

The Relationship of the Aorto-Septal Angle and Basal Septal Hypertrophy

Background: The angle between the long axis of the left ventricle and ascending aorta is an under-appreciated but potentially important anatomical relationship. This left ventricular (LV) aorto-septal angle (ASA) is reported to decrease (more acute) with age perhaps due to thoracic or aortic changes, and with higher central aortic blood pressure independent of age and increased aortic size and arterial pressure wave reflections. Also, the ASA has been associated with LV basal septal hypertrophy (BSH) (the sigmoid septum or basal septal bulge). Therefore, the ASA may not only reflect an "aging heart" but may be associated with systemic arterial properties, LV systolic strain and LV hypertrophy, and thus be associated with systolic and diastolic LV dysfunction.

Interrelationships of the ASA with BSH, and with LV diastolic and systolic function are not well studied.

Methods: The study that evaluated the ASA and BSH in 150 patients (age 66 ± 16 yrs; 59% female) with normal LV function and with LV systolic and diastolic dysfunction. Echocardiograms and medical records were reviewed, and statistical analyses were performed to find correlations.

Results: The ASA inversely correlated with the basal septal bulge thickness ($r = -.18$; $p = 0.03$) but not with mid septal thickness ($p = .15$) and correlated with right ventricular area ($r = .19$; $p = .02$) and LV mass index ($r = .10$; $p = .02$). There was an inverse trend with age ($r = -.14$; $p = 0.09$). The ASA did not correlate with LA volume, aortic root size, or LV diastolic size. On regression analysis the ASA was associated with BSH and RV area, but not age or LV mass index ($p < .001$ for model). There was no difference in the ASA between patients with normal, diastolic dysfunction and systolic dysfunction. BSH did not correlate with age ($p = .14$).

Conclusion: These results suggest that a more acute ASA is associated with greater BSH and smaller RV size.