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CASE REPORT

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Exploring the Role of MRI in the Detection of Atypical Liver Hemangiomas and Exclusion of Metastases

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Abstract

Background: In this article, we highlight the importance of utilizing multiple imaging modalities, including CT, MRI, and abdominal Doppler ultrasound, to accurately differentiate between atypical liver hemangiomas (LH) and metastases.

Case report: We introduce a 57-year-old male patient who presented with severe abdominal pain. Initial CT scan findings showed hypodense liver lesions and a well-defined hypodense mass in the sub-diaphragmatic region, raising suspicion for metastatic liver lesions, and prompting further evaluation. To differentiate between atypical hemangiomas and metastases, an MRI scan was performed, revealing a hyperintense signal on T2-weighted images and a hypointense signal on T1-weighted images, consistent with the characteristics of LH. These characteristic signal intensities aided in ruling out metastatic liver lesions, which typically present with a more solid and homogeneous appearance. Contrast-enhanced MRI played a crucial role in confirming the diagnosis. The liver lesions demonstrated moderate vascularization during the early phase of contrast enhancement, followed by progressive centripetal filling during the portal venous and delayed phases. This enhancement pattern is consistent with the slow flow within the dilated vascular spaces of liver hemangiomas. The lesion in the right liver lobe is almost completely filled with contrast, further supporting the diagnosis of hemangioma. Abdominal Doppler ultrasound can provide additional information regarding the vascularity of liver lesions. In this case, the Doppler examination likely helped to further confirm the presence of a hemangioma, as these lesions typically demonstrate increased vascularity compared to metastatic lesions.

Conclusion: The comprehensive imaging evaluation utilizing CT, MRI, and abdominal Doppler ultrasound allowed for the confident differentiation of atypical liver hemangiomas from metastatic liver lesions in this case. This emphasizes the importance of a multimodal imaging approach in cases of liver lesions with overlapping features, leading to improved patient management and outcomes.(**International Journal of Biomedicine. 2023;13(3):165-168.**)

Keywords: liver hemangiomas • liver metastases • MRI • CT • Doppler ultrasound

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Introduction

Liver hemangiomas (LH) are the most common benign tumors, often discovered accidentally during routine checkups. These lesions present abnormal proliferation of blood vessels, varying in size, and are typically solitary, although multiple hemangiomas can be present in a few cases.[1]

Most LH are asymptomatic and do not require any treatment. However, larger hemangiomas may cause symptoms such as pain or discomfort in the upper abdomen, especially when compressing tissues nearby.[2,3]

Imaging plays a crucial role in the diagnosis of LH. Ultrasound is often the initial imaging modality, providing valuable information regarding the lesion's size, location, and vascularity. However, more definitive and accurate characterization of LH is achieved through cross-sectional imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI).[4-6]

MRI, in particular, is highly sensitive and specific for detecting LH. T1-weighted images typically demonstrate a hyperintense signal, whereas T2-weighted images show a heterogeneous, hypointense to hyperintense signal.

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Gadolinium-based contrast agents can be used to further enhance the visualization of LH, with rapid enhancement during the arterial phase and progressive centripetal filling during the portal venous and delayed phases. This enhancement pattern results from the slow flow within the dilated vascular spaces of the hemangioma.

LH typically display a characteristic "cavernous" appearance on MRI, with a tangled network of thin-walled blood vessels. This can be visualized as areas of high signal intensity on T2-weighted images.[5,6] Metastases, on the other hand, often present with a more solid and homogeneous appearance. This discrepancy in internal architecture can contribute to the differentiation between LH and metastases.[7]

In contrast, metastatic liver lesions often exhibit a different enhancement pattern, with variable enhancement during different phases depending on the primary tumor type. This disparity in enhancement patterns can be valuable in differentiating LH from metastases.[7] Yet clinical correlation, including the patient's medical history and the presence of primary tumors, provides valuable information to aid in the differentiation process.

MRI's ability to capture the characteristic enhancement patterns, assess the internal architecture, and evaluate the signal intensity characteristics of liver lesions makes it a valuable imaging modality in differentiating LH from metastases. The combination of these features with clinical correlation enhances the accuracy of diagnosis and facilitates appropriate treatment planning for patients.[8]

Case Presentation

We hereby present the case of a 57-year-old male who presented with severe abdominal pain. He is an active smoker, previously diagnosed with peptic ulcers and chronic gastritis.

Initially, the patient underwent a CT scan (Fig.1-3), where the liver presented with a homogenous hypodense lesion in the VII-VIII segment, measuring 3.5×2.5×3 cm, which discretely imbibes contrast but does not homogenate it in the late phase. Another similar hypodense lesion was also found on the IV segment. The stomach was presented with thickened walls. In the sub-diaphragmatic region, between the small stomach curve and the left lobe of the liver and pancreas, there was a hypodense, well-defined mass measuring 5.5×4×6 cm. There were also pre-aortal lymph nodes measuring 1 0mm and advanced left lumbar spine scoliosis.

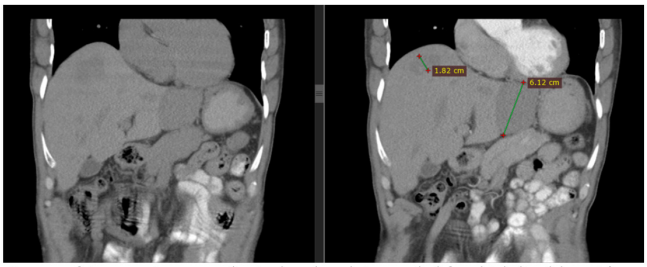

Fig. 1. *Left image: Native CT scan showing hypodense lesions on the left and right liver lobes. Right image: After intravenous contrast application, there is no pathological contrast concentration in the arterial phase.*

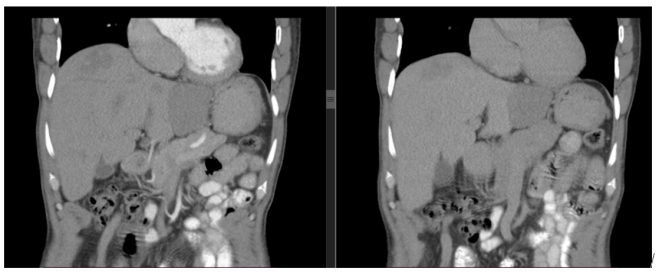

Fig. 2. *Left image: After intravenous contrast application, there is no pathological contrast concentration in the arterial phase. Right image: Venous phase without pathological contrast concentration too.*

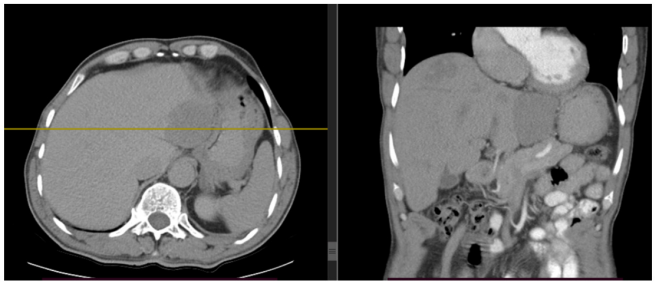

Fig. 3. *Left image: Native CT. Right image: Post-contrast CT.*

Afterward, a gastroscopy revealed hyperemic stomach walls, leading to a diagnosis of chronic gastritis and peptic ulcer. The patient was treated with proton pump inhibitors and sucralfate for three weeks.

An MRI scan (Fig.4-8) was performed to further define the aforementioned findings and differentiate whether liver lesions were atypical hemangiomas or metastasis. The left liver lobe presented with a 49×62 mm lesion with a hyperintense signal on T2 and hypointense in T1 sequences. A small lesion was presented on the right lobe measuring 30×14 mm, with the same MRI characteristics as the previous one. After intravenous contrast application, the lesion showed moderate vascularization in the early phase. In contrast, in the later phase, the lesion in the right liver lobe was almost completely filled with contrast, while in the left lobe, there was centripetal imbibition suggesting hemangioma.

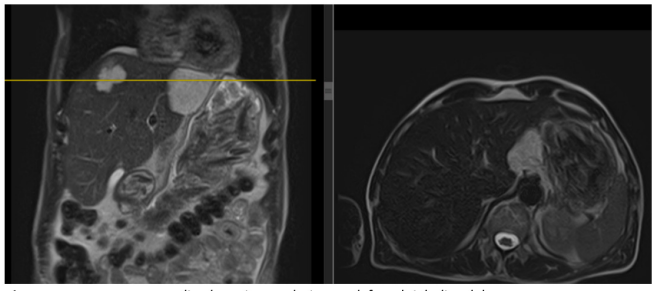

Fig. 4. *T2 sequences revealing hyperintense lesions on left and right liver lobes.*

Additionally, an abdominal echo-Doppler examination was conducted to reaffirm the diagnosis of atypical hemangioma.

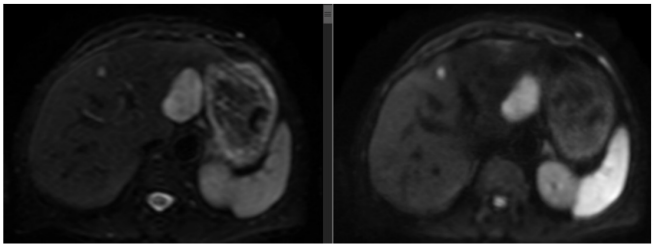

Fig. 5. *DWI sequences revealing restricted diffusion hyperintense lesions on left and right liver lobes.*

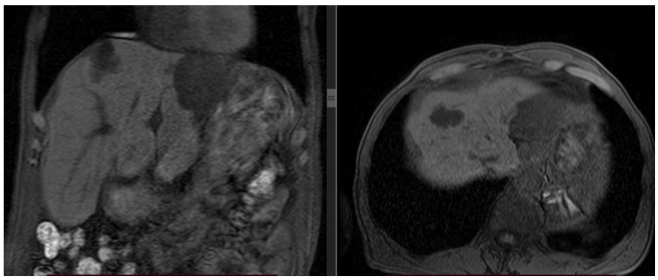

Fig. 6. *In dynamic post-contrast T1 sequence, lesions appear with hypointensity.*

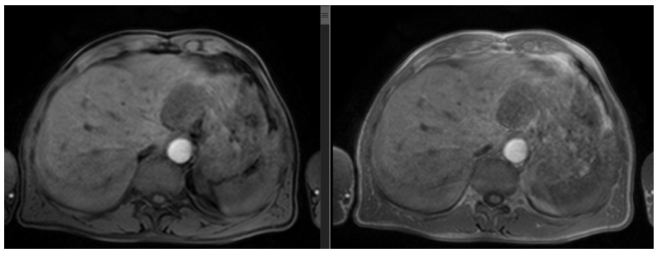

Fig. 7. *After intravenous contrast application on the WFS sequence, there are discrete signs of contrast concentration of the lesion.*

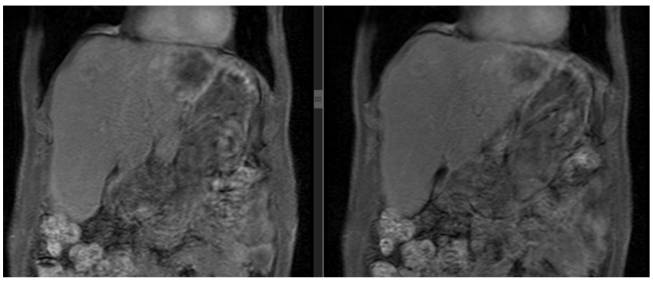

Fig. 8. *The pre-dynamic sequence, 30 minutes after intravenous contrast application, showed that the right liver lobe lesion is almost homogenized. In contrast, the left lobe lesion shows a progressive centripetal typical for hemangioma.*

Discussion

LH pose diagnostic challenges due to their appearance and potential overlap with metastatic lesions. In this case report, our 57-year-old male patient presented with severe abdominal pain. Initial CT scan findings showed hypodense liver lesions in segments IV and VII-VIII, as well as a well-defined hypodense mass in the sub-diaphragmatic region. These findings raised suspicion for metastatic liver lesions, prompting further evaluation.[9]

To differentiate between atypical hemangiomas and metastases, an MRI scan was performed. In this case, the MRI scan revealed a hyperintense signal on T2-weighted images and a hypointense signal on T1-weighted images, consistent with the characteristics of LH. These characteristic signal intensities aided in ruling out metastatic liver lesions, which typically present with a more solid and homogeneous appearance.[9,10]

Furthermore, contrast-enhanced MRI played a crucial role in confirming the diagnosis. The liver lesions demonstrated moderate vascularization during the early phase of contrast enhancement, followed by progressive centripetal filling during the portal venous and delayed phases. This enhancement pattern is consistent with the slow flow within the dilated vascular spaces of LH. The lesion in the right liver lobe is almost completely filled with contrast, further supporting the diagnosis of hemangioma.[10,11]

Abdominal Doppler ultrasound can provide additional information regarding the vascularity of liver lesions. In this case, the Doppler examination likely helped to further confirm the presence of a hemangioma, as these lesions typically demonstrate increased vascularity compared to metastatic lesions.[10]

Overall, this case report highlights the importance of utilizing multiple imaging modalities, including CT, MRI, and abdominal Doppler ultrasound, to accurately differentiate between LH and metastases.[11-14] The characteristic MRI findings, such as the hyperintense signal on T2-weighted images and the dynamic contrast enhancement pattern, were instrumental in ruling out metastatic liver lesions and confirming the diagnosis of atypical hemangiomas. This case emphasizes the value of MRI as a reliable imaging tool for detecting and characterizing LH, aiding in appropriate treatment planning and management decisions for patients.[9-11]

Conclusion

This case report emphasizes the importance of employing a multimodal imaging approach for the accurate diagnosis and differentiation of LH from metastatic liver lesions. The initial CT scan findings raised suspicion for metastatic liver lesions due to the presence of hypodense liver lesions in multiple segments and a well-defined sub-diaphragmatic mass. However, the subsequent MRI scan was pivotal in confirming the diagnosis of atypical hemangiomas. Furthermore, the additional use of abdominal echo-Doppler examination helped to confirm the diagnosis by revealing increased vascularity in the liver lesions, a characteristic feature of hemangiomas.

This case highlights the crucial role of MRI, with its excellent soft tissue contrast, in detecting and characterizing LH. By providing detailed information on signal intensity, and enhancement patterns, MRI aids in distinguishing hemangiomas from metastatic liver lesions, leading to accurate diagnosis and appropriate treatment planning.

In summary, the comprehensive imaging evaluation utilizing CT, MRI, and abdominal Doppler ultrasound allowed

for the confident differentiation of atypical LH from metastatic liver lesions in this case. This emphasizes the importance of a multimodal imaging approach in cases of liver lesions with overlapping features, leading to improved patient management and outcomes.

Competing Interests

The authors declare that they have no competing interests.

References

1. Bajenaru N, Balaban V, Săvulescu F, Campeanu I, Patrascu T. Hepatic hemangioma -review-. J Med Life. 2015;8 Spec Issue(Spec Issue):4-11. PMID: 26361504; PMCID: PMC4564031.
2. Horowitz JM, Venkatesh SK, Ehman RL, Jhaveri K, Kamath P, Ohliger MA, et al. Evaluation of hepatic fibrosis: a review from the society of abdominal radiology disease focus panel. Abdom Radiol (NY). 2017 Aug;42(8):2037-2053. doi: 10.1007/s00261-017-1211-7.
3. Zhang W, Huang ZY, Ke CS, Wu C, Zhang ZW, Zhang BX, Chen YF, Zhang WG, Zhu P, Chen XP. Surgical Treatment of Giant Liver Hemangioma Larger Than 10 cm: A Single Center's Experience With 86 Patients. Medicine (Baltimore). 2015 Aug;94(34):e1420. doi: 10.1097/MD.0000000000001420.
4. Werner JA, Dünne AA, Folz BJ, Rochels R, Bien S, Ramaswamy A, Lippert BM. Current concepts in the classification, diagnosis and treatment of hemangiomas and vascular malformations of the head and neck. Eur Arch Otorhinolaryngol. 2001 Mar;258(3):141-9. doi: 10.1007/s004050100318.
5. Tateyama A, Fukukura Y, Takumi K, Shindo T, Kumagae Y, Kamimura K, Nakajo M. Gd-EOB-DTPA-enhanced magnetic resonance imaging features of hepatic hemangioma compared with enhanced computed tomography. World J Gastroenterol. 2012 Nov 21;18(43):6269-76. doi: 10.3748/wjg.v18.i43.6269.
6. Zheng JG, Yao ZM, Shu CY, Zhang Y, Zhang X. Role of SPECT/CT in diagnosis of hepatic hemangiomas. World J Gastroenterol. 2005 Sep 14;11(34):5336-41. doi: 10.3748/wjg.v11.i34.5336.
7. Lombardo DM, Baker ME, Spritzer CE, Blinder R, Meyers W, Herfkens RJ. Hepatic hemangiomas vs metastases: MR differentiation at 1.5 T. AJR Am J Roentgenol. 1990 Jul;155(1):55-9. doi: 10.2214/ajr.155.1.2112864.
8. akayama Y, Nishie A, Okamoto D, Fujita N, Asayama Y, Ushijima Y, Yoshizumi T, Yoneyama M, Ishigami K. Differentiating Liver Hemangioma from Metastatic Tumor Using T2-enhanced Spin-echo Imaging with a Time-reversed Gradient-echo Sequence in the Hepatobiliary Phase of Gadoxetic Acid-enhanced MR Imaging. Magn Reson Med Sci. 2022 Jul 1;21(3):445-457. doi: 10.2463/mrms.mp.2020-0151.
9. Nouira K, Allani R, Bougamra I, Bouzaidi K, Azaiez O, Mizouni H, Messaoud MB, Menif E. Atypical small hemangiomas of the liver: hypervascular hemangiomas. Int J Biomed Sci. 2007 Dec;3(4):302-4. PMID: 23675058; PMCID: PMC3614658.
10. Sivrioglu AK, Kafadar C. Differentiation between hepatic hemangioma and metastases on diffusion-weighted MRI. Clin Imaging. 2016 Jan-Feb;40(1):183. doi: 10.1016/j.clinimag.2015.09.018.
11. Hui C, Sum R. Hepatic GIST metastases: an illustrative case series. BJR Case Rep. 2022 Jan 10;8(2):20210166. doi: 10.1259/bjrcr.20210166.
12. Coenegrachts K. Magnetic resonance imaging of the liver: New imaging strategies for evaluating focal liver lesions. World J Radiol. 2009 Dec 31;1(1):72-85. doi: 10.4329/wjr.v1.i1.72.
13. Matos AP, Velloni F, Ramalho M, AlObaidy M, Rajapaksha A, Semelka RC. Focal liver lesions: Practical magnetic resonance imaging approach. World J Hepatol. 2015 Aug 8;7(16):1987-2008. doi: 10.4254/wjh.v7.i16.1987.
14. Mamone G, Di Piazza A, Carollo V, Cannataci C, Cortis K, Bartolotta TV, Miraglia R. Imaging of hepatic hemangioma: from A to Z. Abdom Radiol (NY). 2020 Mar;45(3):672-691. doi: 10.1007/s00261-019-02294-8.