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Case Report

Long-term clinical outcome of sacral chondrosarcoma treated by total en bloc sacrectomy and reconstruction of lumbosacral and pelvic ring using intraoperative extracorporeal irradiated autologous tumor-bearing sacrum: a case report with 10 years follow-up

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Abstract

BACKGROUND CONTEXT: Primary malignant tumors of the sacrum are rare. Chondrosarcoma is one of the common malignant tumors arising from the sacrum. Chondrosarcoma is often invasive, and there is a high propensity for local recurrence. Surgical resection is often the only effective treatment; however, the treatment of malignant sacral tumors can be challenging, both because of the anatomy of the spinopelvic complex and the frequently large tumor size.

PURPOSE: We report a case of sacral chondrosarcoma that was successfully treated by total en bloc sacrectomy and reconstruction of the lumbosacral and pelvic ring using intraoperative extracorporeal irradiated autologous tumor-bearing sacrum.

STUDY DESIGN: A case report with 10 years follow-up.

METHODS: A 51-year-old man presented with right lower leg pain. Plain radiographs and computed tomography (CT) showed an osteolytic lesion at the sacrum that extended to the sacroiliac joint. Magnetic resonance imaging demonstrated that the tumor mass was localized from S1 to S2 with an epidural lesion at L5–S1 disc level. Histopathologic evaluation by open biopsy revealed that the lesion was chondrosarcoma. Total en bloc sacrectomy of the tumor-bearing sacrum was performed. The removed tumor-bearing sacrum was extracorporeally irradiated at 200 Gy during the operation and returned to the original position as a bone graft and fixed with instruments thereafter.

RESULTS: We needed two revision surgeries during the first 3 years because of the implant failures; however, 10 years after the initial surgery, CT revealed that the irradiated sacrum had remodeled into living bone and integrated with surrounding iliac bone without radiological evidence of tumor recurrence. The patient ambulates without any support and there was no clinical and radiological evidence of tumor recurrence.

CONCLUSIONS: The advantages of our method include the availability of high dose of radiation because of extracorporeal irradiation, excellent fit between graft and host bone, reduction of the dead space, no immunological rejection, no need for a bone bank, availability of the sacrum not only for the augmentation of the large defect but also for the scaffold for the other bone grafts. Our report is of only one case; however, we consider that it could be one option for the treatment of sacral malignant bone tumors, such as chondrosarcoma.

Keywords: Chondrosarcoma; Total en bloc sacrectomy; Intraoperative extracorporeal irradiation; Long-term clinical outcome; Reconstruction of lumbosacral and pelvic ring; Remodeling into living bone

FDA device/drug status: Not applicable.

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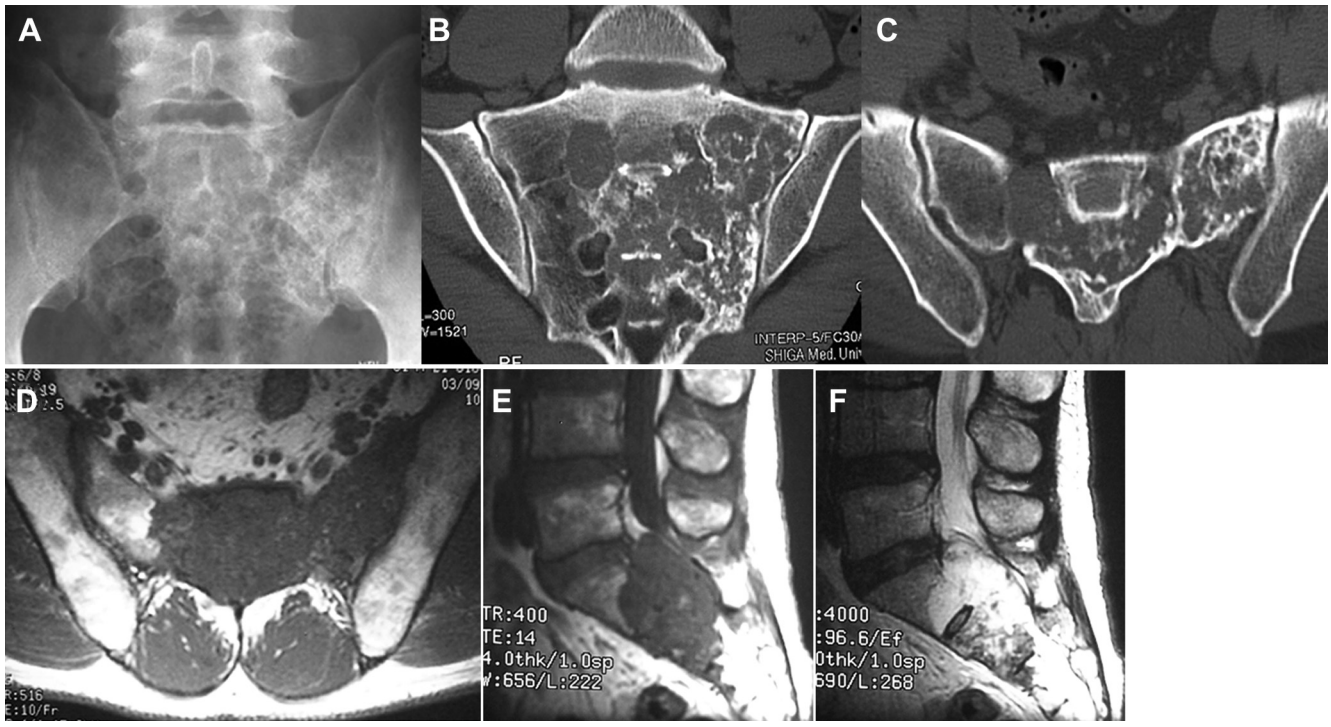

Fig. 1. Preoperative images. (A) Plain radiograph and (B and C) computed tomography showed an osteolytic lesion at the sacrum. (D) Magnetic resonance imaging revealed the lesion extended to the sacroiliac joint. (E) The mass showed low signal intensity in T1-weighted images and (F) heterogeneous high signal intensity in T2-weighted images.

Introduction

Primary malignant tumors of the sacrum are rare [1]. Chondrosarcoma is one of the common malignant tumors arising from sacrum. Although chondrosarcoma is a low-to-intermediate grade malignancy, it is invasive and has a high propensity for local tumor recurrence [2].

It is well known that this tumor is resistant to both chemotherapy and conventional radiotherapy [3]. Therefore, en bloc surgical resection with an adequate margin is often the only effective treatment; however, it is one of the most difficult clinical challenges, especially in case of sacral lesion. There are some reports of total sacrectomy and lumbosacral and pelvic ring reconstruction for the treatment of malignant sacral tumors [4–6]; however, there is no established procedure because of its rarity and anatomical difficulties.

We report a case of sacral chondrosarcoma that was successfully treated by total en bloc sacrectomy and reconstruction of lumbosacral and pelvic ring using intraoperative extracorporeal irradiated autologous tumor-bearing sacrum. After 10 years of follow-up, the patient has no evidence of disease. Furthermore, we confirmed that the irradiated sacrum had remodeled into living bone and integrated with surrounding iliac bone. We propose that this unique treatment might be one of the options for the treatment of malignant sacral tumors, including chondrosarcoma.

Case report

A 51-year-old man consulted our institution with right lower leg pain about 10 years ago. He had no medical history and his physical examination was unremarkable except for his right lower leg pain. Plain radiographs and computed tomography (CT) showed an osteolytic lesion at the

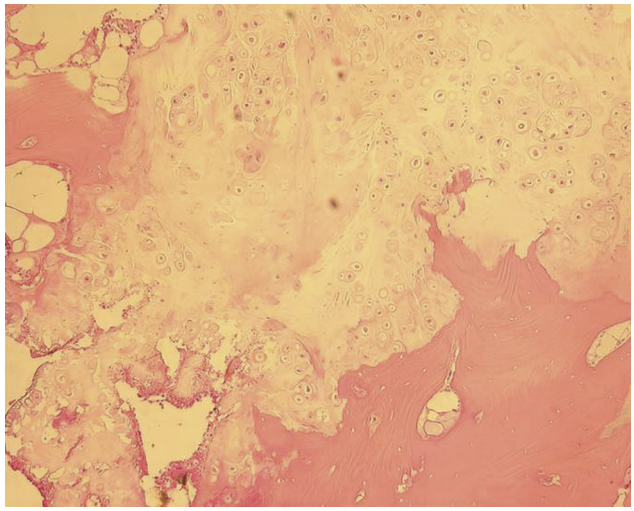

Fig. 2. Histopathologic study. Hematoxylin and eosin staining revealed cartilaginous tumor. Multiple or atypical nuclei of some tumor cells and absence of spindle cells indicated the tumor was chondrosarcoma (original magnification ×200).