Radiology Case Reports 14 (2019) 1360–1363

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Giant vertebral hemangioma masquerading as aggressive tumor: Tc-99m tagged RBC scan can help to solve the diagnostic conundrum!

Islam Ahmed Shehata Elhelf, MD[a], *Ravishankar Pillenahalli Maheshwarappa, MBBS*[b,*], *Jared Hodgson, MD*[c], *Christina K. Hodgson, MD*[d], *Janet Pollard, MD*[b], *Yusuf Menda, MD*[b]

[a] *Department of Radiology, Harvard Medical School, Beth Israel Deaconess Medical Center, Boston, MA 02215*
[b] *Division of Nuclear Medicine, Department of Radiology, University of Iowa Hospitals and Clinics, Iowa City, USA*
[c] *Department of Radiology, University of Iowa Hospitals and Clinics, Iowa City, USA*
[d] *Department of Pathology, University of Iowa Hospitals and Clinics, Iowa City, USA*

ARTICLE INFO

Article history:
Received 14 May 2019
Revised 25 May 2019
Accepted 23 June 2019
Available online 6 September 2019

Keywords:
Giant vertebral hemangioma
Tc-99m tagged RBC scan
Aggressive
Tumor
Mimic

ABSTRACT

Hemangiomas are the most common benign lesions involving the spine. Metastasis is the most common malignant condition. The diagnosis of typical hemangiomas on conventional CT and MRI imaging is straightforward. However, when the hemangiomas are very large they may have atypical features making their diagnosis on these conventional imaging modalities inconclusive. In such cases nuclear medicine techniques such as Tc-99m RBC may aid in resolving the diagnostic conundrum. Awareness and use of proper diagnostic modality can prevent unnecessary biopsy. In this case report we try to highlight the added value of Tc-99m RBC scan to conventional imaging techniques in differentiating giant vertebral hemangioma from more aggressive malignant tumors.

© 2019 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (http://creativecommons.org/licenses/by-nc-nd/4.0/)

Introduction

The neoplastic lesions involving the spine can be either benign or malignant. Imaging is first step in the evaluation of any vertebral mass. The main goal of any imaging is to accurately identify benign lesions to avoid unnecessary biopsies. The most common benign lesion affecting the vertebra is hemangioma. Most the cases are identified by conventional imaging techniques like CT and MRI. However, hemangioma very rarely can mimic malignant lesion when they do not have the typical CT/MRI features or when they are very large and extend into either spinal canal or paravertebral space. When such a diagnostic dilemma is encountered, Tc-99m RBC scan may come to the rescue. Since hemangiomas are blood-filled sinuses they take up Tc-99m tagged RBC thus differentiating them from other malignant conditions.

Declaration of Competing Interest: None.
Informed consent was obtained from the patient.

* Corresponding author at: University of Iowa Hospitals and Clinics, 200, Hawkins Drive, Iowa City-52242, IA, USA
E-mail address: ravishankar-pm@uiowa.edu (R. Pillenahalli Maheshwarappa).

https://doi.org/10.1016/j.radcr.2019.08.016

1930-0433/© 2019 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (http://creativecommons.org/licenses/by-nc-nd/4.0/)

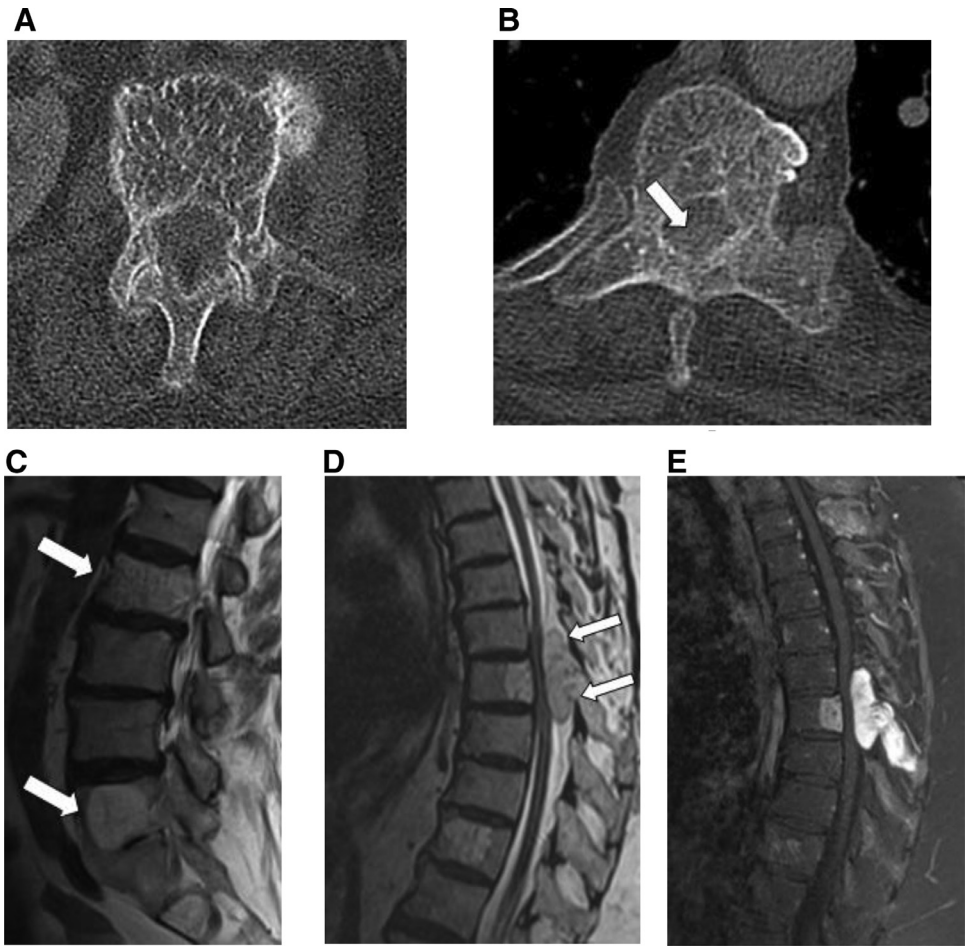

Fig. 1 – (A). "Polka-dot" sign in which cross section of the vertebra on axial CT shows foci of high density owing to trabecular thickening, a finding characteristic of hemangiomas. (B) Axial CT evaluation of the lesions at T7-T8 shows an epidural soft tissue component (arrow) concerning for metastasis. (C) Sagittal T2WI MRI shows multiple high T2 signal osseous lesions (arrows). The high signal, particularly on T1WI, is mainly attributed to the fat content and may vary according the proportion of fat and vascular tissue. (D) Sagittal T2WI MRI shows the posterior epidural component at T7-T8 (arrows) with consequent severe cord compression. (E) Sagittal postcontrast T1W FS MRI shows intense enhancement of the T7-T8 lesion.

Case report

A 69-year-old woman presented with walking difficulties over 2 months. CT scan showed lytic lesions in the spine and the sacrum. CT and MRI of the spine reveled multiple osseous lytic lesions, most of which showed imaging features suggestive of hemangiomas. However, one lesion at T7-T8 showed atypical features and was associated with an epidural soft tissue mass. Given the atypical features of the T7-T8 lesion, clinical concern about metastasis versus atypical hemangioma was raised (Fig. 1). A Tc-99m labeled red blood cells (RBCs) scan with SPECT-CT was performed and demonstrated accumulation of labeled RBCs in multiple osseous lesions including the T8 vertebral body and the epidural component, consistent with hemangiomas (Fig. 2). Surgical spinal decompression at T8 level was performed. The diagnosis was confirmed on histopathology examination (Fig. 3).

Discussion

Vertebral hemangiomas are almost always detected incidentally on imaging studies [1]. Hemangiomas represent hamartomatous proliferation of vascular channels with variable fat content that constitute approximately 1% of primary bone tumors [2]. Spinal hemangiomas are multiple in about one-third of cases [3]. Most lesions are asymptomatic; however atypical hemangiomas may have epidural soft tissue that can cause spinal cord compression [2]. Histopathologically, hemangiomas are endothelial lines thin-walled blood vessels and sinuses interspersed between longitudinally oriented trabeculae of bones. These vascular channels are present in the stroma of varying amount of fat. Less fat and more vascular stroma are present in aggressive hemangioma and mimic metastatic lesion on imaging studies [4].

Most of the hemangiomas show the so-called "polka-dot" or "salt and pepper" sign in which cross section of the vertebra

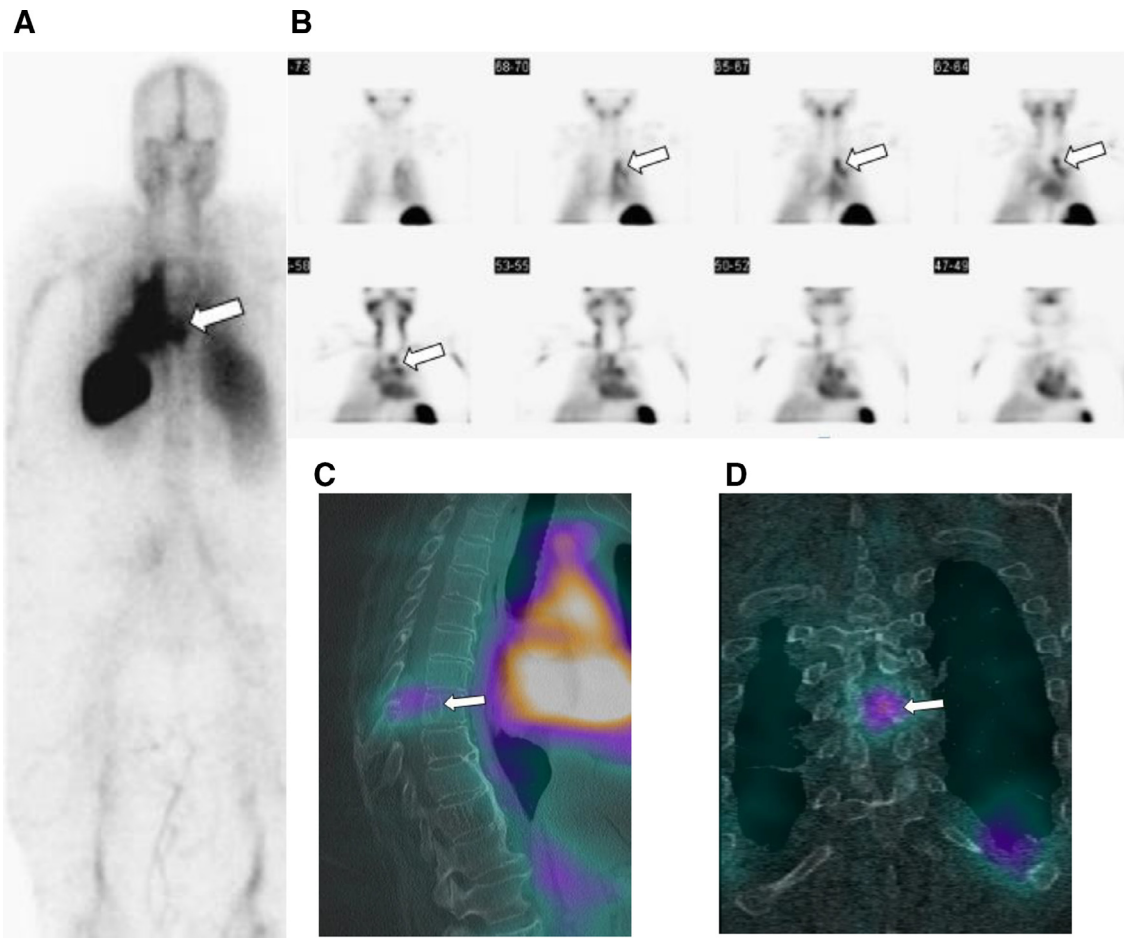

Fig. 2 – (A) Posterior planar image shows increased uptake at T7-T8 (arrow), better visualized on SPECT-CT coronal images (B, arrows). Fused SPECT-CT images (C, sagittal) show localization of the Tc-99m RBCs in the osseous lesion at T7-T8 (arrow) and its epidural soft tissue component (arrow) (D, coronal).

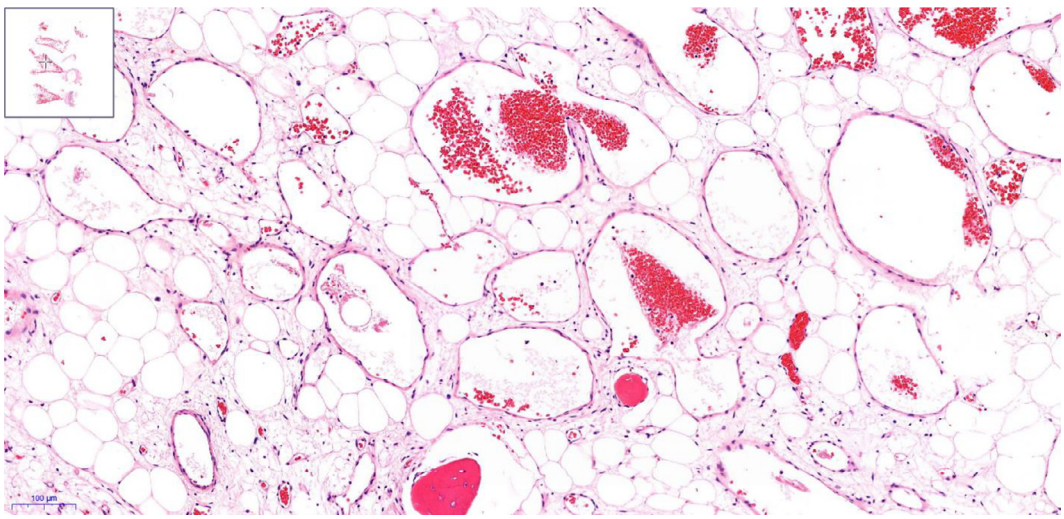

Fig. 3 – Histological examination showed dilated vascular spaces involving adipose tissue with focal fibrosis, diagnostic of hemangioma (digital H&E slide with high power magnification [scale 100 um]).

on CT shows foci of high density owing to trabecular thickening, a finding characteristic of hemangiomas [5]. On MR imaging they appear hyperintense on T1-weighted images owing to their increased fat content. On T2-weighted images they have increased signal owing to their increased water content [5,6].

Tc-99m methyl diphosphonate (MDP) bone scan and F-18 fluorodeoxyglucose (FDG)-PET/CT are commonly used to differentiate benign from malignant lesions. Bone scan is usually negative for increased radiotracer uptake especially with hemangiomas smaller than 3 cm [2,7]. Larger hemangiomas may display increased uptake, particularly on SPECT, mimicking metastasis [2,3]. Increased uptake is possibly attributed to sclerotic changes in larger hemangiomas [3]. F-18 FDG-PET/CT is increasingly used to differentiate osseous hemangiomas from malignant lesions based on the evidence that hemangiomas most frequently do not show increased radiotracer uptake [8,9,10]. However, some reports showed increased FDG uptake particularly in large hemangiomas [11,12]. This may be attributed to internal hemorrhage and inflammation in such large lesions [11]. The role of dynamic Tc-99m RBC blood pool scintigraphy for the diagnosis of hepatic cavernous hemangiomas is well documented. This scintigraphic technique also helps in identifying hemangiomas at other anatomic sites. The application of Tc-99m RBC would avoid unnecessary workup for metastatic disease and helps to predict intraoperative blood if surgery is anticipated [13].

Conclusion

Tc-99m RBC scan with SPECT-CT is a very useful adjunct to bone scan and F-18 FDG-PET/CT to differentiate atypical/aggressive osseous hemangiomas from metastasis, which is a common dilemma in clinical practice.

REFERENCES

[1] Morales KA, Arevalo-Perez J, Peck KK, Holodny AI, Lis E, Karimi S. Differentiating atypical hemangiomas and metastatic vertebral lesions: the role of T1-weighted dynamic contrast-enhanced MRI. Am J Neuroradiol Apr 2018. doi:10.3174/ajnr.A5630.

[2] Razi M, Bashir H, Riaz S, et al. Intrasosseous hemangiomas on hybrid imaging: Aa pictorial review. Journal of Cancer & Allied Specialties; 2(2).

[3] Raphael J, Hephzibah J, Mani S, et al. Abnormal appearance of spinal hemangioma mimicking metastasis in bone scintigraphy and SPECT-CT: case report. J Nucl Med Radiat Ther S 2013;6:2.

[4] Laredo JD, Assouline E, Gelbert F, Wybier M, Merland JJ, Tubiana JM. Vertebral hemangiomas: fat content as a sign of aggressiveness. Radiology 1990;177:467–72.

[5] Persaud T. The polka-dot sign. Radiology 2008;246:980–1.

[6] Ross JS, Masaryk TJ, Modic MT, Carter JR, Mapstone T, Dengel FH. Vertebral hemangiomas: MR imaging. Radiology 1987;165:165–9.

[7] Han BK, Ryu JS, Moon DH, et al. Bone SPECT imaging of vertebral hemangioma correlation with MR imaging and symptoms. Clin Nucl Med 1995;20:916–21.

[8] Bybel B, Raja S. Vertebral hemangiomas on FDG PET scan. Clin Nucl Med 2003;28:522–3.

[9] Domínguez ML, Rayo JI, Serrano J, et al. Vertebral hemangioma:“Cold” vertebrae on bone scintigraphy and fluordeoxy-glucose positron emission tomography–computed tomography. Indian J Nucl Med 2011;26:49–51.

[10] Hatayama K, Watanabe H, Ahmed AR, et al. Evaluation of hemangioma by positron emission tomography: role in a multimodality approach. J Comput Assist Tomogr 2003;27:70–7.

[11] Nakayama M, Okizaki A, Ishitoya S, et al. “Hot” vertebra on (18) F-FDG PET scan: a case of vertebral hemangioma. Clin Nucl Med 2012;37:1190–3.

[12] Ko SW, Park JG. Cavernous hemangioma of the ilium mimicking aggressive malignant bone tumor with increased activity on 18F-FDG PET/CT. Korean J Radiol 2013;14:294–8.

[13] Gordhan A, Soliman J, Malpani A, Peg E 3rd. Symptomatic calvarial cavernous hemangioma: presurgical confirmation by scintigraphy. J Radiol Case Rep 2009;3(8):25–9. doi:10.3941/jrcr.v3i8.278.