

Clinical Trial Protocol

Iranian Registry of Clinical Trials

26 Oct 2026

The Effect of Intravenous Erythropoietin Administration at the Time of Anesthesia Induction on the Incidence of Delirium, Hemodynamic Stability, and Time to Tracheal Extubation in Patients Undergoing Coronary Artery Bypass Graft Surgery

Protocol summary

Study aim

Evaluating the effect of intravenous erythropoietin administration at the time of anesthesia induction on the incidence of postoperative delirium, hemodynamic stability, and time to tracheal extubation in patients undergoing coronary artery bypass graft (CABG) surgery in the cardiac intensive care unit.

Design

This randomized, triple-blind, placebo-controlled Phase II trial includes 104 CABG patients allocated 1:1 to intervention or control groups. Block randomization (size 4) was generated via Excel RAND function. Sample size (52/group; total 104) was calculated with 95% confidence and 80% power, accounting for dropouts.

Settings and conduct

This trial at Shahid Beheshti University hospitals involves CABG patients receiving erythropoietin (150 IU/kg) or placebo at induction. Outcomes include delirium (ICDSC), hemodynamics, and extubation time. It is triple-blind (patient, anesthesiologist, assessor, statistician) using identical coded syringes.

Participants/Inclusion and exclusion criteria

Occurrence of postoperative stroke or hemorrhage
Receipt of high-dose opioids in the ICU: more than 2400 mcg of fentanyl equivalent within 24 hours (equivalent to a mean of 100 mcg/hour) or 240 mg of morphine equivalent within 24 hours (equivalent to 10 mg/hour)
Prolonged surgery duration exceeding 3 hours
Concurrent valve surgery BMI > 38 kg/m² Need for re-operation

Intervention groups

Intervention Group: Patients in this group will receive a single intravenous (IV) dose of erythropoietin at 150 IU/kg body weight administered at the time of anesthesia induction. Control Group: Patients in this group will receive an equivalent volume of normal saline as a

placebo, administered intravenously (IV) at the time of anesthesia induction.

Main outcome variables

Incidence of postoperative delirium; Hemodynamic stability; Time to tracheal extubation

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20231021059795N2**

Registration date: **2026-06-10, 1405/03/20**

Registration timing: **prospective**

Last update: **2026-06-10, 1405/03/20**

Update count: **0**

Registration date

2026-06-10, 1405/03/20

Registrant information

Name

Maryam Aligholizadeh

Name of organization / entity

Country

Iran (Islamic Republic of)

Phone

+98 13 4351 2673

Email address

gholizade001@gmail.com

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-06-22, 1405/04/01

Expected recruitment end date

2026-09-23, 1405/07/01

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

The Effect of Intravenous Erythropoietin Administration at the Time of Anesthesia Induction on the Incidence of Delirium, Hemodynamic Stability, and Time to Tracheal Extubation in Patients Undergoing Coronary Artery Bypass Graft Surgery

Public title

The effect of intravenous erythropoietin administration at the time of anesthesia induction on the incidence of delirium, hemodynamic stability, and time to tracheal extubation in patients undergoing coronary artery bypass graft (CABG) surgery

Purpose

Prevention

Inclusion/Exclusion criteria**Inclusion criteria:**

Age 40 to 80 years ASA physical status classification I, II, or III No history of postoperative delirium No underlying psychiatric disorders or use of antipsychotic medications No history of alcohol consumption or cerebrovascular disease

Exclusion criteria:

Occurrence of postoperative stroke or hemorrhage. Receipt of high-dose opioids in the ICU: more than 2400 mcg of fentanyl equivalent within 24 hours (equivalent to a mean of 100 mcg/hour) or 240 mg of morphine equivalent within 24 hours (equivalent to 10 mg/hour). Prolonged surgery duration exceeding 3 hours. Concurrent valve surgery. BMI > 38 kg/m². Need for re-operation

Age

From **40 years** old to **80 years** old

Gender

Both

Phase

3

Groups that have been masked

- Participant
- Care provider
- Investigator
- Outcome assessor
- Data analyser

Sample size

Target sample size: **104**

Randomization (investigator's opinion)

Randomized

Randomization description

In this study, the block randomization method will be used using blocks of six in random order. Then the patients who will meet the entry criteria; According to the block randomization method, they will be placed in

groups (in this method, the treatment blocks are moved back and forth randomly and different situations can be created with blocks of length 6 for two groups, for example: ABCABC-BACABC-ABCBAC-ABCCBA... and The mentioned situations continue until the sample volume is filled). Blocks will be randomly selected with Excel software and at the disposal of a researcher who has no involvement in choosing the type of intervention; Placed.

Blinding (investigator's opinion)

Triple blinded

Blinding description

Blinding Method: This study will be conducted as a triple-blind trial. To achieve this, after generating the random sequence using Excel software, the intervention drug (Erythropoietin) and the placebo (Normal Saline) will be prepared in identical, unlabeled syringes. A unique numeric code will be assigned to each syringe, and the key linking codes to the specific treatments will be kept in sealed, opaque envelopes, accessible only in emergency situations. In this study: Patients are blinded to the type of treatment received (Erythropoietin or Placebo). The Anesthesiologist administering the drug is unaware of the syringe contents and administers the injection solely based on the assigned code. Outcome Assessors, including trained ICU nurses responsible for recording delirium scores (ICDSC), hemodynamic parameters, and tracheal extubation time, are blinded to the patients' group assignments. The Statistical Analyst will remain blinded to the group allocations until the completion of data analysis. All personnel involved in data collection will receive adequate training prior to the study commencement to ensure the integrity of the blinding process.

Placebo

Used

Assignment

Parallel

Other design features**Secondary Ids**

empty

Ethics committees

1

Ethics committee**Name of ethics committee**

Shahid Beheshti University of Medical Sciences

Street address

تهران- بزرگراه شهید چمران - خیابان یمن - خیابان اعرابی،
دانشگاه علوم پزشکی و خدمات بهداشتی درمانی شهید بهشتی-
ساختمان شماره دو ستاد دانشگاه- طبقه ششم

City

Tehran

Province

Tehran

Postal code

23872206

Approval date

2025-11-23, 1404/09/02

Ethics committee reference number

IR.SBMU.REC.1404.003

Health conditions studied**1****Description of health condition studied**

delirium

ICD-10 code

T88.5

ICD-10 code description

Other complications of anesthesia

2**Description of health condition studied**

Extubation time

ICD-10 code

T88.5

ICD-10 code description

Other complications of anesthesia

3**Description of health condition studied**

Hemodynamic stability

ICD-10 code

T88.5

ICD-10 code description

Other complications of anesthesia

Primary outcomes**1****Description**

Incidence rate of delirium after cardiac surgery

Timepoint

Every 6 hours after surgery for up to 72 hours

Method of measurement

Intensive Care Delirium Screening Checklist (ICDSC)

2**Description**

Extubation time

Timepoint

Up to the first 12 hours of the postoperative period

Method of measurement

Registering patients' extubation time (according to hours: during the first 4 hours after entering the ward, the first 6 hours after entering the ward, the first 8 hours after entering the ward, the first 12 hours after entering the ward)

3**Description**

hemodynamic stability

Timepoint

Every 6 hours after surgery for up to 72 hours

Method of measurement

Invasive monitoring devices (IBP, CVP, EKG, pulse oximetry) and arterial blood gas (ABG) analysis are used to record hemodynamic and respiratory parameters.

Secondary outcomes

empty

Intervention groups**1****Description**

Patients will receive a single intravenous dose of erythropoietin (150 IU/kg) at the time of anesthesia induction.

Category

Treatment - Drugs

2**Description**

Patients will receive an equivalent volume of normal saline as a placebo, administered intravenously at the time of anesthesia induction.

Category

Placebo

Recruitment centers**1****Recruitment center****Name of recruitment center**

Modares Hospital

Full name of responsible person

Maryam Aligholizadeh

Street address

Yadgar Imam Highway (RA) - Saadat Abad Intersection

City

Tehran

Province

Tehran

Postal code

021-23515

Phone

+98 21 23515

Email

gholizade001@gmail.com

Sponsors / Funding sources**1****Sponsor****Name of organization / entity**

Shahid Beheshti University of Medical Sciences

Full name of responsible person

Deputy Director of Research and Technology

Street address

Tehran - Shahid Chamran Highway - Yemen Street -
Shahid A'arabi Street - Building No. 2 - 5th Floor

City

Tehran

Province

Tehran

Postal code

021-22439780

Phone

+98 21 2243 9780

Email

gholizade001@gmail.com

Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?

Yes

Title of funding source

Shahid Beheshti University of Medical Sciences

Proportion provided by this source

100

Public or private sector

Public

Domestic or foreign origin

Domestic

Category of foreign source of funding

empty

Country of origin

Type of organization providing the funding

Academic

Person responsible for general inquiries

Contact

Name of organization / entity

Shahid Beheshti University of Medical Sciences

Full name of responsible person

Siavash Sangi

Position

Faculty member

Latest degree

Master

Other areas of specialty/work

Anesthesiology

Street address

Niayesh Intersection - Shahid Beheshti School of
Nursing and Midwifery

City

Tehran

Province

Tehran

Postal code

1996835119

Phone

88655366

Email

siavashsangi@gmail.com

Person responsible for scientific inquiries

Contact

Name of organization / entity

Shahid Beheshti University of Medical Sciences

Full name of responsible person

Maryam Aligholizadeh

Position

Faculty member

Latest degree

Master

Other areas of specialty/work

Anesthesiology

Street address

Niayesh Intersection - Shahid Beheshti School of
Nursing and Midwifery

City

Tehran

Province

Tehran

Postal code

1996835119

Phone

88655366

Email

gholizade001@gmail.com

Person responsible for updating data

Contact

Name of organization / entity

Shahid Beheshti University of Medical Sciences

Full name of responsible person

Maryam Aligholizadeh

Position

Faculty member

Latest degree

Master

Other areas of specialty/work

Anesthesiology

Street address

Tehran, Vali Asr Street, Ayatollah Hashemi Rafsanjani
Highway Intersection, in front of Shahid Rajaee Heart
Hospital, Faculty of Nursing and Midwifery

City

Tehran

Province

Tehran

Postal code

1996835119

Phone

88655366

Email

gholizade001@gmail.com

Sharing plan

Deidentified Individual Participant Data Set (IPD)

Yes - There is a plan to make this available

Study Protocol

No - There is not a plan to make this available

Statistical Analysis Plan

No - There is not a plan to make this available

Informed Consent Form

Yes - There is a plan to make this available

Clinical Study Report

Yes - There is a plan to make this available

Analytic Code

No - There is not a plan to make this available

Data Dictionary

Not applicable

Title and more details about the data/document

Only a part of the data, such as the information related to the main result or the like, can be shared.

When the data will become available and for how long

Access period 6 months after publication of results

To whom data/document is available

-It will be available only to researchers working in academic and scientific institutions.

Under which criteria data/document could be used

No special conditions are considered.

From where data/document is obtainable

En Person responsible for the study: Maryam

Aligholizadeh gholizade001@gmail.com

What processes are involved for a request to access data/document

After receiving the applicant's email, the documents will be sent in a short period of time.

Comments