The effects of branch pulmonary artery stenting in d-TGA, ToF and TA: a randomized control trial

Published: 16-03-2023
Last updated: 30-11-2024

The primary study objective is to identify the effects of percutaneous interventions for branch PA stenosis on exercise capacity in patients with d-TGA, ToF and TA. The secondary objectives are 1) to assess the effects of percutaneous interventions...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Cardiac and vascular disorders congenital
Study type	Interventional

Summary

ID

NL-OMON53404

Source
ToetsingOnline

Brief title
Effects branch PA stenting d-TGA, ToF and TA

Condition

- Cardiac and vascular disorders congenital
- Vascular therapeutic procedures
- Arteriosclerosis, stenosis, vascular insufficiency and necrosis

Synonym
narrowed pulmonary artery, pulmonary artery stenosis

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Utrecht

Source(s) of monetary or material Support: Hartstichting en Stichting Hartekind

Intervention

Keyword: d-TGA, pulmonary artery intervention, TA, ToF

Outcome measures

Primary outcome

The difference in VO2 max as parameter for exercise capacity between the interventional and control group.

Secondary outcome

• Technical success

• Complications during the intervention

• Complications after the intervention

• Parameters for exercise capacity

o Peak workload (W and % predicted)

o O2 pulse (ml and % predicted)

o VE/VCO2 slope

• Parameters for RV systolic function

o RVEF (%), measured via CMR

o RV strain (%), measured via speckle tracking echocardiography and CMR feature tracking

o RV fractional area change (FAC) (%)

o RV pressure on echocardiography (TI gradient)

• Parameters for RV contractility

o RV end systolic elastance (Ees) measured via pressure volume loops

o RV ESV (ml/m2) measured via dobutamine stress CMR

o RVEF (%) measured via dobutamine stress CMR

• Parameters for RV remodeling

• Parameters for RV-PA coupling (invasive in intervention group)

• Lung perfusion (%) measured via MRI

o Left lung perfusion

o Right lung perfusion

• Quality of life

Study description

Background summary

Postoperative survival of patients with dextro transposition of the great arteries (d-TGA), Tetralogy of Fallot (ToF) and Truncus Arteriosus (TA) has increased over the last decades due to advances in operative techniques and perioperative care. Despite postoperative survival has increased, morbidity of these patients increases during long-term follow-up with a high need for reinterventions. Right ventricular outflow tract (RVOT) obstructions are the most common indication for a reintervention and percutaneous branch pulmonary artery (PA) interventions account for a significant number of these reinterventions. However, the effects of percutaneous branch PA interventions on exercise capacity, RV function and RV adaptation of patients with d-TGA, ToF and TA remains largely unknown. In addition, there is no consensus about the optimal timing for percutaneous interventions for branch PA stenosis in international guidelines.

Study objective

The primary study objective is to identify the effects of percutaneous interventions for branch PA stenosis on exercise capacity in patients with d-TGA, ToF and TA. The secondary objectives are 1) to assess the effects of percutaneous interventions for branch PA stenosis on RV function and 2) to define early markers for RV function and adaptation to improve timing of these interventions.

Study design

This is a multicenter randomized controlled trial. Patients will be included

from the following Dutch interventional centers for congenital heart disease: UMC Utrecht/WKZ (sponsor), LUMC/AUMC and Erasmus MC. During this trial there will be two groups: 1. a group of patients with d-TGA, ToF and TA who will undergo a percutaneous intervention for a branch PA stenosis according to standard care (intervention group) and 2. a group of patients with d-TGA, ToF and TA with a similar degree of pulmonary stenosis as group 1 (class IIa indication) who will undergo conservative management for a branch PA stenosis according to standard care (control group). If necessary, the control group will be able to undergo a percutaneous intervention for branch PA stenosis after the examinations at approximately 6 months follow-up, or sooner in case of symptoms. Patients from both groups will undergo the same series of examinations at baseline and approximately 6 months follow-up (within 6 week time-range) as part of standard care: conventional transthoracic echocardiogram (TTE), cardiopulmonary exercise testing (CPET) and conventional Cardiac Magnetic Resonance (CMR) including a low dose dobutamine stress MRI to assess RV functional reserve. The low dose dobutamine stress MRI will be performed in the interventional group from the UMC Utrecht/WKZ and Erasmus MC because the LUMC and AUMC do not have a suitable infrastructure for the low dose dobutamine stress MRI and this cannot be achieved throughout the duration of this study. The baseline CMR in the interventional group will be performed as close as possible prior to the intervention but maximal 4 weeks prior to the intervention. In addition, the intervention group will undergo standard RV pressure measurements during the intervention. Quality of life (QoL) questionnaires will be obtained at baseline and 2 weeks post intervention (intervention group) or a similar time range in the control group, which is based on experts opinion. TTE, CPET and conventional CMR will be performed within 2-4 years follow-up to assess the long-term effects of percutaneous PA interventions.

Intervention

During this trial, the intervention group will undergo a percutaneous intervention for branch PA stenosis. This is a standard treatment for branch PA stenosis according to international guidelines. The research group will have no influence on the execution of the intervention as it will be performed according to local practice by experienced interventional cardiologists.

Study burden and risks

The research will be conducted in both children and adults because previous studies have shown that first reinterventions for residual lesions such as branch PA stenosis already occur at a median age of 2 years after primary surgical repair. In addition, previous literature has shown that the majority of percutaneous branch PA interventions is performed in children which makes branch PA stenosis mainly a pediatric health care problem. This substantiates the use of children in this research and shows that our study aims will be of

great importance for all age groups. The risks associated with participation in the study are negligible for both children and adults because the two treatments used in this trial (percutaneous intervention for branch PA stenosis and conservative management) are currently both used in clinical practice for patients with a class IIa indication for a branch PA intervention. There is no consensus about the optimal timing for a percutaneous intervention for branch PA stenosis in international guidelines. Therefore, we will assess both options in a randomized controlled fashion without any extra risk for the patient. In addition, the examinations during this study are predominantly non-invasive. Existing burdens from non-invasive examinations will be minimalized using a steep RAMP procedure for cardiopulmonary exercise testing and a low dose dobutamine stress MRI, which has been proven clinically relevant, safe and effective in patients with congenital heart disease (CHD). Taken together, this justifies the use of it in this study.

Contacts

Public
Universitair Medisch Centrum Utrecht

Lundlaan 6
Utrecht 3584 EA
NL
Scientific
Universitair Medisch Centrum Utrecht

Lundlaan 6
Utrecht 3584 EA
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (12-15 years)

Adolescents (16-17 years)
Adults (18-64 years)
Children (2-11 years)

Inclusion criteria

In order to be eligible to participate in this study, a subject must meet all of the following criteria:
• Patients with d-TGA post ASO, ToF or TA
• >=8 years

And one or more of the following inclusion criteria (Baumgartner et al. Eur Heart J 2021; Feltes et al. Circulation 2011; Tatewaki et al. Gen Thorac Cardiovasc Surg 2018):
• All class IIa indications for a branch PA intervention:
• Persistent decreased RV function (based on gold standard CMR)
o <18 years RVEF <=55% (Van der Ven et al. EHJ Cardiovasc Imaging 2020)
o >=18 years RVEF<50% (Maceira et al. Eur Heart J 2006)
• Progressive tricuspid regurgitation (TR) (>=moderate)
• Bifurcation stenosis
o Significant unilateral stenosis (>=50%)
o Borderline bilateral PA stenosis (40-70%)
• Unbalanced perfusion (<=35/65%)
• RV/LV pressure ratio > 2/3 based on echocardiography
• Reduced lung perfusion or decreased objective exercise capacity (based of gold standard VO2 max during CPET)
o <18 years (Takken et al. Ann Am Thorac Soc 2017) VO2 peak <35 mL·kg-1·min-1 (boys)
VO2 peak <30 mL·kg-1·min-1 (girls)
o >=18 years (Kaminsky et al. Mayo Clin Proc 2015) VO2 peak <27 mL·kg-1·min-1 (men) VO2 peak <19 mL·kg-1·min-1 (women)

Exclusion criteria

A potential subject who meets any of the following criteria will be excluded from participation in this study:

• All class I indications for a branch PA stenosis intervention:
o Doppler peak gradient >64 mmHg
o Symptoms related to branch PA stenosis
o R-L shunt via ASD or VSD
o Recently developed decreased RV function
• Physical or mental contraindications for at least one of the examinations (e.g. exercise test, MRI, QoL questionnaire)

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Open (masking not used)

Primary purpose: Treatment

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	11-04-2024
Enrollment:	56
Type:	Actual

Ethics review

Approved WMO

Date:	16-03-2023
Application type:	First submission
Review commission:	METC NedMec

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	NL81160.041.22