Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Imaging Features of Spinal Hemangioendothelioma Simulating Tuberculous Spondylitis: A Case Report

Peng Xie
Shenzhen University
Hou-guang Miao
Shenzhen University
Juan Zhang
Shenzhen University
Xue-dong Li
Shenzhen University
Shi-xin Du
szxiepeng2017@163.com

Shenzhen University

Case Report

Keywords: Metastasis, Hemangioendothelioma, Spinal tuberculosis

Posted Date: September 30th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10417055/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

The clinical manifestations of spinal tuberculosis and spinal metastases are often nonspecific. Although imaging features of these two conditions are usually characteristic, atypical presentations may cause diagnostic confusion and deserve particular attention.

Case presentation

We report the case of a 59-year-old man who presented with a 1-year history of chest and back pain that had worsened over the past month. His imaging findings were highly suggestive of spinal tuberculosis; however, histopathological examination of the surgically resected specimen confirmed a diagnosis of spinal hemangioendothelioma. We initially misdiagnosed the lesion as tuberculosis based on imaging alone.

Conclusions

Distinguishing spinal tuberculosis from spinal tumors on clinical grounds remains difficult. Given the limitations of medical history and imaging in the differential diagnosis, this case underscores the critical importance of pathological examination for accurate diagnosis and appropriate therapeutic decisionmaking in spinal hemangioendothelioma.

Background

Although spinal tuberculosis and spinal tumors are often difficult to distinguish clinically, they typically present with characteristic imaging features that usually facilitate an accurate diagnosis. Tuberculous spondylitis remains endemic in many developing countries, particularly in settings of poverty and malnutrition, and it is still relatively common in China, where we have extensive experience in diagnosing this condition. However, the rising incidence of spinal tumors in modern society poses an increasing diagnostic challenge.

Here, we report the case of a 59-year-old man who presented with a 1-year history of chest and back pain. His radiological findings on both computed tomography and magnetic resonance imaging were highly suggestive of spinal tuberculosis, strongly supporting that initial diagnosis. Surprisingly, however, histopathological examination of the surgically excised specimen revealed a spinal hemangioendothelioma.

This case underscores that a definitive diagnosis of either spinal hemangioendothelioma or tuberculosis should not be based on imaging alone. Clinicians must pay close attention to atypical radiological features and remain aware that imaging findings can be misleading. Furthermore, pathological

evaluation is usually indispensable for establishing the final diagnosis, especially in the context of concurrent endemic tuberculosis and an increasing prevalence of neoplastic spinal lesions. The presence of drug-resistant tuberculous strains further complicates the clinical landscape, making biopsy confirmation critical when the presentation is ambiguous.

Case presentation

We describe the case of a 59-year-old man who presented with a 1-year history of chest and back pain that had worsened over the past month. He reported no low grade fever, evening temperature rise, weight loss, night sweats, or known malignancy, and there was no family history of tuberculosis. Physical examination revealed mild percussion tenderness over the T11 vertebral region. Laboratory findings were unremarkable except for mildly elevated C-reactive protein, erythrocyte sedimentation rate, and alkaline phosphatase; hemoglobin, white blood cell count, and procalcitonin were within normal limits.

Computed tomography (CT) of the chest and thoracic spine demonstrated pleural thickening and scattered small foci of pulmonary fibroblastic proliferation throughout both lungs, as well as an osteolytic lesion involving the T11 vertebral body with sparing of the intervertebral disc space (Fig. 1). Magnetic resonance imaging (MRI) of the thoracic spine showed similar changes in the T11 vertebral body. In addition, a granuloma like soft tissue mass was observed beneath the anterior longitudinal ligament (Fig. 2AB), and bilateral pedicles of T11 were also involved (Fig. 3).

CT was particularly useful in delineating the extent of bony destruction and vertebral involvement. The lesions appeared lytic, without matrix calcification, and showed disruption of the posterior vertebral cortex with variable soft-tissue extension into the spinal canal. Bony expansion of the pedicles and laminae was evident on the CT scan, along with prominent osteolytic bone destruction.

Given the high endemicity of tuberculosis in our region, the absence of a history of malignancy, and the presence of pleural thickening and pulmonary fibrotic foci, a preliminary diagnosis of spinal tuberculosis was considered. Furthermore, the imaging findings-including anterior destruction of the T11 vertebral body, preservation of the adjacent disc space, and presence of a sequestrum were highly consistent with typical features of tuberculous spondylitis [1, 2].

We performed radical debridement, bone autograft reconstruction, and internal fixation through a posterior approach. Intraoperatively, the subligamentous mass was found to consist mainly of granulation tissue and hemorrhagic exudate, with no abscess or purulent material. Postoperatively, antituberculous therapy was continued, and the patient recovered uneventfully. However, histopathological examination of the excised specimen revealed a hemangioendothelioma (Fig. 4AB). In addition, culture for Mycobacterium tuberculosis and acid-fast bacillus smear were both negative. Thus, the final diagnosis was confirmed as spinal hemangioendothelioma, rather than metastatic carcinoma.

Histopathological examination (hematoxylin and eosin staining, x400) showed irregular vascular lumina filled with red blood cells, osteolytic bone destruction with tumor erosion, diffuse endothelial cell

dysplasia-a hallmark of hemangioendothelioma and pathological mitotic figures.

Discussion

Most vascular tumors affecting the spine are hemangiomas, which are benign in nature. Historically, many malignant vascular neoplasms were broadly classified as hemangioendotheliomas; however, recent efforts have refined this classification into distinct subtypes, including angiosarcoma, epithelioid hemangioendothelioma, and hemangioendothelioma. Hemangioendothelioma is a low grade tumor with a biological behavior intermediate between that of hemangioma and angiosarcoma, and it rarely metastasizes distantly. In contrast, angiosarcoma is a high grade malignancy with a much higher propensity for distant metastasis.

Because tuberculosis remains highly prevalent in China, our surgeons are often more inclined to consider spinal tuberculosis over primary vascular tumors, as occurred in the present case. Given the limited diagnostic value of medical history and physical examination in this differential, we relied heavily on CT and MRI findings. In this patient, the imaging features were highly typical of tuberculosis; consequently, we maintained a diagnosis of tuberculous spondylitis until histopathological examination of the excised specimen ultimately confirmed hemangioendothelioma.

Bone contains a complex network of vascular tissue. Arterial inflow is delivered through a plexus of small arteries and arterioles, while venous drainage from the medullary cavity occurs via venules and larger venous plexuses. The periosteum also possesses a rich supply of blood vessels and lymphatics. Extensive vascular communication between the cortex and medullary canal is maintained through the haversian and Volkmann canals. Despite this elaborate vascular architecture, primary vascular bone tumors are rare, and knowledge regarding their optimal management remains limited.

The most common benign vascular tumors involving bone—including hemangiomas, cystic angiomatosis (disseminated skeletal angiomatosis), lymphangiomatosis, and glomus tumors are infrequently encountered by pathologists. Malignant primary vascular tumors of bone, such as hemangioendothelioma, hemangiopericytoma, and angiosarcoma, are also rare.

Historically, the term hemangioendothelioma was applied broadly to a variety of vascular lesions [3]. In 1943, Stout [3] established diagnostic criteria for malignant vascular tumors, which he designated as hemangioendothelioma. Subsequently, other entities—including epithelioid hemangioendothelioma, epithelioid hemangioma, and angiosarcoma have been distinguished from this broad category, leaving a small residual group of lesions that are now classified as hemangioendotheliomas, i.e., low-grade malignant vascular neoplasms [4–7].

In general, patients with hemangioendothelioma range in age from 20 to 80 years, and approximately one quarter present with multicentric lesions [8]. The tumor predominantly involves the lower extremities [9, 10], with more than half of cases arising in the tibia or femur; fewer than 10% of all such lesions occur in the vertebral column.

Hemangioendothelioma has characteristic histopathological features. The tumor is vasoproliferative, with plump endothelial cells lining vascular spaces. Large, well defined vascular channels are rarely identified in the tumor center, in contrast to the periphery, where such channels are more common. The endothelial cells exhibit eosinophilic cytoplasm. In less vascularized areas, the endothelial cells are arranged in cord like or nested patterns. Mitotic activity is typically scarce in these tumors.

The histopathological findings of the excised specimen ultimately confirmed our misdiagnosis. In retrospect, the erroneous diagnosis likely resulted from overlooking the involvement of the vertebral pedicle and intervertebral space. Pedicle erosion is more frequently observed in spinal metastases in conjunction with vertebral body destruction [11]. It has been reported that pedicle involvement in spinal tuberculosis is usually associated with relatively severe vertebral body and disc destruction, a wide prevertebral abscess, and marked kyphotic deformity, which typically manifest in the late stages of the disease [11]. In our case, the left pedicle of T11 was destroyed without severe vertebral body or disc destruction or significant kyphotic deformity. Although it remains difficult to ascertain whether the destruction represented a primary metastatic focus or secondary spread from the T11 vertebral body, these findings were nevertheless helpful in the differential diagnosis.

Fortunately, the misdiagnosis did not result in adverse clinical consequences; however, several important lessons can be drawn from this case. Multiple imaging modalities including plain radiography, nuclear medicine techniques, myelography, positron emission tomography, CT, and MRI play essential roles in the evaluation and characterization of spinal lesions. In our patient, MRI showed evidence of cord compression but was not informative for a pre-biopsy diagnosis; the tumor appeared hypointense on T1-weighted images and hyperintense on T2-weighted images. Although these sequences can achieve high sensitivity and specificity, no single imaging modality is sufficient for a definitive diagnosis. Clinicians must therefore understand the strengths and limitations of each technique. Moreover, appropriate diagnostic procedures should be performed before initiating any treatment. CT-guided percutaneous spinal biopsy has been widely adopted and proven to be a safe, effective, and accurate method [12–14]. Alternatively, a purified protein derivative (PPD) skin test should be considered prior to diagnosing tuberculosis, as it generally yields a strong positive result in patients with active tuberculosis who are not immunocompromised or malnourished.

Conclusions

Although spinal tuberculosis and spinal tumors typically exhibit characteristic imaging features that aid in diagnosis, we advise against relying solely on imaging for a definitive diagnosis of either condition. Greater attention should be paid to atypical radiological presentations, and histopathological examination is generally indispensable for final confirmation.

Declarations

The statement on informed consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this case

Competing interests

The authors declare that they have no competing interests.

Funding

The study is supported by Science and technology Research and Development Foundation of Shenzhen (JCYJ 20230807142814031).

Author Contribution

All of authors have participated sufficiently and equally in the submission. Xue-dong Li and Shi-xin Du are corresponding author and organized the study. Peng Xie: Selecting the case and writing the manuscript. Hou-guang Miao: Literature search. Juan Zhang: Perform pathology. Xue-dong Li and Shi-xin Du: Supervising and editing the manuscript. All authors have read and approved the final version of the article.

Acknowledgement

The authors would like to thank the students and staffs who participated in discussion as well as helps and commented on this study.

Availability of data and materials

All data generated or analyzed during this study are included either in this article or in the Figures.

References

1. Zaidi H, Akram MH, Wala MS. Frequency and magnetic resonance imaging patterns of tuberculous spondylitis lesions in adults. J Coll Physicians Surg Pak. 2010; 20:303–6.
2. Gupta RK, Agarwal P, Rastogi H, Kumar S, Phadke RV, Krishnani N. Problems in distinguishing spinal tuberculosis from neoplasia on MRI. Neuroradiology. 1996; 38: S97-104.
3. Stout AP. Hemangio-endothelioma: A tumor of blood vessels featuring vascular endothelial cells. Ann Surg. 1943; 18:445–64.
4. Fetsch JF, Weiss SW. Observations concerning the pathogenesis of epithelioid hemangioma (angiolymphoid hyperplasia). Mod Pathol. 1991; 4: 449–55.
5. Kleer CG, Unni KK, McLeod RA. Epithelioid hemangioendothelioma of bone. Am J Surg Pathol. 1996; 20:1301–11.
6. O'Connell JX, Kattapuram SV, Mankin HJ, Bhan AK, Rosenberg AE. Epithelioid hemangioma of bone: A tumor often mistaken for low-grade angiosarcoma or malignant hemangioendothelioma. Am J Surg Pathol. 1993; 17:610–17.
7. Weiss SW, Ishak KG, Dail DH, Sweet DE, Enzinger FM. Epithelioid hemangioendothelioma and related lesions. Semin Diagn Pathol. 1986; 3:259–87.
8. Wenger DE, Wold LE. Malignant vascular lesions of bone: Radiologic and pathologic features. Skeletal Radiol. 2000; 29:619–31.
9. Resnick D, Kyriakos M, Greenway GD. Tumors and Tumor-like Lesions of the Bone: Imaging and Pathology of Specific Lesions. In: Resnick D (ed). Diagnosis of Bone and Joint Disorders. Ed 3. Philadelphia: WB Saunders Co; 1995: 3628–938.
10. Wold LE, Unni KK, Beabout JW, Ivins JC, Bruckman JE, Dahlin DC. Hemangioendothelial sarcoma of bone. Am J Surg Pathol. 1982; 6:59–70.
11. Algra PR, Heimans JJ, Valk J, Nauta JJ, Lachniet M, Van Kooten B. Do metastases in vertebrae begin in the body or the pedicles? Imaging study in 45 patients. AJR Am J Roentgenol. 1992; 158:1275–9.
12. Kang M, Gupta S, Khandelwal N, Shankar S, Gulati M, Suri S. CT-guided fine-needle aspiration biopsy of spinal lesions. Acta Radiol. 1999; 40:474–8.
13. Lis E, Bilsky MH, Pisinski L, Boland P, Healey JH, Bernie O'Malley, et al. Percutaneous CT-guided biopsy of osseous lesion of the spine in patients with known or suspected malignancy. AJNR Am J Neuroradiol. 2004; 25:1583–18.
14. Pilge H, Holzapfel BM, Prodinger PM, Hadjamu M, Gollwitzer H, Rechl, H. Diagnostics and therapy of spinal metastases. Orthopade, 2011; 40:185–93.

Figures

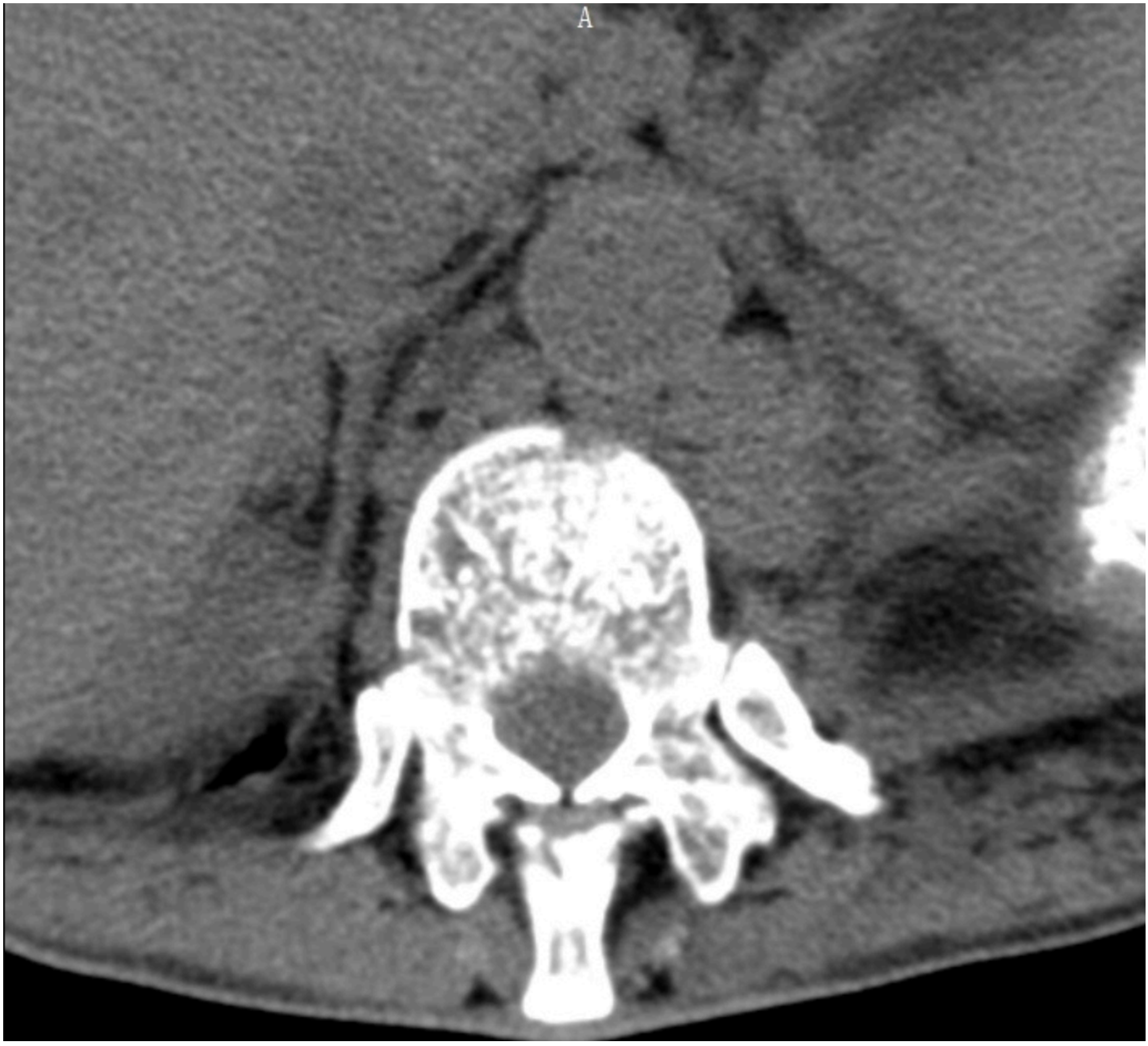

Figure 1

Thoracic spine CT scan showing osteolytic lesions involving the anterior aspect of the T11 vertebral body, with sparing of the intervertebral disc space

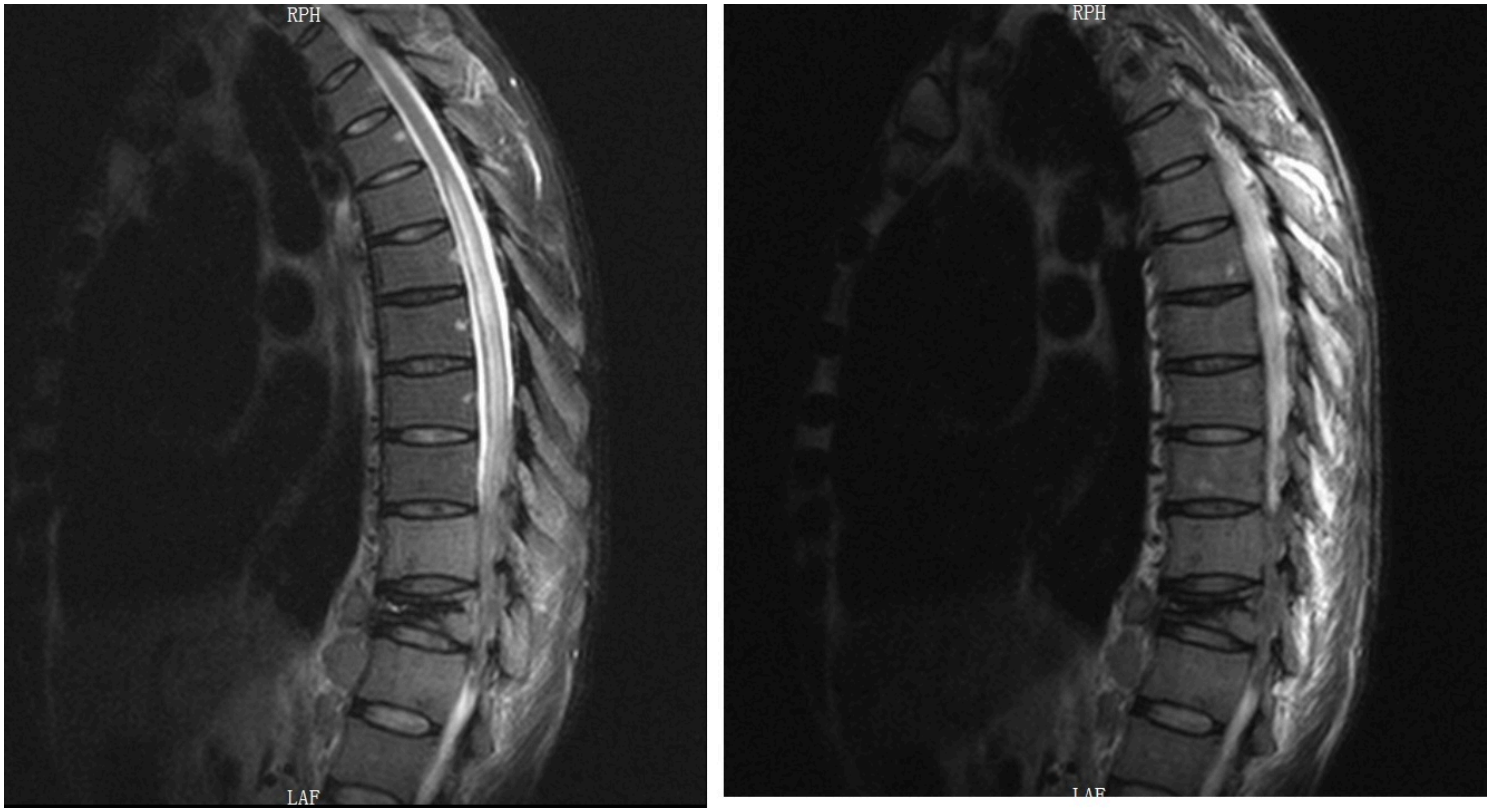

Figure 2

Sagittal T1-weighted (A) and T2-weighted (B) MR images demonstrating destruction of the anterior portion of the vertebral body, with mild involvement of the adjacent disc space. A subligamentous soft-tissue mass is slightly enlarged, and its rim shows no obvious enhancement.

Figure 3

Axial gadolinium-enhanced T2-weighted MRI showing near-complete destruction of the T11 vertebral body, with extension of the lesion into both pedicles.

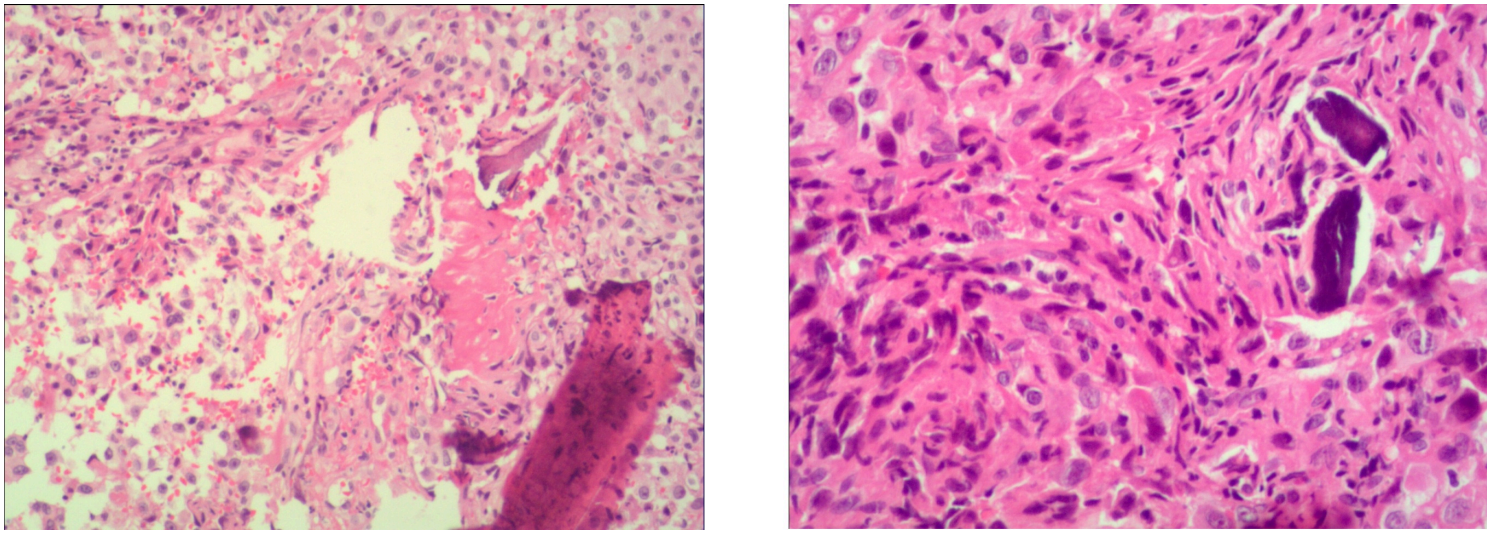

Figure 4

Histopathological examination of the excised specimen (hematoxylin-eosin staining, ×400) reveals irregular vascular lumina filled with numerous red blood cells, osteolytic bone destruction with tumor erosion, diffuse endothelial cell dysplasia (characteristic of hemangioendothelioma), and pathological mitotic figures.