

THE SIMULTANEOUS CHANGES IN ECG STRAIN PATTERN AND LEFT VENTRICULAR FORCE-VELOCITY RELATIONSHIP IMMEDIATELY AFTER VALVE REPLACEMENT FOR AORTIC STENOSIS

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Background The presence of ECG strain pattern has prognostic value in cardiac patients. In aortic stenosis, ECG ST depression and T wave inversion in anterior and lateral leads may indicate LV hypertrophy and/or sub-endocardial ischaemia. The present study was aimed to investigate the immediate changes in ECG strain pattern after valve replacement for aortic stenosis and their temporal relationship to the changes in LV mechanicals.

Methods 50 patients (age 63, 12 years, 32 males) undergoing elective aortic valve replacement for severe AS were studied. Trans-oesophageal Echo and high fidelity LV pressures were recorded at immediately before AVR, and 3 and 20 h after AVR with 12 lead ECG. Transverse LV cavity dimension and wall thickness were derived from mid-cavity M-mode echocardiograms along with LV pressure by digitising. LV EDD, mass index, mean systolic wall stress, circumferential and longitudinal peak shortening rates were determined. In addition, ECG voltage (SV1+RV5), ST segment and T wave amplitude of lead I, aVL, V5, V6 were quantified respectively.

Results AVR resulted in an immediate fall in LV wall stress and LV ECG voltage, an increase in circumferential shortening rate from 3 h; and an improvement in ECG ST segment level from 20 h, respectively. LV mass index, LV long axis shortening rate, ECG T wave amplitude remained unchanged.

Conclusions The reciprocal changes in LV systolic wall stress and shortening rate in circumferential direction after AVR for AS represents a classical force-velocity relationship. It is however important to recognise that the improvement in ST segmental depression did not result in changes in LV longitudinal shortening rate or T wave inversion, implying that the late ones may be more sensitive to myocardial stunning and/or largely determined by LV hypertrophy, thus warrants longer term study.

Table 1

Variable	Pre-AVR	3 h AVR	20 h AVR	ANOVA : p
LV stress, g/cm ²	181 ± 76	122 ± 39*	128 ± 44*	<0.001
Sx-dD/dt, cm/s	7.4 ± 1.8	9.2 ± 2.4*	10.6 ± 2.9*	<0.001
Lx-dD/dt, cm/s	5.2 ± 2.2	5.1 ± 2.1	5.3 ± 2.6	0.918
SV1+RV5, mV	3.17 ± 1.19	2.25 ± 0.79*	2.42 ± 0.99*	<0.001
ST segment, uV	-38 ± 35	-30 ± 40	-17 ± 35*	0.018
T wave, uV	-89 ± 196	-39 ± 153	-30 ± 150	0.176

*, different from Pre-AVR by 95% CI.