

10:45

LOAD-DEPENDENCE OF THE EFFECTIVE REGURGITANT ORIFICE AREA IN AORTIC REGURGITATION

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Treatment of patients with aortic regurgitation (AR) with vasodilators reduces regurgitant volumes, ventricular volumes and left ventricular mass. Although this effect is presumably due to afterload reduction, it is also possible that the effective regurgitant orifice area (ROA) is not constant. To test this hypothesis, AR was created in 10 open-chest sheep. Regurgitant flow was measured by a supravalvular electromagnetic probe; AO and LV pressures were measured using micromanometer transducers. ROA was calculated as (Regurgitant Volume/Filling Period)/(50.4 * square root of mean diastolic pressure gradient). ROA was measured at baseline, after increasing the mean arterial pressure by 25mmHg with dopamine, and after reduction of the mean arterial pressure by 25mmHg from baseline with nitroprusside. **RESULTS:** Baseline values for regurgitant volume, pressure gradient, and ROA are displayed along with percent change following interventions:

	Baseline	Dopamine	Nitroprusside
Regurgitant Volume	5.4±3.2 ml	+82%	-39%
Pressure Gradient	39±12 mmHg	+59%	-42%
ROA	0.084±0.053 cm ²	+42%	-18%

^p<0.05, *p<0.01 by paired t-test versus baseline.

CONCLUSION: In this model of AR, high AO pressures increase the ROA; this mechanism acts to increase regurgitant volume further. This dynamic nature of the ROA may be secondary to distention of the AO root at higher AO pressures.

11:00

TRANSESOPHAGEAL ECHOCARDIOGRAPHIC PULMONARY VENOUS FLOW IN SEVERE PROSTHETIC MITRAL VALVE REGURGITATION.

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Transesophageal echocardiographic assessment of prosthetic mitral valve regurgitation (MR) by color Doppler may be inaccurate due to eccentric flow jets impinging on the LA wall (Coanda effect) which may reduce the regurgitant jet area. Pulmonary venous flow patterns have been useful in identifying severe native valvular MR with eccentric jets. Thirteen Pts with dysfunctional prosthetic mitral valves were studied intraoperatively and color-guided pulsed Doppler pulmonary vein systolic (S) and diastolic (D) wave peak velocities were measured immediately before and after successful mitral valve replacement. Group I consisted of 10 Pts with severe prosthetic MR and Group II had 3 Pts with obstructed prostheses and minimal MR. All Group I Pts had S wave reversal, mean S≤0 and mean S/D ≤0 which resolved post-op. All Group II Pts had upright S waves and mean S/D >0 both before and after prosthetic reimplantation.

	MR	S(m/sec)	S/D	S Reversal (n)
Group I				
pre-Implant	3/3	-.38*	-.79θ	9**
post-Implant	<1/3	.56*	1.07θ	0**
Group II				
pre-Implant	<1/3	.42	1.83*	0**
post-Implant	<1/3	.44	.85*	0**

(*P<0.03; θP<0.0001; **=chi squared analysis P<0.001) Pulmonary vein S wave reversal and S/D ≤0 by transesophageal echocardiography are highly sensitive (100%)/specific (100%) indicators of severe prosthetic MR and resolve after successful mitral replacement.

11:15

ISCHEMIC ZONE SITE, NOT SIZE IS THE MAJOR DETERMINANT OF ACUTE ISCHEMIC MITRAL REGURGITATION

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In order to examine the influence of ischemic zone site and size on mitral regurgitation (MR) we performed transesophageal 2-D echo and color flow Doppler in 9 closed chest anesthetized dogs. The left anterior descending (LAD) and left circumflex (LCX) coronary arteries were each occluded for 3 mins in random order, with 60 mins of reperfusion between the two occlusions. Areas at risk were 25.7±7.1% and 30.9±8.1% of the left ventricle for LAD and LCX occlusions, respectively (p=NS) as assessed by post mortem staining of the perfusion bed. MR severity was assessed by planimetry of the maximal color flow jet area (CFA) during early, mid and late systole.

	Early	Mid	Late
LCX (± SD)	.99 ± .52	.92 ± .62*	1.14 ± .65*
LAD	.73 ± .38	.15 ± .22	.72 ± .49

*p<.05 vs LAD

The mean MR color flow area, computed as the average of the maximal CFA from early, mid and late systole was larger after LCX than LAD occlusion (1.1±2.6 cm² vs. 0.5±0.2 cm², p<.05). These differences could not be explained by differences in ejection fraction or left atrial and ventricular pressures. Linear regression analysis failed to reveal a significant relationship between the size of the area at risk and CFA for either LAD (r=.12, p=.75) or LCX occlusion (r=.56, p=.11). Thus the magnitude of acute mitral regurgitation is dependent on the ischemic zone site, being greater for posterior than anterior ischemia, but not on the size of the ischemic area at risk.

11:30

ROLE OF LEFT VENTRICULAR SHAPE IN THE ETIOLOGY OF MITRAL REGURGITATION IN PATIENTS WITH HEART FAILURE

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The relation between LV shape and mitral regurgitation (MR) was evaluated in 39 heart failure patients with LV ejection fraction (EF) ≤30%. LV shape was assessed from angiographic silhouettes using the ratio of the major-to-minor axes at end-systole (ESR) and end-diastole (EDR). Patients with valvular heart disease or LV aneurysms were excluded from the analysis. The etiology of heart failure was CAD in 23 and dilated cardiomyopathy (DCM) in 16. Nine of 23 CAD patients and 10 of 16 DCM patients had mild to moderate MR. Values of LV EF, LV end-diastolic (EDVI) and end-systolic (ESVI) volume index, ESR and EDR are shown below (MEAN ± STD).

	CAD		DCM	
	MR	No MR	MR	No MR
n	9	14	10	6
EF (%)	24±6	24±5	21±5	23±5
EDVI (ml/m ²)	110±29	112±36	151±55	141±68
ESVI (ml/m ²)	85±24	86±31	119±45	109±58
ESR	1.42±.13	1.72±.20#	1.41±.20	1.69±.09*
EDR	1.36±.15	1.63±.19*	1.38±.15	1.62±.08*

[*P<.01; #P<.001 MR vs No MR]

In both CAD and DCM patients, EF and EDVI were similar in those with or without MR. ESR and EDR, however, were significantly lower, indicating a more spherical LV, in patients with MR. Conclusion: In patients with heart failure, the development of MR is related to LV shape rather than LV volume.