



Case report

# Dedifferentiated chordoma- a case report

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## Keywords:

Chordoma;  
Dedifferentiation;  
Immunohistochemistry;  
Sarcoma;

## ABSTRACT

Dedifferentiated chordoma is a rare variant of chordoma, exhibiting the simultaneous presence of conventional chordoma and components of high-grade sarcoma. It occurs either de novo or in the form of high-grade transformation of a conventional chordoma in a setting of recurrence or radiotherapy-induced changes. Despite similar clinical manifestations, it shows significantly poorer survival among all variants of chordomas, making an accurate diagnosis important. We, herein, report a case of large chordoma in a 65-year-old female, arising de novo in the sacrum, where the dedifferentiated component was present only focally, highlighting the importance of adequate grossing.

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Received : January 9<sup>th</sup> 2022 ; Accepted : February 14<sup>th</sup> 2022

Citation: Shrestha G, Roy P, Arun I, Chatterjee A, Biswas G. Dedifferentiated chordoma- a case report. J Pathol Nep 2022;12(1):1946-9. DOI: 10.3126/jpn.v12i1.42213

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## INTRODUCTION

Chordomas are malignant bone tumours of notochord origin, most commonly arising in the axial skeleton. Three histological variants of chordoma are recognized, viz. conventional, dedifferentiated, and poorly differentiated. Conventional chordomas typically have large epithelioid cells with clear to light eosinophilic cytoplasm, separated by fibrous septa into lobules. These neoplastic epithelioid cells are termed physaliphorous cells and show expression of brachyury.

Dedifferentiated chordoma is considered to be the rarest subtype of notochordal tumours, with only case reports and

small series published.<sup>1</sup> A study by Hung et. al. identified <1% occurrence of dedifferentiated chordomas among >1000 chordomas.<sup>2</sup> This variant of chordoma shows biphasic components of conventional chordoma and a high-grade spindle and/or pleomorphic sarcoma.

We, herein, report a case of dedifferentiated chordoma in a 65-year-old female, and a brief review of the literature.

### # CASE REPORT

A 65-year-old female presented with complaints of swelling over the sacral region for 4 years, which was gradually increasing in size and not associated with pain, altered bowel/bladder habits, or neurological symptoms. The patient had no significant past surgical/ medical history. She had a significant family history of malignancy.

Radiological (MRI-Pelvis, fig.1) evaluation showed a large lobulated midline soft tissue mass arising from the coccygeal vertebrae measuring 11.4 cm x 10.8 cm x 8.8 cm, abutting the mesorectal fascia and displacing the rectum and anal canal anteriorly. Laterally it abutted medial margins of the gluteal muscles with intramuscular fatty replacement and posteriorly extending into the subcutaneous layer. No extension to the spinal canal was noted. CT scan showed destruction of the coccygeal vertebrae. Other visualized pelvic organs were unremarkable.

A percutaneous biopsy was obtained which showed proliferation of physaliphorous cells in lobules separated by fibrocollagenous septae and intervening abundant myxoid stromal matrix, overall features consistent with chordoma.

(fig 2A and B)

Immunohistochemistry showed tumour cells to be positive for CK, EMA (fig. 3A), and negative for S100 (fig. 3B). The dedifferentiated component was not seen in needle core biopsy. The patient subsequently underwent excision of the sacrococcygeal mass with extra levator abdominoperineal excision. Grossly, the tumour measured 14.0 cm in the greatest dimension with a predominantly extrasosseous component. The tumour was solid, grey-white to yellow-tan with a glistening surface and focus of necrosis. The attached skin was unremarkable.

Morphologically, two distinct components were noted, comprising predominantly of conventional chordoma component showing proliferation of epithelioid cells with abundant bubbly cytoplasm (physaliphorous cells) in lobular arrangement with intervening fibrous septae and background myxoid stroma. Abrupt sarcomatous transition (dedifferentiated area) was noted, showing spindle cell proliferation in fascicles exhibiting marked pleomorphism, brisk mitotic activity, and necrosis. The sarcomatous area was identified juxtaposed to necrotic areas. Separately submitted specimens of sigmoid colon, rectum, and anal canal did not show any significant histopathological change. No lymph nodal metastasis was identified. On immunohistochemical evaluation on the resection specimen, conventional areas were found to be positive for CK (AE1/AE3; fig 3C), while dedifferentiated areas were negative. INI-1 (fig. 3D) was retained throughout the tumour. Hence, a diagnosis of dedifferentiated chordoma was rendered.

Postoperatively, the patient underwent radiotherapy in view

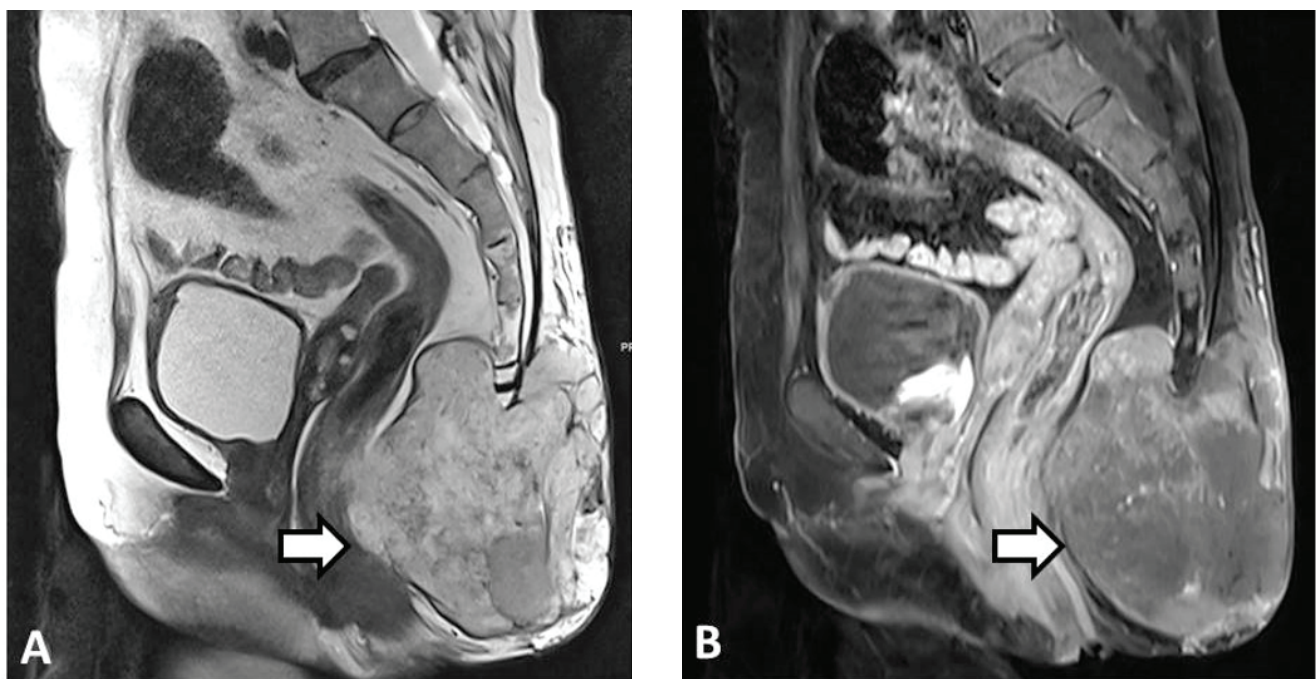


Figure 1: Sagittal T2 - weighted (A) and sagittal post-contrast fat-saturated T1-weighted (B) image shows large heterogeneous mass [arrow] involving the distal sacral vertebrae and coccyx showing T2 hyperintensity and patchy heterogeneous enhancement. The mass shows intra-pelvic as well as subcutaneous components.

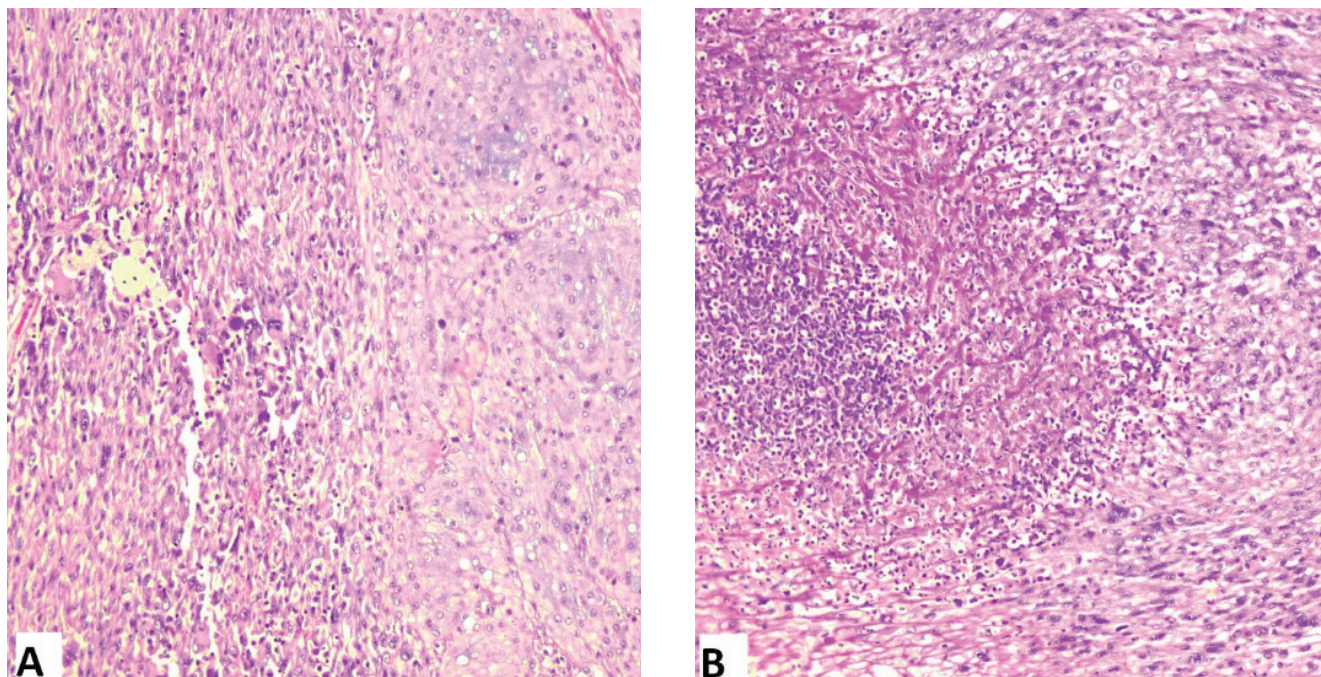


Figure 2: Dedifferentiated chordoma. (A) Conventional chordoma (right) is sharply demarcated from the area of dedifferentiation (left). (B) Dedifferentiated area juxtapsed to necrotic region. (HE stain, X100)

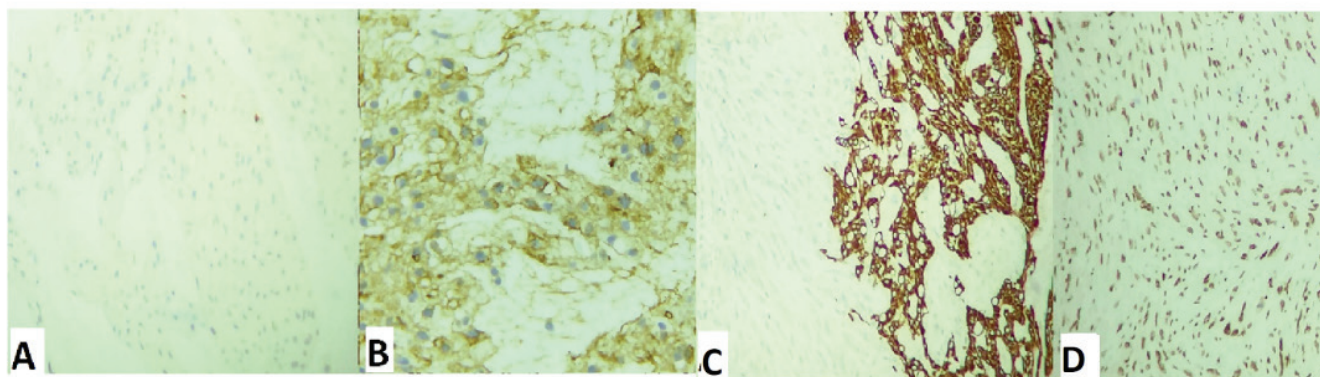


Figure 3: A,B. Immunohistochemical stain on pre-operative needle biopsy. Conventional chordoma component negative for (A) S100, positive for (B) EMA. C,D. Immunohistochemical stain done on resection specimen. (C) CK (AE1/AE3) diffusely positive in conventional chordoma component and negative in dedifferentiated area. (D) INI-1 is retained in dedifferentiated area.

of focal involvement of the resection margin. At five months post-surgery, the patient remains disease-free.

## DISCUSSION

Sites of occurrence of both conventional and dedifferentiated chordomas are similar. They arise mostly from the axial spine with the sacrococcygeal region being the most common site.<sup>3</sup> These can occur either de novo or as a malignant transformation of a conventional chordoma during recurrence or as a post-radiotherapy change.<sup>3,4</sup> Despite similar presenting features, dedifferentiated chordomas exhibit rapid progression with poor prognosis, high metastatic rate, and mortality than that of a conventional chordoma.<sup>4</sup> De-differentiation indicates the worst prognosis with the shortest survival among all variants of Chordomas.<sup>5</sup> Hence, its identification is crucial and can be achieved by adequate sampling. In the present case, a de-differentiated

area was identified juxtapsed to an area of necrosis.

The distinguishing feature of a de-differentiated chordoma is the simultaneous presence of a conventional chordoma and a high-grade sarcoma.<sup>1</sup> Use of CK, EMA, and S100 is generally adequate to support a diagnosis of component of conventional chordoma, which is diffusely immunoreactive for Cytokeratin and EMA and show variable S100 positivity ranging from 60% to 80%.<sup>1,5</sup> In morphologically ambiguous cases, the use of Brachyury is warranted, which has been shown to be positive in 86% to 90% of chordomas.<sup>6,7</sup> In the present case, S100 was negative, similar to the finding of Bisceglia et. al.<sup>8</sup> and in contrast to findings of C Manasan et al<sup>9</sup> and Rekhi et. al.<sup>3</sup> De-differentiated components show loss of brachyury and negative to focal cytokeratin staining.<sup>1,2</sup>

It is imperative not to misdiagnose a de-differentiated

chordoma as a poorly differentiated chordoma or other high-grade sarcomas. Poorly differentiated chordomas are composed of cohesive sheets or nests of epithelioid cells, often with a focal rhabdoid morphology, some imparting signet-ring cell morphology. The physaliphorous cells typical of chordoma are absent. Tumour cells in poorly differentiated chordoma are immunoreactive for CK, brachyury with variable positivity for S100. However, the diagnostic feature is a loss of SMARCB1 (INI1) expression.

Cases with a predominant component of dedifferentiation may be misdiagnosed as a high-grade sarcoma and a high index of suspicion is required with an axial location being a pivot to rule out a dedifferentiated chordoma before settling on other diagnoses. Similarly, sampling of tissue adjacent to necrotic areas is important so as not to miss a minor component of the dedifferentiated area in an otherwise typical conventional chordoma.

**Conflict of interest:** None

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