
Predictors of positive inotropic drug use in patients undergoing concomitant coronary artery bypass graft without cardiopulmonary bypass

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Abstract: Objective: To observe and analyze the factors related to the use of positive inotropic drugs in coronary artery bypass grafting (CABG) surgery. Method: A total of 630 patients (351 males and 279 females) who underwent off pump CABG at the Heart Center of Daxing District People's Hospital in Beijing from January 2012 to December 2013 were selected as the study subjects. According to whether positive inotropic drugs were used during surgery, they were divided into an applied group (n=330) and a non applied group (n=300). Collect clinical data by reviewing original medical records. The application of positive inotropic drugs is defined as the use of dopamine at doses exceeding $5 \mu\text{g}/(\text{kg} \cdot \text{min})$, any dose of adrenaline or norepinephrine, milrinone. Result: Three independent factors related to the application of positive inotropic drugs were identified: ① Cardiac index (CI) $\leq 2.5 \text{ L}/(\text{min} \cdot \text{m}^2)$; ② Left ventricular ejection fraction (LVEF) $\leq 35\%$; ③ Left ventricular end diastolic pressure (LVEDP) $\geq 25 \text{ mmHg}$. Conclusion: CI $\leq 2.5 \text{ L}/(\text{min} \cdot \text{m}^2)$, LVEF $\leq 35\%$, and LVEDP $\geq 25 \text{ mmHg}$ are independent related factors that increase the risk of using positive inotropic drugs in non extracorporeal circulation CABG.

Keywords: Extracorporeal circulation; Coronary artery bypass grafting; Positive inotropic drugs; Related factors

Left ventricular dysfunction is a common complication in off pump coronary artery bypass grafting (CABG) surgery, which often requires the use of positive inotropic drugs to maintain hemodynamic stability. There are studies reporting that factors such as advanced age, gender, cardiac hypertrophy, congestive heart failure, decreased ejection fraction, emergency surgery, prolonged extracorporeal circulation and aortic occlusion, myocardial infarction, and left main artery disease all increase the risk of using positive inotropic drugs during surgery. The purpose of this study is to screen and determine which factors in population composition, clinical symptoms, laboratory tests, echocardiography, and hemodynamic parameters are associated with increasing the use of positive inotropic drugs.

The study subjects were patients who underwent non extracorporeal circulation CABG at our cardiac center from January 2012 to December 2013. The Scientific Research and Ethics Committee of Daxing District People's Hospital in Beijing reviewed and supervised the authenticity of this study. Inclusion criteria: ① Patients receiving CABG outside of cardiopulmonary bypass at our cardiac center; ② The original medical records are relatively complete and cover the content to be investigated. Exclusion criteria: ① Preoperative use of positive inotropic drugs or aortic balloon counterpulsation; ② Patients with incomplete records in the original medical records; ③ Perform extracorporeal circulation treatment during surgery. According to whether positive inotropic drugs were used during CABG surgery, they were divided into two groups: the application group (n=330) and the non application group (n=300).

This study included a total of 630 patients who underwent CABG without extracorporeal circulation, of which 330 cases (53%) received positive inotropic drugs during surgery. The study

identified three independent related factors (predictive indicators) for the application of positive inotropic drugs: ① $CI \leq 2.5 \text{ L}/(\text{min} \cdot \text{m}^2)$; ② $LVEF \leq 35\%$; ③ $LVEDP \geq 25 \text{ mmHg}$ 。 This research result will help cardiac surgeons, anesthesiologists, and critical care physicians to prospectively determine which patients are more likely to require positive inotropic drug support before surgery, thereby developing more personalized surgical plans and postoperative management. The results of this study were compared with those of McKinley et al. , and the positive inotropic drug support rate was basically consistent in simple CABG. In the previous two studies , $LVEF \leq 35\%$ was also used as an important independent indicator for predicting positive inotropic drug delivery. Salem et al. found that elevated LVEDP is an independent risk factor for increased mortality after cardiac surgery, which is consistent with the results of this study within a certain range. Compared with previous reports, this study collected more comprehensive hemodynamic data and found that $CI \leq 2.5 \text{ L}/(\text{min} \cdot \text{m}^2)$ is an independent risk factor for increasing positive muscle strength drug support rate. In the study reported by Rao et al. , $LVEF \leq 20\%$, age ≥ 70 years, and female patients were identified as independent risk factors for increasing positive muscle strength drug support rates. Ahmed et al. also reported similar results in their study. Rao et al. used a standard of $\leq 20\%$ for LVEF in their study, possibly because their study subjects included patients undergoing CABG under extracorporeal circulation

The LVEF may be lower; Ahmed et al. used a standard of $\leq 40\%$ for LVEF in their study, which may be due to their study subjects being patients with aortic valve replacement combined with CABG. Rao et al. found that the conclusions of elderly and female participants in their study were inconsistent with those of this experiment, possibly due to differences in race and geography in addition to the aforementioned reasons.

In our research, there are inevitably certain limitations. This is a retrospective study that cannot be randomized controlled and has a limited sample size.

Reference:

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