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INPLASY

Meta-analysis of timing of IABP implantation for CABG in patients with coronary heart disease

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ADMINISTRATIVE INFORMATION

Support - Nanjing University of Traditional Chinese Medicine.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 20 August 2023 and was last updated on 20 August 2023.

INTRODUCTION

Review question / Objective This meta-analysis systematically evaluated the efficacy and safety of different timing of IABP implantation on the prognosis of patients with CHD undergoing CABG.The observation group applied IABP prophylactically before surgery, while in the control group, IABP was placed passively during intraoperative and postoperative periods in the presence of circulatory instability or malignant arrhythmias.The primary outcome measure of the study included were: (1) Running time of IABP; (2) Mechanical ventilation time; (3) Postoperative hospitalization time; (4) ICU monitoring time; (5) Positive myodynamia medicine assistant time; (6) Hospitalization cost. The following are the main safety indicators:(1) Mortality; (2) Reoperation for bleeding; (3) Renal insufficiency rate; (4) Limb ischemia; (5) Stroke and cerebrovascular accident. This meta-analysis was performed according to the the Cochrane Handbook for Evaluation of Interventions.

Condition being studied According to previous studies, IABP is mostly used passively during intraoperative or postoperative clinical deterioration such as low cardiac output, low intraoperative or postoperative cardiac output, malignant arrhythmias, acute myocardial infarction, and those refractory to high doses of vasoactive drugs15. Meanwhile, several small cohort studies have found significant clinical benefit in patients with high-risk coronary artery disease who received IABP before CABG.

METHODS

Search strategy This meta-analysis was performed according to the the Cochrane

Handbook for Evaluation of Interventions16. A computer will be used to retrieve the following databases: PubMed, EMBASE, the Cochrane Database, Web of Science, CNKI, Wanfang, VIP and SinoMed published before August 4, 2023. In the search, key terms were identified, including “Intra-aortic balloon pump”, “Coronary artery bypass grafting”, “Coronary heart disease”, “Optimal time”, and synonyms for the terms. We will use a combination of subject terms and free words to conduct our search. Furthermore, all references listed in relevant original papers and review articles were checked.
The literature screening was completed independently by two researchers based on the inclusion and exclusion criteria. A dispute was resolved by discussion with a third investigator. First, we eliminated duplicates using Endnote software. In addition, titles and abstracts were read to eliminate obvious irrelevant literature. Following this, the two authors will read the full text and decide which articles will qualify based on the inclusion and exclusion criteria. Two authors independently extracted the following information from included papers: title, first author, date of publication, type of research, patients age, surgical approach, sample size and past medical history.The primary outcome measure of the study included were: (1) Running time of IABP; (2) Mechanical ventilation time; (3) Postoperative hospitalization time; (4) ICU monitoring time; (5) Positive myodynamia medicine assistant time; (6) Hospitalization cost. The following are the main safety indicators:(1) Mortality; (2) Reoperation for bleeding; (3) Renal insufficiency rate; (4) Limb ischemia; (5) Stroke and cerebrovascularaccident.

Participant or population Patients with coronary heart disease.

Intervention The observation group applied IABP prophylactically before surgery.

Comparator While in the control group, IABP was placed passively during intraoperative and postoperative periods in the presence of circulatory instability or malignant arrhythmias.

Study designs to be included Retrospective cohort.

Eligibility criteria Literature inclusion and rejection criteria are as follows: Included criteria: (1) During the procedure, all patients received CABG; (2) The observation group applied IABP prophylactically before surgery, while in the control group, IABP was placed passively during intraoperative and postoperative periods in the presence of circulatory instability or malignant arrhythmias.Exclusion criteria: (1) Patients with contraindications to IABP implantation; (2) Patients with complications such as tumors, acute stage of cerebral hemorrhage, and other diseases such as severe liver and renal insufficiency; (3) Study includes other experiments supported by percutaneous circulation; (4) Case reports, animal experiments, reviews, letters, laboratory studies, or reviews of conferences; (4) Literatures that are excluded contain incomplete data, incorrect data, wrong comparison methods, outcome indicators are not included in the scope and unable to extract data; (5) Literature that duplicates was selected based on its comprehensiveness.

Information sources PubMed, EMBASE, the Cochrane Database, Web of Science, CNKI, Wanfang, VIP and SinoMed.

Main outcome(s) A total of sixteen studies with 691 patients were included in this meta-analysis. According to the meta-analysis, compared with the intraoperative and postoperative placement group, the running time of IABP [MD = -12.16, 95% CI (-15.33, -8.99), $P < 0.00001$], mechanical ventilation time [MD = -24.89, 95% CI (-34.25, -15.53), $P < 0.00001$], postoperative hospitalization time [MD = -7.06, 95% CI (-10.29, -3.83), $P < 0.00001$], ICU monitoring time [MD = -7.63, 95% CI (-10.19, -5.07), $P < 0.00001$], and positive myodynamia medicine assistant time [MD = -14.41, 95% CI (-23.19, -5.63), $P < 0.00001$] were significantly shorter in the preoperative placement group ($P < 0.05$).

Additional outcome(s) The intraoperative and postoperative placement group had significantly more hospitalization [MD = -5.38, 95%CI (-7.78, -2.99), $P < 0.00001$].In terms of safety outcomes, intraoperative and postoperative placement group had a higher risk of mortality [OR = 0.17, 95% CI (0.11, 0.25), $P < 0.00001$], bleeding [OR = 0.56, 95% CI (0.33, 0.96), $P = 0.04$], renal insufficiency [OR=0.20, 95% CI (0.04, 0.93), P=0.04], limb ischemia [OR = 0.45, 95% CI (0.25, 0.82), $P = 0.009$], and stroke and cerebrovascular accident [OR = 0.35, 95% CI (0.15, 0.81), P=0.01] ($P < 0.05$).

Quality assessment / Risk of bias analysis Newcastle-Ottawa Scale (NOS).

Strategy of data synthesis We used Revman5.4.5 software for data analyses. We represented counting data as relative risk (RR) and its 95%CI, and measurement data as mean difference (MD) and its 95%CI. We will use the I2 test to identify

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heterogeneity among studies. According to our criteria, I2 < 50% indicates low heterogeneity; I2 = 50-75% indicates moderate heterogeneity; I2 > 75% indicates high heterogeneity. In studies with low or moderate statistical heterogeneity (I2 = 25%-50%) , we used a fixed effects model, and in studies with high statistical heterogeneity (I2 > 50%), we used a random effects model. We used a p-value of less than 0.05 to determine significance.

Subgroup analysis No.

Sensitivity analysis Delete a piece of literature and observe the change in effect size.

Country(ies) involved China.

Keywords Intra-aortic balloon pump; Coronary artery bypass grafting; Timing of implantation; Efficacy; Safety; meta-analysis.

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