

ECHO ROUNDS Section Editor: Edmund Kenneth Kerut, M.D.

## Prosthetic Valve Strands

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(Echocardiography 2014;00:1–2)

**Key words:** stroke, fibrin, mechanical

A 62-year-old woman presented with a sudden transient ischemic attack (TIA). Symptoms resolved within 2 hours of onset. Neurological evaluation and workout for etiology of the TIA was unremarkable.

Her medical history included having a St. Jude mitral valve replacement for mitral regurgitation 10 years before presentation. The patient had been maintained on warfarin with INR levels generally in the 3.2–3.6 range. There was no history of atrial dysrhythmia.

The admission electrocardiogram was normal. Transthoracic echocardiography (TTE) (Toshiba America, Tustin, CA) was unremarkable except for a mildly enlarged left atrium (LA) measuring 43 mm, with normal left ventricular systolic function noted. The St. Jude mitral prosthesis functioned normally with a normal diastolic gradient.

Transesophageal echocardiography (TEE) was performed to evaluate for a cardiac source of embolism. The thoracic aorta was normal and there was no intracardiac shunt detected with saline contrast injections via the antecubital vein. Spontaneous echo contrast was noted near the mouth and within the left atrial appendage, but no thrombus was found.

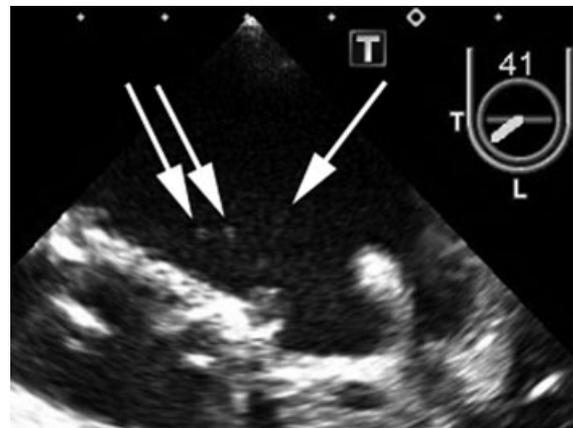
The prosthetic mitral valve was found to function normally, demonstrating a color Doppler short-duration diverging “V” pattern of small nonturbulent “flames” of backflow in the LA during systole (movie clip S1).<sup>1</sup> Multiple mobile filamentous linear echo dense structures were noted within the LA, attached to the prosthetic valve (Fig. 1 and movie clip S2). Based on these TEE findings, a recommendation was made to aggressively maintain an INR > 3 and add low-dose aspirin.

Valve strands have been noted since the advent and routine clinical use of TEE.<sup>2–4</sup> They

are linear echo dense structures attached to the mechanical valve and are usually 1–2 mm in width and several mm in length. In distinction, sewing ring sutures are shorter, brighter, and spaced in regular intervals around the ring. Microbubbles are also highly mobile echoes, but move away from the valve during leaflet closure.<sup>5</sup>

Valve strands may be associated with native or prosthetic heart valves, and appear to be relatively common, most often attached to mechanical mitral valves. One study (n = 182) found strands in 26% of all patients with an artificial heart valve, with a prevalence of 27% in mechanical and 8% in bioprosthetic valves. By location, they occurred in 32% of mitral and 13% aortic prosthetic valves.<sup>5</sup> Another large study of patients with mechanical heart valves (n = 283) found strands in 38% of prosthetic valves, most often those in the mitral position.<sup>6</sup>

Valve strands are likely associated with systemic embolic events. It has been postulated that they may be a marker of inadequate anticoagulation or be indicative of a “pro-thrombotic” state. Strands tend to be associated with older



**Figure 1.** Transesophageal echocardiography imaging in the mid-esophagus demonstrates within the left atrium multiple highly mobile filamentous strands (arrows) attached to the St. Jude mitral valve prosthesis.

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mechanical heart valves, a lower average INR level, atrial fibrillation, and lack of aspirin in conjunction with warfarin. Although aspirin therapy is associated with a lower incidence of valve strands, it may not be protective against an arterial embolic event.<sup>6</sup>

Management of patients who are found to have valve strands is somewhat controversial. The American Heart Association guidelines recommend addition of aspirin to warfarin for all patients with mechanical heart valves.<sup>7</sup> European guidelines recommend warfarin plus aspirin only for specific indications.<sup>8</sup> Particularly for patients with otherwise unexplained embolic events, it is the practice of our laboratory and others<sup>9</sup> to adhere to strict anticoagulation guidelines and to add antiplatelet therapy to the patient regimen.

In conclusion, valve strands are thin filamentous highly mobile echo dense structures found on both native and prosthetic heart valves. They are most commonly found on the LA aspect of a mechanical mitral valve, and may be associated with cardioembolic events. Management includes adherence to strict anticoagulation guidelines and possibly the addition of an antiplatelet agent.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article:

**Movie Clip S1.** Transesophageal echocardiography with the mid-esophagus demonstrating a normal color Doppler systolic short-duration diverging “V” pattern of small nonturbulent “flames” within the left atrium.

**Movie Clip S2.** (A and B) Transesophageal echocardiography demonstrating highly mobile filamentous strands attached to the St. Jude mitral valve prosthesis within the left atrium.