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A comparison between different strategies to handle anticoagulation during cardiac surgery

Submission date
19/12/2014

Recruitment status
No longer recruiting

Registration date
14/01/2015

Overall study status
Completed

Last Edited
09/02/2023

Condition category
Circulatory System

[_] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Bleeding after surgery (postoperative bleeding) is one of the most common complications that occur after heart (cardiac) surgery involving cardiopulmonary bypass (CPB). CPB Is a technique where a machine takes over the work of the heart and lungs during surgery, adding oxygen to the blood and circulating it around the body. Postoperative bleeding is, at least in part, due to the patient's blood being in contact with the artificial surface of the CPB circuit over a long period of time. Contact with this surface causes the blood to clot and so drugs such as heparin are used to stop this clotting from happening. Heparin is given to the patient either as a fixed dose based on the patients weight or by measuring the individual response of the patient to the heparin given. It is not known which strategy is the best in order to best maintains hemostasis (the process that stops the blood from clotting) after the operation. Here, we are going to compare these two strategies.

Who can participate?
All patients that undergo coronary artery bypass grafting or valve replacement.

What does the study involve?
Participants are randomly allocated into one of two groups. Those in group 1 (intervention group) are given heparin via the HEPCON Haemostasis Management System Plus device (Medtronic Inc, Minneapolis, Minnesota). After estimating the patients' blood volume (how much blood they have)and heparin sensitivity (how they react to heparin), the amount of heparin given (dose), the response of the patient to the dose given (heparin dose response) and ACT (amount of time it takes for the blood to clot – activated clotting time) are determined using the HEPCON device. The amount of heparin needed to maintain a desired blood clotting time is estimated every 20 to 30 minutes throughout the surgery. At the end of the CPB, the amount of a drug called protamine, used to neutralise the effects of heparin, is also established using the HEPCON device. Those participants in group 2 (control group) are given a dose of heparin needed to achieve a desired blood clotting time according to their body weight. Heparin monitoring during the surgery is performed by standard ACT. After CPB, the heparin is neutralised by giving protamine. For both groups, blood sampling during and after the operation are taken as are recording of any bleeding and transfusions.

What are the possible benefits and risks of participating?
No immediate benefits but the information gained can be used to improve cardiac operations

Where is the study run from?
Sahlgrenska University Hospital in Gothenburg (Sweden)

When is the study starting and how long is it expected to run for?
January 2011 to April 2013

Who is funding the study?
1. Västra Götaland region (Sweden)
2. Swedish Heart and Lung Foundation (Sweden)

Who is the main contact?
Professor Anders Jeppsson
anders.jeppsson@vgregion.se

Contact information

Type(s)
Scientific

Contact name
Dr Anders Jeppsson

ORCID ID
https://orcid.org/0000-0003-2356-2295

Contact details
Department of Cardiothoracic Surgery
Sahlgrenska University Hospital
Gothenburg
Sweden
413 45
+46313427515
anders.jeppsson@vgregion.se

Additional identifiers

Protocol serial number
308-11

Study information

Scientific Title
Heparin titration vs standard dosing - effects on postoperative hemostasis: a prospective randomized study

Study objectives

Anticoagulation management during cardiopulmonary bypass based on heparin and protamine titration preserves the hemostatic capacity better than weight based heparin dosing

Ethics approval required
Old ethics approval format

Ethics approval(s)
Regional Research Ethics Committee in Gothenburg, 18/04/2011, ref: 308-11

Primary study design
Interventional

Study design
Prospective randomized open controlled single center study with blinded evaluation

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Study anticoagulation strategies during cardiopulmonary bypass.

Interventions
1. Intervention group: HEPCON Haemostasis Management System Plus device (Medtronic Inc, Minneapolis, Minnesota) was used, according to manufacturer's recommendations. After estimating the patients' blood volume and individualized heparin sensitivity, the initial bolus heparin dose, heparin dose response and ACT were determined using a six channel cartridge (two channels with heparin concentration 2.5 U/ml, two with heparin concentration 1.5 U/ml and two without added heparin). Since the CPB circuit has already been primed with 10 000 U heparin, only bolus doses of heparin were estimated every 20 to 30 min throughout the surgery, in order to maintain target ACT above 480 s. At the end of the CPB, the protamine dose required for heparin neutralization was also established using the device.
2. Control group: The patients received unfractionated heparin (350 units/kg body weight) in order to achieve target activated clotting time (ACT) of more than 480 seconds. Heparin monitoring intraoperatively was performed by standard ACT (HEMOCHRON Jr. ACT+ [ITC, Edison,NJ]). After CPB, the heparin was reversed by administration of protamine sulphate (1mg protamine/100 units of the initial heparin dose).

Intervention Type
Device

Primary outcome(s)
Endogenous thrombin potential in plasma 2 hours after surgery as assessed by calibrated automated thrombogram.

Key secondary outcome(s)
1. Total heparin and protamine doses during the operation
2. Whole blood clot formation as measured with thromboelastometry 10 min, 2h and 4h after the operation

3. Hemostatic analyses (aPTT, PT, anti-thrombin, fibrinogen, platelet count) 10 min, 2h and 4h after the operation
4. Postoperative bleeding volume the first 12 h, Red blood cell transfusion during hospital stay

Completion date
01/04/2013

Eligibility

Key inclusion criteria
1. Patients undergoing elective coronary artery bypass grafting surgery or single valve repair /replacement on cardiopulmonary bypass
2. >18 years old

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Sex
All

Total final enrolment
60

Key exclusion criteria
1. Acute operation
2. Known bleeding disorder, liver or kidney disease,
3. Previous stroke
4. Treatment with a P2Y12 receptor antagonist <5 days before surgery

Date of first enrolment
25/10/2011

Date of final enrolment
15/01/2013

Locations

Countries of recruitment
Sweden

Study participating centre
Sahlgrenska University Hospital
Gothenburg
Sweden
41345

Sponsor information

Organisation
Sahlgrenska University Hospital

ROR
https://ror.org/04vgqjj36

Funder(s)

Funder type
Not defined

Funder Name
Västra Götaland Region (Sweden)

Funder Name
Hjärt-Lungfonden

Alternative Name(s)
Swedish Heart-Lung Foundation, Hjart Lungfonden

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
Sweden

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are/will be available upon request

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	02/07/2015		Yes	No
Protocol (other)			09/02/2023	No	No