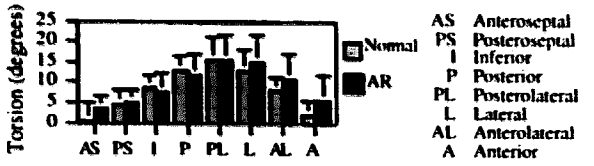
1169-20 Alterations in Chamber Geometry do Not Affect Left Ventricular Torsion in Chronic Aortic Regurgitation

C.H. Scott, V.A. Ferrari, L. Axel, M.G.S.J. Sutton. *University of Pennsylvania, Philadelphia, PA, USA*

Background: Helical left ventricular (LV) fiber orientation results in torsion during systole. Fiber orientation in the septum is, however, more circumferentially oriented and septal torsion, measured with radially tagged MRI, is decreased compared to the free wall. LV dilatation seen with aortic regurgitation (AR) may alter chamber architecture, thereby reducing global and/or regional torsion.

Methods: We studied 8 normal adult volunteers and 20 asymptomatic subjects with echocardiographically-defined moderate aortic regurgitation (AR). Echocardiograms were obtained for volumetric measurements. Two-dimensional tagged MRI short axis images were acquired through systole. The LV was divided into 8 equally spaced wall segments from the anterior right ventricular insertion. Torsion, was measured as the difference in end systolic angular displacement of the MRI tag intersections between the most apical and the most basal short axis slice for each of the 8 regions.

Results: End diastolic volume was increased in AR patients vs. normals (215 ± 53 cc vs. 137 ± 19 cc, $p < 0.02$). In both normal subjects and patients with AR, torsion in the anteroseptal and anterior walls was less than the posterolateral wall (*ANOVA* $p < 0.05$).



Conclusion: LV torsion, as measured by MRI, shows regional heterogeneity predicted by LV fiber architecture in both normal subjects and patients with AR. Despite a larger LV chamber, patients with AR have torsion values similar to normals in all wall segments.

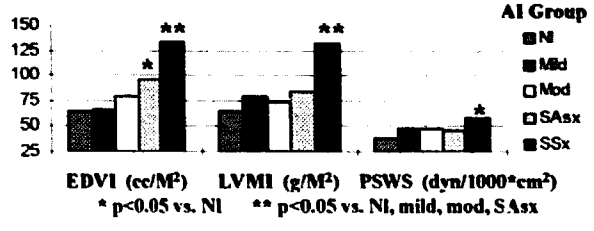
1169-21 Aortic Insufficiency: Relationship Between Left Ventricular Volume, Mass, Wall Stress, and Symptoms

M.R. Newton, M.L. Chuang, K.V. Kissinger, W.J. Manning. *Beth Israel Deaconess Medical Center, Boston, MA, USA*

Background: It has been shown that patients with severe aortic insufficiency (AI) develop left ventricular (LV) hypertrophy and dilation in response to increases in wall stress. We hypothesized that the unique ability of cardiac MRI to measure LV anatomy would allow further insight into the pattern of LV changes among patients with a range of insufficiency severity.

Methods: Thirty-five subjects: 9 healthy adults (NI) and 26 stable patients with mild (n = 4), moderate (n = 9), severe asymptomatic (SAsx, n = 9) and severe symptomatic (SSx, n = 4) AI by echo underwent cardiac MR using contiguous short-axis cine MR of the LV to determine end diastolic volume index (EDVI), mass index (LVMI), and peak systolic wall stress (PSWS).

Results: see chart.



Conclusions: Among asymptomatic patients with a broad range of AI severity, PSWS is maintained with a measurable increase in EDVI, while patients with symptomatic AI have a significant increase in *both* EDVI and LVMI. More work is needed to determine if a rise in EDVI alone might serve as an early marker for patients who will develop symptoms and thus benefit from early intervention.

1169-22 Are Flow-mediated Changes in Doppler-Echo Aortic Valve Area due to Changes in Left Ventricular Outflow Tract Spatial Velocity Profiles?

I.G. Burwash, K.M. Hay, K.L. Chan. *University of Ottawa Heart Institute, Ottawa, Ontario, Canada*

Aortic valve area (AVA) derived by continuity equation using LV outflow tract velocity (V_{LVOT}) and transvalvular velocity (V_{AS}) has been observed to change with transvalvular flow rate (Q). The AVA change may represent a "true" increase in effective orifice area or an "artifactual" increase related to flow-mediated perturbations in LVOT spatial velocity profiles, which are assumed to be constant. To investigate these hypotheses, we varied transvalvular flow with dobutamine infusion in 30 patients with at least moderate aortic stenosis ($AVA \leq 1.2\ cm^2$) to assess effects on AVA calculated by continuity equation using (1) traditional methods ($AVA_{DOP} = SV_{LVOT}/VTI_{AS}$, where $SV_{LVOT} = VTI_{LVOT} \times$ LVOT area), and (2) stroke volumes obtained from 2-D apical views using Simpson's rule (SV_{2D}) ($AVA_{2D} = SV_{2D}/VTI_{AS}$).

Results: Baseline AVA_{2D} and AVA_{DOP} had a good correlation ($r = 0.81$, $p < 0.0001$). However, AVA_{2D} was systematically smaller than AVA_{DOP} (0.52 ± 0.19 vs $0.73 \pm 0.23\ cm^2$, $p < 0.0001$) because SV_{2D} was systematically smaller than SV_{LVOT} (52 ± 15 vs 74 ± 19 ml, $p < 0.0001$; $\Delta SV = 22 \pm 15$ ml). With dobutamine infusion (10 ug/kg/min), SV_{LVOT} increased from 74 ± 19 to 82 ± 28 ml ($p < 0.005$), $Qmean_{[LVOT]}$ increased from 228 ± 51 to 327 ± 113 ml/s ($p < 0.0001$), and AVA_{DOP} increased 15% from 0.73 ± 0.23 to $0.84 \pm 0.32\ cm^2$ ($p < 0.0005$). Dobutamine induced changes in $Qmean_{[2D]}$ correlated with changes in $Qmean_{[LVOT]}$ ($r = 0.62$, $p < 0.0005$) and resulted in an 8% increase in AVA_{2D} from 0.52 ± 0.19 to $0.56 \pm 0.20\ cm^2$ ($p < 0.05$).

Conclusions: Although AVA_{2D} correlates with AVA_{DOP}, AVA_{2D} is systematically smaller than AVA_{DOP}. Dobutamine induced increase in transvalvular flow results in an increase in both AVA_{DOP} and AVA_{2D}, suggesting that effective orifice area increases with increased flow. In aortic stenosis, flow-mediated increase in AVA_{DOP} cannot be attributed to changes in LVOT spatial velocity profiles alone.

1170 Cardiac Surgery

Wednesday, April 1, 1998, 9:00 a.m.–11:00 a.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 9:00 a.m.–10:00 a.m.

1170-41 Allen Test – New Value of the "old" Test

M. Komeda, B.F. Buxton, J. Raman, L. Mullaly, D.L. Hare. *Austin & Repatriation Medical Center and University of Melbourne, Heidelberg, Victoria, Australia*

Background: The radial artery (RA) is now employed more frequently for coronary artery bypass grafting surgery (CABG). Reliability of Allen test for predicting hand circulation after RA removal has not been confirmed.

Methods: Predictability of Allen test for hand circulation was studied in 48 patients (7 females, age 64 ± 10 year [mean ± S.D.] who underwent CABG with or without RA removal. The pressures in thumb (T), little finger (L), and brachial artery (B) were measured using photoplethysmography in both hands before and after surgery, with and without ischemic hand stress. T/B and L/B ratios were calculated. Allen test was done pre-operatively and quantitated using recovery time (seconds) after release of RA compression.

Results: Five patients had both RA harvested, 21 left, 5 right, and 17 no RA. The predictors of the T/B ratio were impact of CABG (*i.e.* before or after the CABG, $F = 42.4$, $p < 0.001$ by ANOVA), Allen test results ($F = 12.9$, $p < 0.001$), RA removal ($F = 11.4$, $p = 0.001$) and patients (*i.e.*, individual difference, $F = 2.9$, $p < 0.001$) but not stress (*i.e.*, exercise simulation) or side (*i.e.*, left or right hand) (p = NS). L/B ratio was also affected by CABG impact ($F = 34.2$, $p < 0.001$), RA removal ($F = 11.7$, $p = 0.001$), Allen test ($F = 7.4$, $p = 0.007$), and patient ($F = 2.5$, $p < 0.001$).

Conclusions: Preoperative Allen test results were strongly related to post-operative T/B and L/B ratios. The results confirm the usefulness of the Allen test to predict hand circulation after RA removal.

1170-42 Enhanced Recovery Protocol in Cardiac Surgery to Reduce Length of Stay and Morbidity

S.D. Herman, R. Sahni, T. Schwarz, C. Delacruz, A. Shehadeh, D. Bregman. *St. Michael's Medical Center and University Hospital-UMDNJ, Newark, New Jersey, USA*

To reduce length of stay (LOS) in cardiac surgery, a surgical approach was developed which permitted discharge in as little as one day by reducing operative morbidity and the trauma of surgery. From 1995–1997, 206 consecutive