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Apical Twist Is Abnormal In Left Bundle Branch Block Independent of Left Ventricular Systolic Function

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Apical torsion is a critical determinant of LV ejection. We studied apical twist dynamics in normals and patients with left bundle branch block (LBBB) and normal and abnormal systolic function.

Methods: Velocity Vector Imaging (VVI, Sequoia, Siemens, CA) of the LV in apical 4C (A4C) and SAX views was done in 17 normal volunteers (NV), 12 patients with LBBB (normal EF), and 14 patients with LBBB (abnormal EF). Apical twist velocity (AT), longitudinal velocity (V_{Long}), circumferential strain (CS), strain rate (SR) and global and regional EF were calculated on an off-line VVI workstation, Figure.

Results: AT was 1.82 ± 0.17 cm/s in NV, 1.25 ± 0.18 cm/s in LBBB (normal EF) and 0.46 ± 0.09 cm/s in LBBB (low EF= 0.28 ± 0.11), $p < 0.05$ and 0.01 respectively versus normals. There was a non-linear relationship between V_{Long} and AT ($y = 0.56x^2 + 0.63x - 0.17$, $p < 0.001$). CS was $-26.8\% \pm 7.3\%$ in normal subjects, $-15.4\% \pm 6.6\%$ ($p < 0.05$) in LBBB (normal EF= 0.55 ± 0.10) and $-9.1\% \pm 2.6\%$ ($p < 0.001$) in LBBB (low EF). SR was 1.70 ± 0.33 /s in normals, 1.23 ± 0.11 /s ($p < 0.01$) in LBBB (normal EF), $p < 0.01$ Vs. normals, and 0.96 ± 0.03 /s on LBBB (low EF) $p < 0.001$ Vs. normals.

Conclusions: Apical twist is abnormal in LBBB irrespective of systolic function. Also, in normal EF LBBB, this abnormality precedes changes in global and regional EF.

