CASE REPORT

Aortic root ring sign: multimodality imaging of aortic root abscess

H. Liu1,*, Y.-H. Juan2,3,*, Q. Wang1, J. Xie1, Q. Hou1, H. Fei4, X. Zhang5, H. Zhou6, C. Liang1, Y.-C. Lin3, R.Y. Kwong2 and S.S. Saboo7

From the 1Department of Radiology, Guangdong General Hospital, Guangdong Academy of Medical Sciences, GuangZhou, GuangDong, China, 2Department of Cardiovascular Medicine, Brigham and Women’s Hospital, Harvard Medical School, Boston, MA, USA, 3Department of Medical Imaging and Intervention, Chang Gung Memorial Hospital, Linkou and Healthy Aging Research Center, Chang Gung University, Taoyuan, Taiwan, 4Department of Cardiology, Guangdong General Hospital, Guangdong Academy of Medical Sciences, GuangZhou, GuangDong, China, 5Department of Cardiovascular Surgery, Guangdong General Hospital, Guangdong Academy of Medical Sciences, GuangZhou, GuangDong, China, 6Department of Thoracic Surgery, Guangdong General Hospital, Guangdong Academy of Medical Sciences, GuangZhou, GuangDong, China and 7Department of Radiology, University of Texas Southwestern Medical Center, Dallas, TX, USA

Address correspondence to Hui Liu, Department of Radiology, Guangdong General Hospital, Guangdong Academy of Medical Sciences. No. 106, Zhongshan 2 Rd, Guangzhou, People’s Republic of China. email: liuhuijiujiu@gmail.com

*These authors contributed equally to this work.

Learning point for clinicians
Accurate diagnosis of culture-negative infective endocarditis with aortic root abscess is difficult but important, as the patients may benefit from early antibiotics and early surgical treatment. Multimodality imaging and the remarkable ring-like imaging appearance should complement echocardiography and allow further confirmation of the diagnosis in such cases.

Introduction
Aortic root abscess occurs typically secondary to infective endocarditis and frequently complicated by fistulous communication with other cardiac chambers, such as the left ventricular outflow tract (LVOT).1 Echocardiography is the main diagnostic tool, but accurate diagnosis may be difficult in patients with negative bacterial culture or in early stages of aortic root abscess.2 We present multimodality imaging of culture-negative endocarditis with aortic root abscess as a form of ring-like appearance on cardiac computed tomography angiography (CCTA), magnetic resonance imaging (MRI) and [18F]fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT), which helps differentiation of aortic root abscess from neoplasm.

Case presentation
A 56-year-old male had recurrent episodes of self-limiting fever for several months, but was not immunocompromised nor was he a drug abuser. He had received antibiotic treatment during his first visit to an outside hospital, and CCTA revealed a mildly enhancing soft tissue mass adjacent to the aortic root. Due to suspicion of para-aortic neoplasm, such as lymphoma, he was referred to our institution for further evaluation.

Upon arrival, he was febrile with mild chest pain and unremarkable physical examination. Laboratory tests revealed leukocytosis, but blood culture, cardiac serum markers and serum tumor markers were all negative. A transesophageal echocardiography (TEE) was performed to differentiate possible para-aortic neoplasm or culture negative peri-aortic infectious process. TEE revealed vegetations with thickening of the left and non-coronary cusps and fistulous communication between the LVOT and aortic root (Figure 1 and supplementary movie S1). Subsequent MRI revealed fluid-containing cavity lesion, fistulous connection to the LVOT (supplementary...
movie S2) and a prominent ring-like enhancement along the wall (Figure 1B) with possible intra-cavity thrombus. The findings corresponded with a moderate heterogenous and ring-like uptake of FDG tracer from PET/CT. The combined multimodality imaging findings all supported the diagnosis of aortic root abscess over para-aortic neoplasm.

Patient started on empiric antibiotics, and open thoracotomy surgery for excision of infectious tissue, fistula repair and valvular replacement confirmed the image findings. Patient recovered uneventfully after the operation and was discharged for regular follow-up.

Discussion

Since first introduction in 1856, infective endocarditis remains a rare disease condition with prevalence of <0.0001%. Despite its high mortality and poor prognosis, appropriate treatment of infective endocarditis focused on early diagnosis, prompt antibiotic administration and early surgical management in complicated cases. The diagnosis of infective endocarditis relies on both positive bacterial culture and endocardial involvement by echocardiography, but bacterial culture can sometimes be negative, especially in patients with prior antibiotic administration or unusual causative organism, which posed a diagnostic dilemma. Multimodality imaging, such as CCTA, PET/CT or MRI, can complement bacterial culture and echocardiography for early diagnosis and delineation of margins of involvement for surgical planning in such cases. PET/CT can depict FDG uptake along the abscess wall and evaluate for distant infectious foci. MRI can supplement echocardiography by demonstrating the gadolinium enhancement within the abscess wall in the form of ring, cine imaging to appreciate the flow of blood into the cavity and to differentiate intra-cavitary thrombus from fluid, debris or tumor, such as our patient. To the best of the authors’ knowledge, ring-like wall enhancement has not been emphasized in aortic abscess imaging, but had been proposed in other body organs, such as in cerebral abscess.

Conclusion

Accurate diagnosis of culture-negative infective endocarditis with aortic root abscess is difficult but important, as the patients may benefit from early antibiotics and early surgical treatment. Multimodality imaging and the remarkable ring-like imaging appearance should complement echocardiography and allow further confirmation of the diagnosis in such cases.

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Supplementary material

Supplementary material is available at QJM online.

References