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SINUS VENOSUS TYPE ATRIAL SEPTAL DEFECT IS FREQUENTLY MISSED BY CONVENTIONAL ECHOCARDIOGRAPHY AND IS BETTER DETECTED BY TRANSESOPHAGEAL ECHOCARDIOGRAPHY

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Conventional transthoracic Doppler echocardiography (TTE) is useful in the diagnosis of atrial septal defect (ASD). Transesophageal echocardiography (TEE) provides a more detailed view of the interatrial septum and can better define the defect size and location.

The purpose of this study was to compare TTE and TEE in the diagnosis of various type of ASD's. Twenty-seven adult pts with the clinical diagnosis of ASD were studied by TTE and by TEE (20 females, 7 males, ages 18-81).

TTE demonstrated ASD in 21 pts (secundum type in 18, primum type in 2, and sinus venosus type in 1). TEE demonstrated the ASD in all 27 pts. Thus, in 6/27 pts (22%) ASD was demonstrated by TEE and not by TTE. Four of the 6 had sinus venosus type ASD. The other 2 pts had secundum ASD (one of these had technically poor TTE, the other had a small ASD). TTE, therefore, failed to demonstrate sinus venosus defect in 4/5 pts (80%). The anomalous venous connection associated with sinus venosus could be visualized by TEE in all 5 pts, and was not seen on TTE. In 4 pts, sinus venosus type ASD were later confirmed at surgery. One pt refused further work-up.

CONCLUSION: Sinus venosus type ASD are frequently not visualized in adults by conventional TTE. TEE is the approach of choice for the diagnosis of these defects.

PULMONARY VENOUS FLOW IN MITRAL REGURGITATION AND AFTER SUCCESSFUL VALVE RECONSTRUCTION

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To study whether pulmonary venous flow (PVF) might be used as an indicator of the severity of mitral regurgitation (MR), we used transesophageal echocardiography (TEE) to record pulsed Doppler traces from the left upper pulmonary vein in 18 pts, before and just after mitral valve reconstruction. All pts were in NYHA class III or IV, and all had angiographic grade 3 or 4 MR. **Results:** Before surgery, 15 pts (83%) had abnormal retrograde PVF during ventricular systole - all 10 pts with prolapse of the posterior leaflet and a regurgitant jet directed anteromedially (early systolic retrograde PVF 4, late 2, holosystolic 4), all 3 pts with anterior leaflet prolapse and a posterolateral jet, and 2/5 pts with central MR. The time velocity integral (TVI) of the Doppler velocity profile in systole was 0.9 ± 1.7 (mean ± sem) cm, compared with 8.2 ± 0.8 cm in diastole ($p < 0.01$). After surgery, no patient had significant residual MR on color flow mapping by TEE. 5 patients had some residual retrograde PVF, but colour M-mode studies showed that this was confined to early systole. The TVI in systole had increased to 3.7 ± 0.9 cm ($p < 0.01$) and was similar to the TVI in diastole, 7.5 ± 1.0 cm, which had not changed. The ratio of peak diastolic to peak systolic velocities was 0.55 ± 0.45 before surgery and 0.97 ± 0.13 afterwards (ns). **Conclusions:** Severe MR causes systolic retrograde flow in the pulmonary veins which resolves immediately after successful surgery. TEE analysis of PVF with calculation of systolic TVI, may be a useful indicator of the severity of MR.

REVERSAL OF SYSTOLIC FLOW IN PULMONARY VEINS BY TRANSESOPHAGEAL DOPPLER ECHOCARDIOGRAPHY PREDICTS SEVERITY OF MITRAL REGURGITATION

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Systolic reflux of blood into the pulmonary veins (PV) has been a sign of 4+ mitral regurgitation (MR) by catheterization (CATH). We hypothesize that transesophageal Doppler echocardiographic reversal of systolic flow (RSF) in the PV would also correlate with MR severity. We studied 45 pts in whom severity of MR was an issue, using transesophageal echo color flow mapping (CFM) and CATH (n=35). Measurements were RSF in the right and left PV by pulsed Doppler, presence of eccentric jets, and height of V wave by CATH. MR severity by CFM and CATH was graded independently as 2-4+. Twenty-six of 28 pts (93%) with 4+ MR by CFM had RSF; 8 of 10 pts (80%) with 3+ MR had blunting of PV systolic flow, and 4 of 7 (57%) with 2+ MR had normal biphasic PV flow. Anteromedial MR jets due to posterior flail leaflets had greater RSF in the right than left PV while posterolateral MR jets had greater RSF in the left than right PV. Nineteen of 21 patients (90%) with 4+ MR by CATH had RSF. Patients with RSF had a greater V wave by CATH (42±14 mmHg vs. 28±11 mmHg; p=0.02) than without. Sensitivity/specificity of RSF in detection of 4+ MR was 93%/100% for CFM and 90%/79% for CATH. Thus, reversal of systolic flow in the pulmonary veins by transesophageal Doppler echocardiography is a useful marker in quantitation of mitral regurgitation.

NORMALIZATION OF PULMONARY VENOUS FLOW AFTER MITRAL VALVE REPAIR SURGERY: AN INTRAOPERATIVE TRANSESOPHAGEAL ECHO STUDY

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Pulmonary venous (PV) flow, normally composed of biphasic systolic (S) and diastolic (D) forward velocities (VEL), has been used in the assessment of LV diastolic function; however the effect of severe mitral regurgitation (MR) on PV flow is not known. We performed intraoperative transesophageal (TEE) pulsed doppler of the left and right PV, pre and post-pump during mitral valve (MV) repair surgery in 22 pts (mean age 61 ± 10 yrs,: 15M) with 3-4+ MR graded independently by TEE color flow mapping (CFM) and catheterization (CATH). Measurements were reversal of systolic flow (RSF), peak PV forward (S), (D) flow velocities (VEL) and % forward flow VEL integral in systole (FFVIs). Patients were divided into 2 groups by RSF (n=10) and no RSF (n=12).

	RSF (=0 forward Vel)			No RSF		
	PV VEL, (cm/s)			PV VEL, (cm/s)		
	S	D	%FFVIs	S	D	%FFVIs
Pre-pump	0*	56*	0*	37*	58*	33*
Post-pump	51	48	52	60	48	57

*$P < 0.002$ for differences between Pre and Post-pump. No patient had RSF or blunting of S flow post-pump.

Conclusion: Severe MR causes abnormal PV flow which "normalizes" (biphasic) post mitral valve repair. This factor should be taken into account in using pulmonary venous flow VEL in LV diastolic function.