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V-WAVES ARE INSENSITIVE MONITORS OF MITRAL REGURGITATION BECAUSE OF THE NON-UNIFORMITY OF LEFT ATRIAL BLOOD FLOW.

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Introduction: Pathologic V-waves (>5 mmHg) on the pulmonary artery occlusion pressure (PAOP) tracing are used to diagnose mitral regurgitation (MR) but lack sensitivity and specificity. Pulsed Doppler determination of pulmonary vein (PV) blood flow velocity is an echocardiographic method of assessing the severity of MR with systolic reversal of flow suggesting severe MR. The objective of this study was to define the relationship between V-waves, the severity and direction of MR, and pulmonary vein blood flow velocity.
Methods: 50 cardiac surgery patients were studied prospectively after approval from the human studies committee. Echocardiographic data was obtained by transesophageal echocardiography (TEE) and recorded on VHS tape while simultaneous EKG and PAOP tracings were recorded. The position of the PA catheter was determined by TEE. Using color flow Doppler, the magnitude of the MR jet was determined by the width and distal most extension of the regurgitant jet into the left atrium (LA), scale of 1 to 5. The direction of the regurgitant jet was described as overriding the anterior leaflet toward the interatrial septum (ANT), overriding the posterior leaflet towards the free wall of the LA (POST), or directed centrally (CENT). PV blood flow velocity was described by spectral display of the pulsed Doppler signal. The locus and direction of PV blood flow was confirmed by identifying the normal reversal (negative Doppler shift) during atrial contraction (Fig 1A). Reversal of PV blood flow during ventricular systole was determined as either present or absent. Statistical significance was assessed using Mann Whitney and Chi-square analysis.
Results: Direction of PV blood flow velocity was measurable in 57% and 55% of the right lower and left lower PVs respectively, compared to 95% and 88% in the left upper and right upper PVs. The relationship between V-waves in the right PAOP tracing, the severity and direction of MR and the selective reversal of PV blood flow is described in Fig. 1B. Systolic reversal of blood flow in the right PVs was a significant predictor of a V-wave with a right PAOP ($P<0.05$). Although the difference between the mean severity in the 2 groups of patients was significant, V-waves were not predicted by individual severity scores. Of the patients with severe MR (≥ 3) but no V-wave on a right PAOP tracing, 7 of 8 patients had a POST directed jet.
Discussion: The sensitivity of V-waves to diagnose MR is dependent on the direction of the regurgitant jet relative to the location of the PA catheter. MR produces selective systolic reversal of PV blood flow. Velocity sampling in at least one PV on each side is recommended if PV blood velocity is used as an echocardiographic index of the severity of MR.

FIGURE 1A

Normal PV flow velocity pattern with reversal of flow (A) during atrial contraction.

Systolic reversal of PV flow velocity (B) in a patient with severe MR.

FIGURE 1B

	n	Mean Severity (1-5)	Reversal of PV Flow R	Reversal of PV Flow L	Direction MR Jet ANT	Direction MR Jet CENT	Direction MR Jet POST
V-waves	18	3.7	16	14	7	5	6
No V-waves	32	1.8	0	6	0	23	9

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TITLE: A RANDOMIZED, BLINDED TRIAL OF AMRINONE, EPINEPHRINE, AND AMRINONE/EPINEPHRINE AFTER CARDIOPULMONARY BYPASS (CPB)

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Introduction: Amrinone (A), a phosphodiesterase inhibitor, and epinephrine (E), a β_1 and β_2 receptor agonist, are inotropes often used during cardiac surgery, but which have not been compared alone or in combination. We compared A, E, and A+E in a randomized, blinded, placebo-controlled fashion in patients after CPB.
Methods: After IRB approval and informed consent, 40 patients with ejection fraction >0.45 undergoing coronary artery bypass surgery were studied. All patients had right ventricular ejection fraction (RVEF) and arterial catheters. Immediately after CPB, patients were randomized to receive either a placebo bolus (P) or an A bolus (1.5 mg/kg) at time 0, and a placebo infusion (PI) or E infusion (30 ng/kg/min) at time 5 min, resulting in 4 comparison groups: (1) P+PI, (2) P+E, (3) A+PI, and (4) A+E. Hemodynamics were measured at 0, 2.5, 5, 7.5, and 10 min. Blood from the CPB reservoir was infused to maintain pulmonary artery diastolic pressure constant.
Results: E, A, and A+E all significantly increased cardiac output, stroke volume (SV), and left ventricular stroke work (LVSW). The change in SV was 13±6, 16±4, and 38±8 ml/beat with E, A, and A+E, respectively. Systemic and pulmonary vascular resistance decreased significantly with A and A+E while mean arterial pressure and mean pulmonary artery pressure increased only with E. O_2 delivery/LVSW ratios were greater for A+E than for E or A. RVEF increased from .43 to .45 with E, .45 to .53 with A, and .43 to .55 with A+E. A improved right ventricular (RV) compliance more than E.
Conclusions: A, E, and A+E all significantly improved cardiac performance after CPB. A+E increased SV more than the sum total of A and E, suggesting synergism (Fig). A+E is more effective than either A or E after CPB, most likely due to their sequential actions on cyclic-adenylate monophosphate metabolism.

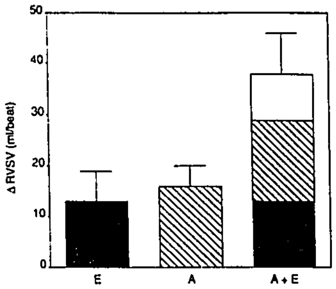

Figure. Change in right ventricular stroke volume (RVSV) with epinephrine (E), amrinone (A), and the combination of A+E. There was a greater than additive effect with the combinations, suggesting inotropic synergism.