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LV Outflow Tract Area in Discrete Subaortic Stenosis and Hypertrophic Obstructive Cardiomyopathy

A Real-Time 3-Dimensional Transesophageal Echocardiography Study

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PRECISE ANATOMICAL ANALYSIS OF STENOTIC LESIONS OF THE LEFT VENTRICULAR outflow tract (LVOT) in discrete subaortic membranous stenosis (DSS) and hypertrophic obstructive cardiomyopathy (HOCM) is challenging due to their complex nature (1,2). In the present study, we clarified the difference of the geometry and dynamic change of LVOT area using en face views of the LVOT in 6 patients with DSS and 6 patients with HOCM by real-time 3-dimensional transesophageal echocardiography. There was a conspicuous difference in LVOT velocity (Fig. 1) and geometry between DSS and HOCM: the LVOT shape was almost oval or flat in DSS, whereas there was a V shape or 2 separate open spaces in HOCM (Figs. 2 and 3, Online Videos 1 and 2). The magnitude of area change of the LVOT was less in DSS than in HOCM. The LVOT area was minimal in late systole in both DSS and HOCM in spite of the presence of an early peak in LVOT flow velocities in DSS versus a late peak in HOCM (Fig. 4).

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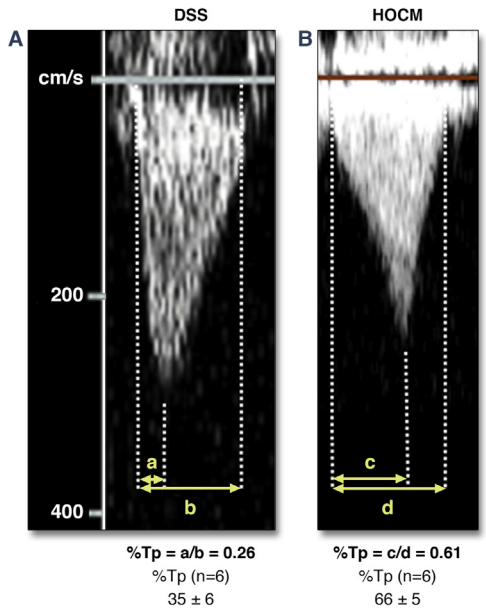

Figure 1. Continuous Wave Doppler Tracing of a Representative Case With DSS and HOCM Through the LVOT

Continuous wave Doppler tracing of a representative case with discrete subaortic membranous stenosis (DSS) **(A)** and hypertrophic obstructive cardiomyopathy (HOCM) **(B)**. We evaluated the timing of peak velocity in the left ventricular outflow tract (LVOT) Doppler tracing by measuring the percentage of time from the onset of systolic flow to peak velocity **(a and c)** out of the entire ejection time **(b and d)** (%Tp). In cases with DSS, continuous wave Doppler peaked in early systole **(A),** but in cases with HOCM, the peak was in late systole **(B)** (%Tp: 35 ± 6% in 6 patients with DSS vs. 67 ± 5% in 6 patients with HOCM).

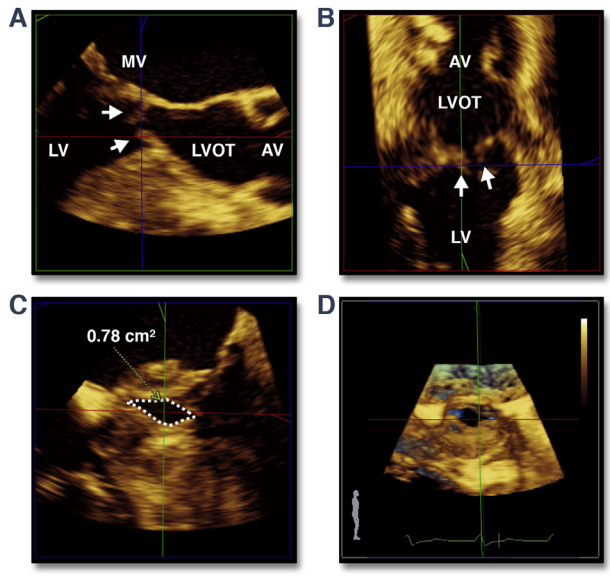

Figure 2. RT3D TEE Analysis of the LVOT Narrowed Area in Case With DSS

At first, 2 orthogonal long-axis planes of LVOT were extracted from the 3-dimensional (3D) datasets to be parallel to the LVOT **(A and B)**. A third plane perpendicular to both of the long-axis planes, a short-axis plane of the LVOT, was aligned. Fine adjustments of the cutting plane were performed to obtain the smallest cross-sectional area of the LVOT narrowed lesion. In this frame, we measured an LVOT narrowed area by manual planimetry **(C). Arrows** indicate the subaortic membrane. **(D)** Demonstrates a 3D image of LVOT. AV = aortic valve; LV = left ventricle; MV = mitral valve; RT = real time; TEE = transesophageal echocardiography; other abbreviations as in Figure 1.