

# Peran Glutamin Sebagai Protektor Miokard pada Bedah Pintas Arteri Koroner Elektif dengan Fraksi Ejeksi Rendah yang Menggunakan Mesin Pintas Jantung Paru = Myocardial Protecting Role of Glutamine in Patients with Low Ejection Fraction Undergoing Elective On-pump Coronary Artery Bypass Graft Surgery

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## Abstrak

Penyakit jantung koroner (PJK) menyebabkan ketidakseimbangan suplai dan kebutuhan metabolik miokard dalam melakukan fungsi sirkulasi dan homeostasis. Baku emas terapi PJK adalah bedah pintas arteri koroner (BPAK). Prosedur BPAK dengan mesin pintas jantung paru (PJP) dapat mencetuskan cedera miokard tingkat selular sehingga memerlukan aplikasi proteksi miokard. Glutamin adalah asam amino conditionally essential yang berperan dalam proteksi miokard dengan membentuk energi selama periode iskemia, tetapi belum teruji penggunaannya pada pasien dengan fraksi ejeksi rendah. Padahal, pasien fraksi ejeksi (EF) rendah lebih rentan terhadap cedera miokard, sehingga glutamin diharapkan dapat memberi proteksi. Penelitian menggunakan desain double blind randomized controlled trial di Instalasi Bedah Jantung Dewasa RSJPDHK Jakarta pada bulan Januari–Agustus 2021 dengan subjek penelitian 60 pasien sesuai kriteria inklusi dan eksklusi. Alokasi random subjek untuk memilih 30 pasien mendapatkan 500 mL glutamin 0,5 g/kg dalam NaCl 0,9% sebagai kelompok intervensi (glutamin), dan 30 pasien mendapatkan NaCl 0,9% sebanyak 500 mL sebagai kelompok kontrol selama 24 jam pertama. Pengukuran yang dilakukan meliputi kadar glutamin plasma, kadar -KG, myocardial injury score, indeks apoptosis, ekspresi anti-kardial troponin I, kadar troponin I, EF, indeks jantung dan kadar laktat. Dua subjek drop out sehingga analisis dilakukan terhadap 58 subjek. Efek proteksi miokard glutamin terlihat pada kadar troponin I, laktat plasma, dan myocardial injury score yang lebih rendah pada kelompok glutamin, serta ekspresi anti-kardial troponin I jaringan apendiks atrium kanan jantung setelah mesin PJP dilepas lebih tinggi dibandingkan kontrol. Tidak didapatkan perbedaan bermakna indeks apoptosis jaringan apendiks atrium kanan, fraksi ejeksi pasca-operasi, penggunaan vasoaktif dan inotropik pasca-operasi, durasi penggunaan ventilator dan durasi perawatan intensif pasca-operasi pada kedua kelompok. Simpulan: Pemberian preoperatif glutamin 0,5 g/kg secara intravena dalam 24 jam pertama memiliki efek proteksi miokard pada pasien BPAK elektif dengan EF rendah yang menggunakan mesin PJP.

.....Coronary heart disease (CHD) causes a myocardial metabolic supply and demand imbalance in performing circulatory and homeostatic functions. The gold standard treatment of CHD is coronary artery bypass graft (CABG). The CABG procedure with a cardiopulmonary bypass (CPB) machine can trigger myocardial injury at cellular level due to ischemia and reperfusion. Glutamine is a conditionally essential amino acid in the human body which has a role as myocardial protector through energy production during myocardial ischemia. However, its application has not been tested in low ejection fraction (EF) patients. Meanwhile, patients with low EF are more vulnerable to myocardial injury. Thus, glutamine administration was expected to provide myocardial protection. The study was a double-blind, randomized controlled trial design and was performed at the Adult Cardiac Surgery Installation of the National Cardiovascular Center Harapan Kita, Jakarta from January to August 2021 with a sample size of 60 patients meeting the inclusion

and exclusion criteria. Subjects were randomly allocated into intervention (glutamine): 30 patients were administered a solution of glutamine 0.5 g/kg dissolved in 0.9% NaCl up to 500 mL in total volume and control group; 30 patients were administered 500 mL of 0.9% NaCl, both over a period of the first 24 hours. Parameters measured include plasma glutamine levels, -KG levels, myocardial injury scores, apoptotic index, anti-cardiac troponin I expression, troponin I levels, EF, cardiac index and lactate levels. Two samples were dropped out; hence 58 patients were analyzed in this study. Myocardial protective effects of glutamine are observed in plasma troponin I, lactate levels, and myocardial injury score of right atrial appendage tissue, which were significantly lower in the glutamine group and higher anti-cardiac troponin I expression of right atrial appendage tissue in the glutamine group. Apoptotic index of right atrial appendage tissue, postoperative ejection fraction, postoperative use of vasoactive and inotropic, ventilator time, and duration of intensive care showed no significant differences in both groups. Conclusion: Preoperative administration of intravenous glutamine 0.5 g/kg in the first 24 hours has a cardioprotective effect in low EF patients underwent elective on-pump CABG.