Endocarditis of Left Atrial Wall: Importance of the Jet Effect and Role of 3d Transesophageal Echocardiography

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ABSTRACT
Infection of the endocardium can occur at virtually any site and infection of the atrial wall especially in association with mitral regurgitation has been described previously. We present a case of endocarditis involving the atrial wall at the site where the mitral regurgitation jet knocks-on the atrial wall. We emphasize the role of tracing the regurgitation jet in identifying extra-valvular endocarditic lesions. We also advocate the routine use of 3-D technology when available in addition to transesophageal echo.

Keywords — Endocarditis, Jet effect, Transesophageal Echocardiography; Ultrasound; Atrial Wall.

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A 37 year old man with history of intravenous drug abuse and renal cancer presented to the hospital complaining of chest pain for two days associated with fever, chills, and fatigue. On presentation he appeared to be in mild distress. Vital signs showed a temperature of 39.2° C (102.6° F) and heart rate of 106 bpm. His examination was remarkable for a IV/VI holosystolic murmur that was loudest at the apex as well as a third heart sound. Initial laboratory data was significant for white blood cell count of 12,900 cells/µl. Blood cultures later grew Streptococcus mutans in all bottles from two consecutive days. The patient had been admitted a year earlier for fever, body aches and a left arm abscess. A transthoracic echocardiogram showed a definite, large, spherical vegetation measuring 19x19 mm on the posterior mitral leaflet and allowed clear visualization of a strand-like laminated mobile mass on the wall of the left atrium opposing the aortic valve and independent of the mitral valve vegetation (Figure 1D). A four-week course of intravenous ceftriaxone and gentamicin was started in the hospital. Repeated transthoracic ultrasound analyses two weeks and four weeks from initiation of treatment showed persistent mitral leaflet vegetation but no vegetation was seen on the atrial wall. Cardiothoracic surgery evaluation was obtained and a robotic repair of the mitral valve as an outpatient was planned. The patient was discharged in good condition after clearance of his blood cultures for 5 consecutive days. He was instructed to follow up with cardiothoracic surgery as an outpatient.

DISCUSSION
Infective endocarditis is a rare infection that involves not only the lining of the cardiac valves but also of other cardiac structures such as ventricular and atrial walls. The diagnostic lesions are called vegetations and those are usually evident on transthoracic (sensitivity of 65%) or TEE (sensitivity > 90%).

Unless injured, the endothelium is resistant to infection by most bacteria. Injury to endothelial cells at the site of impact of high velocity jet, or on the low-pressure side of cardiac structural lesions, causes aberrant flow and allows either direct infection by virulent organisms or the development of an uninfected platelet-fibrin thrombus that can become super infected during bactremia. Several reports have described left atrial wall endocarditis associated with mitral regurgitation usually in association with mitral valve prolapse and the presence of mitral valve vegetation. The atrial lesions were usually located at the site of impact of the blood jet on the atrial wall.
Figure 1. (A) 2D Transthoracic echocardiography (TTE) previous to admission with endocarditis (See also Video 1); (B) 2D TTE showing the mitral regurgitation (MR) jet (See also Video 2); (C) 2D TTE showing the mass on the posterior leaflet and the strand-like structure on the anterior atrial wall (See also Video 3); (D) 3D Transesophageal echocardiography (TEE) from the atrial mass shows the vegetation on the mitral leaflet and the atrial wall (See also Video 4).

Some authors have advised that in all cases of valvular endocarditis and presence of regurgitation, the regurgitation jet should be traced back and meticulous care should be given to examining the point of knock-on of the jet on the atrial wall to look for other foci of infection.\(^7\) The potential importance of such an approach can be explained by the case series in which the surgeons operating on endocarditic aortic valves prior to echocardiographic description of regurgitant jets, were occasionally faced intraoperatively with lesions on the mitral valves that were not described preoperatively and which they often reported as corresponding to areas of aortic insufficiency jet impact.\(^8\)

Transthoracic echocardiography is considered the first go to modality in the study of mitral valve disease. Recent advances in evaluating the anatomy of the leaflets and subvalvular apparatus helped not only in the diagnosis of mitral valve disorders, but also to guide advanced treatment techniques.\(^9\)

The advent of 3D TEE as a diagnostic modality promises several advantages that can add to the diagnostic armamentarium of endocarditis. First, TEE allows a full interrogation of leaflet geometry and the location of the regurgitant jet and hence potential foci of infection.\(^10\) Second, the improved spatial orientation with 3D TEE allows full examination of the cardiac structural relationships. For example, initial experience has shown improved delineation of aortic valve complications of endocarditis such as annular and root abscess.\(^11\) Third, 3D evaluation of a vegetation allows a better estimate of overall size.\(^12\) This usually carries important prognostic information.\(^13\)

As in the other case reports, our patient’s atrial wall vegetation corresponded to the location of mitral regurgitation jet. However, to our knowledge this is the first case of a jet induced atrial wall endocarditis in which 3D TEE revealed the lesion very clearly and allowed the
estimation of its size, shape, and spatial orientation in reference to the aortic valve.

We believe that 3D TEE should be an integral part of the TEE evaluation of the patient with suspected endocarditis.

References