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International Journal of Surgery Case Reports

journal homepage: www.casereports.com

A rare case report of rib hemangioma mimicking a malignant bone tumor or metastatic tumor

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ARTICLE INFO

Article history:

Received 5 August 2015

Received in revised form 4 September 2015

Accepted 24 September 2015

Available online 3 October 2015

Keywords:

Hemangioma

Chest wall

Rib

Malignancy

Computed tomography

Osteolytic change

ABSTRACT

Hemangioma of the rib is a rare benign vascular tumor. This benign disease induces osteolytic changes, and must be distinguished from a malignant bone tumor or metastatic tumor. Definitive diagnosis is achieved by excision biopsy or histological examination after surgical resection in many cases. We here in present a rare case of hemangioma of the rib.

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1. Introduction

Hemangioma of the rib is a rare benign bone tumor that accounts for 1% of all bone tumors. This tumor may arise in all ribs, and it is asymptomatic or mildly symptomatic. About half of costal tumors are malignant, and it is difficult to distinguish an osteolytic hemangioma of the rib from a malignant tumor.

2. Presentation of case

A 73-year-old woman was referred to our hospital for surgical resection of sigmoid colon carcinoma. Physical examination in our hospital revealed an asymptomatic palpable tumor at the left chest wall. She had no remarkable family history or other physical examination findings. She had no history of chest trauma or rib fractures. Preoperative chest computed tomography (CT) showed an osteolytic, expanding left chest tumor extending from the left sixth rib to the adjacent soft tissues and measuring $2.9 \times 2.5 \times 1.9$ cm. The tumor was enhanced by contrast medium (Fig. 1). Magnetic resonance imaging (MRI) of the tumor revealed low signal intensity on T1-weighted images, high signal intensity on T2-weighted images, and early-phase enhancement by contrast medium (Fig. 2). The muscles adjacent to the tumor in the left chest wall were

edematous. Positron emission tomography with 2-fluoro-2-deoxy-D-glucose (^{18}F -FDG PET) revealed a maximum standardized uptake value (SUV_{max}) of 2.66 (Fig. 3). An aspiration needle biopsy of the tumor showed mainly blood cells and benign mesenchymal cells, with no malignant cells. We could not exclude the possibility of a primary malignant bone tumor or metastatic chest tumor; therefore, the left sixth rib was excised en bloc with the adjacent soft tissues. The chest wall was reconstructed using a polytetrafluoroethylene patch. The postoperative course was uneventful, and the patient was discharged on postoperative day 15.

The postoperative histological diagnosis was hemangioma of the rib. Macroscopic examination revealed a polycystic tumor containing hemorrhagic tissue (Fig. 4). Microscopically, the tumor was composed of dilated vessels and capillary-sized vessels in the bone and adjacent soft tissues (Fig. 5). These vessels comprised a single layer of endothelial cells.

The patient had no evidence of recurrence 1 year after surgical resection.

3. Discussion

Hemangioma of the rib is a rare bone tumor that accounts for 1% of all bone tumors. Most bone hemangiomas arise in the skull or vertebral bodies. Two major histological types of hemangiomas have been defined: the cavernous or capillary type and other subtypes including the arteriovenous or mixed type [1,2].

To the best of our knowledge, 25 reports of hemangioma of the rib have been published to date (Additional file; Table 1). These

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Table 1
Case reports of hemangioma of the rib.

Case	Age (y)	Gender	Location	Osteolytic changes in CT	Size	Symptom	Year	Author	Journal
1	53	F	Rt. 7th rib	Negative	Not mentioned	Epigastric discomfort	1979	Feldoman	Skeletal Radiol.
2	11	F	Rt. 6th rib	Negative	Not mentioned	Back pain	1986	ortega	J. Comput. Assit.
3	14	M	The sacrum and Rt. 7th rib	Positive	Not mentioned	Pain in leg and low back			Tomorg.
4	65	F	Lt. 8th rib	Negative	Not mentioned	Back pain			
5	56	F	Lt. 7th rib	Positive	16 × 7 × 6 cm	None	1994	Kuo	Kaohsiung J. Med. Sci.
6	76	M	Rt. 3rd rib	Negative*	7.5 × 3.5 cm	None	1998	Clements	Am. Surg.
7	61	M	Lt. 12th rib	Negative	5 cm	Contralateral chest pain	1995	Filosso	J. Cardiovasc. Surg.
8	59	F	Lt. 7th rib	Positive	3.5 × 2.5 × 1.5 cm	None	2000	Okumura	Jpn. J. Clin. Oncol.
9	50	F	Rt. 1st rib	Negative	Not mentioned	Arm discomfort	2001	Yeow	J. Vasc. surg.
10	59	M	Lt. 4th rib	Positive	7.5 cm	None	2002	Shimizu	Ann. Thorac. Surg.
11	45	M	Rt. 7th rib	Positive	Not mentioned	Costal Pain	2005	Roy	CMA Med. Icn.
12	74	M	Lt. 5th rib	Positive	9.5 × 6.5 × 3.0 cm	Left back pain	2007	Nakamura	Gen. Thorac. Cardiovasc. Xurg
13	28	F	Rt. 5th rib	Positive	7 × 9 × 5 cm	Back pain, dyspnea and cough	2007	Sirmali	Acta. Chir. Belg.
14	62	M	Rt. 5th rib	Positive	6 × 5 × 3.5 cm	None	2008	Ceberut	Asian Cardiovasc. Thorac. Ann.
15	54	F	Lt. 8th rib	Positive	9 × 6 × 5 cm	None	2008	Cakir	Acta. Chir. Belg.
16	29	F	Lt. 7th rib	Negative	4.5 cm	None	2010	Gourgiotis	Case Rep. Med.
17	48	F	Lt. 7th rib	Positive	5 × 3.8 cm	None	2011	Abrao	Ann. Thorac. Surg.
18	64	F	Lt. 5th rib	Positive	8 × 4 × 2.5 cm	None	2011	Hashimoto	Ann. Thorac. Surg.
19	54	F	Rt. 9th rib	Positive	7.5 × 5.2 × 4.5 cm	None	2011	Jia	Clin. Nucl. Med.
20	20	M	Rt. 5th rib	Positive	5 cm	None	2011	Khimseng	Diag. Interv. Radiol.
21	26	F	Rt. 8th rib	Positive	3 × 5 cm	Back pain	2011	Sanjay	Indian J. Surg.
22	17	M	Rt. 6th rib	Positive	10 cm	None	2012	Bouchikh	Pan Afr. Med. J.
23	16	M	Lt. 8th rib	Negative	7.2 × 3.7 × 4.0 cm	Back pain	2012	Burke	Ir. Med. J.
24	73	F	Lt. 8th rib	Positive	12 × 11 × 11 cm	None	2013	Yamamoto	Kyobu Geka.
25	30	M	Rt. 8th rib	Negative	6 × 4 cm	Cough, chest pain	2013	Memduh	Intern. Med.
26	79	F	Lt. 6th rib	Positive	2.9 × 2.5 × 1.9 cm	None	2015	Haro	This case

* Tumor expansion and bony speculations within the mass.

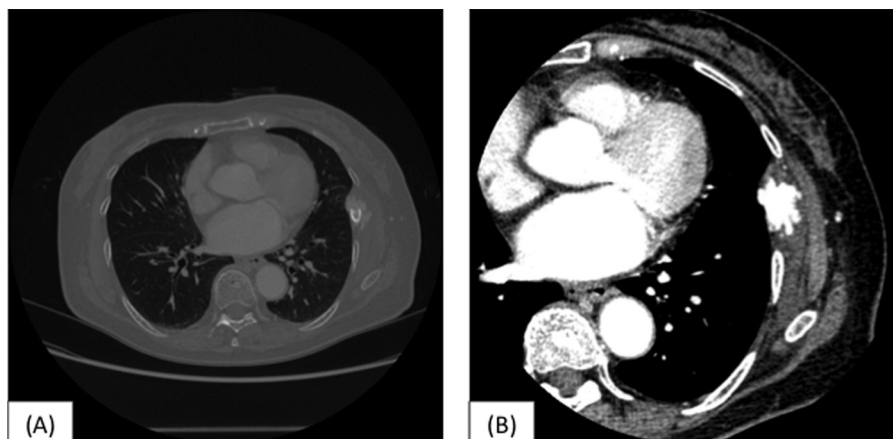


Fig. 1. Chest CT examination revealed (A) an expanding osteolytic tumor and (B) enhancement by contrast medium.

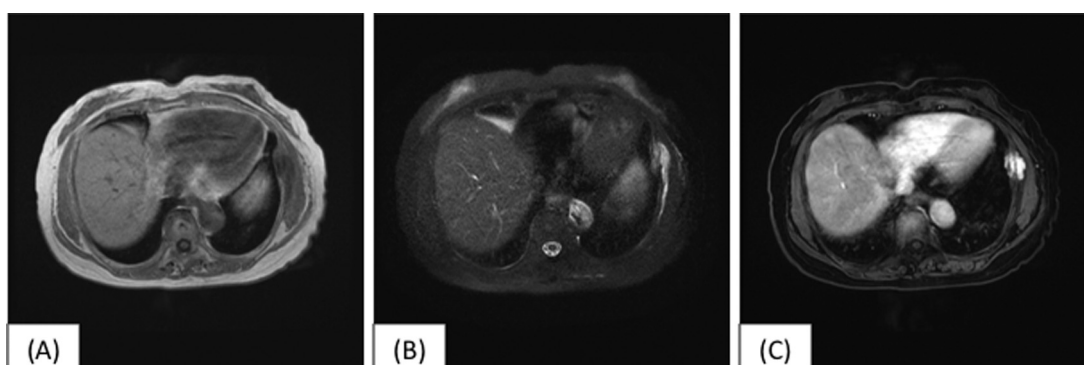


Fig. 2. Magnetic resonance imaging showed (A) low signal intensity on T1-weighted images, (B) high signal intensity on T2-weighted images and (C) enhancement by contrast medium.

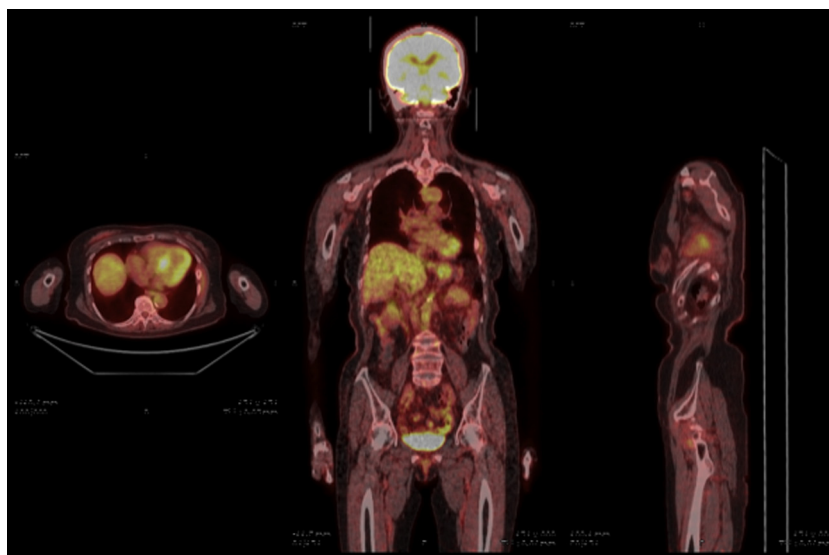


Fig. 3. FDG-PET examination revealed accumulation with an SUV_{max} of 2.66 at the left sixth rib.

reports involved 15 males and 11 females patients, and the average age was 47.0 ± 21.2 years old (range, 11–79 years). In one report, osseous hemangioma was identified in middle-aged patients [1], but middle-aged patients with hemangioma of the rib constituted 38.5% (9/26 cases) of all patients. The proportions of younger and older patients among all affected patients were 38.5% (9/26 cases) and 30.8% (8/26 cases), respectively. A total of 42.6% (12/26 cases) of

all patients had one or more symptoms, and all the symptoms were mild. Hemangiomas occurred in the right and left rib at the same frequency (13/26 cases each). The tumors arose in all ribs from the 1st to 12th. In one report, they most frequently arose in the 7th rib [3]. Overall most of the hemangiomas (21/26 cases) occurred in the 5th and 8th ribs.

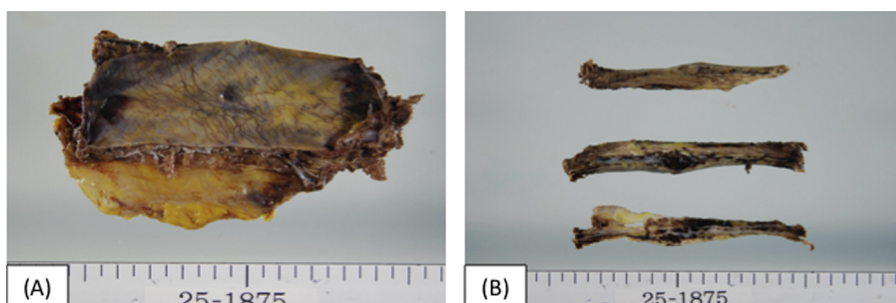


Fig. 4. (A) Resected tumor en bloc with the left sixth rib and adjacent soft tissues and (B) cut section of the tumor.

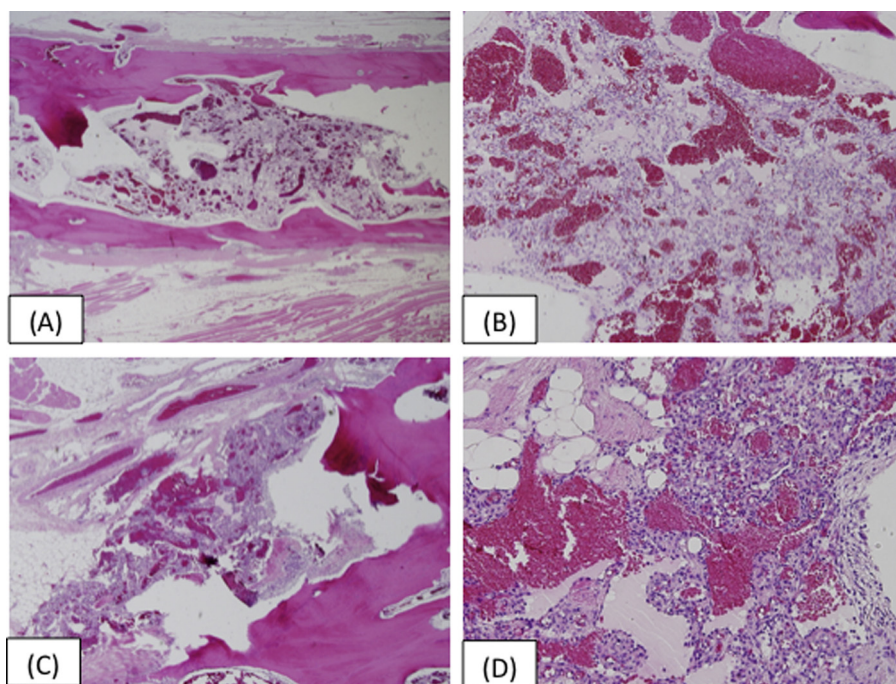


Fig. 5. Hematoxylin and eosin staining (A, $\times 20$; B, $\times 100$; C, $\times 40$; D, $\times 200$). (A) Many dilated, thin-walled vessels, compatible with those of a cavernous hemangioma were present in the osseous tissue. Proliferation of capillary-sized vessels were observed in (B) the osseous tissue and (C, D) surrounding soft tissue.

About half of costal tumors are malignant, and it is difficult to distinguish an osteolytic hemangioma of the rib from a malignant tumor such as a metastatic tumor, multiple myeloma, chondrosarcoma, or osteosarcoma [1]. Previous reports described osteolytic changes in 65.4% of cases (17/26 cases) on chest CT examination. On the other hand, osteosclerosis with calcification was described in a few reports [3,4].

The SUV_{max} values of the rib in ^{18}F -FDG PET examinations in previous reports were 2.5 [5] and 2.2 [3], showing weak positivity. The SUV_{max} of 2.66 in this case indicated that the tumor was a low-grade malignant tumor or metastatic tumor. Bone scintigraphy using technetium 99m labeling reportedly revealed accumulation in a rib tumor [6], and ^{18}F -FDG PET examination is considered to be more useful than bone scintigraphy because it can indicate low or high accumulation [3]. The usefulness of ^{18}F -FDG PET examination should be estimated in additional cases.

The necessity of preoperative biopsy is controversial [7]. Some reports have stated that preoperative needle biopsy should be avoided due to the risk of seeding or bleeding [4,8], while others have found this technique to be safe and useful for obtaining a definitive diagnosis [3]. No complications of needle biopsy occurred in the present case. Aspiration biopsy of the tumor showed mainly blood cells, suggesting a hematoma or hemangioma.

The standard treatment of rib hemangiomas is complete excision with clean surgical margins [9]. Surgical resection was selected in 96.1% of previous cases (25/26 cases); radiotherapy and steroids were used in one case [10].

Hemangioma of the rib should be considered as a differential diagnosis of a weakly ^{18}F -FDG PET-positive osteolytic tumor of the rib, especially in asymptomatic or mildly symptomatic patients.

4. Conclusion

We experienced a rare case of hemangioma of the rib. This tumor can be misdiagnosed as a malignant tumor. Hemangioma of the rib should be considered as a differential diagnosis of rib tumors, principally in asymptomatic or mildly symptomatic patients. ^{18}F -FDG PET examination can be helpful for distinguishing hemangiomas of the rib from malignant tumors.

Conflicts of interest

None.

Funding

None.

Ethical approval

Not requested.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Authors contribution

AH acquired the data and wrote the article. AN coordinated and critically revised the study. Both read and approved the final manuscript.

Guarantor

Akira Haro.

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