may be very bland or moderately differentiated. Immunohistochemical evaluation has limited role in its diagnosis.

Dedifferentiated CS with OS should be differentiated from Chondroblastic Osteosarcoma. Chondroblastic OS radiologically

shows periosteal reaction and destruction of bone. Microscopically, Cartilage component is very malignant appearing and merging with spindle cell component in contrast to low grade cartilaginous component and juxtaposed high grade sarcoma in dedifferentiated CS. Chondroblastic OS usually affects long bones in adolescent age group.

Dedifferentiated CS should also be distinguished from Mesenchymal CS in which biphasic pattern is seen consisting of spindle cells and cartilage cells intermixed throughout tumour. Also cartilage show zonal relation to spindle cells.

The fate of most of the patients is determined by the rapid development of metastases. The anatomical sites of metastases are lung (70%–82%), viscera (20%) and skeleton (10%).^[15] However, in other regions, such as skin, adrenal glands, heart, intestines and brain, metastases are also detected as per literature. The incidence of metastasis and disease survival is dependent on histological grade, and local recurrence is determined by the adequacy of surgical margins. Risk factors, such as grading, metastatic disease, age, and location, significantly influence overall survival.

Patients with metastasis have particularly poor prognosis. Malchenko et al reported that 90% of patients with dedifferentiated CS develop lung metastasis within few months of diagnosis.^[16]

Conclusion

Very limited number of studies is there which solely address osteosarcomatous differentiation in Dedifferentiated CS. Any high grade spindle cell sarcoma in a bone in an older patient should be thoroughly investigated to identify any hidden cartilaginous tumour as they carry very bad prognosis. We emphasize the importance of clinical, radiological and pathological investigations in the diagnosis of suspected dedifferentiated CS.

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