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ABOUT COVER

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The WJCC is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for WJCC as 1.534; IF without journal self cites: 1.491; 5-year IF: 1.599; Journal Citation Indicator: 0.28; Ranking: 135 among 172 journals in medicine, general and internal; and Quartile category: Q4. The WJCC's CiteScore for 2021 is 1.2 and Scopus CiteScore rank 2021: General Medicine is 443/826.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Hua-Ge Yin; Production Department Director: Xu Guo; Editorial Office Director: Jin-Lei Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

July 16, 2022

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INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Solitary plasmacytoma of the left rib misdiagnosed as angina pectoris: A case report

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Specialty type: Oncology

Provenance and peer review:

Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): C, C, C
Grade D (Fair): D
Grade E (Poor): 0

P-Reviewer: Aziz JMA, Iraq; Sung WY, South Korea; Surani S, United States; Teragawa H, Japan

A-Editor: Hasan A, Egypt

Received: November 22, 2021

Peer-review started: November 22, 2021

First decision: December 10, 2021

Revised: December 24, 2021

Accepted: May 22, 2022

Article in press: May 22, 2021

Published online: July 16, 2022



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Abstract

BACKGROUND

Solitary plasmacytoma in the left rib is rare and can cause chest discomfort such as chest pain and tightness, and its clinical manifestations are not typical, so it is often misdiagnosed. We report a case of left costal plasmacytoma misdiagnosed as angina pectoris. We also review the literature and provide suggestions as to how to avoid misdiagnosis.

CASE SUMMARY

A 77-year-old man with a history of intermittent chest tightness for 3 years presented with pain in the left chest for 1 wk and was admitted to hospital. The cardiologists initially diagnosed angina pectoris but the findings of coronary angiography were not consistent with the symptoms. Computed tomography showed that the left eighth rib mass was accompanied by bone destruction. The patient was transferred to our department for further treatment. Preoperative biopsy indicated that the lesion was possibly malignant, and elective surgery was performed to remove the lesion. The size of the tumor was about 4 cm. The tumor was spindle-shaped and protruded into the pleural cavity, without invading the lungs. Postoperative pathology confirmed that the left rib lesion was plasmacytoma. After 14 mo follow-up, the patient died of systemic metastasis.

CONCLUSION

Left rib solitary plasmacytoma is a rare disease confined to a specific rib and can

cause local pain. Attention should be paid to the differential diagnosis of angina pectoris to avoid misdiagnosis.

Key Words: Solitary plasmacytoma; Rib; Misdiagnosis; Angina pectoris; Case report

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Core Tip: In the diagnosis of rib solitary plasmacytoma (SP), attention should be paid to the following aspects: the patient has an unknown cause of rib fracture or there is a long-term chest pain; and the computed tomography of the rib shows that osteolysis of ribs coexists with soft tissue mass around the rib. Local surgical resection is the first choice for the treatment of rib SP. Postoperative radiotherapy should be performed to obtain a better curative effect, prolong patient survival and prevent tumor progression and recurrence. Attention should be paid to the differential diagnosis from angina pectoris to avoid misdiagnosis.

Citation: Yao J, He X, Wang CY, Hao L, Tan LL, Shen CJ, Hou MX. Solitary plasmacytoma of the left rib misdiagnosed as angina pectoris: A case report. *World J Clin Cases* 2022; 10(20): 7037-7044

URL: <https://www.wjgnet.com/2307-8960/full/v10/i20/7037.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v10.i20.7037>

INTRODUCTION

A 77-year-old man with a history of intermittent chest tightness for 3 years, presented with pain in the left chest for 1 wk, and was admitted to hospital.

CASE PRESENTATION

Chief complaints

The patient's chest pain was dull and had not dissipated. The pain increased on rising and lying in bed. No awakening or sweating occurred at night. After oral administration of nitroglycerin tablets, chest tightness was significantly reduced, but chest pain was not obviously alleviated.

History of present illness

The patient had a history of angina pectoris for 3 years.

History of past illness

The patient was conscious, with normal temperature, blood pressure, heart rate and rhythm, and slightly increased respiration (22 breaths/min). Electrocardiography at admission showed a sinus heart rate with ST segment depression of 0.05 mV in leads V4–V6. There was no chest pain on palpation. The primary diagnosis by the cardiologist was recurrent angina pectoris.

Personal and family history

Both the patient and his family denied that they had a family history of cancer.

Physical examination

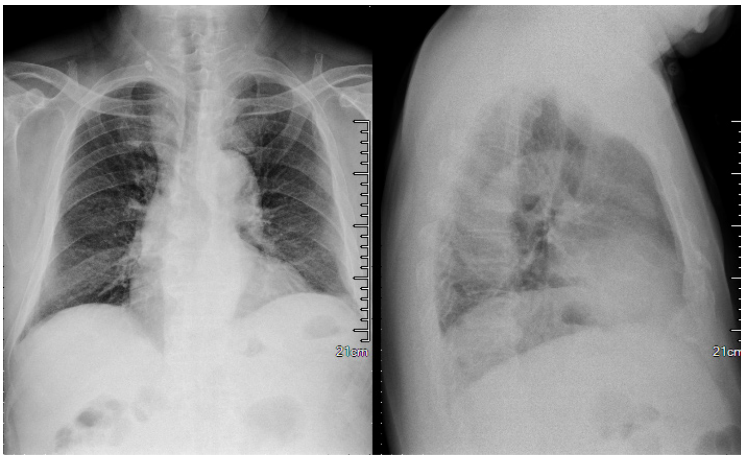
The patient was conscious, with normal temperature, blood pressure, heart rate and rhythm, and slightly increased respiration (22 breaths/min). Electrocardiography at admission showed a sinus heart rate with ST segment depression of 0.05 mV in leads V4–V6. There was no chest pain on palpation. The primary diagnosis by the cardiologist was recurrent angina pectoris.

Laboratory examinations

Routine blood tests, renal function, ion levels and myocardial enzymes were normal.

Imaging examinations

Chest X-ray showed no significant abnormalities (Figure 1). Coronary angiography performed by cardiologists showed that the intima of the coronary arteries was not smooth, and the proximal segment of the left anterior descending branch (LAD) was narrowed by 40%, the middle segment of the LAD by



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Figure 1 Chest X-ray. No significant cardiopulmonary abnormalities were seen.

50%, the middle segment of the right coronary artery (RCA) by 40%–50%, and the distal segment of the RCA by 30%–40%. Compared with 3 years ago, the degree of stenosis had not changed significantly. Chest computed tomography (CT) (Figure 2A) showed that left eighth rib mass was accompanied by bone destruction.

FINAL DIAGNOSIS

Postoperative pathology (Figures 3 and 4) showed that many immature plasma cells proliferated diffusely, with CD 138(+) and ki-67 (20%+). Therefore, the left rib tumor was finally diagnosed as a plasmacytoma.

TREATMENT

After coronary angiography, the cardiology department invited the cardiothoracic surgery department for consultation, and the left rib lesion was found after careful reading of the CT. The patient was transferred to our department for further treatment. A puncture biopsy was performed on the rib masses. Postoperative pathology showed a high degree of suspicion of malignant tumor (Figure 5A and B). Whole body CT scan showed no other bone damage. Ribectomy was performed under general anesthesia. The rib lesions showed fusiform growth, protruding to the pleural cavity, and did not invade the lungs. The tumor was about 4 cm and 2 cm in size, and another small lump was about 1.5 cm and 0.8 cm away from the larger one, and the rib surface was damaged. At 5 cm from the medial and lateral ends of the mass, the ribs were cut off and the rib mass was completely removed (Figure 2B).

OUTCOME AND FOLLOW-UP

Chest pain was significantly relieved after the operation. Patients were unaware of the fact that they had a malignant tumor. The patient's family unanimously disagreed with the patient's radiotherapy and chemotherapy. Therefore, after discharge, the patient took thalidomide and dexamethasone tablets orally. Due to serious gastrointestinal reactions, the patient voluntarily gave up taking the above-mentioned drugs. Unfortunately, after 14 mo follow-up, the patient died of systemic metastasis.

DISCUSSION

Plasmacytoma is a malignant tumor mainly caused by abnormal proliferation of plasmacytoma clones. Clinically, multiple myxomas are common, and isolated plasmacytoma is rare. Solitary plasmacytoma (SP) is characterized by a single clonal plasma cell mass; no or only a small amount of bone marrow plasma cell degeneration; and no symptoms except those of the primary lesion. SP can present as extramedullary (extraosseous) plasmacytoma, that is, in soft tissues, or as solitary bone plasmacytoma (SBP)[1]. SP is a rare disease with a cumulative incidence of 0.15/100000[1,2]. SBP comprises 70% of all

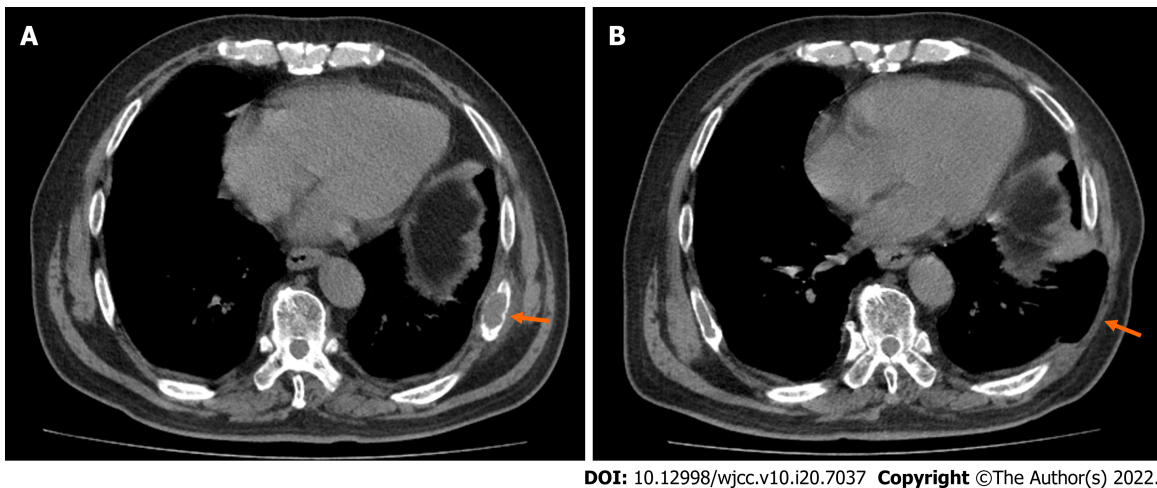


Figure 2 Comparison of computed tomography (CT) images of left eighth rib mass before and after surgery. A: CT scan of lung before surgery showed that the left eighth rib mass was accompanied by bone destruction (orange arrow); B: Lung CT scan after surgery showed changes after resection of the left eighth rib (orange arrow).

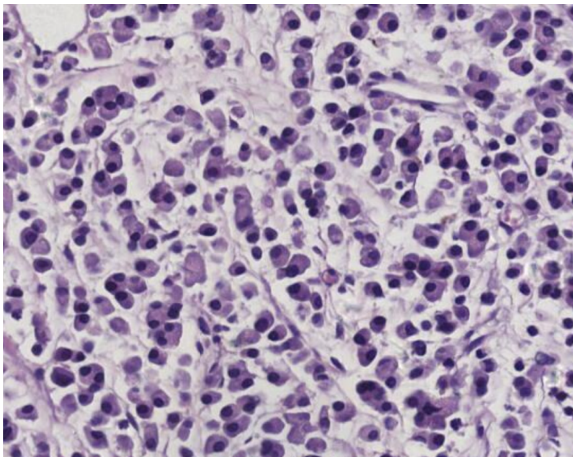


Figure 3 Postoperative pathology showed that a large number of immature plasma cells proliferated after decalcification (HE, × 400).

SP cases [1].

SP is difficult to diagnose preoperatively, with a high misdiagnosis rate and limited sites of occurrence. It can occur in any bone tissue but most commonly in the spine and skull, followed by ribs, clavicle and scapula, and rarely in the long tubular bones of the lower limbs, and generally without bone marrow abnormality. Rib SP is a rarer disease with no definite criteria for diagnosis and treatment. SP is confined to a specific rib, causing local pain, and its clinical manifestations are not characteristic, so it is often misdiagnosed[3].

We conducted a literature search on PubMed using the search terms “solitary plasmacytoma and rib” and identified 23 case reports published between 1992 and 2020[4-26] (Table 1). Among these rib SP patients, 14 were male and nine were female (with a male to female ratio of 1.6:1), aged between 26 and 75 years (mean 50.5 ± 15.6 years; median 46 years). The ratio of right rib to the left rib was 1.8: 1, and most tumors occurred in the fourth to sixth rib (65.2%). In our case, the lesion was located in the left eighth rib (the overlap areas of common angina pain, *i.e.*, precordial area), and the patient also had a history of angina pectoris. Electrocardiography at the time of admission showed a sinus heart rate with ST segment depression of 0.05 mV in leads V4–V6. However, the results of coronary angiography did not explain the cause of the patient’s left chest pain. After coronary angiography, the cardiology department invited the cardiothoracic surgery department for consultation, and the left rib lesion was found after careful reading of the CT. Because the tumor location was covered by the heart and diaphragm, it could not be observed in the chest X-ray. Undoubtedly, it is highly likely to be misdiagnosed as angina pectoris for early stage of left-sided rib tumor. In addition, nitroglycerin has a relaxing effect on bronchial smooth muscle. This may be related to the relief of chest tightness. It is the relief of the patient’s symptoms after the application of nitroglycerin that misled the initial judgment of the

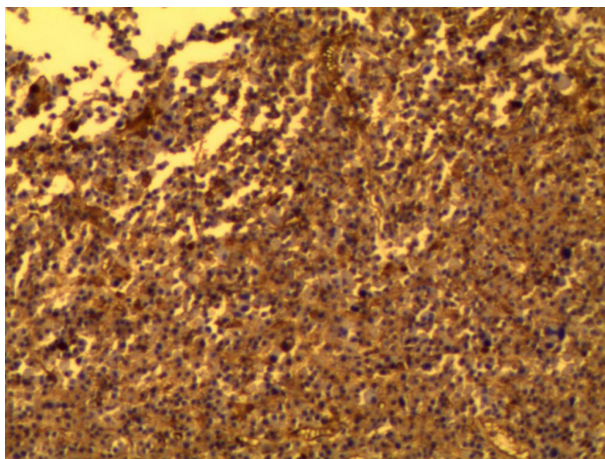
Table 1 Literature review of features of solitary plasmacytoma of the ribs

Ref.	Gender	Age	Location of rib	Treatment	Prognosis
1 Ikeda <i>et al</i> [4], 1992	M	75	Left 4 th	R	NM
2 Hihara <i>et al</i> [5], 1993	F	52	Left 4 th	NM	Relapse-free for 23 months' follow-up
3 Hanawa <i>et al</i> [6], 1994	M	58	Right 7 th and 8 th	S+R	Recurrence on the left side after 7 mo
4 Hirai <i>et al</i> [7], 1995	F	72	Right 5 th	S+R	Relapse-free for 23 mo' follow-up
5 Mankodi <i>et al</i> [8], 1999	F	26	Left 6 th	S+R	NM
6 Kadokura <i>et al</i> [9], 2000	M	44	Left 7 th	S+R	Relapse-free for 24 mo' follow-up
7 Sato <i>et al</i> [10], 2001	M	46	Right 5 th	S	NM
8 George <i>et al</i> [11], 2002	M	29	Right 11 th	S+R	NM
9 Yan <i>et al</i> [12], 2003	F	45	7 th rib (left or right NM)	R	Relapse-free for 24 mo' follow-up
10 Garcia <i>et al</i> [23], 2004	F	32	Right 9 th	S	Relapse-free for 18 mo' follow-up
11 Bousnina <i>et al</i> [13], 2006	M	52	Left 6 th	S+R	Relapse-free for 12 mo' follow-up
12 Xiao <i>et al</i> [14], 2008	F	30	Right 4 th	S+R	Relapse-free for 11 mo' follow-up
13 Ketata <i>et al</i> [15], 2009	M	60	Left 1 st	S+R	Relapse-free for 8 mo' follow-up
14 Pattanayak <i>et al</i> [16], 2010	M	60	Right 4 th	S+R	Remission for 8 mo
15 Kodate <i>et al</i> [17], 2010	M	70	Right 4 th	S+R+C	Remission for 33 mo
16 Singal <i>et al</i> [18], 2011	F	43	Right 5 th	S+R	Relapse-free for 30 mo' follow-up
17 Lee <i>et al</i> [19], 2012	M	73	Right 5 th	S+R	NM
18 Santos <i>et al</i> [20], 2012	F	65	Right 6 th	NM	NM
19 Tajima <i>et al</i> [21], 2014	F	71	Right 3 rd	S	Relapse-free for 18 mo' follow-up
20 Razafimanjato <i>et al</i> [22], 2014	M	42	Left 2 nd	S+C	Relapse-free for 36 mo' follow-up
21 Caffery <i>et al</i> [24], 2014	M	33	Right 5 th	R	NM
22 Jia <i>et al</i> [25], 2015	M	44	Right 6 th	S+R	Relapse-free for 6 mo' follow-up
23 Singh <i>et al</i> [26], 2020	M	39	Left 4 th	NM	NM

F: Female; M: Male; S: Surgery; R: Radiotherapy; C: Chemotherapy; NM: Not mentioned.

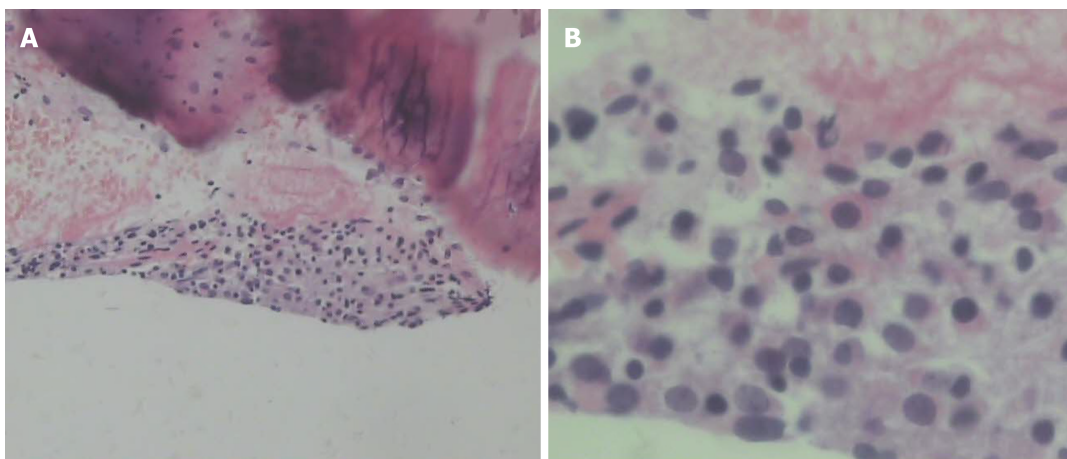
cardiologist. The currently recommended diagnostic criteria[27] for SPB include: (1) Absence of bone marrow plasma cells; (2) Single lesion of bone or soft tissue; (3) Negative whole body imaging for additional lesions; and (4) Absence of end organ damage: Hypercalcemia, renal dysfunction, or anemia. In our case, the patient underwent a biopsy before removing the rib mass. Pathology revealed a malignant tumor of plasma cells. Other parts of the body were scanned with CT but no similar lesions were found in other bone tissues. Therefore, rib SP was considered before the operation. At present, the diagnosis of SP is based on biopsy, histology and immunohistochemistry to confirm homogeneous infiltration of monoclonal plasma cells, which usually express CD138 and/or CD38[1]. In our case, postoperative immunohistochemical pathology showed CD138 (+), which met the above pathological diagnosis criteria.

Plasmacytomas usually do not require surgical resection, because these malignancies are sensitive to radiation. In most cases, surgical resection is reserved in the case of loss of anatomical integrity or emergency decompression, necessitating resection due to compression of the spinal cord or nerve root. If surgery is performed, it is usually before radiotherapy, and it is used to assist deterministic radiotherapy[1,27]. According to our literature review, costal plasmacytoma was treated with surgical resection combined with radiotherapy, and the tumor recurrence-free or remission-free duration was 6–30 mo (average 16.1 ± 8.9 , median 12 mo)[5,7,9,13–16,23,25]. For patients who received only surgical resection without postoperative radiotherapy, the tumor relapse-free duration was 18 mo[21,23]. For those who had undergone surgical resection combined with chemotherapy[22], or surgical resection combined with radiotherapy and chemotherapy[17], the tumor recurrence-free duration after surgery appeared to be longer, and could be > 33 mo. In our case, the patient underwent surgery combined with chemotherapy, but due to serious adverse drug reactions, the patient stopped drug chemotherapy, resulting in tumor recurrence and death 14 mo after surgery. Despite good local control, most patients with SP eventually develop multiple myeloma[27]. Sustained high levels of monoclonal protein after



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Figure 4 Immunohistochemical staining showed diffuse CD 138(+) in the tumor cell membrane (× 100).



DOI: 10.12998/wjcc.v10.i20.7037 Copyright ©The Author(s) 2022.

Figure 5 Pathology of rib biopsy. A: The pathological findings of rib biopsy showed that it was mainly striated muscle tissue, with a small amount of connective tissue, skin and bone tissue, and short spindle cells (HE, × 100); B: Rib biopsy pathology showed that under high magnification, some cells were short spindle-shaped, and the nuclei were slightly dark stained, with non-nuclear divisions (HE, × 400).

radiotherapy are now an important factor in prognosis. Serum monoclonal protein > 0.5 g/dL and abnormal serum-free light chain could be negative prognostic factors, according to the results of a retrospective study by Dingli *et al*[28]. In addition, it has been suggested that early diagnosis of SP may prevent SP from developing into multiple myeloma and enable patients to obtain prolonged tumor-free survival or cure by reducing tumor burden by surgery and postoperative adjuvant radiotherapy. Therefore, the timeliness of SP diagnosis is also a factor affecting prognosis.

CONCLUSION

Rib SP is a rare disease confined to a specific rib and can cause local pain. The majority of patients are male and the location of onset is mostly in the right rib, with the majority occurring in the fourth to sixth ribs. Surgical resection combined with postoperative radiotherapy or chemotherapy appears to result in longer tumor recurrence-free survival. If the SP is in the left rib, attention should be paid to the differential diagnosis of angina pectoris to avoid misdiagnosis.

FOOTNOTES

Author contributions: Yao J, He X and Wang CY performed the operation; Shen CJ, Tan LL provided guidance on preoperative diagnosis; Hao L completed the pathological analysis and diagnosis; Yao J and Hou MX wrote and

reviewed the paper; all authors issued final approval for the version to be submitted.

Informed consent statement: The patient provided written informed consent to publish this case report and accompanying images.

Conflict-of-interest statement: All the authors report no relevant conflicts of interest for this article.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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S-Editor: Xing YX

L-Editor: A

P-Editor: Xing YX

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