

Intracoronary Administration of Levosimendan to Treat Severe Postpericardiotomy Heart Failure

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Introduction

Levosimendan is a calcium sensitizing drug which exerts inotropic positive effects and vasodilation. The systemic hypotension limits the intravenous (IV) use of Levosimendan particularly in presence of coronary disease. Previous papers showed that intracoronary (IC) administration of Levosimendan in the anesthetized pig causes a dose related increase in coronary blood flow (CBF) without concomitant changes of arterial pressure and/or other hemodynamic parameters.

Here, we report the use of IC administration of Levosimendan to treat Patients (Pts) that were in severe postcardiotomy heart failure.

Materials and Methods

Intracoronary 24 mcg/kg bolus of Levosimendan was administered by mean a 20 ml syringe connected to a line composed by a three way stopcock and two butterfly needles which were inserted into the vein graft aorta - obtuse marginal branch and the vein graft aorta - right coronary artery respectively, in a series of 18 Pts affected by trivascular coronary artery disease and that presented a difficult weaning from cardiopulmonary bypass (CPB) and the cardiac index was not satisfactory also at maximal doses of inotropic drugs. Flows of all grafts (by mean of Doppler flowmeter probes), heart rate (HR), cardiac output (CO), diastolic (ratio E/A) and systolic function (EF), systolic and diastolic blood pressure (SBP and DBP), pulmonary systolic arterial pressure (PAPS) and pulmonary wedge pressure (PWP) were measured before and after the bolus of Levosimendan.

Results

During and after the bolus no changes of HR, SBP, DBP, PAPS and PWP were observed while significant increases of graft flows, CO, diastolic and systolic function occurred at the end of the bolus. The mean cardiac index (CI) increased significantly: mean pre-bolus = 2.0 ± 0.3 versus mean post-bolus = 2.9 ± 0.2 ($p < 0.01$). The mean of systemic vascular resistances decreased significantly: mean pre-bolus = 1460.7 ± 123 versus mean post-bolus 1185.8 ± 105 dyne \times s \times cm⁻⁵ ($p < 0.01$)

The hemodynamic improvements observed were stable in the following 48 hours and Pts overcome successfully the early postoperative period.

Conclusions

After intracoronary administration of Levosimendan, primary cardiac effects appear earlier than systemic vascular dilatation avoiding the dangerous decrease of arterial pressure and therefore the primary cardiac effects will be enhanced by the following decreasing of systemic vascular resistance. These findings can explain absence of changes of arterial blood pressure and cardiac rate.

The present report supplies important elements to develop new protocols for Levosimendan administration in cardiac surgery.