



INTRALIPID INFUSION PROTECTS THE HEART

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Abstract

Intralipid is used to improve clinical outcomes in patients with myocardial injury or suffering from reperfusion injury after cardiopulmonary bypass following open heart surgery. Data supporting this practice is conflicting but suggestive of minimal benefit.

Keywords: Intralipid, cardiopulmonary bypass, reperfusion injury

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1. INTRODUCTION

Heart disease is one of the main causes of death in the world in the present time. One of the methods to reduce death caused by this disease is to use of Coronary Artery Bypass Grafting (CABG) surgery. This surgery is the most common surgery performed nowadays by cardiac surgeons (Rahimi, et.al.2014). During open heart surgery, the myocardium is subjected to endure the periods of ischemia and reperfusion which may end in post-ischemia contractile dysfunction. That is a major contributor of early and late morbidity and mortality and increased requirement of pharmacologic and mechanical circulatory support. The underlying mechanisms include oxidative stress, inflammatory reaction, calcium overload, ion channel dysfunction and increased membrane permeability, energy metabolism disorders, etc.

These mechanisms interrelated with each other, and most importantly, the energy metabolism disorders are the primary link. Improving myocardial energy metabolism can reduce myocardial I/R injury (Yuan et al, 2020).

Since the myocardium relies mainly on fatty acid oxidation (FAO) instead of glycometabolism to produce energy, some experimental studies indicated that supplementing the exogenous FAO substrate can increase the supply of myocardial ATP and thus exert protection of the heart muscle. However, preischemic exposure of fatty acids will lead to inadequate FAO during the period of ischemia and cause cardiotoxicity injury subsequently. In the meanwhile, clinically, the myocardial ischemic processes are not predictable, so the intervention of FAO during the period of

reperfusion is more controllable and valuable. Intralipid, a necessary fatty acid carrier, has been safely used as an energy supplier in the clinic for more than 50 year. It has also played a very important role in rescuing the cardiac arrest caused by local anesthetic toxicity, which has been incorporated into several clinical guidelines. Recently, experimental studies have shown that lipid emulsion infusion just before reperfusion, could reduce myocardial infarct sizes, improve cardiac function and reduce myocardial I/R injuries. (Yuan et al, 2020).

Use of glucose insulin and potassium (GIK) solution for myocardial protection was 1st time introduced by Sodi-Pollares and colleagues. They used this solution in patients with acute myocardial infarction and concluded that GIK solution limited electrocardiographic changes in these patients. Several studies have declared reduced morbidity and mortality in patients of acute MI with the use of GIK solution. The role of GIK solution in cardiac surgery patients has also been investigated and studies have proven its efficacy in reducing mortality and improvement in post-operative morbidity (Bothe et al, 2007).

Meta-analysis by Bothe et al involving 11 randomized trials were included with a total of 468 patients who underwent either coronary artery bypass grafting or heart valve replacement. Six studies noted a significant improvement in postoperative recovery. One study demonstrated no effect and in four studies, no comparable statistical analysis was available. GIK patients required similar or lesser doses of catecholamines. Five of the studies reported the incidence of postoperative atrial fibrillation (AF) (Bothe et al, 2007).

Most of these studies were conducted in diabetic patients and few studies have been conducted in non-diabetic patients regarding effectiveness of GIK solution in cardiac surgery patients. Myocardial ischemia/reperfusion (I/R) injury is an important factor affecting cardiac function and prognosis in patients of cardiac surgery (**Shahbazi, et al., 2019**).

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