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## Case Report

# Recurrent radiation-induced osteosarcoma of the sternum in a patient with remote radiation therapy for breast cancer

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### ABSTRACT

**Background:** Recurrent radiation-induced osteosarcoma of the sternum following remote radiation therapy for breast cancer and sternal reconstruction.

**Case:** A 51-year-old woman presents with recurrent, radiation-induced sternal osteosarcoma 11 years after receiving both radiation therapy for breast cancer and sternal reconstruction. The case details both her work-up and subsequent course, including reconstructive and curative efforts.

**Discussion:** An uncommon side effect of radiation therapy for breast cancer is development of osteosarcoma of the chest wall. Even rarer is recurrence of the osteosarcoma following sternal reconstruction.

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## Introduction

Osteosarcoma is the second most common primary malignant bone tumor, typically occurring in the long bones of the pediatric population. Occurrence in the adult population is less common, and occurrence in the geriatric population is uncommon, with tumors of these populations usually related to radiation exposure [1]. Primary osteosarcoma of the sternum is exceedingly rare, with a reported median age of 42 years old, commonly causing symptoms of pain and swelling [2,3]. The best characterization of these lesions is by computed tomography (CT) and magnetic resonance imaging (MRI), with little gained from radiography. MR is the most useful

examination for staging, as positron emission tomography imaging may overestimate the actual bony involvement [4,5].

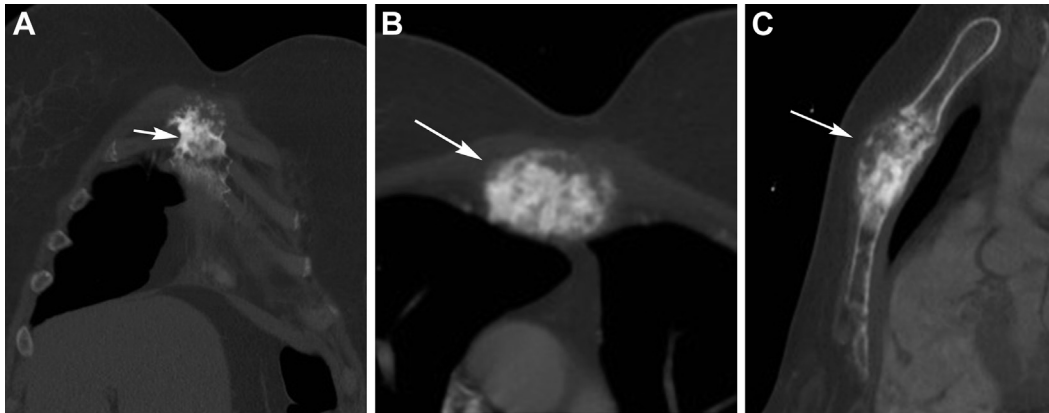
We present the case of a 51-year-old woman with a remote history of invasive ductal carcinoma, treated with unilateral radical mastectomy, chemotherapy, and radiation therapy. While undergoing CT imaging to evaluate for a painful sternum 11 years after the initial treatment, a sternal mass was discovered, which was biopsied and shown to be a sternal osteosarcoma. Subsequent treatment was with chemotherapy, surgical resection, and reconstruction of the sternum. Two years later, the patient had recurrence of the osteosarcoma, which was found to be penetrating through the sternal reconstructive hardware.

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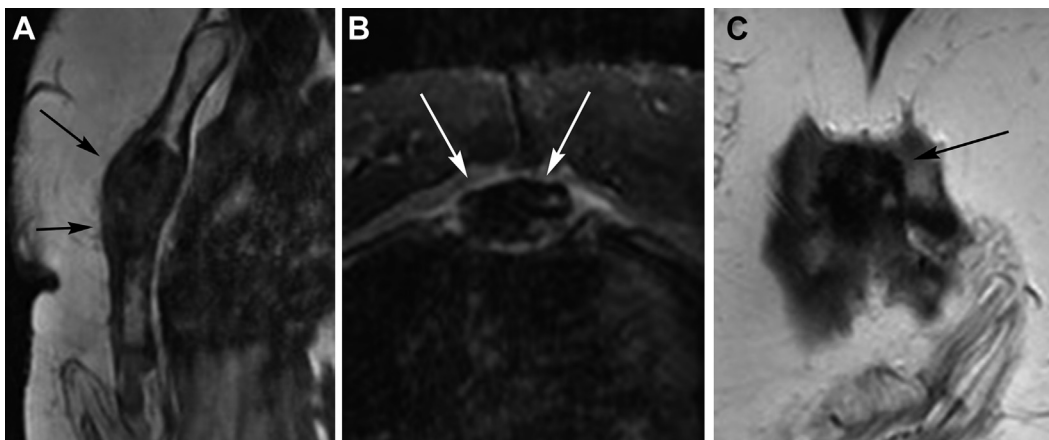
**Fig. 1 – (A-C): (A) Coronal, (B) axial, and (C) sagittal CT images show an irregularly shaped, sclerotic (osteoid matrix containing) mass (arrows) arising from the superior sternal body, with extension into both the inferior margin of the manubrium and the bilateral costochondral cartilages of ribs 2-4.**

### Case history

A 51-year-old woman with a history of treated, left-sided, invasive ductal carcinoma of the breast presented with an enlarging, painful sternal mass. She previously underwent unilateral radical mastectomy, chemotherapy, and radiation therapy for her breast cancer 11 years before her presentation. At the time of presentation, it was felt that this mass was suspicious for recurrent breast carcinoma and CT of the neck, chest, abdomen, and pelvis was ordered to restage the patient. Initial laboratory work included only a complete blood count, which was within normal limits. The follow-up CT of the chest showed an expansile, sclerotic, osteoid matrix containing lesion (Fig. 1) of the manubrium and superior body of the

sternum, measuring  $4.5 \times 3.8 \times 2.5$  cm, extending from the superior sternal body into the inferior margin of the manubrium. The lateral extent of the lesion extended to the bilateral 2-4 ribs costocartilaginous junctions. For further characterization of the mass, an MRI examination was performed (Fig. 2) showing a hypointense mass arising from the superior sternal body, with extension into the inferior margin of the manubrium, with perilesional edema.

The initial differential considerations were broad and included metastatic disease and radiation-induced osteosarcoma. After initial imaging evaluation, the patient underwent open biopsy of the lesion, performed by the general surgery department. Pathologic review of the biopsy specimen showed highly atypical cells and was initially felt to show



**Fig. 2 – (A-C): (A) Sagittal T2 weighted, (B) axial T2FS, and (C) coronal T2-weighted MR images show a hypointense mass (arrows) arising from the superior sternal body, with extension into the inferior margin of the manubrium, with perilesional edema.**

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