INTRODUCTION

Osteogenic sarcoma of the ribs accounts for less than 3% of all osteosarcomas (1). Most rib osteosarcomas have been associated with pre-existing lesions such as Paget’s disease or irradiated bone. Few studies have been reported on the primary osteosarcoma of the rib (2). Even fewer studies have described CT or magnetic resonance (MR) findings of a primary osteosarcoma of the rib. We report both the CT and MR imaging findings of primary osteoblastic osteosarcoma of the rib with histopathologic correlation.

CASE REPORT

A 31-year-old woman without previous medical history presented with a bony hard mass in the right lower back area. Chest radiographs demonstrated a calcified mass involving the posterior arc of right 10th rib (Fig. 1A). A CT scan showed a densely calcified mass measuring about 5.5 × 5.0 × 2.5 cm in the right lower back, with bone destruction of the right 10th rib (Fig. 1B). MR images revealed a heterogeneous high signal intensity lesion with multiple signal voids on T2-weighted image (T2WI) (Fig. 1C) and intermediate signal intensity mass with multiple signal voids on T1-weighted image (T1WI) (Fig. 1D) and well-enhancing portions of the tumor mass on fat-suppressed T1WI (Fig. 1E). The initial differential diagnosis was chondrosarcoma, possibly low grade, due to high signal intensity lobulated portions on T2WI. Mild uptake on a F-18 fluorodeoxyglucose positron emission tomography imaging study corresponding to the mass was suggestive of a low grade tumor-like lesion with a max SUV of 1.4. The patient underwent resection of the right 9-10th ribs. The histopathologic examination revealed the mass to be an osteoblastic type of osteosarcoma (Fig. 1F, G).

DISCUSSION

Osteogenic sarcoma of the ribs accounts for less than 3% of...
all osteosarcomas. The tumor most commonly occurs during the 2nd decade of life. When it manifests in older patients, underlying pathology should be considered. Only a few reports exist on the CT appearance of primary osteosarcoma of the rib (2-6), most of which had a prior history of radiation or pre-existing pathology. Several cases described the CT findings of primary osteosarcoma of the rib to provide optimal assessment of the tumor matrix, dense central calcification within a large soft tissue mass with sparing of peripheral areas, and localization of the epicenter of the soft tissue mass to the rib. Some authors suggested that it is possible to differentiate an osteosarcoma from a chondrosarcoma based on these findings (3, 6). CT also delineates the involvement of adjacent structures. This case also showed typical dense calcification with a relatively spared marginal peripheral area of the mass lesion.

Even fewer reports have described the MRI findings of primary osteosarcoma of the rib (6, 7). MR findings of primary osteosarcoma of the rib described in previous studies were quite similar to the usual osteosarcomas in long bones, which have a slightly higher signal intensity than muscle on T1WI as well as mixed and high signal intensity on T2WI with multiple signal void areas at the mineralized matrix. Due to dense calcification of the majority of the mass, this case showed diffuse low signal intensity with multifocal high signal intensity within the mass on T2WI, which is consistent with previous studies.

Osteosarcoma of the rib presents a diagnostic challenge because of the rarity of this lesion. This lesion is usually initially evaluated with plain radiographs. Suboptimal visualization of calcifications in plain radiographs may lead to misinterpretation such as lung cancer, extraosseous chest wall tumors, or lytic rib metastases (3). Even with the visualization of calcifications in plain radiographs, other lesions with calcifications, including chondrosarcoma, osteochondroma, fibrous dysplasia, extraosseous chest wall tumors, myositis ossificans, infections and fractures should be included in the differential diagnoses (1, 3, 5-7). Therefore CT and MRI findings for osteosarcoma

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**Fig. 1.** Radiograph, CT, MRI, and histopathologic specimen images of 31-year-old woman with osteoblastic osteosarcoma of the rib.

A. Chest radiograph shows non homogenous calcification (white arrowheads) involving the right 10th rib.
B. CT scan of chest shows the tumor mass with central dense calcification (white arrowheads).
C. Axial T2-weighted image shows the tumor (white arrowheads) with extensive central signal loss due to dense calcification.
D. Axial T1-weighted image shows intermediate signal intensity lesion (white arrowheads) with multiple central signal void areas.
E. Axial T1-weighted contrast-enhanced image shows well enhancing portions of the soft tissue mass of the tumor (white arrowheads).
F. Gross specimen image shows lobulated mass with mineralized matrix.
G. Mineralized (open arrows) or unmineralized (arrow) osteoid is haphazardly distributed and neoplastic hyperchromatic cells (arrowhead) are noted between the osteoid (H&E, ×200).
of the rib can help to correctly diagnose the lesion. In this case, the correct diagnosis was not suggested from the chest radiographs. CT and MR scans provided valuable information about the tumor. CT provided the characteristic features of primary rib osteosarcoma, allowing for the differentiation from other more common lesions. MRI also depicted the full extent of osseous and soft tissue extension, which could not be seen on CT, especially in cases with dense calcification such as this case.

REFERENCES

2. Kim H, Park C, Lee YB, Jin SY, Ro JY, Ayala AG. Case report