

ROLO The Renoprotective value of Leukodepletion in Heart Valve surgery

Submission date 18/02/2014	Recruitment status No longer recruiting	☐ Prospectively registered ☐ Protocol
Registration date 18/02/2014	Overall study status Completed	☐ Statistical analysis plan ☒ Results
Last Edited 29/03/2021	Condition category Circulatory System	☐ Individual participant data

Plain English summary of protocol

Background and study aims

Having a heart operation can affect the functioning of other organs in the body and sometimes people suffer from damage to their kidneys as a result of their surgery. This is called acute kidney injury. The risk of acute kidney injury is greater in people having heart valve operations compared to other types of heart operation. Most people completely recover from heart surgery related acute kidney injury, but some people will experience long-term kidney disease, affecting their quality of life. Acute kidney injury can increase the length of time patients spend in hospital after their operation and therefore increase the cost of care. One of the reasons heart valve surgery patients suffer from acute kidney injury is because during the operation people are attached to a heart-lung bypass machine. This machine takes over the job of pumping blood around the body whilst the heart is being operated on. The white blood cells circulating in the blood then react to the materials in the heart-lung bypass machine, which activates them and causes inflammation throughout the body. This inflammation can damage the kidneys. This study is looking to see if removing the activated white blood cells from the blood (through a special filter in the heart-lung bypass machine) during surgery will reduce damage to the kidneys.

Who can participate?

Males and females, aged between 18-89 years, having planned heart valve surgery.

What does the study involve?

Participants are randomly allocated to one of two groups. In the standard group a standard filter will be used in the heart bypass machine. This will filter the blood in the normal way but it won't filter out the white blood cells. This is standard practice at the hospital where the study is being held. In the new group a new filter will be used in the heart bypass machine, which will filter the blood in the same way as the standard filter but will also filter out the white blood cells. Participants will be followed for 3 months to see if they develop acute kidney injury after surgery. We will also see how well participants recover in general.

What are the possible benefits and risks of participating?

Possible benefits for patients who have their surgery using the new filter may be reduced kidney damage after surgery. This may lead to reduced recovery times and improved health after surgery, although this cannot be guaranteed. Little is known in terms of risks or adverse effects

associated with the new filter. In theory there is a small risk of contamination when the new filter is inserted into the heart-lung bypass machine and also a small risk of the filter clotting, but these are both thought to be negligible. Patients who have their surgery using the standard filter as part of the study will have no benefits or risks above those patients who do not take part in the study, as the standard filter is used routinely during heart surgery outside of the study.

Where is the study run from?

The study is being run from Blackpool, Fylde and Wyre Hospitals NHS Foundation Trust with the University of Bristol providing management support.

When is the study starting and how long is it expected to run for?

September 2011 to April 2017

Who is funding the study?

National Institute for Health Research (NIHR), UK.

Who is the main contact?

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Contact information

Type(s)

Scientific

Contact name

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Additional identifiers

Protocol serial number

15826

Study information

Scientific Title

The Renoprotective value of Leukodepletion in Heart Valve surgery: an external feasibility randomised controlled trial

Study objectives

That leukodepletion during cardiopulmonary bypass will reduce the incidence and severity of cardiac surgery related acute kidney injury (CSA-AKI) and therefore improve clinical outcomes in patients undergoing heart valve surgery.

Ethics approval required

Old ethics approval format

Ethics approval(s)

North West - Preston REC, 04/11/2013, ref: 13.NW.0728

Primary study design

Interventional

Study design

Randomised; Interventional; Design type: Treatment

Study type(s)

Treatment

Health condition(s) or problem(s) studied

Topic: Cardiovascular; Subtopic: Cardiovascular (all Subtopics); Disease: Cardiovascular

Interventions

Current interventions as of 18/05/2017:

Eligible patients are randomised either to a LG6B leukocyte-depleting filter, or a standard 40µm filter into the arterial line of the extracorporeal circuit downstream from the CPB pump.

All patients are managed according to the local standard CPB protocol for valve surgery using mild hypothermic CPB and intermittent antegrade or combined antegrade and retrograde cold blood cardioplegic arrest. Surgical procedures, anaesthesia and post-intervention treatment are all managed according to local standard procedure.

The intervention lasts as long as the patient is attached to the CPB machine. After discharge from hospital, patients are followed up at 6-weeks and 3 months.

Previous interventions:

Control: Standard heart valve surgery will be carried out incorporating a Pall corporation standard 40 µm filter into the arterial line of the extracorporeal circuit downstream from the CPB pump.

Leukodepletion filter (LG6): Standard heart valve surgery will be carried out incorporating a Pall corporation LG6B leukocyte-depleting filter into the arterial line of the extracorporeal circuit downstream from the CPB pump.

Follow Up Length: 3 month(s)

Intervention Type

Other

Phase

Not Applicable

Primary outcome(s)

Current outcome measure as of 18/05/2017:

The development of AKI is measured using the Kidney Disease: Improving Global Outcomes" (KDIGO) definition of AKI, endorsed in the Renal Association Clinical Guidelines in the period from surgery until 6 weeks after the operation date.

Previous primary outcome measure:

Primary outcome; Timepoint(s): Development of AKI in the period from surgery until 6 weeks post-op using KDIGO criteria

Key secondary outcome(s)

Current secondary outcome measures as of 18/05/2017:

1. Proportion of elective patients undergoing elective heart valve eligible for the trial
2. Proportion of eligible patients who agree to participate
3. Tubular kidney injury using the following biomarkers: urinary excretion ratio of Retinol Binding Protein (RBP) to Creatinine (RBP:Cr), urinary excretion ratio of Kidney Injury Molecule-1 to Creatinine (KIM-1:Cr) and urinary NGAL measured at the end of CPB, and at 4, 24, 48 and 72 hours after surgery. RBP:Cr has previously been validated in cardiac surgical patients (16, 17), but recently reviewed evidence suggests that KIM-1:Cr may be a superior biomarker (17, 18).
4. Glomerular kidney injury using the following biomarkers: urinary excretion ratio of Albumin to creatinine (A:Cr) and serum Cystatin C measured at the end of CPB, and at 4, 24, 48 and 72 hours after surgery. These markers, which have potentially better sensitivity compared to glomerular filtration rate(19), allow for early detection of renal injury before conventional clinical parameters, e.g. blood urea and serum creatinine become abnormal
5. Total diuretic dosage over first 5 postoperative days
6. Daily fluid balance (total input and output) over first 5 postoperative days
7. Adverse events including: in-hospital mortality, need for haemodialysis (continuous veno-venous hemofiltration, CVVH) and infection rates in the period from surgery to 12-weeks
8. Length of post-operative stay in hospital (intensive care and ward days) and other resource use in the period from surgery to 12-weeks
9. Health-related Quality of life (HRQoL) assessment: Minnesota Living with Heart Failure Questionnaire (MLHFQ) and EQ-5D measured at baseline, 5 days, 6 and 12 weeks. The MLHFQ27 is recommended as the most responsive validated disease-specific measure for heart failure(20). It is also one of the few measures specifically validated for heart valve surgery, demonstrating superior sensitivity to the SF36(29) and good responsiveness with elderly patients(21). In order to evaluate the relative magnitude of changes in quality of life across health conditions, it is standard practice to include a generic HRQoL measure. The EQ-5D is a generic measure that enables the evaluation of both impact and cost in a single measure(22, 23), which has been widely used in a range of cardiac surgery studies(24-27). The recently revised version of the EQ-5D-5L(28), with 5 levels of impairment (the standard version has 3 levels), will be used.

Previous secondary outcome measures

1. Evaluation of tubular kidney injury using the following biomarkers: urinary excretion ratio of Retinol Binding Protein (RBP) to Creatinine (RBP:Cr) and urinary excretion ratio of Kidney Injury Molecule-1 to Creatinine (KIM-1:Cr)
2. Evaluation of glomerular kidney injury using the following biomarkers: urinary excretion ratio of Albumin to creatinine (A:Cr) and serum Cystatin C measurement
3. Total diuretic dosage over first 5 postoperative days
4. Daily fluid balance (total input and output)

5. Adverse events including: in-hospital mortality, need for haemodialysis (CVVH) and infection rates
6. Length of post-operative stay in hospital (intensive care and ward days) and other resource use required for the economic evaluation
7. Health-related Quality of life (HRQoL) assessment: Minnesota Living with Heart Failure Questionnaire (MLHFQ) and EQ-5D

Completion date

01/04/2017

Eligibility

Key inclusion criteria

1. Adults aged 18-89 years having single or multiple heart valve repair or replacement as a first time or redo operation as an elective or urgent procedure (i.e. non-emergency procedure), who are able to give informed consent
 2. Patients with or without concomitant procedures. Concomitant procedures may include but are not restricted to: coronary artery bypass graft (CABG), ascending aortic and/or root replacement, and ablation for atrial fibrillation
 3. Baseline urea and creatinine levels are within normal range, defined as follows: urea 2.5 to 7.8 mmol/L; creatinine 45 to 90 µmol/L for women and 60 to 110 µmol/L for men. Patients taking medications that may influence renal function, such as aspirin, statins, beta adrenergic antagonists, calcium channel antagonists, ACE inhibitors, diuretics and other cardiac medications, can be included provided that baseline urea and creatinine levels are within the normal ranges given above
- Target Gender: Male & Female; Upper Age Limit 89 years ; Lower Age Limit 18 years

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 Years

Upper age limit

89 Years

Sex

All

Total final enrolment

64

Key exclusion criteria

1. Baseline eGFR <30 ml/min/1.73m²
2. Patients on renal replacement therapy
3. Planned deep hypothermic circulatory arrest with cardiopulmonary bypass switched off
4. Patients participating in any other interventional research study (until the end of the follow-up period of the study). Participation in an observational study will not preclude participation in ROLO

Date of first enrolment

01/02/2014

Date of final enrolment

02/12/2015

Locations

Countries of recruitment

United Kingdom

England

Study participating centre

Blackpool Teaching Hospitals NHS Foundation Trust

Whinney Heys Road

Blackpool

United Kingdom

FY3 8NR

Sponsor information

Organisation

Blackpool, Fylde and Wyre Hospitals NHS Trust (UK)

ROR

<https://ror.org/03444yt49>

Funder(s)

Funder type

Government

Funder Name

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study will be available upon request from bristol-cteu@bristol.ac.uk

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		26/03/2021	29/03/2021	Yes	No