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Diagnostic value of cardiac computed tomographic angiography in suspected prosthetic valve dysfunction

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Background: Echocardiographic assessment of prosthetic mechanical valves is limited by shadows, artefacts and the need for cumbersome Doppler calculations. CT scan has the potential to overcome some of the limitations of echocardiography in assessment of prosthetic valves.
Objectives: Determine the incremental diagnostic value of cardiac computed tomographic angiography (CTA) over transesophageal echocardiography (TEE) in patients with suspected prosthetic valve dysfunction (PVD) and its impact on treatment decisions.
Methods: 50 consecutive patients with suspected PVD underwent both 64-slice ECG-gated CT and TEE and the results were compared. Imaging was compared against surgical findings (Reference standard). Echocardiographic evaluation focused on the detection of signs of PVD: vegetations, new or increased paravalvular leakage (PVL), aortic root pseudoaneurysms or abscesses and occluder malfunction. The CT interpreter was blinded to the findings of TEE.
Results: ECG-gated CT showed findings that were not detected by TEE in fifteen patients (30%). Additional aortic root abscess in four patients (8%), additional aortic root pseudoaneurysm in four patients (8%), and sclerodegenerative change across one of occluder of aortic prosthesis as cause of PVL in another patient (2%) not detected by TEE. CT negated the presence of aortic root abscess in one patient (2%), negated the presence of PVL in another patient (2%) both were detected by TEE. CT diagnosed occluder malfunction in one patient (2%) and underlying cause in two patients (4%) both were not detected by TEE. CT diagnosed presence of aortic arch dissection in one patient (2%) with large aortic root pseudoaneurysm.
CT showed minor diagnostic change in six patients (12%). CT showed better delineation of site and periannular extension of aortic root abscess in four patients (8%). CT showed better assessment severity of PVL in one patient (2%) and cause of PVL across mechanical aortic prosthesis in another patient (2%).
CT resulted in change of treatment strategy in 14 patients (28%). This included surgical excision of additional aortic root abscess or aortic root pseudoaneurysm in four patients (8%), surgical removal of prosthesis for underlying pathology (vegetation, malfunction due to underlying thrombus or PVL) in four patients (8%), aortic arch replacement with tubular graft and reimplantation of coronaries in one patient (2%) and conservative treatment with antibiotic therapy for small aortic root abscess not detected by TEE in 2 patients (4%), proper anticoagulation therapy and close monitor of INR in one patient (2%).
Conclusion: ECG-gated CT and TEE are complementary in patients with prosthetic valve dysfunction. Therefore, CT imaging has to be considered after clinical routine workup and TEE in patients with a high suspicion on prosthetic valve dysfunction.