ISRCTN23564393 https://doi.org/10.1186/ISRCTN23564393

Does carbon dioxide reduce the chance of kidney problems in minimally invasive (endovascular) artery treatments?

Submission date
12/11/2024

Recruitment status
Recruiting

Registration date
29/11/2024

Overall study status
Ongoing

Last Edited
29/11/2024

Condition category
Circulatory System

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

Plain English summary of protocol

Background and study aims
One in five people suffer from narrowings or blockages in their leg arteries. This is called peripheral arterial disease (PAD). It leads to poor leg circulation, which can cause leg gangrene or infection. Sometimes this may even lead to amputation. To prevent this from happening, the affected arteries have to be opened. This is usually done using X-rays and balloons to stretch the arteries open. These procedures are the most common artery surgeries in the NHS. To be able to do these procedures, doctors use a dye injected into the artery. This dye can affect kidney function. Instead of the usual dye that causes kidney problems, carbon dioxide can be used. Carbon dioxide does not affect the kidneys. No previous research, however, has tested whether using carbon dioxide does indeed protect the kidneys in these procedures. This study aims to perform a multicentre trial to assess whether using an automated CO2 injector reduces the impact of endovascular revascularisation on renal function in patients with PAD and chronic kidney disease by reducing the amount of iodinated contrast medium necessary to complete the revascularisation. The study will also assess the acceptability, feasibility and factors that may influence the implementation of this technology in the NHS from the perspective of patients and practitioners and record and report the overall costs of performing endovascular lower limb revascularisation using an automated CO2 injector versus the usual NHS standard of care.

Who can participate?
People with peripheral arterial disease who are having a procedure to open their arteries

What does the study involve?
What does the study involve, and what can participants expect?
The KID trial is exploring the use of two types of contrast dyes in a procedure called endovascular revascularisation. This procedure is commonly performed to treat blocked leg arteries, improving blood flow and preventing complications such as severe pain, tissue damage, or even amputation in patients with Peripheral Arterial Disease (PAD).
The study focuses on comparing:
• Iodine-based contrast: A liquid dye that is the standard option in the NHS. While effective, it may negatively affect kidney function, particularly in patients with reduced kidney health.

• Carbon dioxide (CO_2) contrast: A gas already used for patients with impaired kidney function. CO_2 is quickly absorbed by the body and does not harm the kidneys, but further research is required to confirm its effectiveness compared to iodine-based contrast.
Participants will undergo the standard endovascular revascularisation procedure. This involves inserting a small, flexible tube (called a sheath) into a blood vessel, typically near the groin, to access the blocked arteries. During the procedure, either iodine-based contrast or CO_2 contrast will be used to visualise the arteries. If CO_2 does not provide clear enough images during the procedure, the team will switch to iodine-based contrast to ensure the procedure is completed effectively.
Participants will be randomly assigned to receive either iodine-based or CO_2 contrast as part of the study. Following the procedure, recovery will be closely monitored to evaluate the effectiveness of the contrast used, as well as to identify any potential side effects or complications.
The trial's goal is to determine which contrast is safer and more effective for patients with PAD and Chronic Kidney Disease (CKD). Additionally, the study will assess which option is more cost-effective for the NHS.
By participating in this research, individuals contribute to valuable insights that could help improve treatment options for patients with PAD and CKD, potentially influencing future care standards in the NHS and beyond.

What are the possible benefits and risks of participating?
There are no guaranteed direct benefits to taking part in the trial. Participant's condition may remain the same, improve, or worsen. However, given that the research team will be in regular contact with the participant to monitor their health following the procedure, they may receive more frequent follow-up care compared to someone not participating in the trial.
All participants taking part in this trial will be helping to make a significant contribution to the research. The results of this trial may lead to better treatment for other patients with coexisting PAD and CKD in the future.

All medical procedures carry some risks. Below are the relevant risks and side effects associated with both the procedure and the contrast mediums used in this trial:
• Iodine-based contrast risks: Iodine contrast can sometimes impact kidney function, which may be more challenging for those with CKD. It can also occasionally cause allergic reactions, though these are rare.

• CO_2 contrast risks: The CO_2 gas injection method may cause mild discomfort or a "tingling" sensation at the injection site. There is also a small risk that the CO_2 injection could delay the procedure by a few minutes. However, because this trial uses an automated injector, any discomfort is expected to be considerably less than the usual injection of CO2 by hand. In rare cases, CO_2 injections may not provide a clear enough image, and the surgeon may switch to iodine contrast during the procedure.

The CO_2 gas used is safely absorbed by the body before it reaches vital areas, like the heart or brain, minimising the risk of complications. Although side effects are rare, your doctor and medical team will monitor you closely throughout the procedure and recovery.

Where is the study run from?
The KID trial is being run in the UK, across at least six NHS hospitals that provide specialist care for Peripheral Arterial Disease (PAD). These hospitals are equipped with an automatic injector system, which is a key component of the study and will be recruiting participants to take part in the trial.

When is the study starting and how long is it expected to run for?
March 2024 to August 2026 - The study grant started on 01/03/2024, the study duration is 30 months, in which recruitment takes place for 12 months, follow-up for 3 months and another 6 months for data lock and analysis.

Who is funding the study?
National Institute for Health and Care Research (NIHR) Research for Patient Benefit (RfPB) programme

Who is the main contact?
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Contact information

Type(s)
Principal Investigator

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Additional identifiers

EudraCT/CTIS number
Nil known

IRAS number
340062

ClinicalTrials.gov number
Nil known

Secondary identifying numbers
CPMS 55634, NIHR Central Commissioning Facility (CCF) Grant Code: NIHR206198

Study information

Scientific Title
Preventing kidney injury using carbon dioxide as contrast medium in patients with peripheral arterial disease (PAD) and chronic kidney disease (CKD) having arterial intervention (The KID TRIAL)

Acronym
KID

Study objectives
Using carbon dioxide as a contrast medium via an automated injector will reduce the likelihood of short and medium-term decline in renal function in patients with peripheral arterial disease and chronic kidney disease, who are undergoing endovascular revascularisation.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 05/11/2024, Wales REC 7 (-, -, -, United Kingdom; -; Wales.REC7@wales.nhs.uk), ref: 24/WA/0332

Study design
Randomized controlled trial

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Hospital

Study type(s)

Treatment

Participant information sheet
Not available in web format, please use the contact details below to request a patient information sheet

Health condition(s) or problem(s) studied
Peripheral arterial disease and chronic kidney disease

Interventions
Eligible patients identified by their doctors, radiologists, or any other member of their care team /healthcare professional will be given the patient information sheet prior to their procedure to review and ask any questions. If they are happy to continue, they will be consented to the trial, undergo baseline assessments, and then be randomised to either standard of care iodine contrast or carbon dioxide contrast. Baseline assessments in this trial will include collecting demographic data, height and weight, medical history and any concomitant medications; the serum creatinine (eGFR) value taken as part of the standard of care will be recorded, and the participant will be asked to complete the QoL questionnaires (EQ-5D-5L and SF-36), health care resource use questionnaire, and Theoretical Framework of Acceptability questionnaire.

On the day of the index procedure, fluid administration and AKI prevention-related care will be recorded pre-op throughout the procedure and after. During the index operation, the participants will be asked about their pain score, procedural data and concomitant medications will also be documented. From post-procedure to discharge, an eGFR (standard of care) value will be recorded, as well as safety reporting, concomitant medications, and other procedure-related data collected.

Participants will then have 2 follow-up appointments post-discharge, at 30 and 90 days post-procedure, which will be conducted either in person or over the phone where their eGFR values will be collected along with any concomitant meds, safety reviews, and fluid/AKI-related info will be recorded. At the 90-day follow-up, participants will be asked to complete the QoL questionnaires again, as well as a health care resource use questionnaire.

For participants that agree to the optional interviews, the research team at the site and researchers at St George's (who are conducting the interviews) will organise the interview with the participant for roughly 3-4 weeks post-procedure to allow participants to recover from their procedure, but ensure they are still able to recall events from during their admission.

There will also be three qualitative aspects for the practitioners involved in delivering the intervention, led by researchers at City St George's, University of London: a post-procedure questionnaire offered to all lead practitioners, to be completed within 3 days of the procedure; a cross-sectional practitioner questionnaire offered to all practitioners involved in delivering the intervention, with data collection beginning roughly halfway through trial recruitment and ongoing until the sample size is achieved; and optional practitioner interviews, which will take place during participant procedures and will begin at sites once the Cross-Sectional Questionnaire is nearing completion.

Intervention Type
Other

Phase

Not Specified

Primary outcome measure
Log serum creatinine measured from the blood sample taken at 2, 30 and 90 days (part of the standard of care) after endovascular revascularisation

Secondary outcome measures
Key secondary outcome measure:
The volume of iodinated contrast medium used during endovascular revascularization measured using data recorded in the index revascularisation intervention case report form on the day of the intervention (day 0).

Other secondary outcome measures:
1. Proportion of participants developing AKI within 2 days (48 hours) of procedure based on the KDIGO definition of AKI-stage
2. Proportion of participants developing Major Adverse Kidney Events (MAKE) by 90-day follow-up. A MAKE event is defined as either death, new requirement for dialysis or worsening kidney function denoted by >25% decline in estimated Glomerular Filtration Rate (eGFR). Baseline eGFR will be defined as the most recent value before the procedure.
3. Time spent as an inpatient (days) since randomisation measured using patient medical records by a 90-day follow-up
4. Pain experienced during the procedure measured using a Visual Analogue Scale (VAS)
5. Quality of Life (QoL) at 90-day follow-up measured using the EQ-5D-5L and SF-36 questionnaires
6. The proportion of revascularisation completed as planned measured using patient medical records at one timepoint
7. Number of surgical or endovascular re-interventions measured using patient medical records by the 90-day follow-up
8. Perceived acceptability, feasibility and factors that may influence the adoption of CO2 during each revascularisation by the practitioners/participants measured using the Theoretical Framework of Acceptability Questionnaire at the 90-day follow-up for patients, and post-procedure (administered within 3 days of the intervention) and cross-sectional questionnaires (administered after few months into recruitment) for practitioners.
9. Costs associated with each procedure (health economic analysis) measured using a Healthcare Resource Use questionnaire over a minimum 90-day period (end of clinical follow-up)

Overall study start date
01/03/2024

Completion date
31/08/2026

Eligibility

Key inclusion criteria
1. Age > 18 years
2. Undergoing any revascularisation with an endovascular component
3. Estimated glomerular filtration rate < 60ml/min/1.73m2
4. Signed informed consent

Participant type(s)

Patient

Age group
Adult

Lower age limit
18 Years

Sex
Both

Target number of participants
Planned Sample Size: 174; UK Sample Size: 174

Key exclusion criteria
1. Known allergy to iodinated contrast media
2. Individuals already on long-term dialysis at the time of screening
3. An inability to understand the languages in which the trial materials are provided.

Date of first enrolment
31/12/2024

Date of final enrolment
31/12/2025

Locations

Countries of recruitment
United Kingdom

Study participating centre
Leicester Royal Infirmary
Infirmary Square
Leicester
United Kingdom
LE1 5WW

Study participating centre
St Georges Hospital
Blackshaw Road
Tooting
London
United Kingdom
SW17 0QT

Study participating centre
ST Thomas' Hospital
Westminster Bridge Road
London
United Kingdom
SE1 7EH

Study participating centre
University Hospitals of North Midlands NHS Trust
Newcastle Road
Stoke-On-Trent
United Kingdom
ST4 6QG

Study participating centre
Manchester University NHS Foundation Trust
Cobbett House
Oxford Road
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United Kingdom
M13 9WL

Study participating centre
Hull Royal Infirmary
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HU3 2JZ

Sponsor information

Organisation
University of Leicester

Sponsor details
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Leicester
England
United Kingdom

LE1 7RH
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not@provided.com

Sponsor type
Hospital/treatment centre

Website
https://www.le.ac.uk/

ROR
https://ror.org/04h699437

Funder(s)

Funder type
Government

Funder Name
Research for Patient Benefit Programme

Alternative Name(s)
NIHR Research for Patient Benefit Programme, RfPB

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Publication and dissemination plan
A detailed trial protocol will be published before the start of pooled analysis in a peer-reviewed journal

Intention to publish date
31/08/2027

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are not expected to be made available because personal identifiable data will be collected, such as age, sex/gender, ethnicity and date of birth.

IPD sharing plan summary

Not expected to be made available