Clinical Trial Protocol
Iranian Registry of Clinical Trials

18 Sep 2026

Comparison of ultrasound-guided radial artery cannulation with Doppler guidance technique and palpation technique in patient undergoing cardiac surgery referred to Shahid Rajaei Heart Center in Tehran: A clinical trial

Protocol summary

Study aim
The aim of this study is to compare the success rate of radial artery cannulation in three ways: ultrasound-guided, Doppler and palpation of the radial artery in patients undergoing heart surgery.

Design
A study of a randomized clinical trial with a control group, one-blind, with a parallel design on 300 patients undergoing cardiac surgery Which are randomly assigned to three equal groups and for random assignment, the randomization block balance method with backward and forward hexagonal blocks is used.

Settings and conduct
The study will be performed on patients undergoing cardiac surgery referred to Shahid Rajaei Heart Center in Tehran. The procedure is performed in the operating room of Shahid Rajaei Hospital. Patients will be randomly divided into three groups and arterial line will be performed by three methods: touch, ultrasound and Doppler. The study is a blind study that only the patient does not know about the study group.

Participants/Inclusion and exclusion criteria
inclusion criteria: Patients over 18 years of age undergoing cardiac surgery

Intervention groups
Doppler group Ultrasound group

Main outcome variables
Success in the first attempt at cannulation

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20161127031131N4**
Registration date: **2022-05-10, 1401/02/20**
Registration timing: **prospective**

Last update: **2022-05-10, 1401/02/20**
Update count: **0**

Registration date
2022-05-10, 1401/02/20

Registrant information
Name
Rasoul Azarfarin
Name of organization / entity
Country
Iran (Islamic Republic of)
Phone
+98 21 2392 2017
Email address
azarfarin@rhc.ac.ir

Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2022-05-22, 1401/03/01

Expected recruitment end date
2022-09-23, 1401/07/01

Actual recruitment start date
empty

Actual recruitment end date
empty

Trial completion date
empty

Scientific title
Comparison of ultrasound-guided radial artery cannulation with Doppler guidance technique and palpation technique in patient undergoing cardiac surgery referred to Shahid Rajaei Heart Center in Tehran:

A clinical trial

Public title
Guided radial artery cannulation in patient undergoing cardiac
Purpose
Treatment
Inclusion/Exclusion criteria
Inclusion criteria:
Patients over 18 years of age undergoing cardiac surgery
Exclusion criteria:
Patients under 18 years Patients with peripheral vascular disease Patients with vascular collagen diseases Patients with inflamed skin near the puncture site Patients with cold and mottled skin and weak capillary refill Patients who have undergone radial artery cannulation for the past 30 days
Age
From **18 years** old
Gender
Both

Phase
N/A
Groups that have been masked

- Participant

Sample size
Target sample size: **300**
Randomization (investigator's opinion)
Randomized
Randomization description
In this study, patients are randomly assigned to three equal groups and for random allocation, permuted block randomization with hexagonal blocks is used.
Blinding (investigator's opinion)
Single blinded
Blinding description
In this study, the patient is unaware of which group he is in, but the patient's caregivers (physician and nurse) and statistical analyst are aware. In this study, after obtaining the patient's consent, it is explained that he is in one of the three groups of touch, Doppler or ultrasound.
Placebo
Not used
Assignment
Parallel
Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
کمیته اخلاق دانشگاه علوم پزشکی ایران
Street address
Shaheed Rajaie Cardiovascular, Medical & Research Center
City
Tehran
Province
Tehran
Postal code
1995614331
Approval date
2021-09-25, 1400/07/03
Ethics committee reference number
IR.RHC.REC.1400.044

Health conditions studied

1

Description of health condition studied
Radial artery cannulation
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
Success in the first attempt at cannulation
Timepoint
The time of the first puncture
Method of measurement
See blood at the end of the leader cath And measure its time

Secondary outcomes

1

Description
cannulation time: It is a measured time from skin puncture to successful cannulation, which is described as the observation of blood at the end of the lead.
Timepoint
From skin puncture to successful cannulation, which takes less than 5 minutes, is considered a successful procedure.
Method of measurement
Successful cannulation in 5 minutes using a stopwatch

2

Description
Examination of complications such as arterial spasm, hematoma, infection, thrombosis, ischemia, complex pain syndrome, which will be followed up in the intensive care unit up to 72 hours later.
Timepoint
The patient's hand in which the radial artery cannulation has been performed will undergo a clinical examination for complications immediately after the procedure (0), 24, 48 and 72 hours after the procedure.
Method of measurement
Physical examination

Intervention groups

1

Description
Control group: For cannulation with palpation technique , the anesthesiologist touches the pulse of the radial artery with a non-dominant hand. The catheter will be advanced towards the radial artery, at 15–30 degrees to the skin, until blood observes in the catheter hub, Guidewire is then inserted through the needle. The leader catheter is then connected to the transducer so that arterial waves appear on the monitoring screen.
Category
Treatment - Devices

2

Description
Intervention group: Doppler group: In the Doppler-guided radial artery cannulation method, the Doppler probe is placed in the non-dominant hand of the anesthesiologist to determine the location of the highest pulsating signal. The needle is inserted through the anesthetized skin. An increase or decrease in Doppler tone is a sign that the needle is being pressed against the artery. The needle is then pushed forward until the Doppler tone returns to baseline (indicating reopening of the artery) or pulsating blood appears at the end of the needle. Guidewire is then inserted through the needle and after removing the needle, the leader catheter is placed in place. The leader catheter is then connected to the transducer so that arterial waves appear on the monitoring screen.
Category
Treatment - Devices

3

Description
Intervention group: Ultrasound group: For ultrasound-guided arterial cannulation, the ultrasound probe detects the radial artery perpendicular to its longitudinal axis approximately 5 mm proximal to the skin puncture site. The needle is pushed at an angle of 15-30 degrees to the skin until the catheter tip is visible on the screen. The position of the catheter is adjusted until the tip of the catheter comes in contact with the artery. Guidewire is then inserted through the needle and after removing the needle, the leader catheter is placed in place. The leader catheter is then connected to the transducer so that arterial waves appear on the monitoring screen.
Category
Treatment - Devices

Recruitment centers

1

Recruitment center
Name of recruitment center
Shahid Rajaei Hospital
Full name of responsible person
Rasoul Azarfarin
Street address
Vali Asr Street (AS) - next to Mellat Park
City
Tehran
Province
Tehran
Postal code
1995614331
Phone
+98 21 23921
Fax
+98 21 2204 2026
Email
azarfarinr@gmail.com
Web page address
http://rhc.ac.ir

Sponsors / Funding sources

1

Sponsor
Name of organization / entity
Iran University of Medical Sciences
Full name of responsible person
سعیده مظلوم زاده
Street address
Shaheed Rajaie Cardiovascular, Medical & Research Center
City
Tehran
Province
Tehran
Postal code
1995614331
Phone
+98 21 23921
Fax
+98 21 2204 2026
Email
sa.mazloom@gmail.com
Web page address
http://rhc.ac.ir
Grant name
Grant code / Reference number
Is the source of funding the same sponsor organization/entity?
Yes
Title of funding source
Iran 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
Iran University of Medical Sciences

Full name of responsible person
Yasmin Chaibakhsh Langroudi

Position
Flowship

Latest degree
Specialist

Other areas of specialty/work
Anesthesiology

Street address
Shaheed Rajaie Cardiovascular, Medical & Research Center

City
Tehran

Province
Tehran

Postal code
1995614331

Phone
+98 21 23921

Fax
+98 21 2204 2026

Email
yasmin.chaibakhsh@gmail.com

Web page address
http://rhc.ac.ir

Person responsible for updating data

Contact

Name of organization / entity
Iran University of Medical Sciences

Full name of responsible person
Yasmin Chaibakhsh Langroudi

Position
Flowship

Latest degree
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Other areas of specialty/work
Anesthesiology

Street address
Shaheed Rajaie Cardiovascular, Medical & Research Center

City
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Province
Tehran

Postal code
1995614331

Phone
+98 21 23921

Fax
+98 21 2204 2026

Email
yasmin.chaibakhsh@gmail.com

Web page address
http://rhc.ac.ir

Person responsible for scientific inquiries

Contact

Name of organization / entity
Iran University of Medical Sciences

Full name of responsible person
Rasoul Azarfarin

Position
professor

Latest degree
Subspecialist

Other areas of specialty/work
Anesthesiology

Street address
Shaheed Rajaie Cardiovascular, Medical & Research Center

City
Tehran

Province
Tehran

Postal code
1995614331

Phone
+98 21 23921

Fax
+98 21 2204 2026

Email
azarfarinr@gmail.com

Web page address
http://rhc.ac.ir

Sharing plan

Deidentified Individual Participant Data Set (IPD)
Yes - There is a plan to make this available

Study Protocol
Yes - There is a plan to make this available

Statistical Analysis Plan
Yes - There is 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
Yes - There is a plan to make this available

Data Dictionary
Yes - There is a plan to make this available

Title and more details about the data/document
All data is potentially shareable after unidentified individuals

When the data will become available and for how long
Data will be available after the article is published

To whom data/document is available
Information will be available to academic researchers

Under which criteria data/document could be used
Use of information is permitted provided the source is acknowledge

From where data/document is obtainable
Applicants can request the required information by sending an email to yasmin.chaibakhsh@gmail.com

What processes are involved for a request to access

data/document

Information will be sent to them within one week of sending the email

Comments