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# What is the impact of a modified Roux-en-Y-gastric bypass operation on people with type 2 diabetes mellitus?

**Submission date**
02/11/2020

**Recruitment status**
No longer recruiting

**Registration date**
26/11/2020

**Overall study status**
Completed

**Last Edited**
20/10/2023

**Condition category**
Nutritional, Metabolic, Endocrine

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

## Plain English summary of protocol

Background and study aims
Obesity is the most potent risk factor for T2DM and it accounts for 80-85% of the overall risk of developing the disease. Modern laparoscopic bariatric surgery and in particular Roux-en-Y bypass (RYGB) is one of the safest operations in the field of surgery. In RYGB surgery, there are three intestinal segments or "limbs": the "alimentary limb" through which food enters through a much smaller portion of stomach (the gastric pouch) to the small intestine, the "biliopancreatic limb" which includes the bypassed segment of duodenum and jejunum (parts of the small intestine) and through which digestive juices from the bile duct and pancreas flow, and the "common limb" which is where food and juices mix together.
For this study we will be comparing the safety and efficacy of a "standard" RYGB surgery with a short alimentary and long common limb to the "modified" RYGB with a long alimentary and short common limb. The purpose of this study is to assess whether "modified" RYGB achieves better glucose (glycaemic) control.

Who can participate?
Patients with type 2 diabetes mellitus (T2DM) and Body Mass Index (BMI) >30 kg/m² who are on the waiting list for bariatric surgery at Imperial College Healthcare NHS Trust, King's College Hospital NHS Foundation Trust, North Bristol NHS Trust, and Whittington Health NHS Trust.

What does the study involve?
In addition to routine NHS care follow-up, patients will be asked to attend clinical trial follow-up at 10 days after the operation and after 3, 6 and 12 months. At an assessment before the operation, and at these follow-up visits, participants' blood samples, blood pressure and body weight will be measured. The number of glucose-lowering medications and adverse events will also be recorded.
There is an optional sub-study to evaluate the effect of this type of surgery on intestinal absorption of ingested glucose which will take place at the NIHR Imperial Clinical Research Facility (CRF) at Hammersmith Hospital following an overnight fast. It involves the insertion of a feeding tube into the small intestine and the infusion of a glucose-containing solution. 7 Blood samples will be collected at varying time points.

What are the possible benefits and risks of participating?
The main benefit we anticipated would be for is significant weight loss leading to improved glycaemic (sugar) control and the possibility of remission of diabetes. There are other benefits to weight loss such as improvement in overall physical health and quality of life. Participants will also benefit from regular contact with a specialist doctor.
The “modified” RYGB procedure is not new or experimental and is currently performed around the world. It is expected that it carries the same risks as the standard RYGB procedure.
For both “standard” and “modified” RYGB surgery: the risks will be explained to participants in greater detail by the surgical team. The total risk for any complication is approximately 2%. Common risks of RYGB surgery include chest infection, wound infection/haematoma, and scars. Less common risks are blood clots in the lung or leg/s, bleeding intraoperative/postoperatively, anastomotic leak, port site hernia, injury of intra-abdominal organs, internal hernia/small bowel obstruction, pain following eating, dumping syndrome, severe malabsorption/excessive weight loss, conversion to an open operation due to bleeding/visceral injury difficult anatomy, and the risk of not being able to do the bypass due to difficult anatomy. There is a very rare risk of death
During the study, experienced doctors will be available to participants at any time should they have any concerns. They will be provided with a mobile number that will be accessible 24 hours a day, 7 days a week in case they develop any unusual severe symptoms and want to speak urgently to a member of the team. Participants will be encouraged to report any ill effects they experience during the study to the doctors immediately. Participants may withdraw from the study at any time, without providing any explanation and this will not affect their future care in any way. If there are any unexpected side effects, the study will be stopped.

Where is the study run from?
Imperial College Healthcare NHS Trust, King’s College Hospital NHS Foundation Trust, North Bristol NHS Trust, and Whittington Health NHS Trust (UK)

When is the study starting and how long is it expected to run for?
From April 2020 to December 2023

Who is funding the study?
JP Moulton Charitable Foundation (UK)

Who is the main contact?
Dr Alexander Miras, a.miras@nhs.net

# Contact information

### Type(s)
Scientific

### Contact name
Dr Alexander Miras

### ORCID ID
http://orcid.org/0000-0003-3830-3173

### Contact details
St Mary's Hospital
Paddington
London

United Kingdom
W2 1NY
No telephone contact available
a.miras@nhs.net

# Additional identifiers

### EudraCT/CTIS number
Nil known

### IRAS number
279091

### ClinicalTrials.gov number
Nil known

### Secondary identifying numbers
CPMS 46960, IRAS 279091

# Study information

### Scientific Title
What is the impact of a modified Roux-en-Y-gastric bypass operation on people with type 2 diabetes mellitus? The LONG LIMB-2 double-blinded randomised controlled clinical trial

### Acronym
LONG LIMB-2

### Study objectives
A “modified” Roux-en-Y-gastric bypass (RYGB) procedure with a long alimentary and short common limb (20:80) is equally safe but superior to the “standard” RYGB with a short alimentary and long common limb (50:50) for glycaemic control in patients with type 2 diabetes mellitus (T2DM) and obesity.

### Ethics approval required
Old ethics approval format

### Ethics approval(s)
Approved 01/11/2020, London – Westminster Research Ethics Committee (The Old Chapel, Royal Standard Place, Nottingham, NG1 6FS, UK; +44 (0)207 104 8012; westminster.rec@hra.nhs.uk), ref: 20/LO/1070

### Study design
Single-centre, prospective double-blinded randomized controlled trial with a nested mechanistic sub-study

### Primary study design
Interventional

### Secondary study design

Randomised controlled trial

## Study setting(s)
Hospital

## Study type(s)
Treatment

## Participant information sheet
See additional file ISRCTN65113000_PIS_v2.0_21Oct2020

## Health condition(s) or problem(s) studied
Diabetes mellitus, type 2 diabetes mellitus (T2DM), obesity

## Interventions
Randomisation will take place intra-operatively. The surgeon will measure the total intestinal length and decide if the patient can be randomised intraoperatively (only patients with a total intestinal length greater than 5.5 m will be randomised) and if so will contact the randomiser who will make the allocation at the time to either a “standard” RYGB or a “modified” RYGB. The randomisation ratio will be 1:2 with 24 participants for standard RYGB and 48 for modified RYGB.

In addition to routine NHS care follow-up, patients will be asked to attend clinical trial visits at baseline, 10 days after the operation, and after 3, 6 and 12 months. Glycated haemoglobin (HbA1C) levels, lipid profile, arterial blood pressure, and body weight will be assessed. The number of glucose-lowering medications and adverse events will be recorded.

There will also be a nested mechanistic sub-study before and at 20% of weight loss after surgery in order to evaluate the effect of RYGB on intestinal absorption of ingested glucose. Participants will attend the NIHR Imperial Clinical Research Facility (CRF) at Hammersmith Hospital after an overnight fast. Their glucose-lowering medications will be adjusted for 5 days before the visit based on capillary glucose measurements and they will be asked to refrain from alcohol and vigorous exercise for 24 h before the visit. An enteral feeding tube will be placed by a trained medical professional using the CORTRAK system that tracks the position of the tube during placement without the need for X-ray confirmation. The tube will be inserted into the duodenum before the operation and in the alimentary limb (jejunum) after the operation. The position of the tube will be confirmed using a PANPEHA pH strip. A solution containing 30 g glucose and 3 g 3-O-methylglycose (a well-established and used marker of glucose absorption) will be infused through the enteral feeding tube. An intravenous cannula will be inserted for blood sampling for metabolites at time points 0, +30, +60, +90, +120, +150, +180 min. The blood tests will be used to measure intestinal absorption of ingested glucose and 3-omg. Once the last blood sample is taken, both the enteral feeding tube and cannula will be removed and the participant will be free to leave the facility.

## Intervention Type
Procedure/Surgery

## Primary outcome measure
1. Glycaemic control measured using glycated haemoglobin (HbA1C) levels in blood samples taken at baseline and 12 months

## Secondary outcome measures

1. Rate of remission of T2DM measured using routine blood tests and review of glucose lowering medications at baseline and 12 months
2. Number of glucose-lowering medications recorded at baseline and 12 months
3. Body weight recorded at baseline and 12 months
4. Arterial blood pressure measured using sphygmomanometer at baseline and 12 months
5. Lipid profile measured using fasting lipid blood tests taken at baseline and 12 months
6. Adverse events (including surgical complications, hypoglycaemia and micronutrient deficiencies) recorded between baseline and 12 months
7. Rate of intestinal absorption of ingested glucose in participants in the mechanistic study only measured using a standard Oral Glucose Tolerance Test (OGTT) at baseline and 12 months

### Overall study start date
01/04/2020

### Completion date
01/12/2023

## Eligibility

### Key inclusion criteria
1. Diagnosis of type 2 diabetes mellitus (T2DM)
2. Body Mass Index (BMI) >30 kg/m²
3. Aged between 18 and 65 years
4. Eligible for metabolic/bariatric surgery as per NICE guideline 189

### Participant type(s)
Patient

### Age group
Adult

### Lower age limit
18 Years

### Upper age limit
65 Years

### Sex
Both

### Target number of participants
72

### Key exclusion criteria
1. Current use or need for insulin
2. Unacceptably high risk for anaesthesia or surgery
3. Pregnancy/breastfeeding
4. Total small intestinal length <5.5 m

### Date of first enrolment

01/02/2021

**Date of final enrolment**
01/10/2023

# Locations

**Countries of recruitment**
England

United Kingdom

**Study participating centre**
**St Mary's Hospital**
Praed Street
London
United Kingdom
W2 1NY

**Study participating centre**
**Hammersmith Hospital**
Du Cane Road
London
United Kingdom
W12 0HS

**Study participating centre**
**Kings College Hospital**
Mapother House
De Crespigny Park
Denmark Hill
London
United Kingdom
SE5 8AB

**Study participating centre**
**The Whittington Hospital**
Highgate Hill
London
United Kingdom
N19 5NF

**Study participating centre**
**Southmead Hospital**
Southmead Road
Westbury-on-trym
Bristol
United Kingdom
BS10 5NB

# Sponsor information

**Organisation**
Imperial College London

**Sponsor details**
Imperial College London
Hammersmith Campus
Du Cane Rd
London
England
United Kingdom
W12 0NN
No telephone contact available
k.boland@imperial.ac.uk

**Sponsor type**
University/education

**Website**
http://www3.imperial.ac.uk/

**ROR**
https://ror.org/041kmwe10

# Funder(s)

**Funder type**
Charity

**Funder Name**
JP Moulton Charitable Foundation

# Results and Publications

### Publication and dissemination plan
Planned publication in a high-impact peer-reviewed journal.

### Intention to publish date
01/07/2024

### Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study will be stored in a publically available repository. The weblink for the repository is https://data.hpc.imperial.ac.uk. Data will be completely anonymised and will become available once the trial is finished. Consent will be obtained from patients during recruitment. The data will be able for 10 years.

### IPD sharing plan summary
Stored in publicly available repository

### Study outputs

| Output type | Details | Date created | Date added | Peer reviewed? | Patient-facing? |
|---|---|---|---|---|---|
| Participant information sheet | version v2.0 | 21/10/2020 | 26/11/2020 | No | Yes |
| Protocol file | version v2.0 | 21/10/2020 | 26/11/2020 | No | No |
| HRA research summary | | | 28/06/2023 | No | No |