EXercise magnetic resonance imaging in Patients with Obesity aSsociated heart failURe with preserved Ejection fraction (EXPOSURE) study

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To investigate the negative effects of epicardial fat on cardiac function, morphology and pericardial restrain during exercise.

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Cardiac disorders, signs and symptoms NEC
Study type	Observational non invasive

Summary

ID

NL-OMON51285

Source
ToetsingOnline

Brief title
EXPOSURE

Condition

- Cardiac disorders, signs and symptoms NEC

Synonym
adipose tissue around the heart, Heart failure

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Epicardial fat, Exercise CMR, Heart failure, Obesity

Outcome measures

Primary outcome

Patients will be stratified according to high (>=100 ml/m2) and low (<100 ml/m2) epicardial fat volume measured with CMR. The primary outcome parameter is the difference in LV eccentricity index at peak exercise between the two groups.

Secondary outcome

Pre-specified secondary outcome parameters between the subgroups are: 1) VO2-max, 2) LV and right ventricular (RV) diastolic strain rate, 3) slope of early LV/RV filling, 3) left and right atrial reservoir strain and emptying fraction, 4) pulmonary artery distensibility and pulsatility and 5) cardiac output, all at peak exercise. The amount of epicardial fat will be correlated with change in LV eccentricity index from rest to peak exercise, change in LV/RV diastolic strain rate, change in slope of LV/RV filling, change in atrial reservoir strain and emptying fraction, change in pulmonary artery distensibility and pulsatility, and change in cardiac output. All results will be also compared between men and women.

Study description

Background summary

Obesity is prevalent, also in The Netherlands, and has become one of the most important risk factors for heart failure (HF), especially HF with preserved ejection fraction (HFpEF). Obesity is defined as BMI >30 kg/m2, but this general measurement provides limited information on the amount of adipose

tissue. Especially visceral adiposity imposes a huge risk for the development of HFpEF. In particular epicardial fat, the visceral fat situated directly adjacent to the heart, seems involved in the pathophysiology of HFpEF. Increased epicardial fat was predictive of incidence HFpEF, but not HF with reduced ejection fraction. In recent years we and others have demonstrated that increased epicardial fat volume in HFpEF is associated with more left ventricular (LV) diastolic dysfunction, higher myocardial mass, higher cardiac filling pressures, reduced exercise capacity and increased risk of mortality and HF hospitalization. We observed that 22% of non-obese patients with HFpEF actually had high amount of epicardial fat and this specific group had a higher risk of mortality and HF hospitalization compared to obese patients with less epicardial fat volume. However, the exact mechanisms responsible for the negative effects of epicardial fat on the heart in HFpEF remain inaccurately defined. We hypothesize that an abundance of epicardial fat surrounding the heart within a closed pericardial sac may constrain the heart leading to ventricular interdependence. This phenomenon is typically present during exercise, not at rest. More insights into the role of epicardial fat in HFpEF are important as they may help the design of specific therapies that target epicardial fat.

Study objective

To investigate the negative effects of epicardial fat on cardiac function, morphology and pericardial restrain during exercise.

Study design

Investigator initiated, cross-sectional, observational cohort study.

Study burden and risks

This will be a non-invasive exercise study. The will be no vena puncture, no invasive intervention and the patients are not exposed to any radiation and/or contrast agents. The cardiopulmonary exercise test (CPET) is supervised by trained personnel according to standard protocols. CPET is considered a safe test, with the risks the same as for mild-moderate exercise. Major adverse events including death, myocardial infarction, arrhythmia, haemodynamic instability and orthopaedic injury are reported in study populations at a rate of <1 to 5 per 10,000 tests. Since this is primarily a mechanistic study aimed at understanding the negative effects of epicardial adipose tissue on the heart, there is no direct benefit for the study participants. Better insights into the negative effects that epicardial adipose tissue has on the heart in HFpEF may help the design of future therapies that will potentially be of benefit for this population.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

1. Signs and symptoms of HF according to the Europeans Society of Cardiology guideline.
2. LV ejection fraction >=40%.
3. HFA-PEFF score >=5 or HFA-PEFF score 2-4 in combination with positive stress test
4. >18 years of age
5. Able to perform a bicycle exercise test
6. Willing to sign informed consent

Exclusion criteria

1. Body weight >140 kg
2. Uncontrolled atrial fibrillation or other significant arrhythmia with resting heart rate >110 bpm during the assessment
3. Contraindications for CMR (e.g. claustrophobia, implanted cardiac devices)
4. Myocardial infarction, percutaneous coronary intervention or coronary artery bypass graft <3 months or untreated severe obstructive coronary artery stenosis
5. More than moderate left-sided valve disease.
6. Complex congenital heart disease.

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	16-01-2024
Enrollment:	50
Type:	Actual

Ethics review

Approved WMO Date:	26-10-2022
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)
Approved WMO Date:	07-06-2024

Application type:	Amendment
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)
Approved WMO Date:	07-10-2024
Application type:	Amendment
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL80740.042.22