Giant Cell Tumor of the Rib

We experienced a rare case of giant cell tumor (GCT) arising in the 5th rib involving the 5th vertebral body and transverse process. A 57-year-old man presented with a well-defined mass in the left thoracic cavity on chest x-ray examination. Chest computed tomography showed a heterogeneous 7cm-diameter mass originating in the posterior segment of the left 5th rib. The tumor had spread to the 5th thoracic vertebra destroying the left half of the body and transverse process. Magnetic resonance imaging showed a heterogeneous-intensity mass involving the 4th to 6th ribs. A radical excision of the tumor followed by a 50 Gy radiotherapy was performed after embolization of the feeding arteries. The pathological diagnosis was a GCT. The patient remains well without evidence of recurrence for 6 years following surgery. The present case is only the 14th case of GCT arising in the rib to have been reported in Japan.

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Giant cell tumor (GCT) of the rib is rare. Hanna and co-workers reviewed eight large series, and reported only 12 (0.6%) among 2,128 GCT originating in the ribs.1 Since up to 50% of giant cell tumors will recur if treated by curettage, en block radical excision is recommended.2 Here, we present a case of aggressive giant cell tumor originating in the rib involving the vertebral body and transverse process. Following radical excision, the patient has remained without recurrence for over 6 years.

Case

A fifty-seven year old male was admitted, on October 28, 1996, with a 2-year history of back pain. A chest radiograph on admission showed a well defined 7.0 cm mass in the left lung field (Fig. 1). A contrast-enhanced chest computed tomography (CT) revealed a heterogeneous 7.0 x 6.0 cm mass in the left posterior chest wall with destruction of both the posterior part of the fifth rib and transverse process and lateral body of the fifth thoracic vertebra. The mass was dumb-bell-shaped with a ventral extension into the chest cavity close to the descending aorta (Fig. 2). Magnetic resonance imaging (MRI) showed high signal intensity with low signal intensity areas, and indicated that the tumor extended into the erector spinal muscles (Fig. 3A). Furthermore, the fifth rib was completely destroyed and the tumor extended to the soft tissue surrounding the fourth and sixth ribs (Fig. 3B). Echo-guided needle biopsy indicated a giant cell tumor. Abdominal CT, brain MRI and bone scans showed no other tumorous lesions. We decided to perform a radical resection of the tumor. According to the staging system developed by Enneking,3 this case was classified as a stage 3 aggressive giant cell tumor. The third to sixth intercostal arteries, supplying the blood to the tumor, were embolized preoperatively in order to reduce the blood loss and prevent seeding of tumor cells into the vessels during the operative procedure (Fig. 4).

On November 20, 1996, the tumor was completely resected together with the S6 segment of the lung, the fourth to sixth ribs with related muscles, the left half of the fifth and sixth vertebral bodies and the erector spinal muscles. A 5cm-long piece of the rib was implanted into the excised part of the vertebral bodies. Chest wall reconstruction was made using Marlex mesh. Excision of the tumor was followed by 50 Gy of radiotherapy to the fifth thoracic vertebra.

Macroscopically, the excised tumor measured 7.0 x
Fig. 1. Chest X ray showed a well defined 7 cm mass in the left thoracic cavity.

Fig. 2. Chest computed tomography showed a heterogeneous 7.0 × 6.0 cm mass arising in the posterior segment of the rib, which invaded to the thoracic vertebral body, arch and transverse process.

Fig. 3. A: Magnetic resonance imaging showed a heterogeneous-intensity mass.
B: The tumor involves the 4th to 6th ribs.

6.5 × 4.5 cm, was centrally located in the 5th rib and had a smooth surface (Fig. 5). The cut surface was a whitish-tan multicystic structure with black-brown fluid.

Microscopically, many giant cells were scattered on a background of mononuclear cells, which proliferate in a sheet-like, fascicular or striiform pattern. These tumor cells were composed of three cell types osteoclast-like round to polygonal mononuclear cells, histiocyte-like round to polygonal mononuclear cells, and spindle-shaped mononuclear stromal cells. There were only a few mitotic figures. Fibrous adhesion was found between the lung and the tumor. Microscopic examination revealed that the tumor did not invade to the lung but was attached to the lung with fibrous tissue. The blood vessels and lymphatics were markedly involved (Fig. 6). The tumor was diagnosed as a giant cell tumor originating from the rib.

The postoperative course has been uneventful, without evidence of recurrence for over 6 years (Fig. 7).

Discussion

In general, up to 50% of giant cell tumors will recur if treated by curettage. En bloc radical excision is more effective than curettage but is also associated with osseous and soft tissue recurrence in 10 to 15% of patients. Although a microscopic grading system for giant cell tumor using a scale of 1 to 3 has been suggested, histologic grading alone will not predict recurrence, local aggressiveness, or metastasis. Enneking developed a surgical staging for giant cell tumors which mainly relies on radiographic findings. In the present case, extension of the tumor was wide. In particular, invasion of the tumor to the