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The Importance of FDG PET in Workup of Nonbacterial Thrombotic Endocarditis

LETTER TO THE EDITOR

To the Editor,

The term "nonbacterial thrombotic endocarditis" (NBTE, marantic endocarditis, Libman-Sacks endocarditis, verrucous endocarditis) stands for noninfectious endocarditis, which is a sterile deposition of platelet thrombi on heart valves rather than an infection. It is associated with malignancy, rheumatologic conditions like systemic lupus erythematosus (SLE), and hypercoagulable states like antiphospholipid syndrome. Since it has been commonly defined in postmortem studies, it can be said that it is under or misdiagnosed or may even be treated as infective endocarditis.[1,2]

The 2023 Duke-International Society for Cardiovascular Infectious Disease criteria for infective endocarditis (IE) should be used as a diagnostic guide together with clinical judgment and must be interpreted in the context of the pretest probability for IE. The clinical criteria are divided into 2 categories: major and minor criteria. The major criteria include microbiologic evidence, imaging evidence, or surgical evidence that can define infection. The minor criteria include predisposing conditions, fever, vascular phenomena, immunologic phenomena, microbiologic evidence, imaging of abnormal metabolic activity with FDG PET in a prosthetic vascular/cardiac material or device, and new murmur when there is no transthoracic echocardiography (TTE) available.[3]

Transthoracic echocardiography alone and sometimes transesophageal echocardiography (TEE) are sufficient to fulfill the imaging criteria of infective endocarditis. It is not rare to face a cardiology consultation after a TTE is already obtained in a critically ill patient, which looks concerning for endocarditis, but the current Duke criteria are not suggestive of infective endocarditis. Clinicians feel stuck when the pretest probability for IE is not suggestive, but there is an incidental imaging criterion by echocardiography as the TTE/TEE image of IE cannot be differentiated from NBTE.

Fluorodeoxyglucose positron emission tomography (FDG PET) has been proposed to increase the diagnostic accuracy for the detection of endocarditis according to the latest ESC (European Society of Cardiology) guidelines.[4] FDG PET uses fluorodeoxyglucose, a glucose analog, which works by being taken up by cells instead of regular glucose for metabolism. It can eventually detect abnormal metabolic activity in the setting of bacterial infection or malignancy. Since there is no infection in NBTE, it should not detect it as abnormal metabolic activity. Therefore, when the clinical probability of IE is low but there is a significant imaging criterion, a negative FDG PET in bigger vegetations (>10 mm) can help with the diagnosis of NBTE, especially if the workup for antiphospholipid syndrome or systemic lupus erythematosus is positive. Moreover, FDG PET from skull to toe can also detect an occult malignancy, given the high cooccurrence of advanced malignancy.

On the other hand, although prior meta-analysis showed FDG-PET/CT has excellent (99%) specificity, it lacks the sensitivity (36%) to be used as a rule-out test,[5] especially if the suspicious tissue is small. FDG-PET/CT is mostly reserved for mechanical valves or device-related infections. One should keep in mind that the suggested algorithm is not proposing a definitive diagnosis but aiding clinicians by

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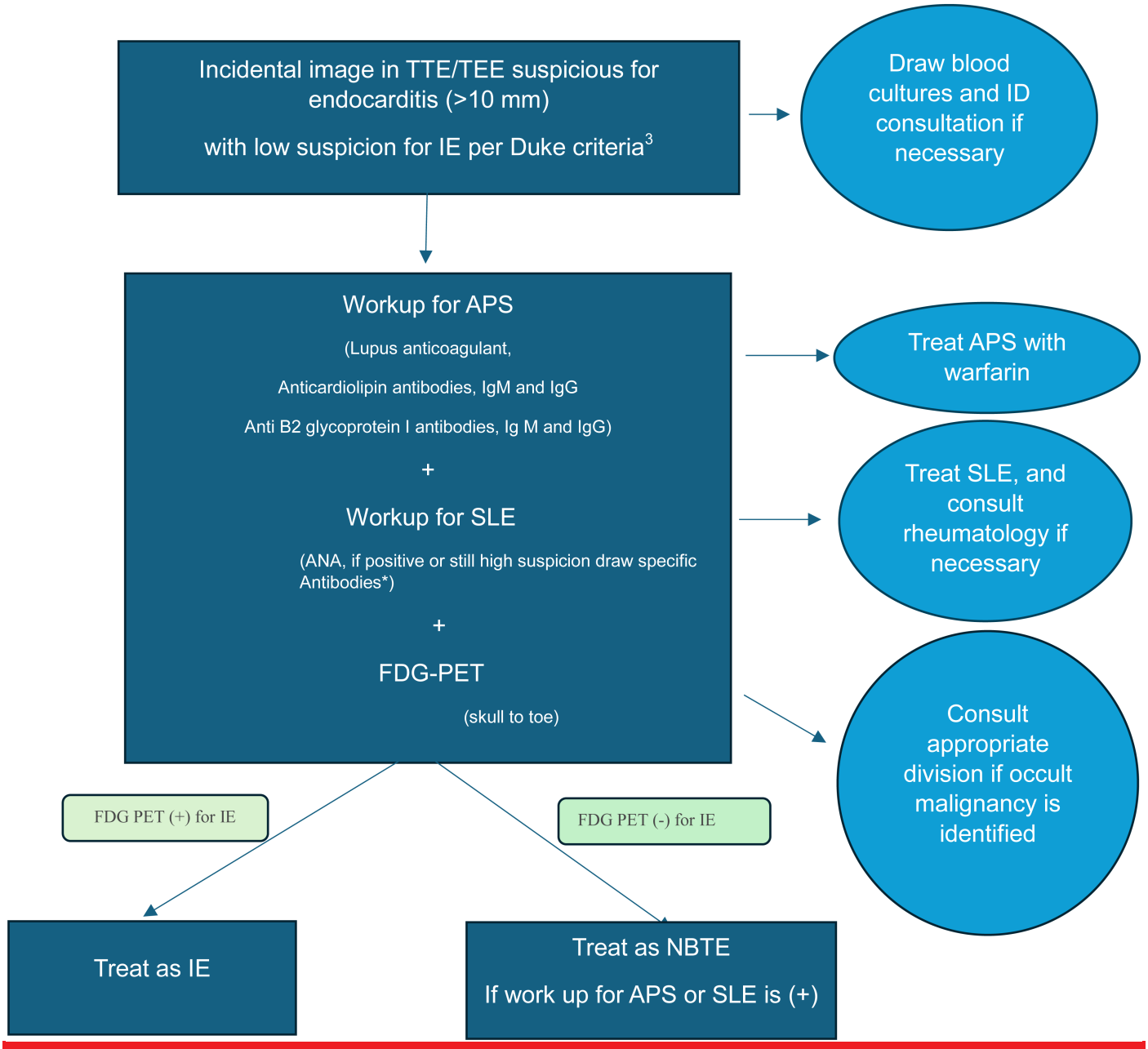

Figure 1. Proposed diagnostic algorithm for NBTE when the echocardiographic image is suspicious for endocarditis but there is low clinical suspicion for IE per Duke criteria. *If the ANA (antinuclear antibody) is positive, one should test for other specific antibodies, such as anti-dsDNA, anti-Smith (anti-Sm), Ro/SSA, La/SSB, and U1 ribonucleoprotein (RNP). Diagnosis and classification should be per related guidelines.[6]

providing extra clues since there is no single imaging modality that can differentiate vegetations from thrombus. Overall, FDG-PET can be added to the workup for NBTE as shown in the suggested diagnostic algorithm in Figure 1.

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