Official Case Reports Journal of the Asian Pacific Society of Respirology
Respirology Case Reports
OPEN ACCESS
APSR

A solitary pleural metastasis of benign giant cell tumor of bone

Ai Mitsui[1], Hisashi Saji[1], Masatomo Doi[2], Masahiro Hoshikawa[2], Akinobu Hayashi[3] & Haruhiko Nakamura[1]

[1]Department of Chest Surgery, St. Marianna University School of Medicine, Kanagawa, Japan.
[2]Department of Pathology, St. Marianna University School of Medicine, Kanagawa, Japan.
[3]Department of Pathology, Mie University School of Medicine, Mie, Japan.

Keywords
Mediastinal tumor, metastases, pleura.

Correspondence
Hisashi Saji, Department of Chest Surgery, St. Marianna University School of Medicine, 2-16-1 Sugao, Miyamae-ku, Kawasaki, Kanagawa 216-8511, Japan. E-mail: saji-q@ya2.so-net.ne.jp

Received: 08 November 2015; Revised: 18 January 2016; Accepted: 19 January 2016

***Respirology Case Reports*, 4 (3), 2016, e00147**

doi: 10.1002/rcr2.147

Abstract

Giant cell tumor of bone (GCTB) usually appears as a benign tumor. We describe an extremely rare case of a metastatic pleural tumor arising from a benign GCTB. The patient had undergone radial resection of a GCTB in his left wrist. After 6 years, he was sent to us for diagnosis of a large mass detected upon routine radiographic screening. We resected the tumor, which was found to be a solitary pleural metastasis of GCTB and had evidently spread arterially. To our knowledge, this is the first report of its kind.

Introduction

Giant cell tumor of bone (GCTB) accounts for 5% of primary skeletal tumors and usually appears as a benign neoplasm. However, GCTB can grow aggressively and tends to recur locally. Certain GCTBs are known for distant metastasis and are thus called benign metastasizing GCTBs [1]. Most often, metastasis of GCTB is to the lung, and the recently reported frequency of pulmonary metastasis is approximately 3% [2,3]. Metastasis to the parietal pleura has not been reported. Herein, we describe a rare metastatic pleural GCTB that provides insight into the etiology of pleural metastasis of GCTB.

Case Report

The patient was a 44-year-old man who had undergone radial resection of a giant cell tumor of a left wrist carpal bone. Results of physical examination and laboratory tests were unremarkable. There was no elevation of malignant mediastinal tumor marker including CEA, CYFRA, Pro-GRP, AFP, hCG, sIL-2R, or anti-ACR binding antibody. Chest computed tomography (CT) revealed a large (8.5 cm) solid heterogeneous mass with calcification at the right edge of the heart. Partial invasion into the superior vena cava and epicardium was suspected. Contrast-enhanced CT revealed supply by a branch of the abdominal artery (Fig. 1A). Contrast-enhanced magnetic resonance imaging depicted an $85 \times 77 \times 50$-mm tumor in the anterior mediastinum. T1-weighted imaging showed a low-signal-intensity trabecular structure inside, and T2-weighted imaging showed an area of very high signal intensity indicative of cystic degeneration. The remaining area was solid and heterogeneously enhanced. Thymoma with cystic degeneration was suspected.

Resection of the mediastinal tumor was performed via median sternotomy. The tumor was pedunculated, arose from the parietal pleura, and protruded into the right chest cavity. It was contained within a fibrous capsule and adhered to the right lung. There was no clear continuity with the thymus. The surgery included en bloc resection of the tumor along with the parietal pleura and thymus and partial resection of the upper right lung lobe.

The tumor measured $8.5 \times 8.0 \times 4.0$ cm (Fig. 1B). A few cystic zones with hemorrhagic necrosis were found in the

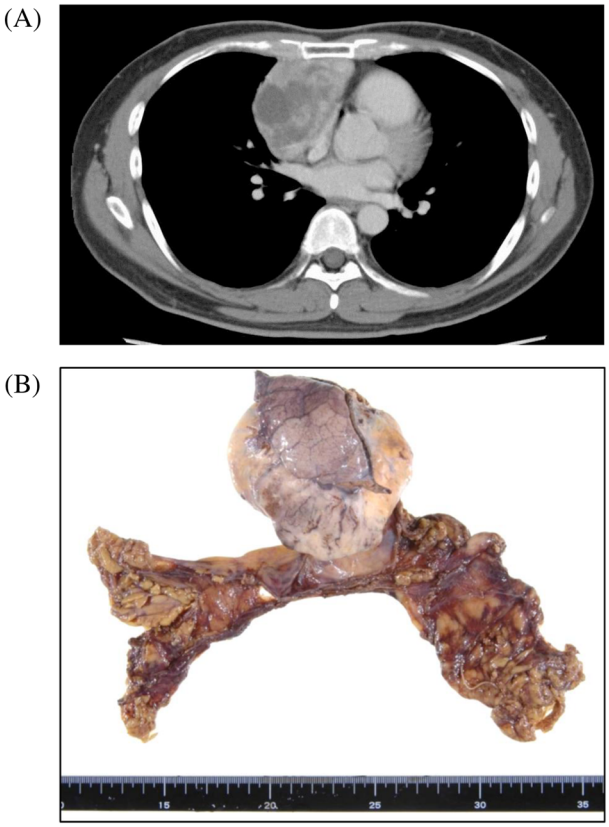

Figure 1. Diagnostic images. (A) Contrast-enhanced CT (mediastinal window). Macroscopic views of the (B) resected mediastinal tumor.

mass. Distribution and clustering of the multinucleated giant cells were similar to those of the previously resected GCTB (Fig. 2A, B). A well-demarcated giant cell tumor was seen in the fibrous thickened pleura (Fig. 2C). Reactive bone formation around the tumor was noted. There was no lung invasion and no pulmonary metastases in the combined resected lung parenchyma (Fig. 2D). Thus, the tumor was considered a solitary pleural metastasis of the previously resected GCTB.

Discussion

GCTB is a primary intramedullary tumor that is usually regarded as benign but can be locally aggressive and even metastatic [1]. The histologic features of the stromal cells support this benign designation. The cells are bland and nonpleomorphic, and there are no atypical mitotic figures. Therefore, GCTB should be distinguished from malignant GCTB. However, many case reports and retrospective studies have supported benign metastatic processes.

The mechanism for the initiation of metastasis of GCTB is unknown. Some authors have argued that metastasis of benign cells is not inherent to progression of the tumor; rather, it is a random event attributed to extrinsic factors. One such notion is that microvascular trauma at the time of surgical resection can create a vessel defect, resulting in a tumor microembolism. Distant metastasis could involve a process similar to vascular invasion of tumor cells. Permeation of trabecular bone and vascular invasion by the primary

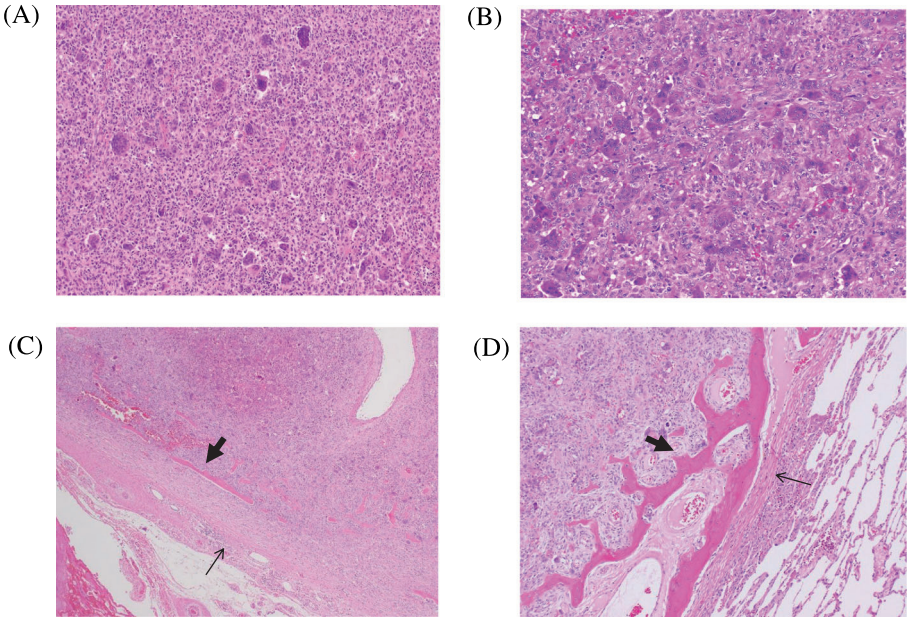

Figure 2. Histologic sections showing (A) the distribution and clustering of multinucleated giant cells of the resected mediastinal tumor, (B) the distribution and clustering of multinucleated giant cells of the primary GCBT, (C) a well-demarcated mass in the pleura (thin arrow), (D) fibrotic tissue (thin arrow) surrounding the tumor. Note the reactive bone formation around tumor (thick arrow).

tumor were noted in a reported series of seven cases of pulmonary metastasis of GCTB. Histologically, the metastatic lesions were identical to the primary tumors [4].

Metastasis of GCTB to uncommon sites is sometimes attributed to antegrade spread of tumor cells through the veins. Once a surgery-related vessel defect and tumor embolization occur in trauma, the superficial venous system, its numerous connections, and external surface pressure could play roles in retrograde spread. Another metastatic pathway may be the lymphatics, especially in cases of spread to the mediastinum or regional lymph nodes without evidence of pulmonary metastasis [5]. Further, in cases of metastasis to skin on the contralateral leg, the penis, or, as in our case, to the parietal pleura, the tumor cells probably bypass the pulmonary circulation and spread via arteries of the systemic circulation.

Recent studies have yielded methods for predicting potential metastasis. Pro-osteoclastogenic cytokines such as receptor activator of nuclear factor kappa-B ligand, interleukin-6, and tumor necrosis factor, as well as monocyte-recruiting chemokines such as stromal cell-derived factor-1 and monocyte chemoattractant protein-1, trigger osteoclastogenesis and bone destruction. High-level expression of these cytokines and chemokines may help in predicting the prognosis of GCTB [2].

The rare metastatic GCTB we encountered in the parietal pleura provides evidence for arterial metastasis of GCTB. The uniqueness of the case lies not only in the site of metastasis but also in the fact that the metastasis occurred in the absence of both local recurrence and lung involvement over a long period. We emphasize the need for recognition of possible metastasis of GCTB regardless of the timing and the lesion site.

Disclosure Statements

No conflict of interest declared.
Appropriate written informed consent was obtained for publication of this case report and accompanying images.

Funding Statement

This study was supported by a Grant-in-Aid for Scientific Research, Japan Society for the Promotion of Science (24592104), Ministry of Education, Culture, Sports, Science and Technology, Japan

Acknowledgment

We are indebted to Tina Tajima, senior editor of Tajima and Associates, for her editorial review of the English manuscript.

References

1. Campanacci M, Baldini N, Boriani S, et al. 1987. Giant-cell tumor of bone. J. Bone Joint Surg. Am. 69(1):106–114.
2. Muheremu A, Niu X. 2014. Pulmonary metastasis of giant cell tumor of bones. World J. Surg. Oncol. 12:261.
3. Takeuchi A, and Tsuchiya H. 2014. Giant cell tumor. J. Jpn. Clin. Orthop. Ass. 49(33):223–241.
4. Caballes RL. 1981. The mechanism of metastasis in the so-called "benign giant cell tumor of bone". Hum. Pathol. 12(8):762–767.
5. Connell D, Munk PL, Lee MJ, et al. 1998. Giant cell tumor of bone with selective metastases to mediastinal lymph nodes. Skeletal Radiol. 27(6):341–345.