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Investigating changes in brain networks and cognition after heart surgery

Submission date
28/06/2018

Recruitment status
Stopped

Registration date
08/08/2018

Overall study status
Stopped

Last Edited
03/10/2024

Condition category
Circulatory System

[X] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
Cognitive impairment is common after cardiac (heart) surgery, particularly in older people. Up to six in every 10 patients who undergo cardiac surgery have some degree of cognitive impairment six months after their surgery. The mechanisms involved are unclear. Recent research in brain imaging has identified some regions of the brain involved in learning and memory which are working when the brain is “at rest”, that is when the subject is not performing an explicit cognitive task. These brain networks, so called “resting state networks”, represent the baseline, or default, mode of the brain. Brain imaging studies have shown that when the activity of resting state networks is reduced, patients are more likely to develop cognitive impairment. There is currently limited evidence to suggest whether cardiac surgery causes damage to resting state networks thus leading to cognitive impairment. This study will investigate changes in resting state networks in 20 patients undergoing cardiac surgery with cardiopulmonary bypass (CPB) using functional brain magnetic resonance imaging (fMRI). This study will help doctors to better understand the mechanisms leading to cognitive impairment following cardiac surgery and will aid in the development of preventive strategies and new treatments.

Who can participate?
Patients aged between 60 and 75 undergoing coronary artery bypass surgery (CABG) with CPB at the Bristol Heart Institute

What does the study involve?
All patients undergo two fMRI scans and cognitive assessments. The first scan and cognitive assessments take place around 1 week before their heart surgery and the second around 6 weeks after surgery. Each fMRI scan takes about 40 minutes. The cognitive tests take around 45 minutes and assess memory, coordination and levels of attention.

What are the possible benefits and risks of participating?
There are no direct benefits of participating in this study. This study of the potential role of default mode networks in CPB-related cognitive decline could aid the development of interventions to improve neurocognitive outcomes following surgery, such as cognitive training and physical exercise. There are no associated risks with functional MRI or the neurocognitive assessments.

Where is the study run from?
University Hospitals Bristol NHS Foundation Trust (UK)

When is the study starting and how long is it expected to run for?
April 2018 to March 2020

Who is funding the study?
Above and Beyond (UK)

Who is the main contact?
Mr Jonathan Evans
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Contact information

Type(s)
Public

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Additional identifiers

Clinical Trials Information System (CTIS)

Nil known

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
N/A

Study information

Scientific Title
Investigation of neural mechanisms of COgnitive DEcline after Cardiac surgery with resting state fMRI (CODEC): a pilot study

Acronym
CODEC

Study objectives
The primary hypothesis is that default mode network connectivity is impaired following coronary artery bypass graft surgery with cardiopulmonary bypass and correlates with neurocognitive testing.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 03/12/2018, London - Hampstead Research Ethics Committee (Barlow House 3rd Floor, 4 Minshull Street, Manchester M1 3DZ; 0207 104 8345; NRESCommittee.London-Hampstead@nhs.net), ref: 18/LO/2121

Study design
Single-centre observational study

Primary study design
Observational

Study type(s)
Other

Health condition(s) or problem(s) studied
Cardiac disease/coronary artery bypass grafting

Interventions
Patients who consent will be required to undergo two functional MRI scans and neuro-cognitive assessments. Patients will have the first scan and neuro-cognitive assessments pre-surgery (1- 8 weeks before surgery date). The second scan and assessments will take place post-surgery (5-10 weeks post surgery date). Each fMRI scan will take approximately 40 minutes. The scans will take place at the Bristol Clinical Research and Imaging Centre. The neuro-cognitive assessment

involves tests that assess memory, coordination and levels of attention. As part of the assessment patients will also complete two questionnaires examining current mood/emotional state. Each neuro-cognitive assessment will take approximately 45 minutes.

Intervention Type
Other

Primary outcome(s)
The change from baseline in default mode network connectivity in the brain post cardiac surgery as assessed by resting state fMRI performed 5-10 weeks post operatively

Key secondary outcome(s))
1. Change from baseline in cognitive ability as assessed by standard neurocognitive tests administered 5- 10 weeks post operatively
2. Length of intensive care unit (ICU)/high dependency unit (HDU) stay. This outcome is assessed during the patient's hospital stay after their surgery.
3. All-cause mortality within 30 days of surgery
4. Clinical outcomes (assessed from surgery until follow up visit 5- 10 weeks post-surgery), defined as:
4.1. Infectious complications i.e. sepsis (defined antibiotic treatment for suspected infection, and the presence of SIRS1 within 24 hours prior to start of antibiotic treatment) or wound infection (ASEPSIS score >20; sternum, leg and arm (if applicable); wounds will be assessed at least once during a participant's hospital stay
4.2. Stroke (validated by CT scanning); assessment of brain imaging (CT or MRI), in association with new onset focal or generalised neurological deficit (defined as deficit in motor, sensory or co-ordination functions)
4.3. ST elevation myocardial infarction accompanied by troponin > 5 ng / ml
4.4. Post-operative acute kidney injury (defined as AKIN criteria stage 1, 2 or 3)
4.5. Respiratory complications i.e. re-intubation, ventilation

The study will also assess the relationship between cognitive decline assessed by the neurocognitive tests (secondary outcome 1) and changes in resting state network connectivity assessed by fMRI (primary outcome).

Completion date
09/02/2021

Reason abandoned (if study stopped)
Lack of staff/facilities/resources

Eligibility

Key inclusion criteria
1. Aged between 60-75 years
2. Electively referred for isolated coronary artery bypass grafting

Participant type(s)
Patient

Healthy volunteers allowed

No

Age group
Senior

Sex
All

Key exclusion criteria
1. Prisoners and adults lacking capacity to consent
2. Contraindications to MR (implanted electronic devices, metallic foreign bodies, claustrophobia, body weight >140 kg or waist perimeter exceeding manufacturer's recommendations and others according to manufacturer’s recommendations and generally accepted guidelines)
3. Patients with a neurological disorder (e.g. epilepsy, Alzheimer’s, dementia and Parkinson’s disease)
4. Patients with a diagnosed psychiatric disorder (e.g. schizophrenia, psychosis), drug or alcohol addiction
5. Patients with an already identified as having cognitive impairment (e.g. memory and/or attentional deficits) as defined by psychometric assessment or a preoperative Mini-mental State Examination score < 24. The Mini-mental State Examination will be adminstered after consent but prior to any of the cognitive assessements or fMRI scan
6. Patients who have previously sustained a stroke, intra-cerebral haemorrhage, acquired brain injury
7. Patients unable to complete the cognitive assessments required for the trial e.g. due to language difficulties, visual or hearing impairment

Date of first enrolment
15/04/2019

Date of final enrolment
01/12/2020

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
University Hospitals Bristol NHS Foundation Trust
Marlborough Street
Bristol
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Sponsor information

Organisation
University Hospitals Bristol NHS Foundation Trust

ROR
https://ror.org/04nm1cv11

Funder(s)

Funder type
Charity

Funder Name
Above and Beyond (Registered Charity Number: 229945)

Results and Publications

Individual participant data (IPD) sharing plan
Current IPD sharing statement as of 11/07/2019:
Anonymised individual patient data (baseline, operative, outcome data and adverse events) will be made available for secondary research, conditional on assurance from the secondary researcher that the proposed use of the data is compliant with the MRC Policy on Data Preservation and Sharing regarding scientific quality, ethical requirements and value for money. Please contact Prof. Chris Rogers (chris.rogers@bristol.ac.uk) to discuss any data requests. Data will be made after the study has been closed and the primary publication is out. It will be made available indefinitely. The patient information leaflet which participants consent to explains that we will only share information collected in this study with the participants' agreement. The consent form includes the following question ‘I give permission for data collected as part of this study to be used in future ethically approved studies’.

Previous IPD sharing statement:
Anonymised individual patient data (baseline, operative, outcome data and adverse events) will be made available for secondary research, conditional on assurance from the secondary researcher that the proposed use of the data is compliant with the MRC Policy on Data Preservation and Sharing regarding scientific quality, ethical requirements and value for money. Please contact Prof. Chris Rogers (chris.rogers@bristol.ac.uk) to discuss any data requests. Data will be made after the study has been closed and the primary publication is out. It will be made available indefinitely. The patient information leaflet which participants consent to explains that data may be provided to researchers running other research studies.

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
HRA research summary			28/06/2023	No	No