

# Pacemaker therapy for drug-refractory symptoms in mid-cavity hypertrophic cardiomyopathy

<b>Submission date</b> 03/01/2018	<b>Recruitment status</b> No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered <input checked="" type="checkbox"/> Protocol
<b>Registration date</b> 11/01/2018	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 07/11/2024	<b>Condition category</b> Circulatory System	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

## Plain English Summary

### Background and study aims

Hypertrophic cardiomyopathy (HCM) is the most common familial heart disease, affecting one in five hundred of the general population. It involves abnormal thickening of the heart in absence of other reasonable causes such as heart valve disease, and the various patterns of thickening mean blood flow within the heart is often abnormal. Obstruction to blood flow out into the main artery (the aorta) is often present at a level below that of the aortic valve, and this can place extra strain upon the heart muscle. This extra strain means patients frequently suffer from symptoms such as shortness of breath and chest pain, poor exercise tolerance, or dizzy spells. Around 60% of HCM patients will have obstruction to blood flow at the base of the heart, at the level of the mitral valve, and there are several invasive therapies to consider as treatment if treatment with medicine is failing to reduce symptoms. However, in a smaller group of around one in ten HCM patients, obstruction to blood flow occurs in a different area, within the middle of the left heart. These patients provide a challenge for management, as they are less suitable for invasive treatment options. Using a pacemaker to excite the heart in patients with obstruction within the middle of the heart has been demonstrated to reduce the obstruction and importantly improve patient symptoms. The aims of this study are to find out how effective cardiac pacing is at reducing obstruction in the middle of the heart, and to see whether this leads to an improvement in symptoms.

### Who can participate?

Patients aged over 18 undergoing implantation of a pacemaker

### What does the study involve?

Participants undergo an assessment and pacemaker implantation. They are randomly allocated to have the pacemaker set up to pace all the time (active pacing) or back-up pacing only (very little pacing) for 24±2 weeks. At 24±2 weeks their symptoms and physical performance are assessed at a visit to the hospital and they then have the pacemaker switched to the other setting for another 24±2 weeks (either active pacing or back-up pacing depending on which they had first). Participants are assessed again at 48±2 weeks.

What are the possible benefits and risks of participating?

It cannot be guaranteed that a patient's symptoms will improve as part of this study. However, patients with the condition have very few treatment options available to them if medication doesn't ease their symptoms. Early tests of using a pacemaker for the condition have been very encouraging, so this study may lead to larger studies that change how patients are treated all over the world with the specific heart condition. Significant side effects are not expected as part of the study. If patients feel unwell for any reason they can get in contact with the research team. If any unexpected health-related findings are discovered as part of this study, they will be shared appropriately with the patient and the clinical team responsible for their care.

Where is the study run from?

St Bartholomew's Hospital (UK)

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

June 2017 to May 2022 (updated 10/05/2021, previously: May 2021)

Who is funding the study?

National Institute for Health Research (UK)

Who is the main contact?

Dr Saidi Mohiddin

## Contact information

**Type(s)**

Scientific

**Contact name**

Dr Saidi Mohiddin

**ORCID ID**

<http://orcid.org/0000-0002-1031-4084>

**Contact details**

Barts Heart Centre

No 1 St Martins Le Grand

London

United Kingdom

EC1A 4AS

## Additional identifiers

**EudraCT/CTIS number**

**IRAS number**

**ClinicalTrials.gov number**

NCT03450252

**Secondary identifying numbers**

## Study information

### Scientific Title

Distal ventricular pacing and intraventricular gradient reduction for symptomatic relief in drug-refractory hypertrophic cardiomyopathy patients with mid-cavity obstruction

### Study hypothesis

Hypertrophic cardiomyopathy (HCM) is the most common familial heart disease, affecting one in five hundred of the general population. Characterised by abnormal thickening of the heart in absence of other reasonable causes such as heart valve disease, the various patterns of thickening mean blood flow within the heart is often abnormal. Obstruction to blood flow out into the main artery, the aorta, is often present at a level below that of the aortic valve, and this can place extra strain upon the heart muscle.

This extra strain means patients frequently suffer from debilitating symptoms such as shortness of breath and chest pain, poor exercise tolerance, or dizzy spells. Around 60% of HCM patients will have obstruction to blood flow at the base of the heart, at the level of the mitral valve, and there are several invasive therapies to consider as treatment if treatment with medicine is failing to reduce symptoms. However, in a smaller group of around one in ten HCM patients, obstruction to blood flow occurs in a different area, within the middle of the left heart. These patients provide a challenge for management, as they are less suitable for invasive treatment options.

Using a pacemaker to excite the heart in patients with obstruction within the middle of the heart has been demonstrated to reduce the obstruction and importantly improve patient symptoms, and this is supported by our pilot data. The research questions to be addressed are: How effective is cardiac pacing at reducing obstruction in the middle of the heart? The second question is does this lead to symptomatic benefit for the patient?

### Ethics approval required

Old ethics approval format

### Ethics approval(s)

London Harrow Research Ethics Committee, 06/12/2017, ref: 17/LO/1725

### Study design

Randomised; Interventional; Design type: Treatment, Complex Intervention

### Primary study design

Interventional

### Secondary study design

Randomised cross over trial

### Study setting(s)

Hospital

### Study type(s)

## Treatment

### Participant information sheet

See additional files

### Condition

Hypertrophic cardiomyopathy

### Interventions

Patients will be identified in outpatient cardiomyopathy clinics, with initial screening and eligibility assessment made by a researcher. A trained member of the research team will take informed consent in the cardiac department at Barts Heart Centre. Recruited subjects will then attend for baseline assessment by a researcher and performance testing over one encounter.

A member of the research team shall direct the participant to fill out the Kansas City Cardiomyopathy questionnaire and the SF36 questionnaire in a private office without interruption. The six-minute walk test shall be performed in the cardiac department by a member of the cardiac physiology team, as per standard care. Cardiac Magnetic Resonance Imaging (MRI) will be done in the imaging department at Barts Heart Centre, performed by the imaging team and reviewed by a consultant cardiologist. Cardiopulmonary exercise testing with simultaneous echocardiography (stress echo) shall take place in the cardiac department and be performed by a member of the cardiac physiology team along with members of the research team as necessary. A small blood sample (~5 mL) shall be taken in the cardiac department at each study visit for analysis of the protein brain natriuretic peptide. The sample shall be taken from venous cannulation performed by a trained individual.

There is a further attendance for device implantation and invasive haemodynamic pacing study. A trial randomisation service (such as <https://www.sealedenvelope.com> or [www.randomize.net](http://www.randomize.net)) will be used to assign participants to one of the cross over arms initially. One group will have the pacemaker set up to pace all the time (active pacing), and one group will be set up for back-up pacing only (very little pacing) for  $24 \pm 2$  weeks. The pacemaker implant shall be performed in the catheter labs of Barts Heart Centre, by a consultant cardiologist. Adjustments to pacemaker settings shall occur at the visits to the cardiac department at Barts Heart Centre. They shall be performed by a member of the cardiac physiologist team who is qualified to do so. At  $24 \pm 2$  weeks the patients' symptoms and physical performance will be assessed at a visit to the hospital and they will then have the pacemaker switched to the other setting for another  $24 \pm 2$  weeks (either active pacing or back-up pacing depending on which they had first). Patients will then be assessed again at  $48 \pm 2$  weeks. The length of each treatment phase is longer than previous pacemaker studies at 24 weeks in order to account for any wash-out periods, which have historically been a criticism of cross-over trial designs.

### Intervention Type

Device

### Phase

Phase II/III

### Drug/device/biological/vaccine name(s)

Not provided at time of registration

### Primary outcome measure

Direct measurement of obstructive gradient (mmHg) via intracardiac catheter during pacemaker implant; Timepoint(s): During implant

### **Secondary outcome measures**

The feasibility of performing a cross-over study and the associated performance tests and symptomatic assessments in this patient population. The statistical information collected will be used to design a much larger research trial of patient benefit.

### **Overall study start date**

01/06/2017

### **Overall study end date**

31/05/2022

## **Eligibility**

### **Participant inclusion criteria**

1. Male or female, >18 years
2. Referred for PPM +/- ICD implantation for either primary prevention of sudden cardiac death or other indications such as heart block or obstructive physiology
3. HCM patients with a mid-cavity gradient of  $\geq 30$  mmHg demonstrated by echocardiography and morphology confirmed by cardiac MRI. Gradient confirmed by cardiac catheterisation
4. All patients should be taking maximum tolerated doses of beta blockers or verapamil with or without disopyramide
5. Symptoms refractory to optimum medical therapy as above, for example breathlessness, chest pain, dizziness, or syncope

### **Participant type(s)**

Patient

### **Age group**

Adult

### **Lower age limit**

18 Years

### **Sex**

Both

### **Target number of participants**

Planned Sample Size: 25; UK Sample Size: 25

### **Participant exclusion criteria**

1. Patients with multi-level obstruction, i.e. across the mid-cavity and outflow tract
2. Patients with moderate or severe valvular stenosis or regurgitation due to primary valvular disease
3. Patients with untreated symptomatic coronary disease
4. Patients in atrial fibrillation at the time of implantation
5. Pregnancy
6. Renal failure with  $\text{eGFR} < 20\text{mL/min}$

7. Any patient not suitable in the clinicians opinion
8. Any patient who is for whatever reason is not expected for more than one year
9. Patients unable to provide informed consent

**Recruitment start date**

01/02/2018

**Recruitment end date**

31/03/2022

## Locations

**Countries of recruitment**

England

United Kingdom

**Study participating centre**

**St Bartholomew's Hospital**

Barts Heart Centre

London

United Kingdom

EC1A 7BE

## Sponsor information

**Organisation**

Queen Mary University of London

**Sponsor details**

c/o Dr Sally Burtles

Director of Research Services & Business Development (JRMO)

QM Innovation Centre, 5 Walden Street

Whitechapel

London

England

United Kingdom

E1 2EF

**Sponsor type**

University/education

**ROR**

<https://ror.org/026zzn846>

# Funder(s)

## Funder type

Government

## Funder Name

NIHR Trainees Co-ordinating Centre (TCC); Grant Codes: ICA-CDRF- 2016-02- 068

# Results and Publications

## Publication and dissemination plan

Project results will be submitted for publication in peer-reviewed journals (e.g. European Heart Journal, Journal of the American College of Cardiology), irrespective of outcome, within 12 months of completion.

## Intention to publish date

31/05/2023

## Individual participant data (IPD) sharing plan

The data sharing plans for the current study are unknown and will be made available at a later date.

## IPD sharing plan summary

Data sharing statement to be made available at a later date

## Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Participant information sheet</a>	version V6	01/12/2017	11/01/2018	No	Yes
<a href="#">Protocol file</a>	version V9	09/11/2017	11/01/2018	No	No
<a href="#">HRA research summary</a>			28/06/2023	No	No