Cardiopulmonary response to maximal exercise in young athletes following the Ross procedure.

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BACKGROUND: Aortic prosthetic devices offer limitations that make them less than optimal valve substitutes because the vast majority are innately obstructive, especially at increased levels of hemodynamic function. The present study is designed to demonstrate the hemodynamics of the pulmonary autograft in 11 conditioned athletes who have undergone the Ross (pulmonary autograft) procedure. Data was compared to a group of 13 age-matched "normal athletes." METHODs: All the Ross athletes had undergone the autograft procedure using the root replacement technique and were at least 3 months into their postrecovery phase. All athletes (both normal and Ross) underwent resting transthoracic echo followed by maximal exercise stress test (modified Bruce protocol) to exhaustion. Post-operative transesophageal echocardiogram obtained within 90 seconds documented aortic valve gradient and velocity across the aortic valve. RESULTS: In the Ross athlete group, maximum heart rate was 188 beats per minute, peak aortic valve gradient at rest (mm Hg) 7.69 (mean), velocity across the aortic valve at rest (cm per second) 129.40 (mean), peak aortic valve gradient at maximal exercise (mm Hg) 16.30 (mean),
velocity across the aortic valve at maximal exercise (cm per second) 190.00 (mean). In the normal athlete group, maximum heart rate was 176 beats/minute, peak aortic valve gradient at rest (mm Hg) 5.97 (mean), velocity across the aortic valve at rest (cm per second) 120.54 (mean), peak aortic valve gradient at maximal exercise (mm Hg) 14.61 (mean), velocity across the aortic valve at maximal exercise (cm per second) 190.23 (mean). CONCLUSION: The pulmonary autograft exhibits hemodynamic characteristics similar to the normal human aortic valve under conditions of enhanced cardiac output.

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