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Can osteoarthritis of the knee be treated by blocking abnormal blood vessels in the knee?

Submission date
27/01/2020

Recruitment status
No longer recruiting

Registration date
17/02/2020

Overall study status
Completed

Last Edited
13/12/2023

Condition category
Musculoskeletal Diseases

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

Plain English summary of protocol

Background and study aims
Osteoarthritis (OA) of the knee is an extremely common and debilitating condition with no known cure. Current treatment includes pain relief, physiotherapy, steroid injections, weight-loss programs, and joint replacement surgery. Moderately severe arthritis that has not improved after trying non-surgical options, but is not yet severe enough to warrant surgery, is difficult for a doctor to manage. Studies have shown that OA is linked with an increase in the number and size of blood vessels in the knee. Arterial embolisation (blocking blood vessels) in the knee has improved symptoms of OA.
This study will investigate the effectiveness and safety of arterial embolisation in knee OA in a small-scale study in order to help guide the design of a larger study. Patients with knee OA will complete pain scores and quality of life questionnaires before and after blocking the abnormal vessels in their knees using tiny particles under x-ray guidance (embolization). Patients will also undergo MRI of the affected knee before the procedure and afterwards to assess structural change. The results of this feasibility study will be used to design a larger cohort study.

Who can participate?
People aged 45 years or above with knee OA and knee pain for at least 6 months that has not responded to non-surgical treatment

What does the study involve?
Participants will have an MRI scan of their knee before surgery and 1 year afterwards. The embolisation procedure, which takes about an hour, will be performed in the X-ray department. The participant will have a thin tube inserted into a large artery in their groin. The tube will be fed through the artery through the thigh and into the abnormal arteries of the knee. Contrast agent will be injected into the blood system so that the location of the tube can be visualised. Tiny particles will be released from the tube to block the abnormal arteries and then the tube will be removed.
Participants will score their pain and fill out a questionnaire on their knee symptoms before the procedure and at 6 weeks, 3 months, 1 year and 2 years after the procedure.

What are the possible benefits and risks of participating?
There are no guaranteed benefits of participating in the study. The potential risks are the risks

related to the embolisation procedure, which include bleeding, infection, pain, nerve injury and the particles going in the wrong place (non-target embolisation).

Where is the study run from?
University of Reading and Royal Berkshire NHS Foundation Trust (UK)

When is the study starting and how long is it expected to run for?
November 2017 to December 2023

Who is funding the study?
Merit Medical Systems Inc (USA)

Who is the main contact?
1. Sarah MacGill (public contact), Sarah.macgill@royalberkshire.nhs.uk
2. Dr Mark Little (scientific contact), Mark.little@royalberkshire.nhs.uk

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Scientific

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Additional identifiers

Clinical Trials Information System (CTIS)
Nil known

Integrated Research Application System (IRAS)
237676

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
CPMS 37741, IRAS 237676

Study information

Scientific Title
Geniculate artEry embolisatioN in patiEnts with oSteoarthrItiS of the knee (GENESIS)

Acronym
GENESIS

Study objectives
Osteoarthritis (OA) of the knee is an extremely common and debilitating condition with no known cure. Treatment includes pain relief, physiotherapy, steroid injections, weight-loss programs, and joint replacement surgery. Moderate arthritis resistant to nonsurgical options that is not yet severe enough to warrant surgery presents a specific management challenge and justifies research into the area. Studies have shown that OA is mediated by increased vascularity and recent work has shown the benefit of embolising abnormal vessels within the knee to alleviate symptoms of OA. The current study will investigate the clinical success and safety of arterial embolisation in knee OA. Patients with knee OA will complete pain scores and quality of life questionnaires before and after blocking the abnormal vessels in their knees using tiny particles under x-ray guidance (embolization). Patients will also undergo MRI of the affected knee before the procedure and afterwards to assess structural change. The results of this feasibility study will be used to design a larger cohort study.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 19/04/2018, London - Bromley Research Ethics Committee (Level 3, Block B, Whitefriars, Lewins Mead, Brisol, BS1 2NT: +44 (0)207 104 8027; nrescommittee.london-bromley@nhs.net), ref: 18/LO/0335

Study design

Non-randomised; Both; Design type: Treatment, Imaging, Other, Validation of investigation /therapeutic procedures

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Osteoarthritis of the knee

Interventions
At baseline, the participant will score their pain using a Visual Analogue Scale (VAS) and score their symptoms and level of disability using the Knee injury and Osteoarthritis Outcome Score (KOOS).

A contrast MRI scan of the knee will be done pre-procedure and repeated at a year after procedure. Gadolinium will be used as a contrast agent. MRI involves a strong magnetic field and the use of radiofrequency energy, which is not high enough to cause health effects such as nerve stimulation. All persons entering the scanning room will be screened for ferromagnetic materials and other risk factors by the research radiographer performing the scan. Operators conducting the MRI scans are trained in MRI safety. This will be done at the Royal Berkshire Hospital in Reading, UK.

The patient will attend the department of neuroscience at the University of Reading and will be given the option of having a functional (non-contrast) MRI scan of the brain to assess resting state pain pathways. Pre-GAE procedure participants undergo a series of neuropsychometric tests, which are compared to participant outcomes, to establish whether specific neuropsychology traits in chronic pain can predict GAE treatment failure. The patient will then be given a number of questionnaires to complete (Pain Catastrophizing Scale (PCS), Five Facet Mindfulness Questionnaire (FFMQ), The Beck Depression Inventory, State Trait Anxiety Inventory (STAI)) and undergo a pain assessment. In a conditioned pain modulation test, participants are asked to rate pain delivered to their calf using a 30x30 mm Peltier Thermode (which is attached to a Medoc Pathway thermal stimulus generator). then to submerge their hand in a hot bath (46.5ºC, Julabo water bath), while the stimulus is re-applied to the calf, and a rating taken.These tests are all done by Dr Richard Harrison at the Centre for Integrative Neuroscience and Neurodynamics, University of Reading, UK.

In the GAE interventional radiology procedure, the common femoral artery in the groin is punctured under ultrasound guidance and a tiny tube is manoeuvred down the artery towards the knee. Iodinated contrast is injected to illuminate the arterial anatomy. A microcatheter is introduced into the genicular arteries of the knee and the abnormalarteries are embolised using tiny particles (100-300 micron Embospheres, Merit Medical). The procedure is performed by a Consultant Interventional Radiologist. It is performed in the x-ray department at the Royal Berkshire NHS Foundation Trust and takes approximately 1 hour.

After the procedure, the participant will fill in the Patient Satisfaction Questionnaire.

6 weeks, 3 months, 1 year and 2 years after the procedure, the patient will provide a VAS score for knee pain and a KOOS. Their pain medications will be recorded. At 1 year after the procedure, they will have a contrast MRI on the knee.

All the follow up questionnaires can be completed by email, telephone or post communication with the patient according to their preference. They are completed by suitably trained and GCP qualified Research staff from the Royal Berkshire Hospital in Reading.

Intervention Type
Procedure/Surgery

Primary outcome(s)
1. Pain caused by knee osteoarthritis assessed using a visual analogue scale (VAS) at baseline and 6 weeks, 3 months, 1 year and 2 years after the procedure
2. Patients evaluation of their knee symptoms assessed using the Knee injury and Osteoarthritis Outcome Score (KOOS) at baseline and 6 weeks, 3 months, 1 year and 2 years after the procedure

Key secondary outcome(s))
1. Safety assessed by collecting all complications attributable to the GAE procedure prospectively as recorded in the patient's electronic medical notes and study file
2. Neural and behavioural indicators of predisposition to central facilitation of pain using the pre-procedural assessments carried out at CINN, University of Reading
3. Patient satisfaction with procedure using Patient Satisfaction Questionnaire after the procedure
4. Structural knee changes assessed using Whole-Organ Magnetic Resonance Imaging Score (WORMS) at baseline and 1 year post-procedure
5. Quality of life assessed using components of the Knee injury and Osteoarthritis Outcome Score (KOOS) before and after the procedure
6. Analgesic use assessed by asking patients if they are taking paracetamol, NSAIDS or opiates pre-procedure and at 6 weeks, 3 months, 1 year and 2 years after the procedure

Completion date
01/12/2023

Eligibility

Key inclusion criteria
1. Willing and able to give informed consent for participation in the study
2. Aged 45 years or above
3. Grade 1-3 knee OA on X-ray as per Kellgren-Lawrence Grading Scale
4. Knee pain for at least 6 months resistant to conservative treatment
5. Able to lie flat for at least 6 h. This will be assessed by asking how participants sleep (bed, chair recumbent, semi-recumbent) and assessing what prevents them from lying flat overnight (breathlessness, back pain, etc).

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Sex
All

Total final enrolment
40

Key exclusion criteria
1. Rheumatoid arthritis or infectious arthritis
2. Severe knee OA (grade 4 on X-ray as per Kellgren-Lawrence Grade)
3. Renal impairment: eGFR <45 ml/min/1.73m2. Assessed from medical records or a blood test if required as is part of standard clinical practice when considering a patient for a therapeutic intervention.
4. Patients with a bleeding diathesis, or other bleeding risk such as patients on warfarin that cannot be stopped easily (e.g. patients with metallic heart valves). This is assessed by asking the patient and from medical records.
5. Requires oxygen on ambulation. This is assessed by asking the patient and from medical records.
6. Low life expectancy (<1 year)
7. Communication difficulty due to language barriers
8. Contraindication to MRI
9. Any other significant disease or disorder which, in the opinion of the recruiting physician, may put either the participants at risk because of participation in the study, or may influence the result of the study or the participant's ability to participate

Date of first enrolment
01/05/2018

Date of final enrolment
01/12/2020

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Royal Berkshire Hospital
Royal Berkshire NHS Foundation Trust
London Rd
Reading
United Kingdom
RG1 5AN

Sponsor information

Organisation
University of Reading

Funder(s)

Funder type
Industry

Funder Name
Merit Medical Systems Inc

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during the current study will be available upon request from Sarah MacGill (sarah.macgill@royalberkshire.nhs.uk). Data will be available 9 months following publication for 36 months. Individual participant data that underlie the results reported in this article, after deidentification (text, tables, figures, and appendices) will be provided

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
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes