A Racing Heart: Unmasking and Differentiating a Cardiac Mass Using Multimodality Imaging

Joshua Solomon, MD, MSc[a], Lauren Basmadjian, MD[a], Igal A. Sebag, MD[a]

[a] Division of Cardiology, Jewish General Hospital, McGill University, Montreal, Quebec, Canada

Clinical Presentation:

A 42-year-old woman presented to the ER with a two-day history of palpitations, dizziness, and pleuritic chest pain. History was otherwise non-contributory. On arrival, she was in atrial tachycardia at 198 beats per minute with a systolic blood pressure of 90 mm Hg. High-sensitivity troponins were 26 and 24 ng/L and her d-dimer was 2,871 mcg/L. She was admitted for further management.

Imaging Findings:

Transthoracic echocardiogram (TTE):

Technically limited poor quality TTE. Dilated right atrium (RA) with at least moderate, functional TR.

CT Chest C+:

Large filling defect within the RA with point of attachment at the superior wall versus the interatrial septum (IAS). No pulmonary embolism.

Cardiac MRI:

A 6.8 x 4.8 x 6.2 cm predominantly hypo-enhancing soft tissue mass is noted originating in the RA causing complete luminal obliteration. Extra-cavitary extension of the mass encircling the proximal aortic root, encasing the left main coronary artery with intra-cardiac extension to the IAS and superior left atrial (LA) wall.

Transesophageal echocardiogram:

Large 4.5 x 6.1 cm greyish echo dense mass attached to the posterior RA wall that is obliterating most of the RA cavity. Mass infiltration into the IAS with extension into the LA cavity; circumferentially around the aortic root; into the anterior atrial/mitral groove. Mild-to-moderate TR. The mass is not prolapsing through the tricuspid valve, nor does it impede function.

Summary:

Multimodality cardiac imaging played a crucial role in diagnosing a malignant right atrial mass, preventing the unnecessary and potentially harmful procedure of atrial tachycardia ablation. While a focused TTE failed to clearly visualize the mass, it reminds sonographers the importance of thorough technique to capture multiple cardiac planes. Still, differentiating normal, benign and malignant cardiac masses and their mimics is one of the limitations of TTE. Cardiac MRI's ability to delineate masses, identify chamber and extra-cardiac involvement, and tissue characterization helped recognize a malignant mass, while peri-operative TEE highlighted the mass' hemodynamic significance. Despite initial suspicion of angiosarcoma, tissue obtained from surgical resection confirmed the rare diagnosis of primary cardiac DLBCL. This case highlights why clinicians are encouraged to use non-invasive cardiac imaging for common cardiac complaints (i.e. palpitations) –it changes clinical outcomes.

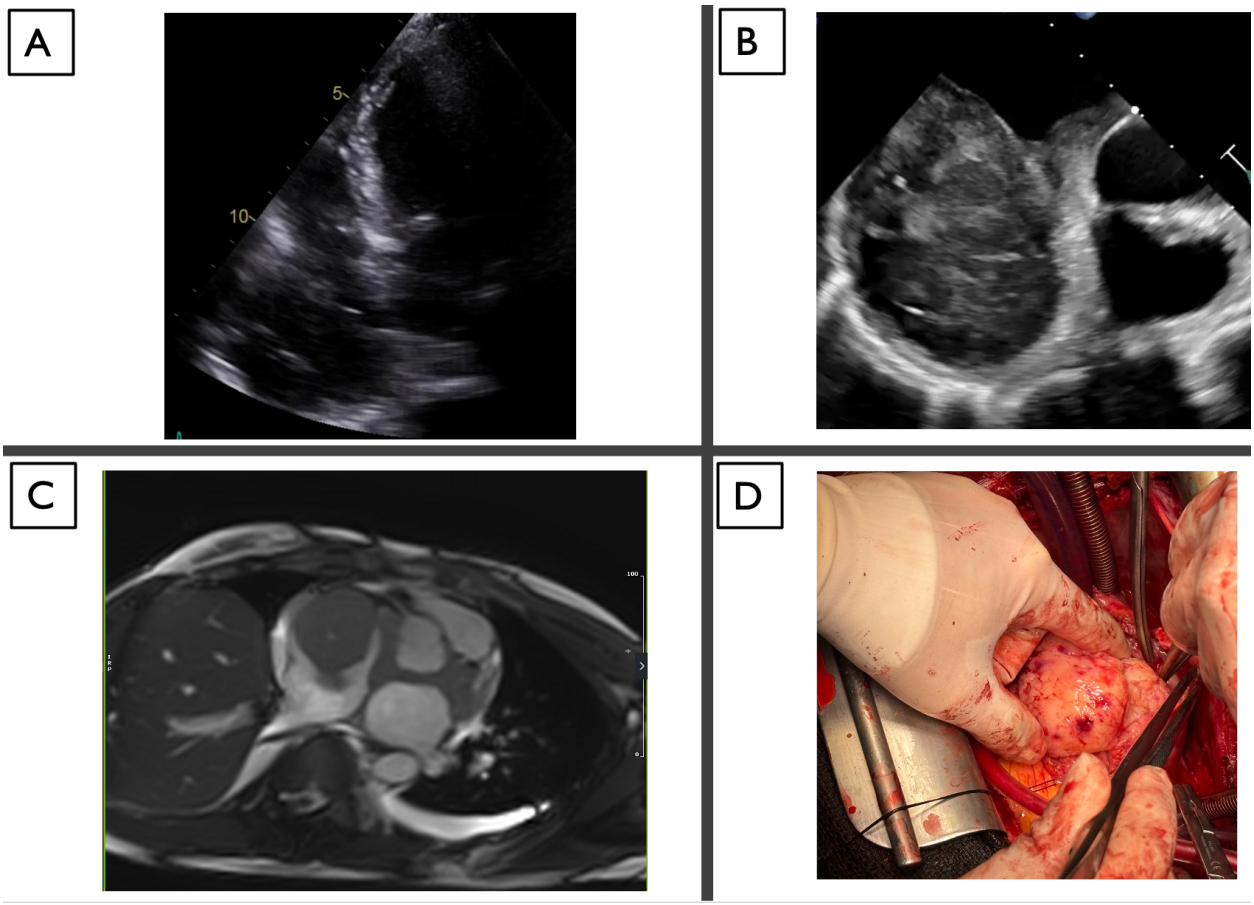

Figure 1. A. Right chamber cavity focused view by transthoracic echocardiogram; B. Right atrium by transesophageal echocardiogram; C. Axial view of right atrium and aortic root with tumor involvement by cardiac MRI; D. Macroscopic pathology of right atrial mass peri-op.

References

1. Tyebally, S, Chen, D, Bhattacharyya, S. et al. Cardiac Tumors: JACC CardioOncology State-of-the-Art Review. J Am Coll Cardiol CardioOnc. 2020 Jun, 2 (2) 293–311. https://doi.org/10.1016/j.jaccao.2020.05.009
2. Johri A, Baetz T, Isotalo PA, Nolan RL, Sanfilippo AJ, Ropchan G. Primary cardiac diffuse large B cell lymphoma presenting with superior vena cava syndrome. Can J Cardiol. 2009 Jun;25(6):e210-2. doi: 10.1016/s0828-282x(09)70110-2. PMID: 19536397; PMCID: PMC2722499.
3. Ghantous E, Hochstadt A, Aviram G, et al. Primary Cardiac Lymphoma Patients Presenting With Heart Failure. *CASE (Phila)*. 2023;7(11):449-455. Published 2023 Oct 4. doi:10.1016/j.case.2023.08.008
4. Jiang, H., Liu, H., Zhao, L., Yang, L., & Zhao, Y. (2024). A rare presentation of primary cardiac diffuse large B-cell lymphoma: A case report. Oncology Letters, 27, 40. https://doi.org/10.3892/ol.2023.14174
5. Laurens Berton, Valerie Van Ballaer, Olivier Ghekiere, Eva De Caluwé, Primary cardiac diffuse large B-cell lymphoma presenting with cardiac tamponade: a case report, *European*

Heart Journal - Case Reports, Volume 6, Issue 5, May 2022, ytac151, https://doi.org/10.1093/ehjcr/ytac151

6. Huang, W., Zheng, Z., Zhang, Y., Qiu, Y., Peng, Y., Yang, Q., Wang, W., & Kang, L. (2024). A rare case of primary cardiac diffuse large B-cell lymphoma imaged with ^{18}F-FDG PET/CT: a case report and literature review. *Frontiers in medicine*, *11*, 1373773. https://doi.org/10.3389/fmed.2024.1373773
7. Malik, S. B., Chen, N., Parker, R. A., 3rd, & Hsu, J. Y. (2017). Transthoracic Echocardiography: Pitfalls and Limitations as Delineated at Cardiac CT and MR Imaging. *Radiographics : a review publication of the Radiological Society of North America, Inc*, *37*(2), 383–406. https://doi.org/10.1148/rg.2017160105

Disclosures

The authors have no disclosures of any financial interests arrangement or affiliation with any organization(s) that may pose a conflict of interest on this subject matter.