The vanishing subaortic membrane

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A fixed subaortic membrane is a rare cause for left ventricular outflow tract obstruction. This case report describes an unusual echocardiographic presentation of a subaortic membrane in which the membrane, initially not seen, was identified only after a linear shadow posterior to the membrane was seen on a transesophageal echocardiogram. This represents an unusual demonstration of an ultrasound beam ‘dropout’ of a subaortic membrane.

KEYWORDS
Subaortic membrane; Shadow artefact

A 71-year-old female with a 5 year history of worsening dyspnea was referred to our hospital for aortic valve replacement. A transthoracic echocardiogram performed at the referring institution demonstrated a thickened but not heavily calcified aortic valve and a hyperdynamic left ventricle. A transvalvular peak aortic gradient of 60 mmHg (mean gradient, 35 mmHg) was demonstrated by continuous wave Doppler imaging. In order to reconcile the aortic valve appearance and the pressure gradient, the patient underwent cardiac catheterization at the referring institution that demonstrated a similar transaortic valve pressure gradient.

Upon arrival, physical examination revealed a 3/6 systolic ejection murmur and bibasilar rales. A repeat transthoracic and transesophageal echocardiogram was performed prior to surgery. The echocardiogram revealed a mildly thickened aortic valve that measured 1.2 cm² by planimetry. The echocardiogram revealed a high systolic flow velocity in the left ventricular outflow tract (LVOT); however, it was noted that the increased turbulence in the LVOT began proximal to the aortic valve. (Figure 1) The LVOT flow velocity, measured by pulsed Doppler, was increased, aliasing at 2.5 m/s. The peak systolic velocity across the LVOT measured by continuous-wave Doppler imaging was 3.9 m/s (Figure 2). There was mild aortic insufficiency. An unusual linear shadow artefact was noted anterior to the LVOT that appeared at the same level the turbulent flow was noted (Figure 3). Initially, no anatomic subvalvular obstruction could be seen. However, upon closer inspection and changes in the gain and brightness settings, a vague, linear structure could be depicted in the LVOT, just above the linear shadow (Figure 4). This linear shadow artefact was thought to be caused by a fixed subaortic membrane that was not initially seen in the LVOT.

The patient underwent surgical resection of a thin subaortic membrane and an aortic valve replacement with significant improvement in her LVOT gradient. The postoperative mean gradient measured 14 mmHg. The patient’s dyspnea resolved and she was discharged home.

Discussion

This patient had the combination of a fixed subvalvular membrane causing subaortic stenosis and mild to moderate valvular aortic stenosis.1,2 This case demonstrates that thin structures which are positioned parallel to the interrogating ultrasound beam may ‘drop out’. Most echocardiographers are familiar with the interatrial septal dropout that may be seen on the apical four-chamber view and may

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simulate an atrial septal defect. However, this is an unusual demonstration of an ultrasound beam ‘drop out’ of a subaortic membrane.

In this case, a thin membrane which created a significant LVOT gradient was not initially seen on transthoracic and transesophageal examination. Instead, it was the findings of flow acceleration and shadowing in front of the membrane that convinced us that an ‘unseen membrane’ was indeed present.3

Figure 2  Continuous-wave Doppler tracing across the left ventricular outflow tract suggested a peak gradient of 59 mmHg and a mean gradient of 32 mmHg.

Figure 3  Transesophageal echocardiogram, 121°, demonstrated a linear shadow anterior to the left ventricular outflow tract at the same level where the turbulent flow was noted (white arrows). There is no clear evidence of anatomic subvalvular obstruction. LA, left atrium; LVOT, left ventricular outflow tract.

Figure 4  After increasing the gain, a linear structure was vaguely visualized in the LVOT directly posterior (white arrows) to the linear shadow artefact (black arrows). This linear structure was the fixed subaortic membrane that was not initially seen with a normal gain setting. LA, left atrium.
References

