TITLE: INTERATRIAL SEPTAL RESPONSES TO TRANSATRIAL PRESSURE GRADIENTS AND THEIR POTENTIAL FOR PREDICTING PULMONARY CAPILLARY WEDGE PRESSURE

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The thin fossa ovalis comprises 28% of the adult interatrial septum(IAS) and its movement may reflect the pressure relationships between the left and right atria. With approval from the Human Research Committee(UCSF), we performed intraoperative transesophageal echocardiography(TEE) on 43 patients referred for vascular or cardiac surgery(abdominal aortic aneurysm: 15; other vascular procedures: 4; mitral valve replacement: 2; aortic valve replacement: 2; coronary artery bypass: 20). All patients were studied after induction of anesthesia with the chest closed using 2-dimensional TEE simultaneously with measurement of central venous pressure(CVP), pulmonary capillary wedge pressure(PCWP), and airway pressure. In addition, the 25 undergoing thoracic procedures were studied with the chest open and post-bypass(where applicable) for a total of 93 episodes.

We found that the IAS normally bows toward the right atrium at both end-systole and end-diastole and moves concordantly with the interatrial pressure gradient. During the expiratory phase of positive pressure ventilation the PCWP-CVP difference(ΔP) often reverses transiently and the interatrial septum momentarily curves toward the left atrium. This systolic reversal(SR) was seen in 51 of 59 episodes where the PCWP was less than or equal to 15mmHg, but in only 2 of 34 episodes where PCWP was greater than 15mmHg (sensitivity .86, specificity .94, positive predictive value .96)(Table). There was no significant difference in tidal volume(TV) or peak airway pressures(PIP) among those patients with SR(TV: 690ml; PIP: 22mmHg) and those without (TV: 710ml; PIP: 23mmHg; p=ns). Positive end expiratory pressure was not used in any patient. Among the thoracotomy patients there was no significant difference in the predictive value of SR among the post induction(.95), chest open(.99), and the post-bypass(.95) episodes. SR likely reflects the increased venous return in the right heart relative to the left during expiration; an effect that is blunted at higher preloads.

We conclude that interatrial septum motion is dependent on the instantaneous pressure gradient between the left and right atria and that the presence of systolic reversal during positive pressure expiration may be a useful indicator of normal pulmonary capillary wedge pressure.

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	PCWP(mmHg)	
	≤15	>15
+ SR	51	2
- SR	8	32

Table: Presence or absence of systolic reversal(SR) vs. pulmonary capillary wedge pressure(PCWP).

A150

Title: THE HEMODYNAMIC RESPONSE TO DESMOPRESSIN IN THE EARLY POST-CARDIOPULMONARY BYPASS PERIOD

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Desmopressin acetate (DES) is often administered as a procoagulant in the cardiac surgical patients, and may be associated with hypotension.

Written, informed consent for an institutionally-approved study protocol was obtained from 25 adult patients scheduled to undergo cardiac surgery. Monitoring included rapid-response thermistor pulmonary arterial and radial arterial catheters. Baseline hemodynamic measurements were obtained 15 minutes after completion of protamine administration. Patients were randomized to receive a blinded infusion of DES 0.3 µg/kg or saline over 10 min. Hemodynamic measurements consisted of heart rate (HR), mean arterial pressure (MAP), pulmonary capillary wedge pressure (PCWP), cardiac output (CO), right ventricular ejection fraction (RVEF). Measurements were taken at baseline (T0), 5 min into the infusion (T1), at the end of the infusion (T2), 5 minutes post-infusion (T3), and 10 minutes post-infusion (T4). Hypotension was treated with i.v. ephedrine. Data were analyzed using ANOVA, paired and unpaired Student's t-test, with Bonferroni's correction, and Fisher's exact test. $P < 0.05$ was considered statistically significant.

There were 13 patients in the DES group, and 12 in the placebo group. The only significant changes were an increase in CO compared to baseline at T3 in the DES group, and increases in CO at T3 and T4 in the DES group compared with the placebo group. Five of 13 patients who received DES required ephedrine, but only 1 of 12 in the placebo group (p=0.09). Power analysis indicated that a sample size of 46 patients would have yielded a significant finding.

The results of the current study are consistent with a mild vasodilating effect of DES. Ephedrine doses may have contributed to this finding. However, the patients who received ephedrine did not have a higher CO than the remainder of the group.

Table (Means ± SD)
*P<.05 compared to baseline +P<.01 compared to desmo.

Desmopressin	T0	T1	T2	T3	T4
HR (bpm)	76±11	78±12	79±13	80±13	82±12
MAP (mm Hg)	75±13	71±14	67±14	67±9	70±12
PCWP (mm Hg)	12±3	11±4	11±6	12±5	11±4
CO (l/min)	4.3±1.0	4.2±0.9	4.7±0.8	4.9±1.0*	4.8±0.9
RVEF (%)	52±13	56±9	53±9	55±10	55±10
Placebo					
HR (bpm)	75±13	79±15	78±14	77±13	74±12
MAP (mm Hg)	72±11	70±7	69±10	69±11	74±7
PCWP (mm Hg)	12±5	10±3	10±3	10±3	10±3
CO (l/min)	4.0±1.3	3.5±1.1	3.9±1.6	3.5±0.9+	3.6±1.2+
RVEF (%)	53±11	51±11	50±11	49±8	49±11