Could the Size of Ductus Arteriosus be an Independent Predictor for the changes in Left Ventricular Function Post Percutaneous closure! Evaluation by Tissue Doppler and Speckle-derived Strain Rate Echocardiography

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Abstract

Aim: Evaluate the changes of left ventricular (LV) systolic and diastolic function in children after percutaneous closure of patent ductus arteriosus (PDA) and to correlate these changes in relation to the size of the ductus. Methods: 30 children provisional diagnosed with PDA and planned for percutaneous trans-catheter PDA closure. Conventional 2D, Doppler and tissue Doppler imaging (TDI) and speckled-derived strain rate echocardiography were obtained pre-closure, early (I day), and late (1 month) post-PDA closure.

Results: Mean age was 26.0 ± 32.17 months (9 male and 21female). The mean PDA diameter was 3.11 ± 1.09 mm. Ejection fraction (EF) and fractional shortening (FS)significant reduced in the day after PDA closure compared with pre closure status ($P<0.05$), then improved significantly after one month compared with early post- closure measures($p<0.05$),but no significant change when compared with pre-closure measure, ($P>0.05$). There is a negative correlation between the PDA size and changes in left ventricular diastolic dimensions, EF and FS early after PDA closure. Significant reduction in both early and late mitral diastolic flow velocities (EM and AM) after PDA closure (both one day and one month) ,early tissue Doppler velocity of lateral mitral annulus (E`lateral) significant decrease early after PDA closure($P<0.05$), but one month after closure E` lateral significantly increased.($P=0.03$), EM/E` lateral had a significant reduction in one month after closure compared with pre-closure and early post–closure ($P=0.001$). There was a significant decrease in global and regional longitudinal strain at early after PDA closure ($P=0.001$), although there was a significant improvement in all measures in the subsequent one month after closure.

Conclusion: Size of PDA considered as an independent predictor for the acute decrease in left ventricular function early after PDA closure which recovers completely within one month.

Keywords: Echocardiography; Percutaneous closure; Tissue doppler; Myocardial deformation