Direct left ventricle to great cardiac vein retroperfusion: a novel alternative to myocardialrevascularization.

Yi GH[1], He KL, Dang NC, Lee MJ, Cahalan P, Kherani AR, Gu A, Burkhoff D, Wang J.

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BACKGROUND: As the number of patients with diffuse coronary artery disease continues to grow, there is renewed interest in alternative methods of perfusing the ischemic myocardium. We tested the feasibility of myocardial retroperfusion via a direct left ventricle-to-great cardiac vein (LV-GCV) conduit to support regional contractility in this setting. METHODS: LV-GCV flow was established using an extracorporeal circuit in 5 dogs. Left ventricle (LV) pressure, aortic pressure, regional myocardial segment length, and circuit blood flow were measured prior to left anterior descending coronary artery (LAD) ligation, following LAD ligation, and after LV-GCV circuit placement. To eliminate backward flow during diastole, an in-line flow regulator was placed. Regional myocardial function was quantified by pressure-segment length loop area divided by end-diastolic segment length (PSLA/EDSL). RESULTS: LAD ligation reduced PSLA/EDSL from 10.0 +/- 1.2 mm Hg mm to 1.6 +/- 0.3 mm Hg mm ($P < .05$). With LV-GCV retroperfusion, mean peak systolic flow was +152 +/- 14 mL/min, mean peak diastolic flow was -39 +/- 11 mL/min, and net mean flow was +36 +/- 13 mL/min. Regional function recovered to approximately 39% of baseline (3.9 +/- 0.4 mm Hg mm, $P < .05$). Upon elimination of backflow, mean flow increased to +41 +/- 12 mL/min and regional function recovered even further to approximately 47% of baseline (4.6 +/- 0.7 mm Hg mm, $P < .05$). CONCLUSIONS: A LV-GCV circuit can significantly restore regional function to the acutely ischemic myocardium. An inline valve that eliminates backward diastolic flow improves regional function even further. This approach may provide an effective therapy for diffuse coronary disease not amenable to traditional revascularization strategies