Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
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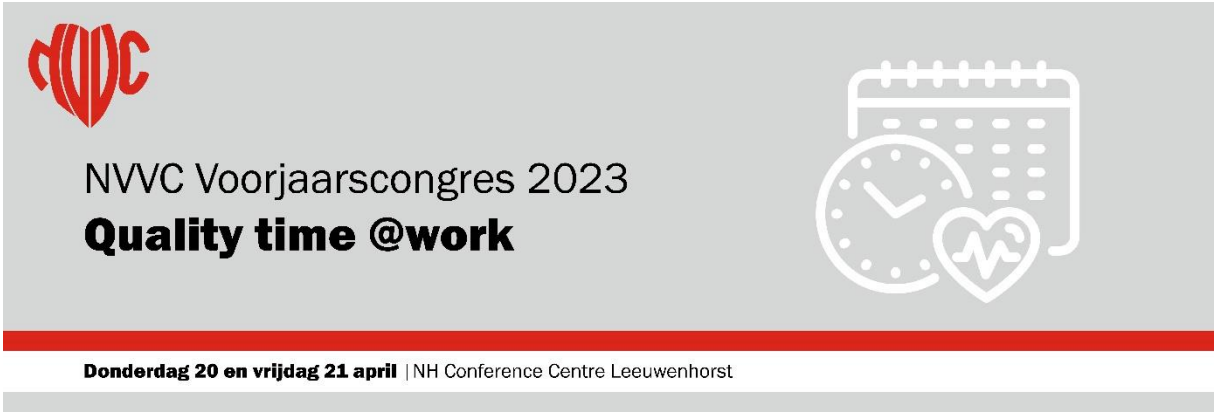

Abstracts of the Scientific Spring Congress of the Netherlands Society of Cardiology
20 -21 April 2023

Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
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Sessie 1: ELECTROPHYSIOLOGY

Quality of Life After Shocks or Complications is Similar Between Subcutaneous and Transvenous Defibrillator Therapy

Presenting author: J.A. de Veld
Department: Heart Center, Department of Clinical and Experimental Cardiology, Amsterdam Cardiovascular Sciences, Amsterdam UMC, location AMC.

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Purpose:
The PRAETORIAN trial showed that the subcutaneous implantable cardioverter defibrillator (S-ICD) is noninferior to the transvenous ICD (TV-ICD) with respect to device-related complications and inappropriate shocks in a conventional ICD population. Nevertheless, the type of complications and underlying mechanism for inappropriate shocks differ between devices. Earlier studies have reported a decrease in quality of life (QoL) in ICD patients with shocks or complications. It is unknown if there is a difference in QoL between the devices in general, and whether shocks and complications are associated with the same burden in both

arms. This prespecified analysis of the PRAETORIAN trial compares the impact of the S-ICD and TV-ICD on QoL and investigates if shocks and complications cause a device-specific reduction in QoL.

Methods:

In the PRAETORIAN trial, 849 patients were randomized to S-ICD (n=426) or TV-ICD (n=423) therapy. QoL was prospectively measured at baseline, discharge and 12 and 30 months after ICD implant, by measuring cardiac-specific physical functioning with the Duke Activity Status Index (DASI) and psychological and physical well-being with the 36-Item Short Form Health Survey (SF-36, divided in 8 subscales). Patients who completed the questionnaires at baseline were included in this analysis. At each time point the mean change in score from baseline was calculated. Patients with and without a shock or device related complication requiring intervention before their 12 month QoL were compared. Regression models and Wilcoxon rank sum tests were used to compare groups.

Results:

A total of 823/849 patients completed the questionnaires at baseline. Questionnaires were also completed by the majority of these patients at discharge (92%), 12 months (85%) and 30 months (69%). There was no difference in QoL between the arms at any time point (figure). At 12 months, patients with a shock or complication showed a significantly lower QoL on the DASI (p=0.005) and SF-36 subscales bodily pain (p=0.04), vitality (p=0.006) and role specific functioning – emotional (p=0.03). This was not significantly different between the arms.

Conclusion:

There were no differences in QoL between S-ICD and TV-ICD treatment in the first 30 months after implant. Patients with ICD shocks or complications requiring intervention showed a reduction in QoL at 12 months, but this did not differ between arms. These results confirm that the S-ICD is an acceptable alternative for the TV-ICD.

Keywords:

Quality of life, Subcutaneous ICD, Transvenous ICD

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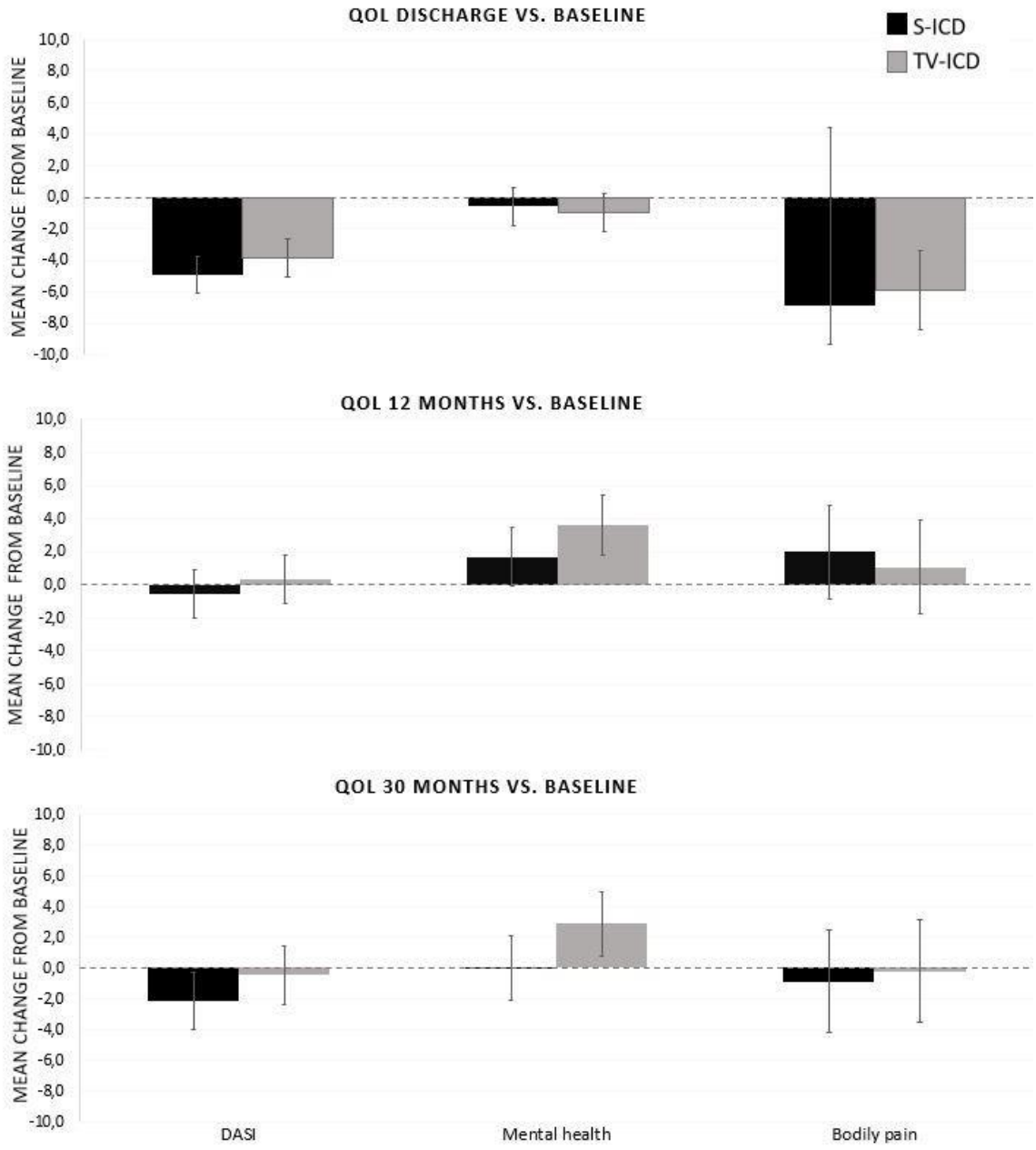
Figure:

Mean change in DASI and most relevant SF-36 subscales. Presented as mean with 95% CIs.



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Post-Implantation CMR Imaging to Study Biventricular Pacing Effects on the Left and Right Ventricle in Left Bundle Branch Block Patients

Presenting author: L.H.G.A. Hopman
Department: Cardiology

L.H.G.A. Hopman (Amsterdam UMC, Amsterdam); L.H.G.A. Hopman (Amsterdam UMC, Amsterdam); A. Zweerink (Amsterdam UMC, Amsterdam); A.C.J. van der Lingen (Amsterdam UMC, Amsterdam); M.C. van de Veerdonk (Amsterdam UMC, Amsterdam); M.J. Huntelaar (Amsterdam UMC, Amsterdam); M.J. Mulder (Amsterdam UMC, Amsterdam); L.F.H.J. Robbers (Amsterdam UMC, Amsterdam); A.C. van Rossum (Amsterdam UMC, Amsterdam); V.P. van Halm (Amsterdam UMC, Amsterdam); M.J.W. Götte (Amsterdam UMC, Amsterdam); C.P. Allaart (Amsterdam UMC, Amsterdam)

Purpose:
Recently introduced cardiovascular magnetic resonance (CMR) conditional cardiac resynchronization therapy defibrillator (CRT-D) devices allow biventricular (BIV) pacing during CMR. This study assesses the feasibility of CMR to study acute effects of BIV-stimulation on left ventricular (LV) and right ventricular (RV) volumes and function in patients implanted with a CMR conditional CRT-D.
Methods:
Ten CRT-D patients were included in this prospective pilot study. Patients underwent CMR imaging (1.5T) prior to device implantation (baseline), and six weeks after device implantation (including CRT-on and CRT-off). LV end systolic volume (ESV), end diastolic volume (EDV), ejection fraction (EF), and strain measures of LV dyssynchrony and dyscoordination were assessed on cine images. Additionally, RV parameters (ESV, EDV, and RVEF) were assessed.
Results:
After six weeks of CRT, reverse LV remodeling was observed with reduction in ESV (253.8±41.3ml vs. 194.9±37.1ml, $p<0.001$) and EDV (336.9±52.8ml vs. 268.1±42.3ml, $p<0.001$) during intrinsic rhythm (CRT-off) while adverse RV remodeling was observed (ESV: 88.9±21.1ml vs. 119.0±26.4ml, $p<0.001$, EDV: 175.1±22.8ml vs. 200.8±34.2, $p<0.01$). During CRT-on, LVEF acutely improved from 27.4±5.9% to 32.2±8.7% ($p<0.01$) and strain assessment showed abolishment of left bundle branch block contraction pattern. RVEF did not improve at CRT-on as compared to baseline (48.6±6.6% vs. 49.6±8.1%, $p=0.75$).
Conclusion:
Post-CRT implantation CMR assessing acute pump function is feasible and provides important insights in the effects of BIV-pacing on cardiac function and contraction patterns. LV hemodynamics improved during BIV-pacing, but RV hemodynamics did not benefit from CRT.

Keywords:
CRT, Remodeling, Pacing

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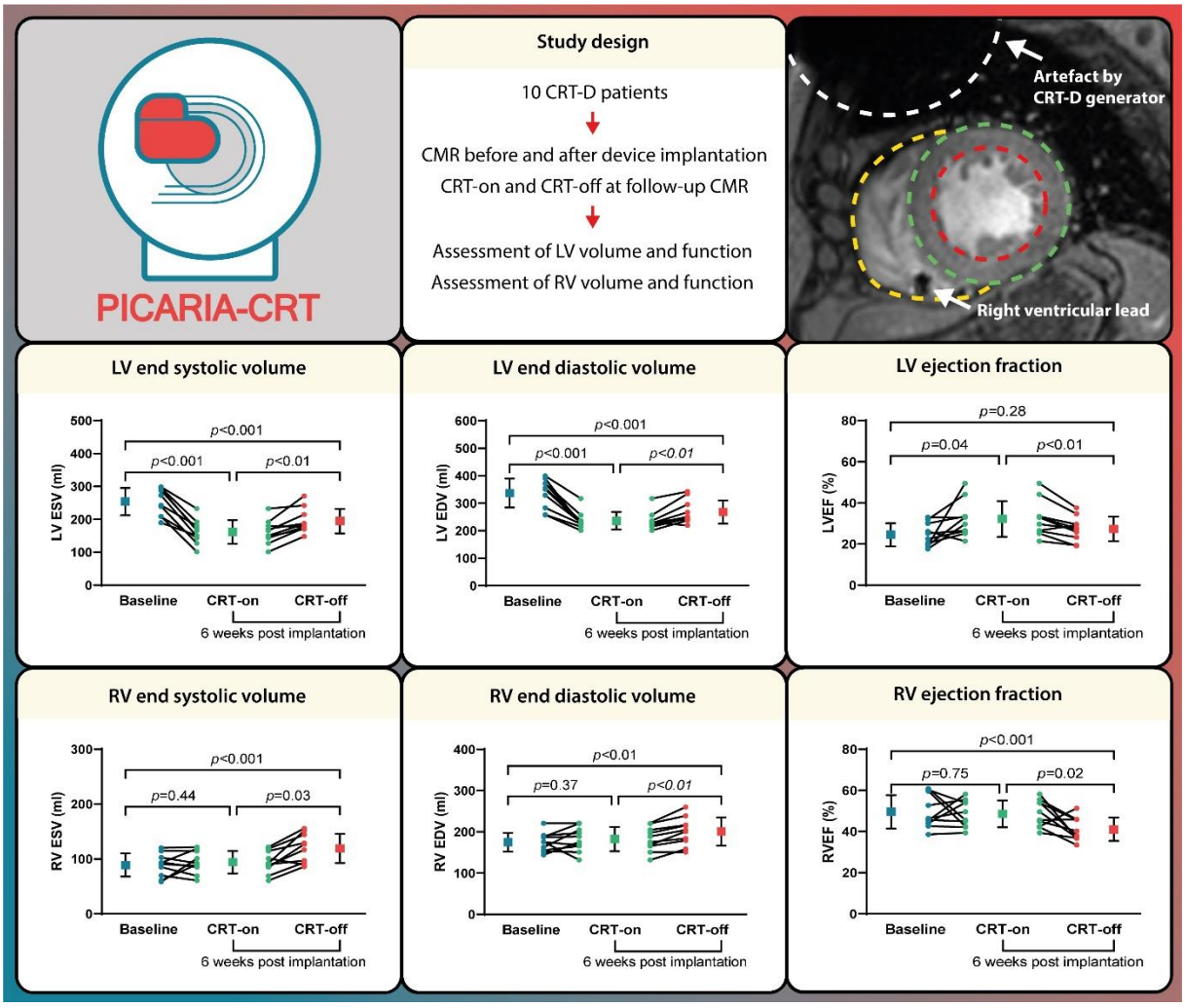
Figure:
Figure: PICARIA-CRT study design and results of LV and RV hemodynamics assessed by CMR at baseline and during follow-up in CRT-D patients.



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Predicted Need for Atrial and Ventricular Pacing per Indication Group in Patients with Dual-chamber Pacemakers

Presenting author: K.T.N. Breeman
Department: Cardiology

K.T.N. Breeman (Amsterdam UMC location AMC, Amsterdam); K.T.N. Breeman (Amsterdam UMC, location AMC, Amsterdam); L.A. Dijkshoorn (Amsterdam UMC, location AMC, Amsterdam); A.A.M. Wilde (Amsterdam UMC, location AMC, Amsterdam); F.V.Y. Tjong (Amsterdam UMC, location AMC, Amsterdam); R.E. Knops (Amsterdam UMC, location AMC, Amsterdam)

Purpose:
Bradyarrhythmias are adequately treated with pacemakers. Currently, different pacing modes (single- and dual-chamber, cardiac resynchronization therapy and physiologic pacing) and device types (leadless/transvenous) are available. Expected pacing need is important for determining optimal pacing mode and device type. We aimed to evaluate atrial (AP) and ventricular pacing (VP) percentages over time for the most common pacing indications.
Methods:
We included patients ≥18 years with a DDD(R) pacemaker implantation and ≥1 year follow-up at a tertiary center between January 2008 and January 2020. Baseline characteristics and AP and VP at yearly follow-up visits up to 6 years after implantation were retrieved from the medical records.
Results:
381 patients were included, primary pacing indications were incomplete AV block (AVB) in 85 (22%), complete AVB in 156 (41%) and sinus node dysfunction (SND) in 140 (37%). Mean age at implantation was respectively 71±14, 69±17, 68±14 years (p=0.23). Median follow-up was 42 months (25-68 months). Overall, AP was highest in SND with median 37% (7-75%), versus 7% (1-26%) in incomplete AVB and 3% (1-16%) in complete AVB (p<0.001); VP was highest in complete AVB with median 98% (43-100%), versus 44% (7-94%) in incomplete AVB and 3% (1-14%) in SND (p<0.001). VP increased significantly over time in patients with incomplete AVB and SND (both p=0.001).
Conclusion:
These results confirm the pathophysiology of different pacing indications, causing clear differences in pacing need and expected battery longevity. These results may help guide optimal pacing mode and suitability for leadless or physiologic pacing.

Keywords:
atrioventricular block, sinus node dysfunction, pacing percentage

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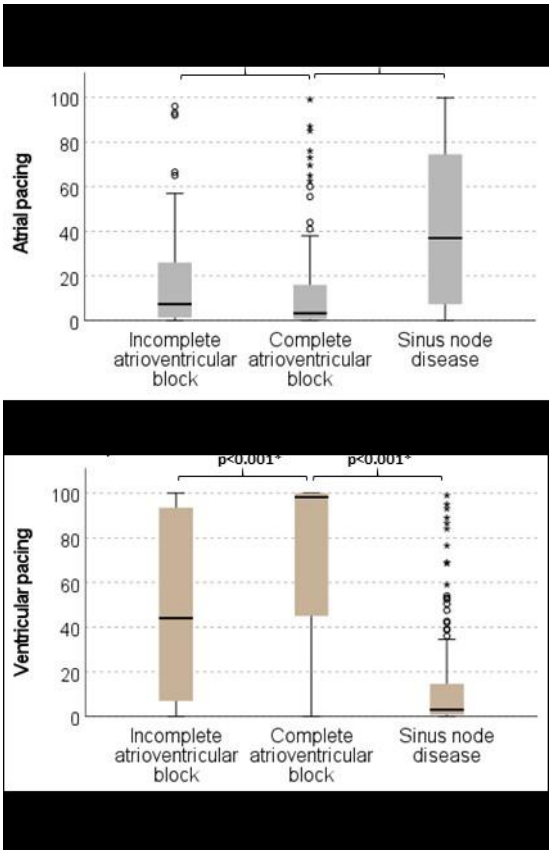
Figure:
Overall atrial pacing (AP) and ventricular pacing (VP) percentages, comparison between indication groups.



Abstract sessies NVVC Voorjaarscongres
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Assessing Feasibility and Safety of a Large Cardiac Device Program in the Curaçao Medical Center

Presenting author: M.Y. Ruiz
Department: Cardiology/devices

M.Y. Ruiz (Curaçao Medical Center, Curaçao); O. Witte (Curaçao Medical Center, Curaçao); J. Navarro Mendez (Curaçao Medical Center, Curaçao); J. Torres Viera (Curaçao Medical Center, Curaçao); J. Lindeboom (Curaçao Medical Center, Curaçao); A. Ramdat Misier (Curaçao Medical Center, Curaçao)

Purpose:
The hospital of Curaçao has a large cardiac device program without surgical backup and uses the European guidelines. However, comorbidities in this multi-ethnic population are higher compared to the Dutch population (e.g. increased incidence of hypertension, diabetes mellitus II, stroke, heart failure and dialysis). For this reason we investigated the feasibility and safety of the device program in this specific population.
Methods:
This was a single-center, retrospective study from January 1st 2020 to September 13th 2022. Patients who underwent a primary device implantation, upgrade, or generator or lead change within the Curaçao Medical Center were included. Several parameters were assessed within 24 hours, 30 days and one year post-procedure.
Results:
The study population consisted of 243 patients (63.1% male, median age 72.5, 62.8% hypertension, 40% DMII) including 143 single- and dual-chamber devices, 36 primary and 13 upgraded biventricular devices, and 52 generator or lead changes. Two (0.8%) procedures were unsuccessful due to unfavorable anatomy. There were no in-hospital mortalities, 1 (0.4%) OHCA within 30 days and 3 (1.2%) cardiovascular deaths within one year. There were 4 (1.6%) lead dislocations within 30 days, of which 2 occurred within the first 24 hours. All dislocations required a revision. One (0.4%) patient developed a pneumothorax, however no cardiac tamponades, hemothorax, pocket hematomas that required intervention and infections were recorded.
Conclusion:
This real-time data showed a high survival rate with a low complication rate in this specific study population. These findings indicate a feasible and safe device program.

Keywords:
Cardiac Implantable Electronic Devices, Ethnicity, Safety

Abstract sessies NVVC Voorjaarscongres
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First Draft of a Novel PLN p.Arg14del Heart Failure Risk Model to Potentially Aid Patient Selection for Future Gene Therapy

Presenting author: M.Y.C. van der Heide
Department: Cardiologie

M.Y.C. van der Heide (Amsterdam UMC, Amsterdam); M.Y.C. van der Heide (AUMC, Amsterdam); T.E. Verstraelen (Amsterdam UMC, Amsterdam); F.H.M. van Lint (UMCU, Utrecht); L.P. Bosman (UMCU, Utrecht); R. de Brouwer (UMCG, Groningen); V.M. Proost (AUMC, Amsterdam); A.H. Zwinderman (AUMC, Amsterdam); T. Germans (NWZ, Alkmaar); C. Dickhoff (Dijklander hospital, Hoorn); B.A. Schoonderwoerd (MCL, Leeuwarden); A.C. Houweling (AUMC, Amsterdam); J.R. Gimeno-Blanes (Virgen de Arrixaca hospital, Murcia); P.A. van der Zwaag (UMCG, Groningen); R.A. de Boer (Erasmus MC, Rotterdam); M.G.P.J. Cox (UMCG, Groningen); J.P. van Tintelen (UMCU, Utrecht); A.A.M. Wilde (AUMC, Amsterdam)

Purpose:
Gene therapy is a rapidly developing treatment option that will alleviate heart disease by directly targeting pathophysiological mechanisms underlying hereditary heart disease. As it stands today, patient selection is focused on the early-stage, young patients with severe and lethal cardiomyopathies for whom other treatment options are lacking. Many severely affected PLN p.Arg14del carriers precisely fit in this characterization, but risk stratification is needed to select patients as this genetic cardiomyopathy is characterized by incomplete penetrance.
The purpose of this study is therefor to develop a prediction model for heart failure in PLN p.Arg14del carriers to help future patient selection for gene therapy.
Methods:
Data were collected of 500 PLN p.Arg14del mutation carriers, aged 39.7 ± 16 years, 42.8% male, with no history or presentation of left ventricular ejection fraction (LVEF) <30%, heart failure hospitalization, left ventricular assist device (LVAD), heart transplantation (HTX) or heart failure (HF) death. We performed a lasso regression to select covariates and used these to develop a cox regression model.
Results:
During a median follow-up of 6 years (Interquartile range 2.9-9.2) after first MRI, 43 (8.6%) carriers experienced a composite endpoint of HF, consisted of a LVEF <30%, hospitalization, LVAD, HTX or HF death. Cox regression was performed with lasso penalty for selection of covariates. Cross validation was used to select the lasso penalty. Based on the number of events in a 10:1 ratio and appearance after cross validation we included AF (hazard ratio (HR) 2.31 [95% CI, 1.57-3.04]; p=0.064), NYHA class ≥2 at presentation (HR 2.74 [95% CI, 1.83-3.65], p=0.037), low-voltage ECG (HR 1.70 [95% CI, 0.99-2.41], p=0.15) and late gadolinium enhancement on MRI (HR 2.18 [95% CI, 1.40-2.97], p=0.064) in the final multivariable Cox regression model. The 5-year risk for heart failure was calculated for each carrier, after which the cohort was divided into two risk groups. Carriers in the high risk group had one or more risk factors and experienced most events and carriers in the low risk group experienced the least events. This resulted in an optimism-corrected C-statistic of 0.76 (95% CI, 0.67-0.85). It should be noted, however, that the number needed to treat at 5 year is still 20 and only after 9 years its declines towards 6 in the high risk group.
Conclusion:
This is the first outline of a novel PLN p.Arg14del risk prediction model for heart failure to potentially aid patient selection for gene therapy in the future when validated.

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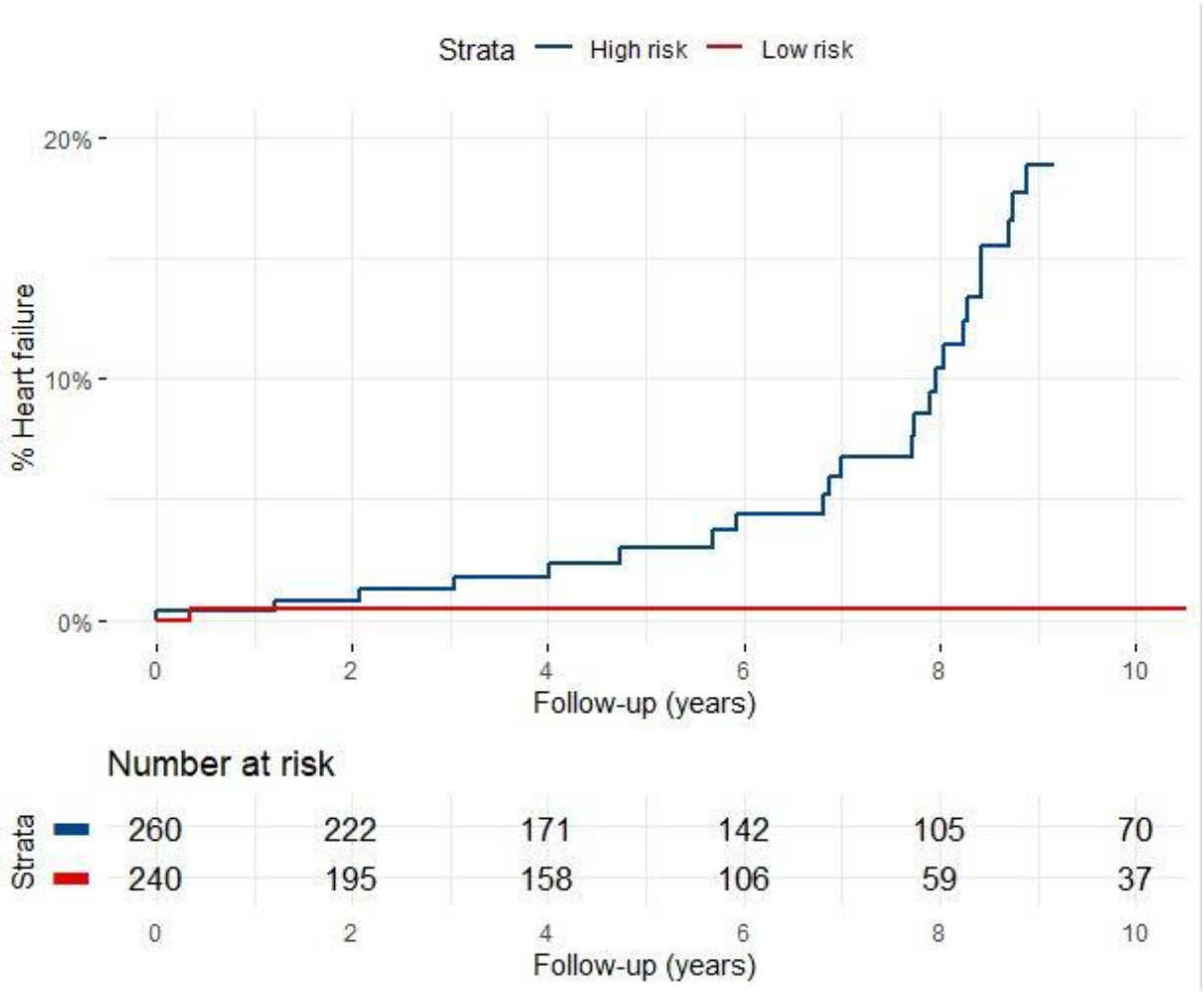
Keywords:
Heart failure, Prediction model, Gene therapy

Figure:
Figure 1. Kaplan-Meier plot, incidence of first heart failure event stratified by risk group



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Stereotactic Arrhythmia Radioablation for Ventricular Tachycardia: Results from the Dutch STARNL-1 Trial

Presenting author: W.F. Hoeksema
Department: Department of Cardiology

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Purpose:
Stereotactic arrhythmia radioablation (STAR) has recently been proposed as a new treatment technique in patients with ventricular tachycardia (VT) recurrences refractory to current treatment options, although prospective studies evaluating its efficacy and safety remain limited. We aimed to evaluate the efficacy and safety of STAR for VT in a prospective trial.

Methods:
The STARNL-1 was a prospective pre-post intervention study with 12 months follow-up. Six patients with VT recurrences despite optimal anti-arrhythmic medication, after one or more unsuccessful catheter ablation(s), were considered therapy-refractory. Patients were treated with a single fraction of 25 Gy to the pro-arrhythmic region. The efficacy endpoint was a reduction in VT episodes comparing the 12 months after treatment with the 12 months before treatment, and safety endpoints were a reduction in left ventricular ejection fraction (LVEF) and pulmonary function and an evaluation of adverse events. Additionally, ICD safety was evaluated during ICD readouts.

Results:
All patients were male and all suffered from ischaemic cardiomyopathy. Four patients (67%) completed 12-month follow-up, two patients died during follow-up of non-treatment related causes. Figure 1 shows the number of VT episodes before and after treatment. Median reduction in VT episodes was 87%. No reduction in LVEF or pulmonary function was observed and there were no treatment related serious adverse events. There were no relevant alterations to ICD parameters during follow-up.

Conclusion:
STAR for VT has a high efficacy and favourable safety profile in the first 12 months after treatment in patients with therapy-refractory VT.

Keywords:
Stereotactic Arrythmia Radiotherapy, Cardiac radioablation, Ventricular tachycardia

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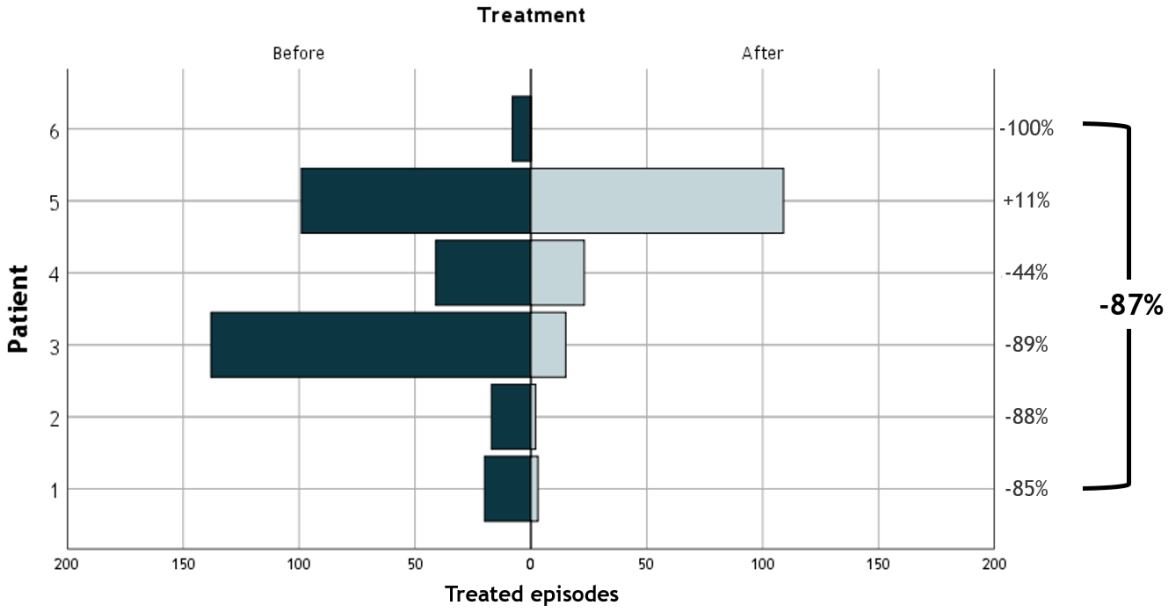
Figure:
The VT episodes in the 12 months before and 12 months after treatment (with a 6-week blanking period after treatment).



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Impact of Obesity on Quality of Life and Clinical Outcome in Patient with Atrial Fibrillation undergoing Primo Pulmonary Vein Isolation

Presenting author: N. van Pouderoijen
Department: Cardiology

N. van Pouderoijen (Amsterdam UMC, Amsterdam); N. van Pouderoijen (Amsterdam UMC, Amsterdam); M.J. Mulder (Amsterdam UMC, Amsterdam); L.H.G.A. Hopman (Amsterdam UMC, Amsterdam); H.A. Hauer (Cardiology Centers of the Netherlands, Amsterdam); G.J.M. Tahapary (North West Clinics, Alkmaar); M.J.B. Kemme (Amsterdam UMC, Amsterdam); C.P. Allaart (Amsterdam UMC, Amsterdam)

Purpose:
Obesity is a major risk factor for the incidence and progression of atrial fibrillation (AF), negatively impacting AF ablation outcomes. Weight loss in obese patients prior to AF ablation may improve quality of life (QoL) and AF ablation success rates. This study assessed the impact of overweight and obesity on patient-reported outcomes (QoL scores) and clinical outcomes (AF recurrence) in patients undergoing index AF ablation procedure.
Methods:
This single-center cohort study retrospectively included 238 patients undergoing primo radiofrequency (RF) pulmonary vein isolation (PVI) who completed 1 year follow-up, including the Toronto AF Severity Scale (AFSS) questionnaire at baseline, 4-, and 12 months post-PVI for assessment of QoL (AF severity, AF burden, and global well-being). At baseline, patients were categorized by body mass index (BMI): normal (<25 kg/m2); overweight (≥25 - <30 kg/m2); and obese (≥30 kg/m2). AF recurrence was evaluated by either 24-h Holter monitoring, AliveCor KardiaMobile devices, or conventional electrocardiograms (ECG).
Results:
Patients were divided based on BMI: 37.8% normal; 44.1% overweight; and 18.1% obese. Obese patients were more likely to be women (men 46.5%,p<0.01), and have diabetes mellitus (25.6%,p<0.01).
AF recurrence rates detected during 12 months follow-up were similar among the three BMI groups: normal 27.8%, overweight 33.3%, and obese 30.2% (p=0.70). After AF ablation, all QoL scores in each BMI group improved, with no between-group differences. Subgroup analysis showed significantly improved QoL scores in patients without AF recurrence independent of BMI category, however in patients with AF recurrence no significant improvement of AF severity and global well-being was found (Fig 1). Despite AF recurrence, self-reported AF burden significantly improved in the normal and overweight categories, but not in obese patients.
Conclusion:
A high BMI was not a major determinant of AF recurrence rates after a primo PVI. QoL after PVI was found to be determined by AF recurrence rather than BMI. This study suggests that obese patients might benefit from PVI to a similar extent compared to non-obese patients, though self-reported AF burden might differ between groups.

Keywords:
Atrial fibrillation ablation, Obesity, Quality of life

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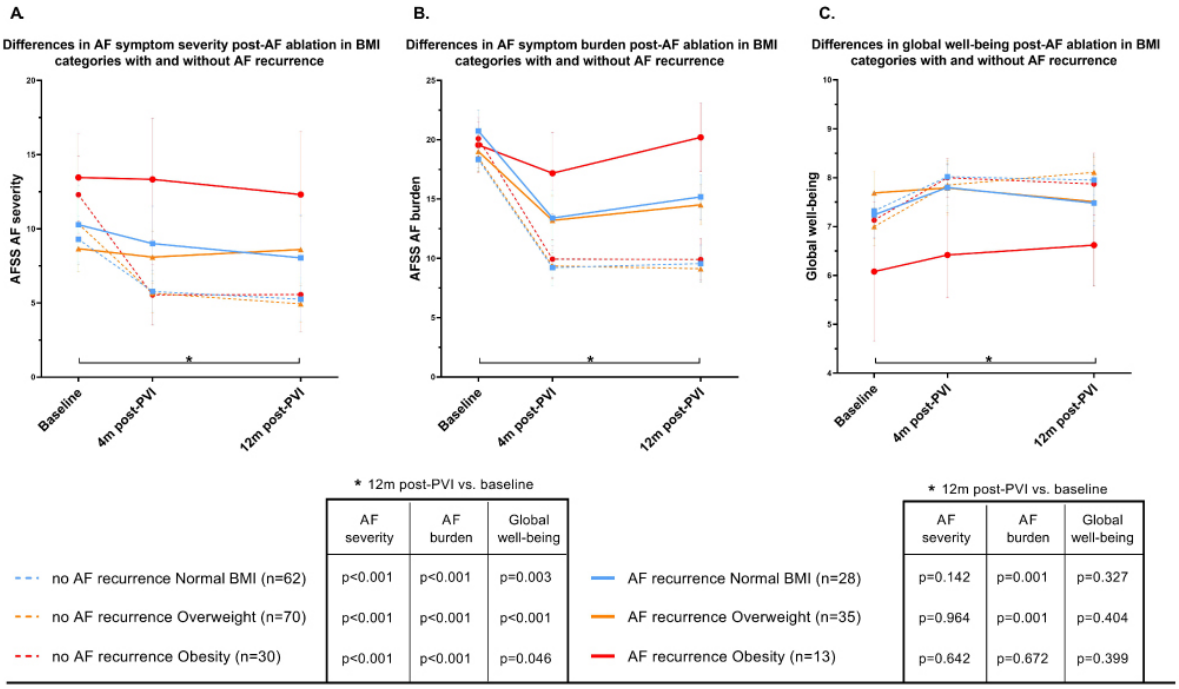
Figure:
Differences in quality of life scores between patients with and without AF recurrence during follow-up within every BMI category.



	AF severity	AF burden	Global well-being
no AF recurrence Normal BMI (n=62)	p<0.001	p<0.001	p=0.003
no AF recurrence Overweight (n=70)	p<0.001	p<0.001	p<0.001
no AF recurrence Obesity (n=30)	p<0.001	p<0.001	p=0.046

	AF severity	AF burden	Global well-being
AF recurrence Normal BMI (n=28)	p=0.142	p=0.001	p=0.327
AF recurrence Overweight (n=35)	p=0.964	p=0.001	p=0.404
AF recurrence Obesity (n=13)	p=0.642	p=0.672	p=0.399

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Sessie 2: GENERAL & HEART FAILURE

Atrial Fibrillation Detected with Outpatient Cardiac Rhythm Monitoring in Patients with Ischemic Stroke or TIA of Undetermined Cause

Presenting author: M.F.L. Meijs
Department: Cardiology

G. van der Maten (Medisch Spectrum Twente, Enschede); G. van der Maten (Medisch Spectrum Twente, Enschede); M.F.L. Meijs (Medisch Spectrum Twente, Enschede); J. van der Palen (Medisch Spectrum Twente, Enschede); P.J.A.M. Brouwers (Medisch Spectrum Twente, Enschede); C. von Birgelen (Medisch Spectrum Twente, Enschede); J. van Opstal (Medisch Spectrum Twente, Enschede); M.H. den Hertog (Isala, Zwolle)

Purpose:
Guidelines advise cardiac rhythm monitoring for ≥3 days to detect atrial fibrillation (AF) in patients with ischemic stroke of undetermined cause. However, the optimal duration of monitoring is unknown. We aimed to determine the AF detection rate during 7 days of outpatient cardiac rhythm monitoring after ischemic stroke or transient ischemic attack (TIA) of undetermined cause and gain insights into the AF-patients' vascular risk factors.
Methods:
Participants from a large tertiary hospital underwent outpatient cardiac rhythm monitoring after negative standard diagnostic evaluation (i.e., 12-lead electrocardiogram and in-hospital telemetry). Primary outcome was the proportion of patients with newly detected AF.
Results:
We examined 373 patients [age: 67.8±11.6 years; women: 166(44.5%); ischemic stroke: 278(74.5%)]. Median monitoring duration was 7 days (IQR 7-7), performed after a median of 36 days (IQR 27-47). AF was detected in 17(4.6%) patients, mostly (53%) on day-1. Within 3 days 73% of AF patients were identified. First AF episodes were detected up to day-7, but median time to AF was 8 hours (IQR 1-81). A significant difference in cardiovascular risk factors [diabetes; hypertension; or age >65 years] existed between the AF and non-AF group, and 12(70.6%) AF patients had ≥2 risk factors.
Conclusion:
After ischemic stroke or TIA of undetermined cause, 7 days of outpatient cardiac rhythm monitoring detected new AF in 4.6% of patients. Patients with AF had significantly more cardiovascular risk factors. About half of new AF episodes occurred during the first monitoring day, and about three quarters during the first 3 days.

Keywords:
Atrial Fibrillation, Brain Ischemia, Embolism

Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

The Use of a Simple Cardiac Triage Unit as a Safe Alternative to Direct Specialized Evaluation of Patients Estimated at Low Risk for Complex Care

Presenting author: S.J. Heuving
Department: Cardiology

S. J. Heuving (Treant, Emmen); S. J. Heuving (Treant, Emmen); M. van der Wielen (Treant, Emmen); L. Kleijn (Treant, Emmen); S.A. Kleijn (Treant, Emmen); R.L. Anthonio (Treant, Emmen); M.K. de Bie (Treant, Emmen)

Purpose:
Treant hospital centralized emergency care to one of their three locations. In order to combat crowding in the remaining Emergency Department (ED) / Cardiac Emergency Unit (CEU), whilst keeping emergency evaluation possible for all patients in its region of adherence, a Cardiac Triage Unit (CTU) was designed. This study evaluates the clinical and economical value of such a CTU in order to assess its potential in the rapidly transforming field of health care.
Methods:
For all patients needing emergency cardiac evaluation living in the area around Stadskanaal and Hoogeveen, presentation at the CTU was considered based on pre-specified criteria (figure 1). Recruitment period was July-December 2022. Outcome of patient care at the CTU and the usefulness of the current algorithm was assessed. Major adverse events were defined as death or acute coronary syndrome, minor adverse events as the need for readmission to CTU/ED/CEU.
Results:
198 patients were included. Most common referral reasons were chest pain (43.2%), palpitations (30.2%), and dyspnea (10.6%). Out of all presentations, 88.8% was discharged home the same day, not needing further evaluation. In the follow-up period of 30 days after initial presentation, major and minor adverse events occurred in 0.5% and 6.9% of the patients dismissed from the CTU, respectively.
Conclusion:
The use of a CTU is a safe alternative to direct admission to CEU for patients who are estimated to need low-complex care. Therefore, CTUs can limit CEU/ED crowding while keeping emergency evaluations possible for all patients

Keywords:
Acute Cardiovascular Care, Pre-hospital Triage, Cost Efficiency

Abstract sessies NVVC Voorjaarscongres
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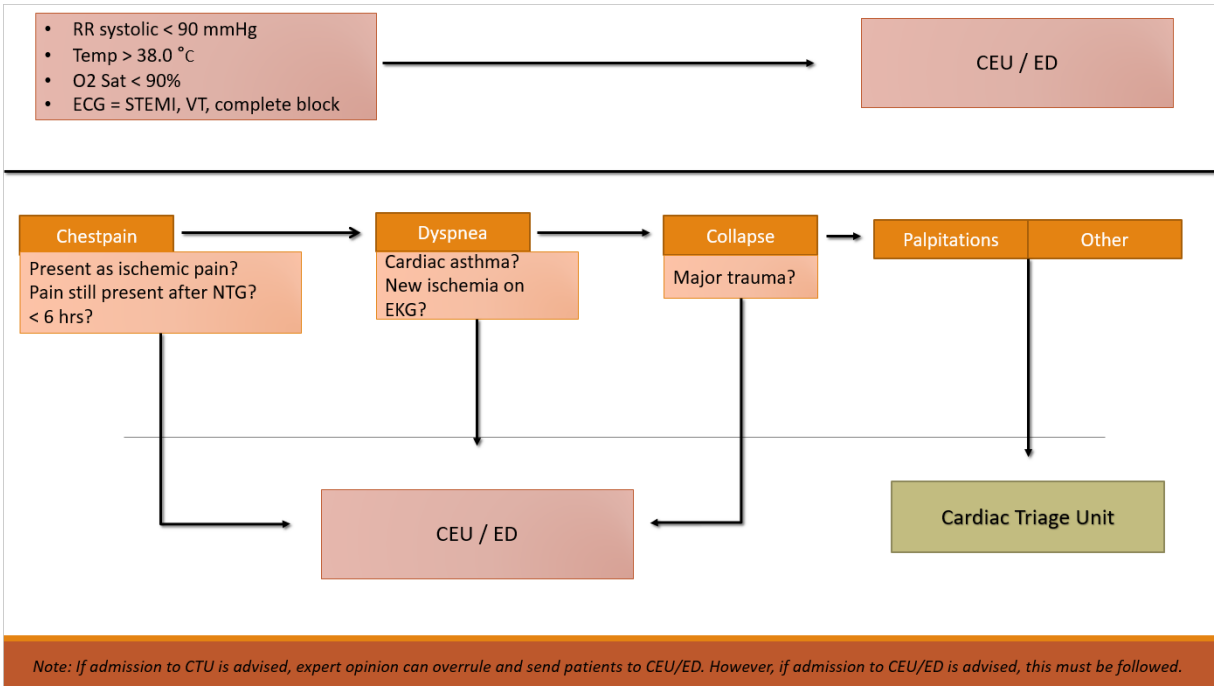
15:00 – 16:30 uur

Figure:



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

The Effect of Resveratrol on Aortic Growth and Function in Patients With Marfan Syndrome

Presenting author: D. Bosshardt
Department: Radiology & Cardiology

D. Bosshardt (Amsterdam UMC, Amsterdam); D. Bosshardt (Amsterdam UMC, Amsterdam); M.M. van Andel (Amsterdam UMC, Amsterdam); E.M. Schrauben (Amsterdam UMC, Amsterdam); L.M. Gottwald (Amsterdam UMC, Amsterdam); R.R.J. van Kimmenade (Radboud UMC, Nijmegen); A.J.H.A. Scholte (Leiden University Medical Center, Leiden); M.G. Dickinson (University Medical Center Groningen, Groningen); A.H. Zwinderman; B.J.M. Mulder (Amsterdam UMC, Amsterdam); A.J. Nederveen (Amsterdam UMC, Amsterdam); P. van Ooij (Amsterdam UMC, Amsterdam); M. Groenink (Amsterdam UMC, Amsterdam); V. de Waard (Amsterdam UMC, Amsterdam)

Purpose:
Patients with Marfan syndrome (MFS) have an increased risk of life-threatening aortic complications, mostly preceded by aortic dilatation. The aim of this study was to investigate if treatment with Resveratrol, a dietary supplement that intervenes in cellular metabolism, reduces aortic dilatation rate in patients with MFS.
Methods:
In this prospective, pre-post observational, multicenter trial, we analysed Resveratrol treatment in adults with MFS. Primary endpoint was the change in aortic dilatation in the thoracic aorta after one year of Resveratrol use, calculated using Magnetic Resonance Imaging (MRI) aorta diameters at three time points. Furthermore, we investigated changes in abnormal hemodynamics (wall shear stress (WSS) and pulse wave velocity (PWV)) determined by 4D-flow MRI. Assessments on risk factors were performed in patients with abnormal WSS or PWV.
Results:
A total of 57 participants, mean age of 37±9 years, of which 28 males (49%) were included in the study. Twenty-six (46%) had undergone aortic root replacement prior to the study. All aortic dimensions remained stable after 1.2±0.3 years follow-up. A significant decrease in growth rate (mm/year) in the ascending aorta was observed during the trial compared to pre-trial, from 0.54 (IQR: 0.09–1.39) to 0.00 (IQR: -0.99–0.67), p=0.004. WSS and PWV did not change after one year of Resveratrol use. High values of PWV were associated with previous aortic root replacement.
Conclusion:
In adult patients with MFS, Resveratrol treatment shows promising results towards stabilizing aortic growth rate after 1.2 year follow up. These findings may warrant a subsequent larger study with a longer follow-up period.

Keywords:
Marfan syndrome, Resveratrol, 4D Flow

Abstract sessies NVVC Voorjaarscongres
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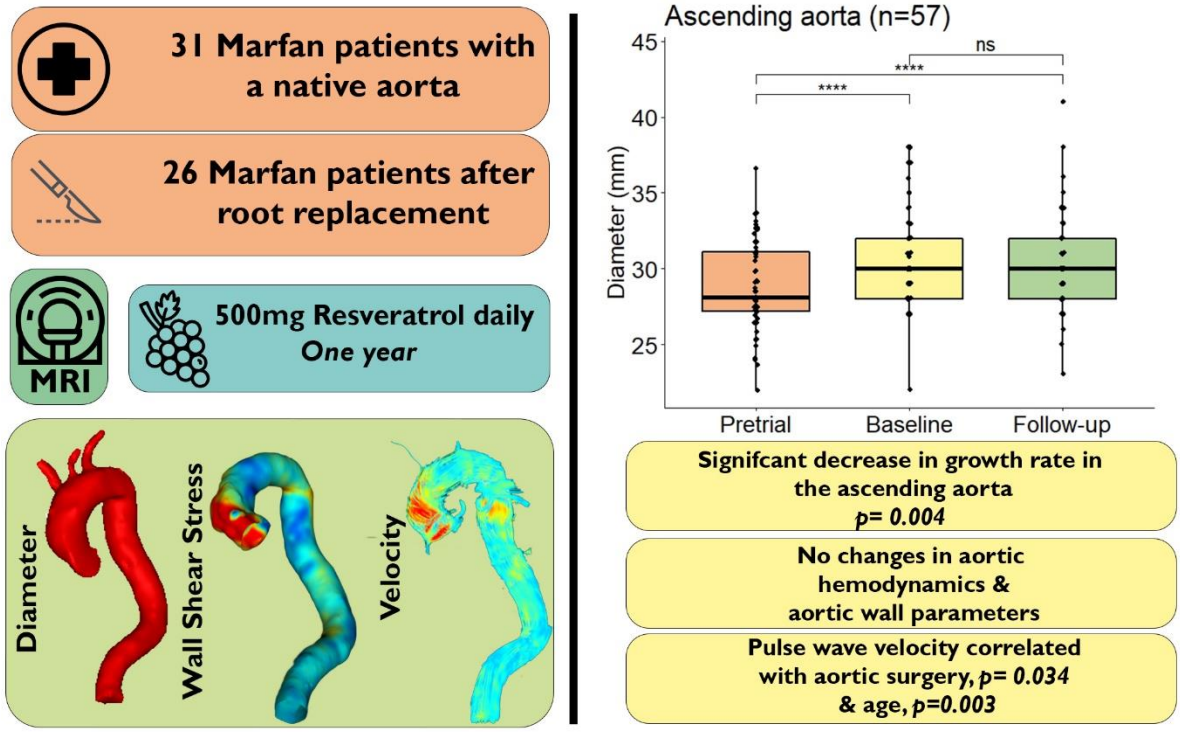
Figure:



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Attainment of Recommended LDL-C Goals after Percutaneous Coronary Intervention in Real-world Practice

Presenting author: D.A.M. Peeters
Department: Cardiology

*D.A.M. Peeters (Radboud University Medical Centre, Nijmegen); D.A.M. Peeters (Radboud University Medical Centre, Nijmegen); E.C.I. Woelders (Radboud University Medical Centre, Nijmegen); J.J.P. Luijkx (Zuyderland Medical Centre, Heerlen); P.J.C. Winkler (Zuyderland Medical Centre, Heerlen); P. Damman (Radboud University Medical Centre, Nijmegen); W. Remkes (VieCuri Medical Centre, Venlo); A.W.J. van 't Hof (Maastricht University Medical Centre, Maastricht); R.J.M. van Geuns (Radboud University Medical Centre, Nijmegen); on behalf of the ZON-HR registry investigators**

Purpose:
Cholesterol management in patients after percutaneous coronary intervention (PCI) from the ''Zuid-Oost Nederland Hart Registratie'' (ZON-HR) was evaluated. The aim of this multi-center prospective registry is to improve secondary prevention after PCI by a patient-tailored approach.
Methods:
Since November 2020 real-world data from 3998 patients who underwent PCI were collected in four hospitals. Patient characteristics, LDL-C values at baseline and after 30 days and medication at discharge were collected.
Results:
LDL-C at baseline and follow-up was complete in 284 patients. This number is limited, because LDL-C was not routinely tested in every patient. The mean age was 64.8 ± 10.7 year, 69% was male (table 1). After one month, the LDL-C value decreased significantly from 2.96 to 1.88 ($p<0.01$). Different cholesterol lowering medication was prescribed at discharge (87.0% statins, 8.1% ezetimibe, 2.1% PCSK-9 inhibitor). Patients with a baseline LDL-C < 3 and older patients had a higher chance to reach target after 30 days. While most of the patients used at least high intensity statins, patients with baseline LDL-C ≥ 3.0 did not reach target in 78% of cases. In 81.8% of the patients only monotherapy was prescribed.
Conclusion:
In our study population the LDL-C value decreased within the first month, target LDL-C was not reached in one month in most patients. More intensive or combination therapies should be initiated in patients with LDL-C ≥ 3 and younger patients (< 65 year) as these patients have difficulty reaching the target value.

Keywords:
Secundary prevention, LDL-cholesterol, Percutaneous Coronary Intervention (PCI)

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Figure:
Table 1: Patient characteristics LDL-C treatment and predictors reaching target value

Baseline Characteristics	**ACS (n=192)**	**CCS (n=92)**	
Age	63.8 ± 11.1	67.0 ± 9.6	p=0.015
Sex			
Male	68.8%	70.7%	NS
BMI	28.3 ± 4.0	28.2 ± 4.2	NS
Smoking			
Yes	25%	20.0%	
Former	22.2%	23.3%	
No	52.8%	56.7%	NS
LDL-C	3.15 ± 1.14	2.57 ± 1.13	p<0.001
LDL-C decrease	1.14 ± 1.12	0.54 ± 1.07	p<0.001
Cholesterol lowering medication at discharge			
Statins	88.2%	84.6%	
Ezetimibe	7.3%	9.8%	
PCSK-9 Inhibitor	2.6%	1.1%	NS
Cholesterol lowering treatment type at discharge			
None	8.4%	14.3%	
Mono therapy	84.4%	75.8%	
Combination therapy	6.7%	9.9%	NS

Univariate Regression of Predictors Reaching LDL-C < 1.4		
Variable	OR	95% CI
Age <65 year	0.574	0.341-0.966
Male	1.325	0.749-2.343
BMI > 30	1.059	0.605-1.852
LDL at baseline < 3	2.028	1.200-3.425
DM	1.153	0.642-2.074
ACS	1.650	0.938-2.904
MI in past	1.451	0.812-2.594
PAD in past	0.789	0.322-1.935

BMI, body mass index; ACS, acute coronary syndrome; CCS, chronic coronary syndrome ; LDL-C, low density lipoprotein-cholesterol; DM, diabetes mellitus; MI, myocardial infarction; PAD, peripheral arterial disease.

Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

The Dynamic Risk of Heart Failure: a Systematic Review and Meta-regression of Observational Studies

Presenting author: A. Shakoor
Department: Cardiology

A. Shakoor (Erasmus University Medical Centre, Rotterdam); R.M.A. van der Boon (Erasmus University Medical Centre, Rotterdam); S. Abou Kamar (Erasmus University Medical Centre, Rotterdam); I. Kardys (Erasmus University Medical Centre, Rotterdam); E. Boersma (Erasmus University Medical Centre, Rotterdam); R.A. de Boer (Erasmus University Medical Centre, Rotterdam); N.M. van Mieghem (Erasmus University Medical Centre, Rotterdam); J.J. Brugts (Erasmus University Medical Centre, Rotterdam)

Purpose:
To determine all-cause mortality and HF hospitalizations associated with the distinct stages of heart failure (HF) and provide evidence for the prognostic value of worsening HF (WHF).
Methods:
A systematic review of observational studies from 2012 to 2022 that reported death and/or HF readmission in new-onset HF (NOHF), chronic (CHF), WHF or adv. HF population was carried out. Primary outcomes were 1-month all-cause mortality and 1-year all-cause mortality and/or HF-rehospitalization. To calculate mortality rates, studies were pooled using random effect meta-analysis. To compare the different stages of HF, a mixed effects meta-regression with inverse-variance weights was used. In the advanced HF group, mortality, heart transplantation and left ventricle device implantation were regarded equivalent.
Results:
Among the 14.432 studies screened, 65 were included representing 862.046 HF patients. Pooled 30-day mortality was comparable between patients admitted to the hospital (NOHF: 10.2% (95% C.I. 8.3-14.0) and WHF: 8.4% (95% C.I. 7.0-9.1). The 1-year mortality- and HF-rehospitalization risk differed and increased stepwise from CHF to adv. HF (Fig 1A and 1B). The Odds ratios (95% C.I.) were 2.98 (2.23-3.98), 4.21 (3.09-5.72) and 4.22 (2.98-5.70) in NOHF, WHF and Adv. HF respectively (CHF as reference).
Conclusion:
The results of our analysis confirm the dynamic risk across the different HF stages. Additionally, it underlines the negative prognostic value of WHF as the first progressive stage from CHF towards adv. HF. These findings underscore the utility of defining WHF as a specific stage within the HF continuum that precedes deterioration. Mitigating WHF may further improve management of this high-risk population.

Keywords:
Heart failure outcome, Dynamic risk, Worsening heart failure

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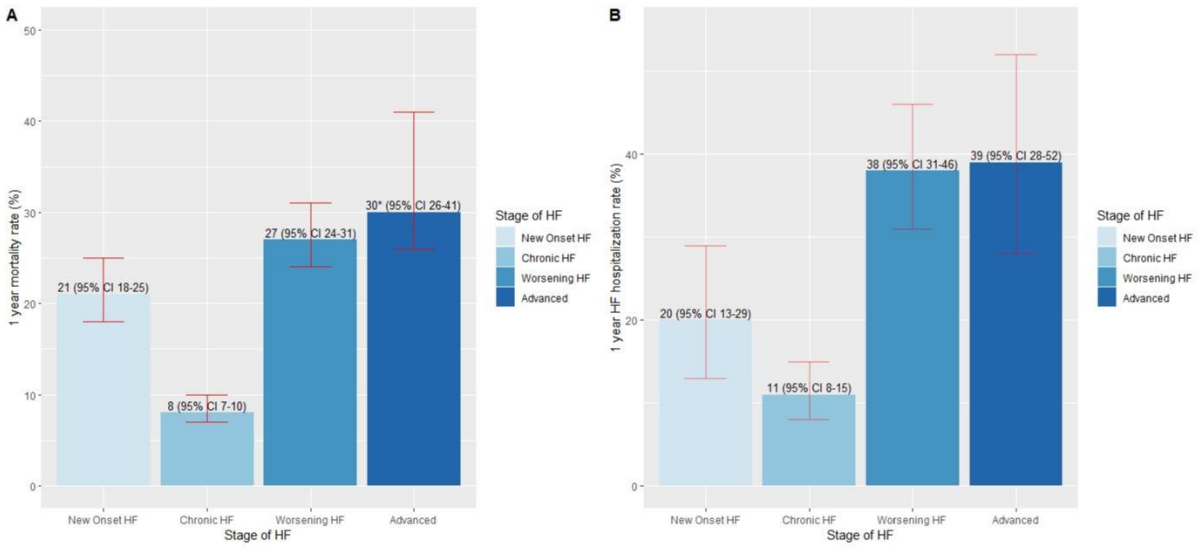
Figure:
Figure 1A and 1B: Pooled 1-year all-cause mortality and HF-hospitalization for the different HF stages. Rates are expressed as percentage (%) with 95% CI. The red error bar is the visual representation of the 95% CI. 95% CI, 95% confidence interval
* Combined endpoint (all-cause mortality, left ventricle assist device implantation and/or heart transplantation)



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Changes in Diagnostic Trajectory of Cardiac Amyloidosis over 6 Years: Role of Improving Awareness

Presenting author: A. Achten
Department: Cardiology

A. Achten (MUMC+, Maastricht); J. Weerts (MUMC+, Maastricht); S. Michielsen (MUMC+, Maastricht); V.P.M. van Empel (MUMC+, Maastricht); S. Sanders-van Wijk (MUMC+, Maastricht); H.P. Brunner-la Rocca (MUMC+, Maastricht); C. Knackstedt (MUMC+, Maastricht)

Purpose:
Introduction
The awareness of cardiac transthyretin amyloidosis (ATTR-CA) has increased over the years due to diagnostic and therapeutic developments. Nevertheless, early diagnosis of ATTR-CA remains challenging and diagnosis is often delayed.
Objectives
To evaluate the diagnostic trajectory of ATTR-CA in a tertiary medical centre in the Netherlands, with emphasis on improving time to diagnosis.
Methods:
This is a prospective observational cohort study of patients diagnosed with ATTR-CA in a tertiary medical centre in the Netherlands, between 2016 and 2022.
Results:
This study included 52 ATTR patients who were screened for cardiac involvement, of whom 42 (80.8%) were diagnosed with ATTR-CA wild-type (ATTRwt-CA) and 10 (19.2%) with ATTR-CA hereditary (ATTRh-CA). Analysis per two year periods revealed an increase in ATTR-CA diagnoses over time (Figure 1), driven by ATTRwt-CA increase. Over time, the diagnostic trajectory entailed more non-invasive radionuclide bone scintigraphy, from 50.0%, 68.0% to 97.0% respectively (p=0.002), and less invasive diagnostic methods (e.g. cardiac biopsy, 75%, 33% and 15% respectively, p=0.025). The prevalence of Perugini grade 1 on bone scintigraphy and therefore the necessity to perform a cardiac biopsy remained unchanged (0.0%, 10.0% and 3.3% respectively, p=0.470). Nevertheless, the interval between the onset of heart failure complaints and ATTR-CA diagnosis has not changed significantly (4.2, 1.8 and 2.7 years respectively, p=0.640). While overall, but not significantly the diagnostic trajectory became shorter (35.1, 7.0 and 7.9 respectively, p=0.552)(figure 1).
Conclusion:
The awareness of ATTR-CA led to a substantial increase in diagnoses, predominantly ATTRwt-CA. Less invasive diagnostic trajectories were employed over time. Overall, the symptom-to-diagnosis duration has remained similar driven by time to referral. Therefore, more effort seems still needed to further increase awareness in the medical field. New strategies, such as clinical prediction scores may help to identify patients with increased risk of ATTR-CA in earlier stages.

Keywords:
Cardiac amyloidosis, Diagnostic trajectory,

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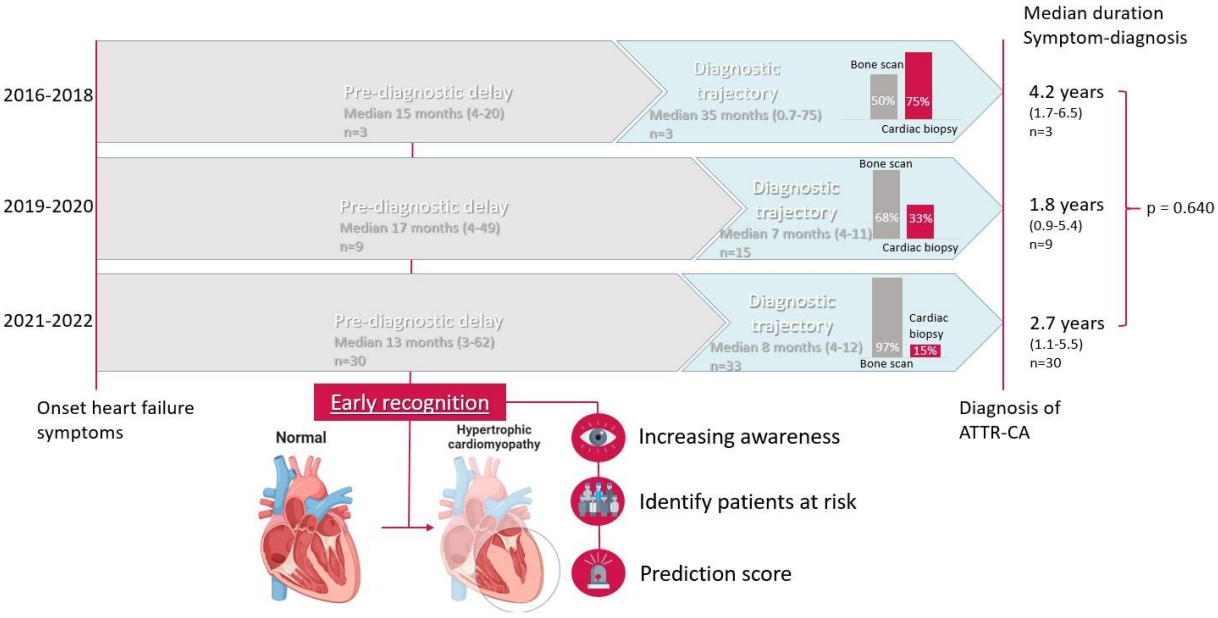
Figure:
Timeline per two year periods of onset of heart failure symptoms to ATTR-CA diagnosis



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Referral Patterns for Advanced Heart Failure Therapies

Presenting author: R. van der Hoorn – Huisman
Department: cardiologie

R. van der Hoorn – Huisman (Erasmus MC, Rotterdam/Hagaziekenhuis, Den Haag); A. Shakoor (Erasmus MC, Rotterdam); M. Darvish (Erasmus MC, Rotterdam); A. Mahamed (Erasmus MC, Rotterdam); A. Mkrtchjan (Erasmus MC, Rotterdam); O.C. Manintveld (Erasmus MC, Rotterdam); C.J.W. Borleffs (Hagaziekenhuis, Den Haag); J.J. Brugts (Erasmus MC, Rotterdam); R.M.A. van der Boon (Erasmus MC, Rotterdam)

Purpose:
Therapies for advanced heart failure (AHF) have shown to increase quality-adjusted life years. However, successful utilization and implementation is dependent on appropriate referral to an AHF center. The purpose of this study is to describe current referral patterns and evaluation outcomes.
Methods:
We performed a retrospective observational analysis of patients referred for AHF therapies to the Erasmus Medical Center in 2021. Patients' demographics, characteristics, referral circumstances and evaluation outcomes were collected.
Results:
A total of 141 patients were referred of which 28% were female and a mean age of 55±16 years (Table. 1). Referrals were evenly distributed from within the Greater-Rijnmond area and beyond. The majority of patients were in NYHA class III/IV and met the ESC criteria for AHF. At referral 44% of chronic HF patients were on triple therapy and most patients (71.6%) could be further medically optimized. Fourty-eight patients were discussed for AHF therapies from whom 18 patients were accepted for LVAD, listing for transplantation or both. Main reason for rejection was comorbidity ('too sick', 36.1%) followed by 'too well' (22.2%) and 'right ventricular failure' (11.1%).
Conclusion:
In this retrospective study the majority of AHF referrals were appropriate. Nevertheless, in a significant proportion of patients AHF therapies could be deferred with medical optimization. From the population discussed most were turned down for AHF therapies primarily due to comorbidities and possible late referral. These outcomes suggest a significant need for regional collaboration and education to improve uptake of medical treatment and appropriate timing of referral to AHF centers for optimal outcomes.

Keywords:
advanced heart failure, referral patterns, collaboration

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Figure:
Table 1. Baseline characteristics of the population referred to the Erasmus MC for advanced HF therapies.
* Excluding new onset heart failure patients

Patients' and Referral Characteristics		N / total
Age, years (mean ±SD)		55.27 ±15.8
Sex	Male	102/141 (72.3)
	Female	39/141 (27.7)
Race (%)	Caucasian	111/141 (78.7)
	Black	7/141 (5.0)
	Asian	3/141 (2.1)
	Hispanic	2/141 (1.4)
	Arab	14/141 (9.9)
	Hindustan's	4/141 (2.8)
In-patient referral		20/141 (14.2)
Referral from within the Greater Rijnmond area		76 / 141 (54.0)
New onset Heart Failure (%)		33/141 (23.4)
Time from HF-diagnosis to referral, months (median) [IQR]*		44 [13-102.75]
HF-Hospitalization in the last 6 months (%)		66/141 (46.8)
Referral conform ESC criteria for advanced care (%)		90/141 (63.8)
History of (%)	Myocardial infarction	46/141 (32.6)
	Atrial fibrillation	56/141 (39.7)
	Hypertension	53/141 (37.6)
	Diabetes mellitus	36/141 (25.5)
	Peripheral artery disease	8/141 (5.7)
	Ventricular ectopy or ICD shock in the last year	23/141 (16.3)
	Chronic kidney disease (GFR < 60 ml/min)	61/139 (43.9)
Etiology (%)	Ischemic	44/141 (31.2)
	Non-ischemic	97/141 (68.8)
NYHA Class (%)	III	66/141 (46.8)
	IV	16/141 (11.3)
INTERMACS (%)	2	2/141 (1.4)
	3	3/141 (2.1)
	4	6/141 (4.3)
	5	26/141 (18.4)
	6	30/141 (21.3)
	7	13/141 (9.2)
Left ventricular function (%)	Good	17/138 (12.3)
	Reasonable	9/138 (6.5)
	Moderate	27/138 (19.6)
	Severely reduced	85/138 (61.6)
Medical therapy* (%)	Beta-blocker	76/108 (70.4)
	RAAS-Inhibitor	77/108 (71.3)
	MRA	73/108 (67.6)
	SGLT2- inhibitor	18/108 (16.7)
Triple therapy* (RAAS-inhibitor, B-blocker, MRA, %)		47/108 (43.5)
Device therapy (%)	CRT	17/141 (12.1)
	ICD	52/141 (36.9)

Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Sessie 3: IMAGING

Exercise-induced Cardiovascular Remodelling in a Large Cohort of Female, Elite Athletes: towards Sex-specific CMR Reference Ranges

Presenting author: J.C. van Hattum
Department: Cardiology

J.C. van Hattum (Amsterdam UMC, location University of Amsterdam, Amsterdam); J.C van Hattum (Amsterdam UMC, location University of Amsterdam, Amsterdam); M.A. van Diepen (Amsterdam UMC, location University of Amsterdam, Amsterdam); S.M. Verwijs (Amsterdam UMC, location University of Amsterdam, Amsterdam); J.J.N. Daems (Amsterdam UMC, location University of Amsterdam, Amsterdam); S.M. Boekholdt (Amsterdam UMC, location University of Amsterdam, Amsterdam); A. Van Randen (Amsterdam UMC, location University of Amsterdam, Amsterdam); R.N. Planken (Amsterdam UMC, location University of Amsterdam, Amsterdam); M. Groenink (Amsterdam UMC, location University of Amsterdam, Amsterdam); AJ. Nederveen (Amsterdam UMC, location University of Amsterdam, Amsterdam); M.H. Moen (Dutch National Olympic Committee & National Sports Federation, High Performance Team, Arnhem); A.A.M. Wilde (Amsterdam UMC, location University of Amsterdam, Amsterdam); Y.M. Pinto (Amsterdam UMC, location University of Amsterdam, Amsterdam); H.T. Jorstad (Amsterdam UMC, location University of Amsterdam, Amsterdam)

Purpose:
Differentiating between exercise-induced cardiac remodelling (EICR) and pathology constitutes a central challenge in sports cardiology. To facilitate this differentiation, reference ranges for cardiovascular magnetic resonance imaging (CMR) are needed. However, female athletes, and especially, female elite athletes with potentially the most outspoken adaptation, are severely underrepresented. To quantify EICR on CMR in a large cohort of female, elite athletes, compared with currently available reference values of the general female population.

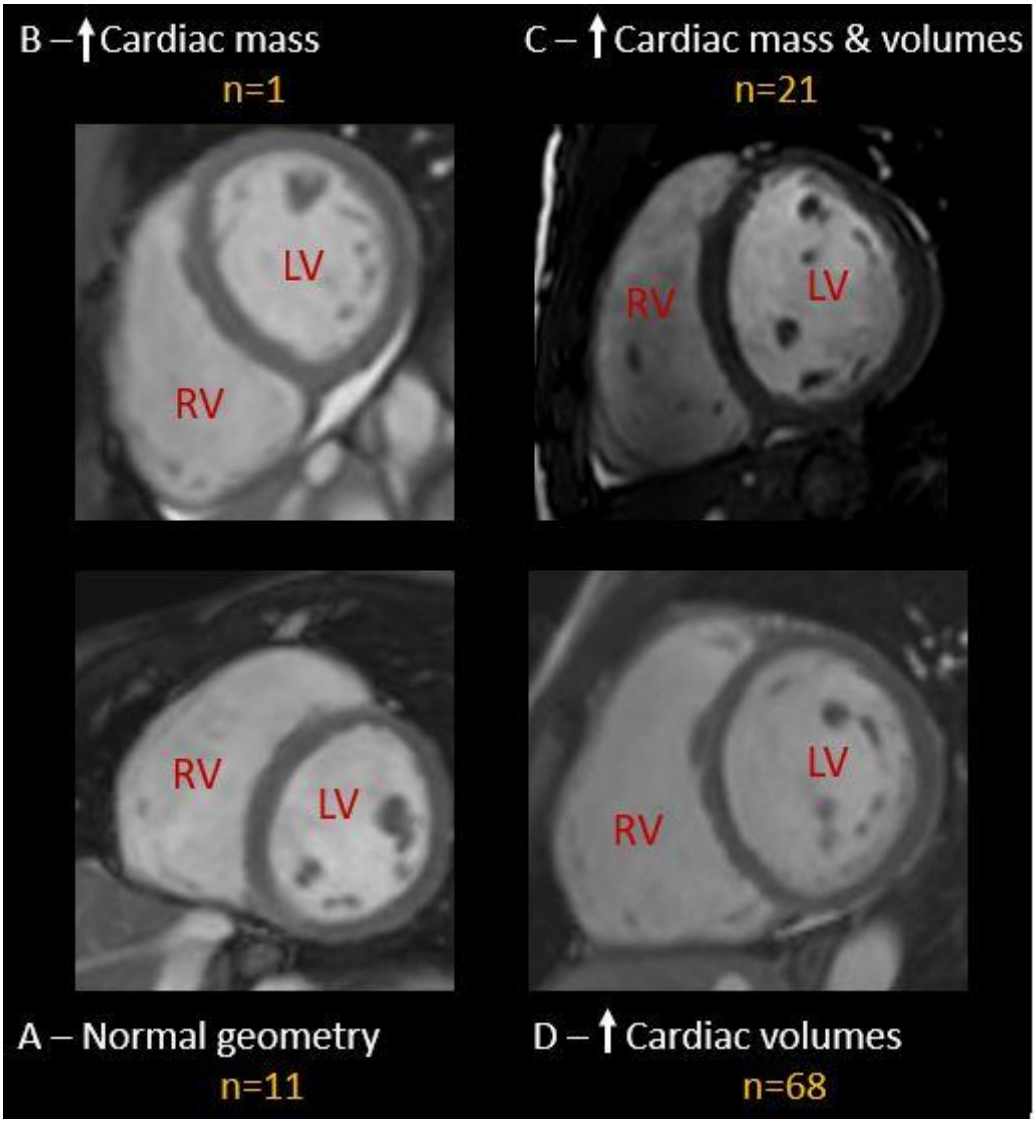
Methods:
We performed a cross-sectional CMR analysis in female elite athletes aged ≥16 years, included in the ELITE cohort. We excluded athletes with known cardiovascular disease. The primary outcome was EICR quantification as BSA-indexed RV and LV end-diastolic volume (EDVi), LV wall mass (LVMi), LV remodelling index (LVMi/LVEDVi), and LV/RV ratio (LVEDi/RVEDVi). CMR was performed according to a uniform protocol, and included cine-imaging and delayed hyperenhancement, preferentially on 1.5T. A dedicated core lab analysed all CMRs in Circle Cardiovascular Imaging.

Results:
We included 102 female elite athletes, 97% Caucasian, mean age of 26.3 ±5.0, BSA 1.79 ±0.14 m2, and mean professional athlete years of 10.3 ±5. Main athlete disciplines (≥10 hours/week) were field hockey (15%), rowing (13%), road cycling (12%), and European-style football (10%). Female elite athletes had marked EICR as compared with general population reference values, with higher LVEDVi (108 ±13.9 vs 69 ±12 ml/m2, $p<0.05$), RVEDVi (110 ±15.3 vs 76 ±14 ml/m2, $p<0.05$), and LVMi (49.9 ±11.2 vs 45 ±7 g/m2, $p<0.05$) (Figure 1). LV remodelling showed a lower LVM/LVEDV ratio (0.46 ±0.08 vs 0.7 ±0.1 ml) compared to the general population, with balanced dilatation (LVEDV/RVEDV=0.98 ±0.05). In general, we observed EICR as increased cardiac volumes in 67% (n=68), increased cardiac volumes and mass in 21% (n=21) lone increase in cardiac mass in 1% (n=1), with 11% (n=11) demonstrating normal geometry (Figure 1).

Conclusion:
EICR on CMR in female, elite athletes is mainly characterised by isolated increased volumes, with a considerable proportion (11%) demonstrating no EICR. Compared with the general population, female athletes have larger cardiac ventricular volumes and wall mass. Our results constitute a first step towards sex-specific CMR reference ranges for female athletes.

Keywords:
Exercised-induced cardiac remodelling, Female elite athletes, CMR

Figure:
Figure 1. CMR end-diastolic short axis basal slice images of exercise-induced cardiac remodelling in female elite athletes: A) CMR image showing normal geometry, B) CMR image showing increased cardiac mass, C) CMR image showing both increased cardiac volumes and mass, D) CMR image showing increased cardiac volumes. LV = left ventricle, RV = right ventricle.



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Relation between Coronary Artery Calcium Score and Cardiovascular Events in Hodgkin Lymphoma Survivors

Presenting author: E.A.S. Polomski
Department: Hartziekten

E.A.S. Polomski (Leids Universitair Medisch Centrum, Leiden); E.A.S. Polomski (LUMC, Leiden); J.C. Heemelaar (LUMC, Leiden); M.A. de Graaf (LUMC, Leiden); A.D.G. Krol (AVL, Amsterdam); M. Louwerens (LUMC, Leiden); J.L. Stöger (LUMC, Leiden); M.J. Schalij (LUMC, Leiden); J.W. Jukema (LUMC, Leiden); M.L. Antoni (LUMC, Leiden)*
**Per 01-03-2023 LUMC, Leiden*

Purpose:
Thoracic radiotherapy is still one of the corner stones of Hodgkin lymphoma (HL) treatment, but is associated with increased risk of cardiovascular events. This study aims to evaluate the presence and distribution of coronary artery calcium in relation to cardiovascular events in HL patients treated with thoracic radiotherapy compared to a non-cancer control group.
Methods:
HL patients treated with thoracic radiotherapy, who underwent evaluation for asymptomatic coronary artery disease with coronary computed tomography angiography >10 years after irradiation were included. HL patients were matched 1:1 to non-cancer patients for gender, age, cardiovascular risk factors and statin use. Differences in coronary artery calcium score (CACS), plaque composition and cardiovascular events between the two groups were compared.
Results:
97 patients with prior HL diagnosis and 97 patients with no history of cancer were included. Elevated CACS was seen in 50.5% of the HL patients and 30.9% of the control patients. HL survivors had an odds ratio of 2.28 [95% CI: 1.22 – 4.28] for having a CACS >0 compared to the matched population (p=0.006). Prevalence of CACS above the 90th percentile differed significantly: 17.5% in HL survivors versus 4.7% in the matched population (p=0.005). Coronary artery plaques were more prevalent in the HL population than in the control population (39.2% versus 15.5% respectively, p<0.001). Nine HL patients experienced an event during follow-up including two patients with a CACS of zero. No events were observed in the control population.
Conclusion:
In a matched study population, HL survivors have a higher prevalence of a CACS >0 and an increased risk of cardiovascular events after thoracic irradiation compared to a matched non-cancer control group.

Keywords:
Hodgkin lymphoma, thoracic radiotherapy, coronary artery disease, ,

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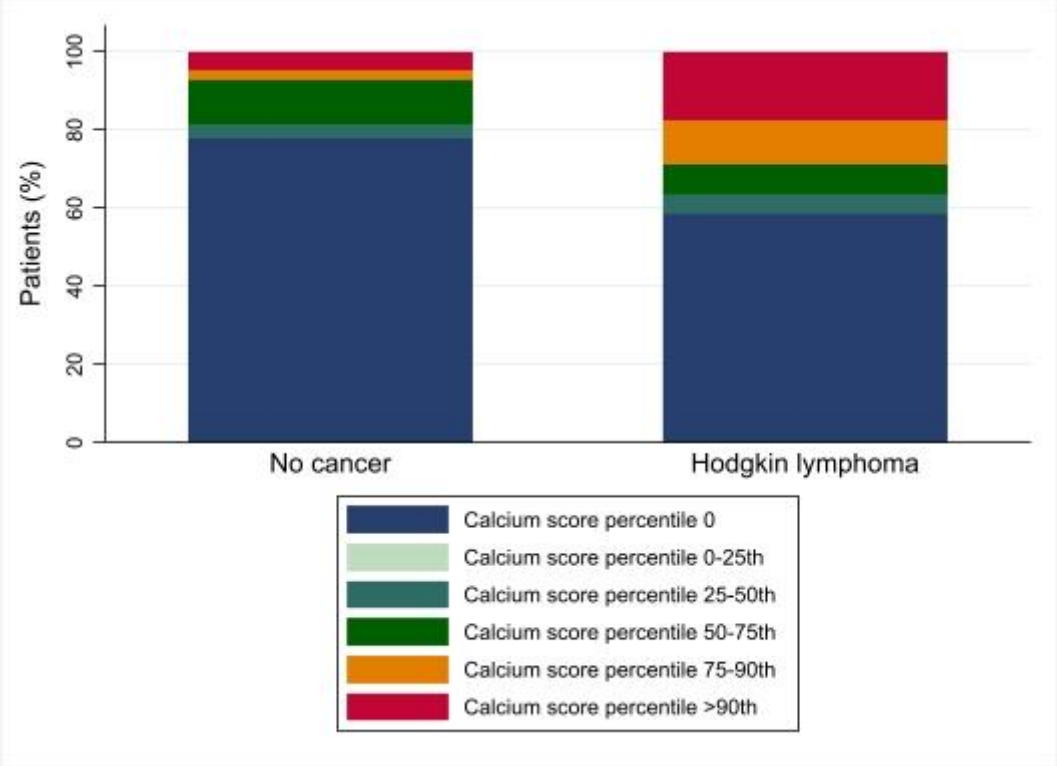
Figure:
Figure 1 shows a bar chart for the distribution of calcium score percentiles in both patient groups.



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Anatomical Features of Patent Foramen Ovale In Patients With Cryptogenic Stroke In Comparison to Autopsy Results

Presenting author: L.S. Witte
Department: Cardiology

L.S. Witte (Amsterdam UMC, Amsterdam); L.S. Witte (Amsterdam UMC, Amsterdam); M.H.M. Immens (Radboud UMC, Nijmegen); A. el Bouziani (Amsterdam UMC, Amsterdam); A. Duijnhouwer (Radboud UMC, Nijmegen); B.J. Bouma (Amsterdam UMC, Amsterdam); F.E. de Leeuw (Radboud UMC, Nijmegen); R.J. de Winter (Amsterdam UMC, Amsterdam); T.J.F. ten Cate (Radboud UMC, Nijmegen)

Purpose:
The prevalence of patent foramen ovale (PFO) found in autopsy studies is approximately 25% but not all patients with PFO will suffer from a PFO-associated stroke.). The prevalence of a PFO in autopsy studies is approximately 25-30%, suggesting that the a priori chance of finding a possible “bystander-PFO” in young stroke victims is substantial. In this study we assessed the anatomical differences between PFO found during autopsy and PFO in patients with cryptogenic stroke.
Methods:
All consecutive patients that underwent PFO closure were retrospectively included. Anatomical PFO characteristics, including PFO diameter, tunnel length and the presence of atrial septal aneurysm, were measured with TEE during the closure procedure and analyzed by two cardiologists. Patients were divided in two groups depending on how the PFO diameter was measured, unstretched (n=119) and stretched (n=109).
Results:
In total 228 patients were enrolled. The mean age was 43±11 years, 116 patients (50.9%) were male and the mean RoPE-score was 7.0±1.4. The mean PFO diameter was 5.4±2.6mm in the unstretched group and 10.9±3.6mm in the stretched group compared to 4.9±2.6mm in previous autopsy (p=0.192 and p<0.001, respectively). The percentage of patients with a PFO size larger than 10mm was 2% in autopsy compared to 6% in the unstretched group (p=0.109) and 52% in the stretched group (p<0.001). The mean PFO tunnel length in our combined cohort was 7.8±2.9mm.
Conclusion:
The difference in PFO diameter found in this study indicates that PFOs found during published autopsy series, which are present in approximately 25-30% of the population, are significantly smaller than PFOs related to cryptogenic stroke. The exact prevalence of PFOs with dimensions similar to those related to cryptogenic stroke remains unknown, but is likely to be much smaller than 25-30%. Future studies should define which characteristics could classify or rule out a PFO prone for associated clinical conditions, such as cryptogenic stroke.

Keywords:
Patent Foramen Ovale, Cryptogenic Stroke,

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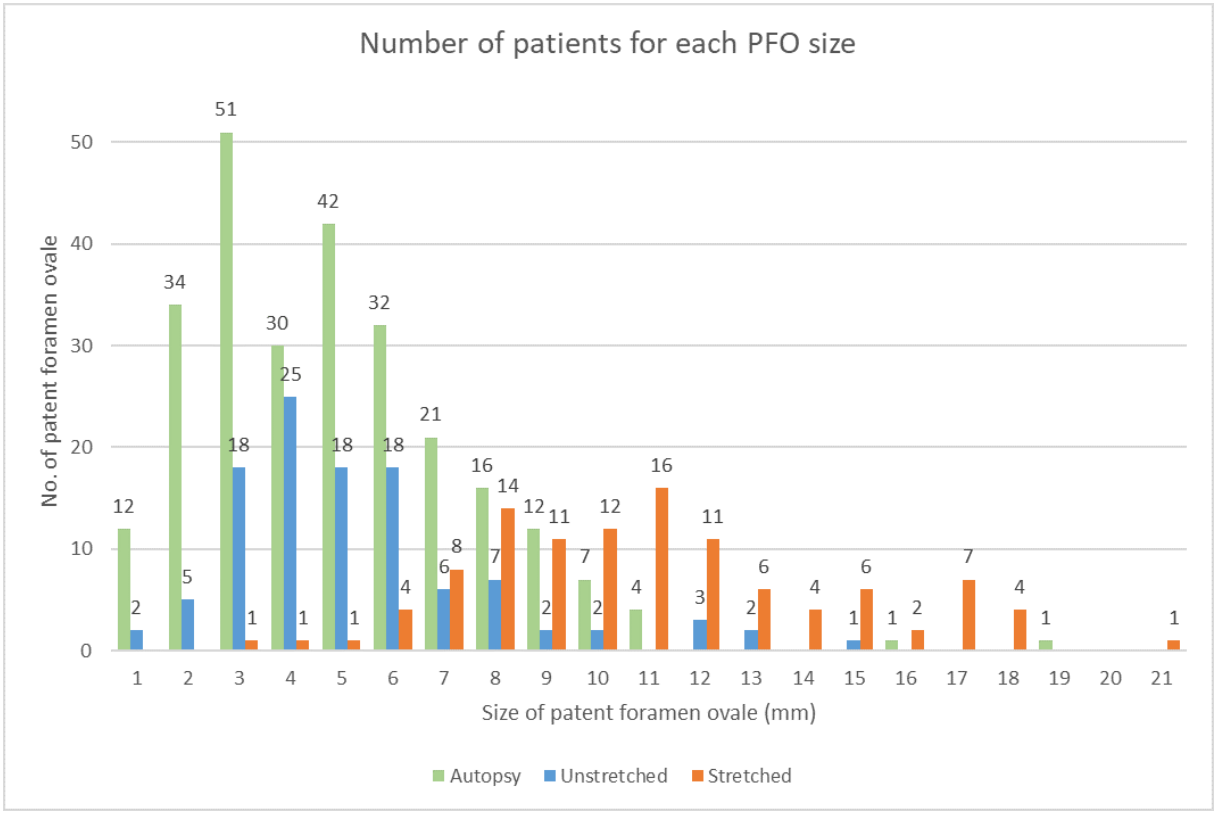
Figure:
Figure 3. Distribution of the number of patients for each PFO size for PFOs found during autopsy, unstretched PFOs and stretched PFOs. The mean PFO diameter was 4.9mm, 5.4mm and 10.9mm, respectively. The percentage of patients with a PFO size larger than 10mm was 2%, 6% and 52% respectively.



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Prevalence of Patent Foramen Ovale in Patients with Vasospastic Angina

Presenting author: A. el Bouziani
Department: Congenital interventional cardiology

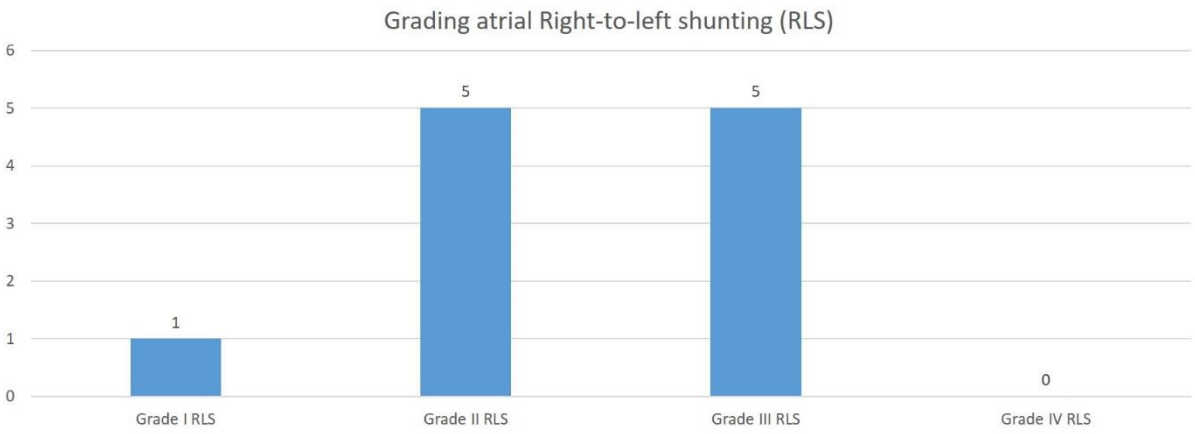
A. el Bouziani (Amsterdam UMC, location AMC, Amsterdam); A. el Bouziani (Amsterdam UMC, location AMC, Amsterdam); L.S. Witte (Amsterdam UMC, location AMC, Amsterdam); R.G.T. Feenstra (Amsterdam UMC, location AMC, Amsterdam); M.P.L. Renkens (Amsterdam UMC, location AMC, Amsterdam); J.J. Piek (Amsterdam UMC, location AMC, Amsterdam); B.J. Bouma (Amsterdam UMC, location AMC, Amsterdam); R.J. de Winter (Amsterdam UMC, location AMC, Amsterdam); M.A.M. Beijk (Amsterdam UMC, location AMC, Amsterdam)

Purpose:
The aim of this study is to assess the prevalence of patent foramen ovale (PFO) and right-to-left shunting (RLS) in 50 patients with documented coronary artery vasospasm. Prevalence of PFO in the general population is estimated to be 20 to 25%. A recent study demonstrated an association between migraine and coronary artery vasospasm, suggesting that RLS through a PFO might be a trigger for complaints due to coronary spasm. However, currently the prevalence of PFO in patients with coronary artery vasospasm is unknown.
Methods:
This is a single-center, prospective, cohort study with an open label follow-up at 1 month. All patients known with angina and documented coronary artery vasospasm underwent a complete transthoracic echocardiography (TTE) including agitated-saline injection. Coronary artery vasospasm is diagnosed in an earlier stage with an intracoronary acetylcholine provocation testing after CAG was performed. Right-to-left shunting (RLS) was semi quantified graded (grade 0 = no microbubbles, grade I = <5 microbubbles (mild), grade II = 5-25 microbubbles (moderate), grade III = > 25 microbubbles (severe) and grade IV = opacification of the entire left atrium). The RLS is assessed within the first four cardiac cycles after opacification of the right atrium. If there was no RLS observable, than the injection with agitated-saline was repeated performing the Vasalva manoeuvre. Afterwards the Seattle Angina Questionnaire and the Migraine Disability Assessment Questionnaire was used to survey patients at baseline and at 1 month. They report on general well-being, daily activities, episodes of angina and migraine.
Results:
Up to now 45 patients have undergone TTE with agitated-saline. The mean age was 57 ± 10 years and 84% were female patients. PFO and RLS was observed in 11 patients (24%), whereas one patient had grade I, 5 patients had grade II and 5 patients had grade III right-to-left shunting. Opacification of the left atrium/ventricle (grade IV) was not detected. Of those 11 patients, 5 patients had epicardial vasospasm, 4 patients had microvascular vasospasm/dysfunction and 2 patients had both types of non-obstructive coronary artery disease. None of the patients with RLS had significant obstructive coronary artery disease. The Migraine Disability Assessment Questionnaire showed that 45% of the patients with RLS had migraine headache at baseline, whereas 5 of them reported migraine with aura. The Seattle Angina Questionnaire demonstrated no significant difference in the angina frequency scale (p=0.612) and quality of life scale (p=0.138) between patients with and without RLS.
Conclusion:
The current study so far, showed that prevalence of PFO in patients with documented coronary artery vasospasm is comparable with the prevalence in the general population. However, it remains unclear what the role is of RLS in those patients. Future studies are

needed in order to investigate RLS as a trigger for coronary artery vasospasm.

Keywords:
Prevalence, PFO, Vasospastic angina

Figure:



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Diagnostic Performance of Quantitative Perfusion Cardiac Magnetic Resonance Imaging in Patients with Prior Coronary Artery Disease

Presenting author: R. Hoek
Department: Cardiology

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Purpose:
Background: The diagnostic performance of quantitative perfusion cardiac magnetic resonance (QP-CMR) imaging has scarcely been evaluated in patients with a history of coronary artery disease (CAD) and new onset angina.
Objectives: To compare the diagnostic performance of QP-CMR for detecting fractional flow reserve (FFR) defined hemodynamically significant CAD with visual CMR assessment (v-CMR) and [15O]H2O positron emission tomography (PET) imaging in patients with prior CAD.
Methods:
This PACIFIC-2 substudy included 138 symptomatic chronic coronary symptom patients with prior myocardial infarction (MI) and/or percutaneous coronary intervention (PCI). All patients underwent dual-sequence, single bolus perfusion CMR and [15O]H2O PET imaging followed by invasive coronary angiography with three-vessel FFR. Hemodynamically significant CAD was defined as an FFR ≤0.80. For QP-CMR, an optimal regional stress myocardial blood flow (MBF) cutoff value to detect significant CAD was defined.
Results:
For QP-CMR, a regional stress MBF ≤1.43 ml/min/g defined presence of myocardial ischemia. QP-CMR, v-CMR and PET exhibited a sensitivity of 67%, 68%, and 81%, respectively, whereas specificity was 57%, 65%, and 64%. Sensitivity of QP-CMR was lower than PET (p=0.033), whereas specificity of QP-CMR and PET was comparable. Diagnostic accuracy and AUC of QP-CMR (63% and 0.65) was comparable to v-CMR (67% and 0.70, both p>0.999), and lower than PET (75%, p=0.048 and 0.79, p=0.020).
Conclusion:
In patients with prior MI and/or PCI, diagnostic performance of QP-CMR was comparable to v-CMR and lower when compared to PET for the detection of hemodynamically significant

CAD as defined by FFR.

Keywords:
Quantitative Perfusion Cardiac Magnetic Resonance Imaging, Myocardial Perfusion Imaging, Fractional Flow Reserve

Figure:
This PACIFIC-2 substudy compared the diagnostic performance of quantitative perfusion CMR, visual CMR and quantitative PET perfusion imaging for detecting hemodynamically significant CAD in patients with prior MI and/or PCI. An average stress MBF ≤1.43 ml/min/g on QP-CMR, a visually assessed perfusion defect on v-CMR, and a stress MBF ≤2.3 ml/min/g in 2 adjacent segments on PET were used to define presence of ischemia. In AUC comparison, diagnostic performance of QP-CMR was comparable to v-CMR and lower when compared to PET.

Echocardiographic Evaluation of the Left Ventricular Function in Patients with noncompaction cardiomyopathy: biplane method, wall motion score or global longitudinal strain?

Presenting author: S. Mohamedhoesein
Department: Cardiology

S. Mohamedhoesein (Erasmus MC, Rotterdam); S. Mohamedhoesein (Erasmus MC, Rotterdam); M. Tukker (Erasmus MC, Rotterdam); E. Kaya (Erasmus MC, Rotterdam; St Antonius, Nieuwegein); K. Caliskan (Erasmus MC, Rotterdam)

Purpose:
Accurate assessment of the (subclinical) LV dysfunction in NCCM patients could improve non-invasive monitoring of disease progression, risk stratification
Methods:
We reviewed the echocardiographic images of 67 patients (54% male, median age 48 year [22-73]. LV function was assessed by conventional biplane disk summation, wall motion score (WMS), and global longitudinal strain (GLS). LV function was considered abnormal if LV ejection fraction (LVEF) <50% and GLS >-18.9%.
Results:
LV function measured by biplane vs WMS showed significantly lower LV EF with WMS (p value: 0.0016; Figure), while the average GLS in all patients was -11.0%, SD ±3.8 (normal values: -18.9%; p-value: p<0.001). By dichotomizing the group into LVEF <50% vs. ≥50%, biplane EF was abnormal in 68.7%, while this was with WMS 88.1% and by GLS 100%. In patient with EF <50% compared to ≥ 50% GLS in low biplane EF group was: -9.3%, SD ±3.0 vs -14.5%, SD ±2.9 (p<0.001). In the WMS EF was this respectively -10.3, SD ±3.6% versus -
15.5, SD ±1.5 (p<0.001).
Conclusion:
The systolic LV dysfunction in patients with NCCM found by WMS and GLS was significantly lower compared to routine biplane EF measurement suggesting that WMS and GLS measurement are much more potential prognostic tool. Given the correct execution of WMS is limited by the assessor's experience, estimation of the LV function with GLS are probably most reliable. Future research should expel whether these results are representative in a larger group of patients and correlates with the clinically relevant endpoints.

Keywords:
Cardiomyopathy, Echocardiography, Ventricular function

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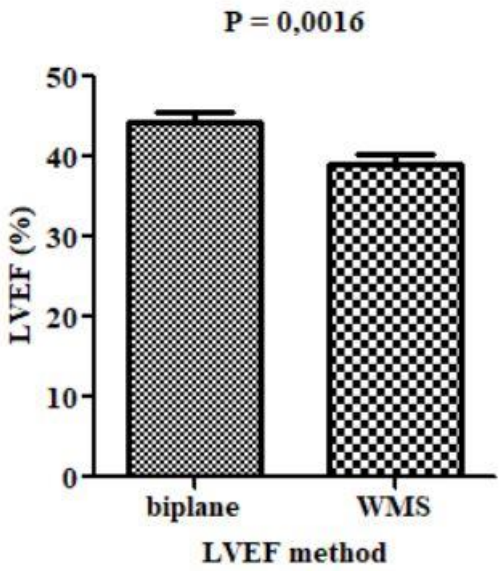
Figure:
LVEF measured by WMS and biplane method.



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Coronary Artery Calcium Assessed on Routine Non-gated Chest CT as a Gatekeeper for Additional CCTA in Patients with Stable Chest Pain

Presenting author: R.A. Groen
Department: Cardiology

R.A. Groen (Leiden University Medical Centre, Leiden); R.A. Groen BSc (Leiden University Medical Centre, Leiden); P.R.M. van Dijkman MD PhD (Leiden University Medical Centre, Leiden); J.W. Jukema MD PhD (Leiden University Medical Centre, Leiden); J.J. Bax MD PhD (Leiden University Medical Centre, Leiden); H.J. Lamb MD PhD (Leiden University Medical Centre, Leiden); M.A. de Graaf MD PhD (Leiden University Medical Centre, Leiden)

Purpose:
Currently applied risk assessment methods in coronary artery disease (CAD) often overestimate patients' risk for obstructive CAD. Assessment of coronary artery calcium (CAC) can be applied to enhance patient-tailored risk estimation. In ~10% of patients presenting with stable chest pain a non-gated chest computed tomography (CT) has been previously performed, suitable for CAC assessment. This is the first study to investigate the clinical utility of CAC assessment on non-gated chest CT for risk assessment of obstructive CAD.
Methods:
All patients referred for coronary CT angiography (CCTA), in whom a previous non-gated chest CT was performed were included in this analysis. For assessment of the extent of CAC, an ordinal score was applied. CAD was assessed on CCTA, with obstructive CAD defined as stenosis of ≥70%. Patients were stratified into groups according to CAC severity and percentages of patients with obstructive CAD were compared between the groups.
Results:
In total, 181 patients between 30-88 years were included. A significant difference in the percentage of obstructive CAD between the CAC groups was observed ($p<0.01$). A calcium score of 0 ruled out obstructive CAD with 100% certainty, irrespective of sex, pre-test probability, type of complaints, and the number of risk factors. Furthermore, in patients with low – intermediate PTP or non-anginal complaints, a mild CAC score ruled out obstructive CAD with 100% certainty.
Conclusion:
CAC assessment on non-gated chest CT can safely rule out obstructive CAD in patients presenting with stable chest pain and can therefore function as a radiation-free and cost-free gatekeeper for additional imaging.

Keywords:
coronary artery disease, coronary calcium, non-gated computed tomography

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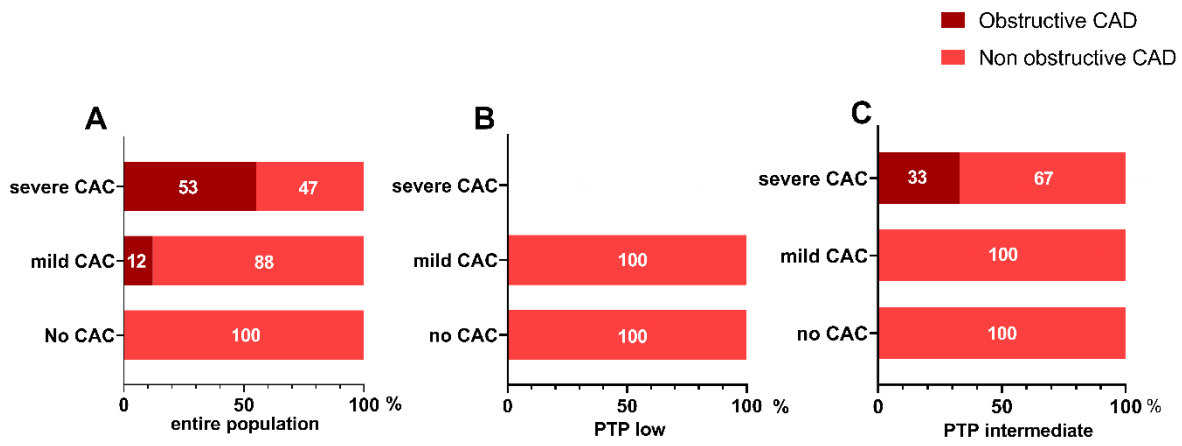
Figure:
Figure1. CCTA results for the entire study population and pre-test probability categories
A: Distribution of obstructive vs no obstructive CAD in all patients
B: Distribution of obstructive vs no obstructive CAD in patients with a PTP of ≤5%
C: Distribution of obstructive vs no obstructive CAD in patients with a PTP of 6-15%



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Elite Athlete Status, Gender and Mitchell Sports Classification Strongly Influence Native t1 Mapping Times

Presenting author: J.J.N. Daems
Department: Sport Cardiology

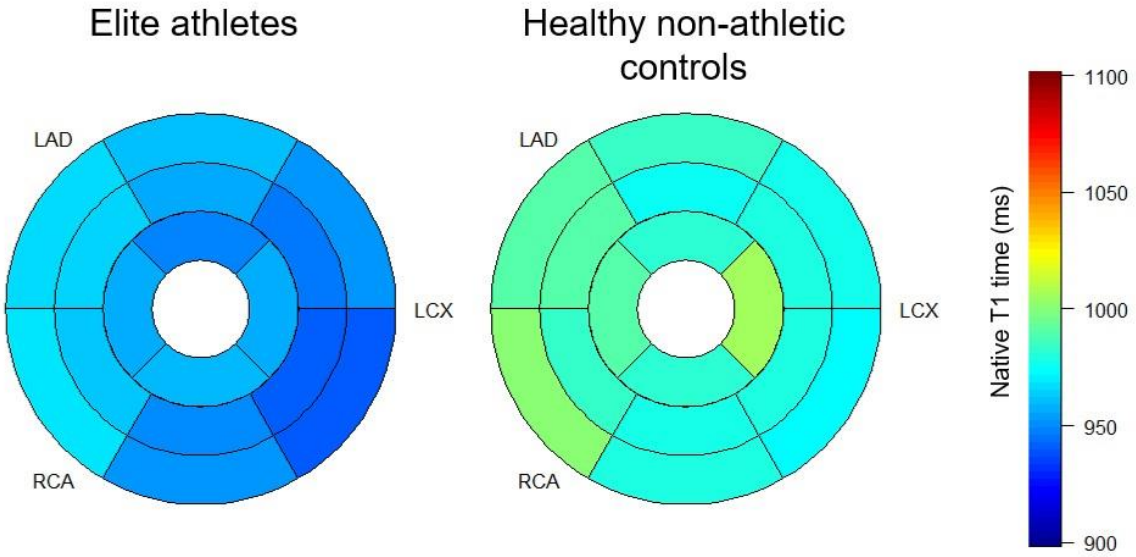
J.J.N. Daems (Amsterdam University Medical Centers, Amsterdam); J.J.N. Daems (Amsterdam University Medical Centers, Amsterdam); S.M. Verwijs (Amsterdam University Medical Centers, Amsterdam); R.D. Janssen (Amsterdam University Medical Centers, Amsterdam); J.C. Van Hattum (Amsterdam University Medical Centers, Amsterdam); S.M. Boekholdt (Amsterdam University Medical Centers, Amsterdam); A. van Randen (Amsterdam University Medical Centers, Amsterdam); R.N. Planken (Amsterdam University Medical Centers, Amsterdam); R.D. van Luijk (Amsterdam University Medical Centers, Amsterdam); M.H. Moen (Amsterdam University Medical Centers, Amsterdam); A. Nederveen (Amsterdam University Medical Centers, Amsterdam); M. Groenink (Amsterdam University Medical Centers, Amsterdam); Y.M. Pinto (Amsterdam University Medical Centers, Amsterdam); H.T. Jorstad (Amsterdam University Medical Centers, Amsterdam)

Purpose:
Cardiac magnetic resonance imaging (CMR) T1 mapping is an established tool for tissue characterisation. This is of particular interest in athletes as differentiation of the 'grey zone' between physiological adaptation to sports and pathology can be highly challenging. To correctly interpret individual T1 times, T1 times are conventionally compared to normal values derived from healthy controls. However, whether these values can be applied to elite athletes with different types of cardiac adaptation is unknown.
Methods:
This is a cross-sectional analysis of elite athletes included in the ELITE cohort. ELITE collects the preparticipation cardiovascular screenings data from all athletes that perform at the highest national, international and/or Olympic level in the Netherlands. All athletes were sixteen years or older. The screening includes cardiovascular magnetic resonance imaging on a Siemens Avanto fit 1.5T machine with cine-imaging, delayed hyperenhancement and a three-pulse shortened modified look-locker inversion recovery 5(3)3 sequence. For this analysis, all athletes with a history of cardiovascular disease or pathological late gadolinium enhancement were excluded. Athletes were classified according to the Mitchell Sports Classification based on the intensity (low (L) / moderate (M) / high (H)) of the dynamic (D) and static components (S). Native- and post-contrast T1 mapping times were calculated by manually tracing the endocardial- and epicardial contours.
Results:
A total of 117 elite athletes (44% women; mean age 26±6.5; Mitchell sports classification: 47 HS/HD, 8 HS/LD, 5 HS/MD, 36 LS/HD, 16 MS/HD, 3 MS/MD, 3 missing) and 48 healthy non-athletic controls (54% women; mean age 39±15.1). Men had lower t1 times compared to women, both in athletes (949ms vs 964ms, $p<0.05$) and controls (969ms vs 1000ms, $p<0.05$). Moreover, elite athletes had a lower global native T1 time compared to healthy non-athletic controls (955 vs 983, $p<0.05$). There were significant differences in native T1 time between the Mitchel Sport classifications (Kruskal-Wallis $p<0.05$); left ventricular mass (LVM) ($R=-0.47$, $p<0.05$) and LVM divided by left ventricular end-diastolic volume ($R=-0.4$, $p<0.05$) were both negatively correlated with native T1 mapping time.
Conclusion:
Conclusion: Men demonstrate markedly shorter T1 times compared to women in both athletes and controls. Moreover, native T1 times were associated with markers for cardiac remodelling. Sex- and athlete-specific characteristics should be taken into account when

interpreting T1 times in athletes.

Keywords:
Elite athlete, Native T1 mapping, CMR

Figure:
Differences in native T1 inversion recovery times between elite athletes and healthy non-athletic controls according to the American Heart Association 16-segmented model.



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Sessie 4: INTERVENTION I

Bleeding Outcomes after Percutaneous Coronary Intervention According to a Simplified Risk Model and to Personalized Antiplatelet Treatment in the South East of the Netherlands

Presenting author: E.C.I. Woelders
Department: cardiologie

*E.C.I. Woelders (Radboud University Medical Centre, Nijmegen); E.C.I. Woelders (Radboud University Medical Centre, Nijmegen); D.A.M. Peeters (Radboud University Medical Centre, Nijmegen); J.J.P. Luijkx (Zuyderland Medical Centre, Heerlen); P. J.C. Winkler (Zuyderland Medical Centre, Heerlen); P. Damman (Radboud University Medical Centre, Nijmegen); W. Remkes (VieCuri Medical Centre, Venlo); A.W.J. van 't Hof (Maastricht University Medical Centre, Maastricht); R.J.M. van Geuns (Radboud University Medical Centre, Nijmegen); on behalf of the ZON-HR registry investigators**

Purpose:
We evaluated the predictive value of a simplified model for bleeding risk to patient-tailor dual antiplatelet therapy (DAPT), and assessed the effect of shortened DAPT in patients with high bleeding risk (HBR).
Methods:
In the "Zuid Oost Nederland Hart Registratie" (ZON-HR), multiple centres for percutaneous coronary intervention (PCI) collect patient and PCI characteristics, medication use and outcomes. HBR was defined by 4 factors (figure 1.). In patients with HBR, the ZON-HR advices to shorten DAPT duration to reduce bleeding outcomes. Regression analysis was performed using 1 year outcomes.
Results:
One year follow-up was completed in 1384 of the 3996 included patients. 15% used oral anticoagulants (OAC) at baseline and 10% of patients had HBR. In the first year of the registry the protocol for short DAPT was followed in 16% which increased to 34% in the second year. The number of bleedings was significantly higher in HBR versus no HBR (p log rank = 0.0062; HR 1.91, 95% CI 1.12-3.27). However, most outcomes occurred in the first month and a landmark analysis showed no difference after one month (figure 1.). In patients with HBR. shortened DAPT showed no reduction of bleeding events.
Conclusion:
In the ZON-HR registry, a simplified risk model showed significant predictive value for bleeding outcomes which is driven by events in the first month. This suggests that this model could be used to guide personalized DAPT, which seems feasible as adherence to the protocol shows improvement over time. However, so far shortened DAP showed no effect on outcomes.

Keywords:
HBR, PCI, DAPT

Figure:
Figure 1.
Survival till BARC 2, 3 or 5 bleeding events according to bleeding risk & adherence to protocol for short DAPT duration in patients with high bleeding risk.
DAPT: Dual antiplatelet therapy; HR: Hazard Ratio; CI: Confidence Interval; HBR: High Bleeding Risk

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Definition HBR: History of ICH or BARC ≥ 2 bleeding <12 months or eGFR <30 or Hb <7 mmol/L)

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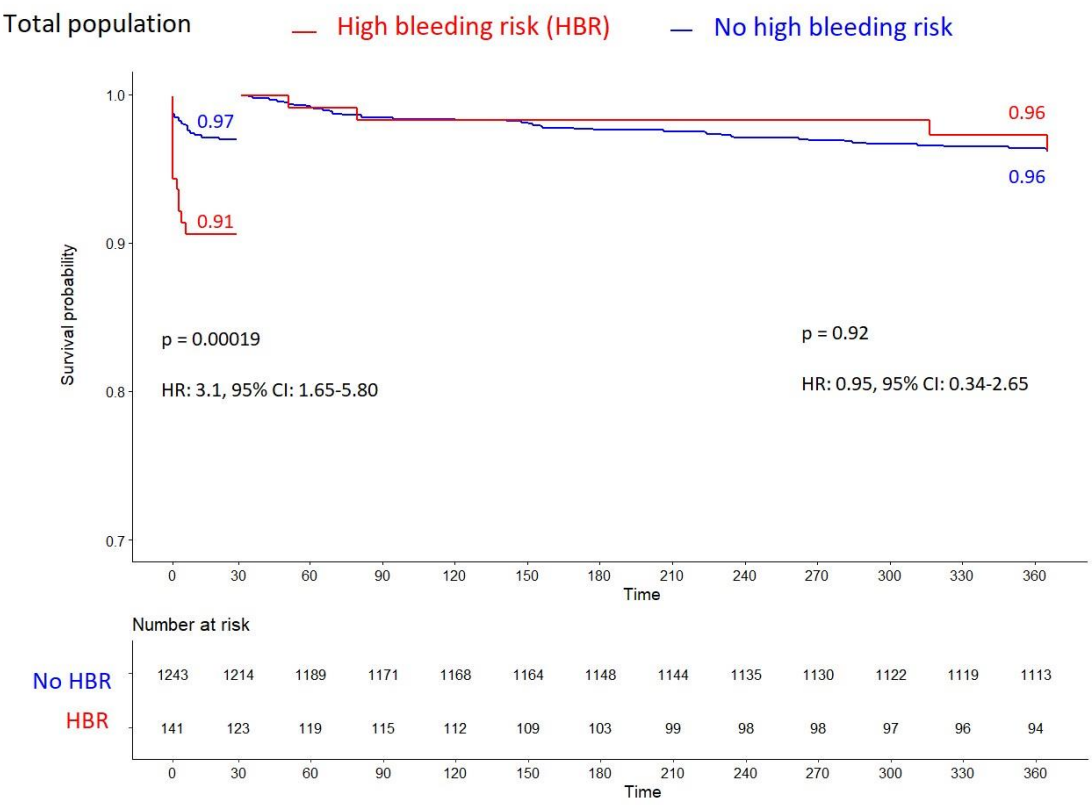

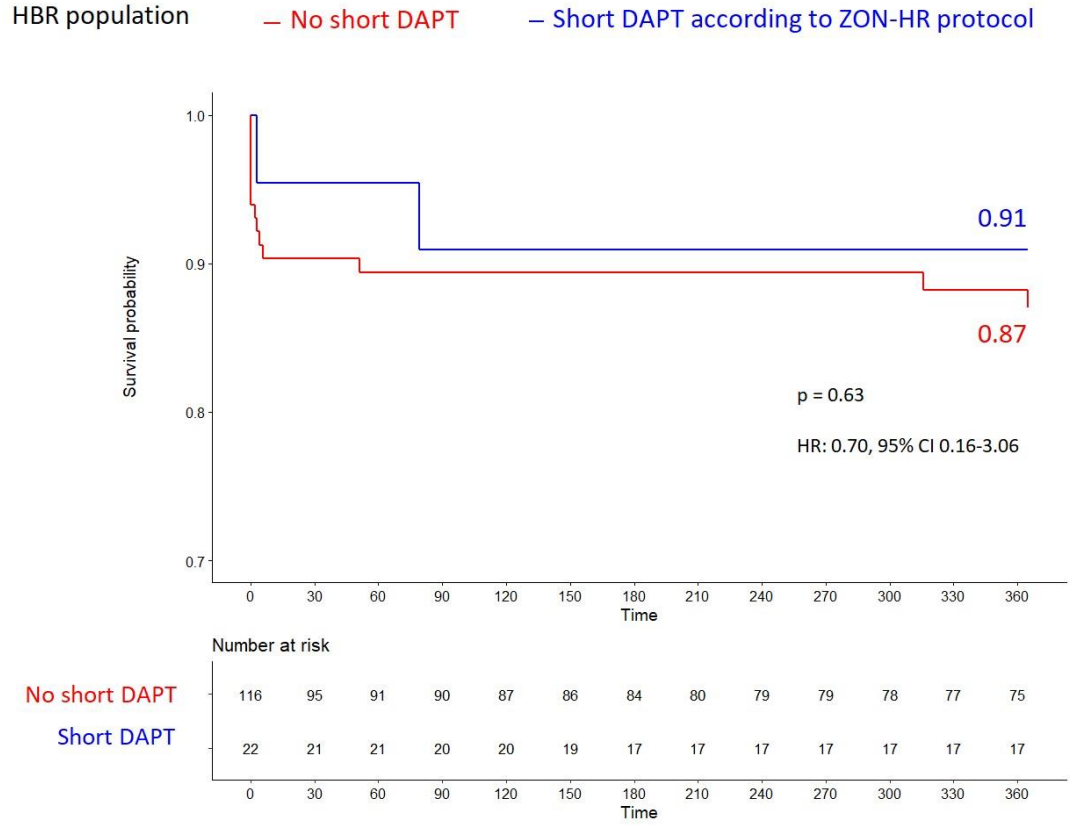

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Impact of Cardiac History and Myocardial Scar on Increase of Myocardial Perfusion after Revascularization

Presenting author: R.A. Jukema
Department: Cardiology

R. Jukema (Amsterdam University Medical Centers, Amsterdam); R. de Winter (Amsterdam University Medical Centers, Amsterdam)*; L. Hopman (Amsterdam University Medical Centers, Amsterdam); R. Driessen (Amsterdam University Medical Centers, Amsterdam); P. van Diemen (Amsterdam University Medical Centers, Amsterdam); Y. Appelman (Amsterdam University Medical Centers, Amsterdam); J. Twisk (Amsterdam University Medical Centers, Amsterdam); N. Planken (Amsterdam University Medical Centers, Amsterdam); P. Raijmakers (Amsterdam University Medical Centers, Amsterdam); P. Knaapen (Amsterdam University Medical Centers, Amsterdam); I. Danad ((Amsterdam University Medical Centers, Amsterdam/University Medical Center Utrecht, Utrecht)*
**share first authorship*

Purpose:
Coronary revascularization is aimed to restore myocardial perfusion and reduce symptoms. Yet, data on the restoration of myocardial perfusion in patients with a prior cardiac history is scarce. The goal of this study is to assess the impact of coronary revascularization on myocardial perfusion and fractional flow reserve (FFR) in patients with and without a cardiac history. Furthermore, we studied the impact of scar tissue.
Methods:
Symptomatic patients underwent [15O]H2O positron emission tomography (PET) and FFR before and after revascularization. Patients with a cardiac history, defined as prior myocardial infarction or percutaneous coronary intervention, underwent scar quantification by magnetic resonance imaging late gadolinium enhancement.
Results:
Among 137 patients (87% male, age 62.2±9.5 years) 84 (61%) had a cardiac history. The increase in hMBF and FFR following revascularization was smaller in patients with a cardiac history compared to patients without (0.58±0.87 vs 0.91±0.96 ml/min/g and 0.22±0.13 vs 0.31±0.18, $p<0.01$ and $p=0.02$, respectively). An increase in FFR was strongly associated to hMBF increase in patients with and without a cardiac history ($r=0.60$ and $r=0.62$, $p<0.01$ for both). Similar results were found for coronary flow reserve. There was no independent correlation between the percentage of scar tissue and myocardial perfusion improvement.
Conclusion:
Patients without a cardiac history demonstrated a greater perfusion improvement following revascularization. FFR increase after revascularization was paralleled by a perfusion increase. Scar burden did not independently affect restoration of perfusion.

Keywords:
Revascularization, FFR, Perfusion

Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Long Term Results of Alcohol Septal Ablation (ASA) in Patients with Hypertrophic Obstructive Cardiomyopathy (HOCM)

Presenting author: P.T.S. Juliea
Department: Cardiology

S. Hubbers (St.Antonius, Nieuwegein); S. Hubbers (St.Antonius, Nieuwegein); P.T.S. Juliea (St.Antonius, Nieuwegein); B. Kara (St.Antonius, Nieuwegein); J.M. Ten Berg (St.Antonius, Nieuwegein)

Purpose:
The main endpoint of the study was to assess the long-term survival of our patients. Additionally, we analyzed our data for possible predictors for mortality, need for implantation of ICD/PM and second septal reducing procedure.
Methods:
This research was an observational retrospective single center registry study. Patients who have undergone ASA between January 2000 and January 2018 at the St. Antonius hospital in Nieuwegein were registered into a database.
Results:
285 patients were included in the database. The mean age at baseline was 65.5 years. The mean NYHA class and CCS class were 2.82 and 0.6 respectively. The mean left ventricle outflow tract (LVOT) gradient was 58.7 mmHg at baseline and 108.4 mmHg after provocation. The mean follow-up time was 9.2 years. 80 of the 285 patients died during follow-up. There was a rate 5.3% of (aborted) sudden cardiac death (SCD) during follow-up. The mean NYHA class and CCS class decreased to 1.58 and 0.2 respectively. 11.6% of patients needed a second procedure for septal reduction.
Conclusion:
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In these patients undergoing ASA for HOCM, the 10-year survival for all-cause mortality was 77% and 78.8% of patients had an improvement of ≥1 NYHA class. There was a relatively little need for periprocedural ICD implantations. The SCD rate in our population was 2.5% with an (aborted) SCD rate of 5.3%. We conclude that in patients with HOCM treated in the St. Antonius hospital, ASA is a safe procedure with few serious complications, of which the majority consist of transient AV block.

Keywords:
Alcohol septal ablation, Hypertrophic obstructive cardiomyopathy, Prognosis

Abstract sessies NVVC Voorjaarscongres
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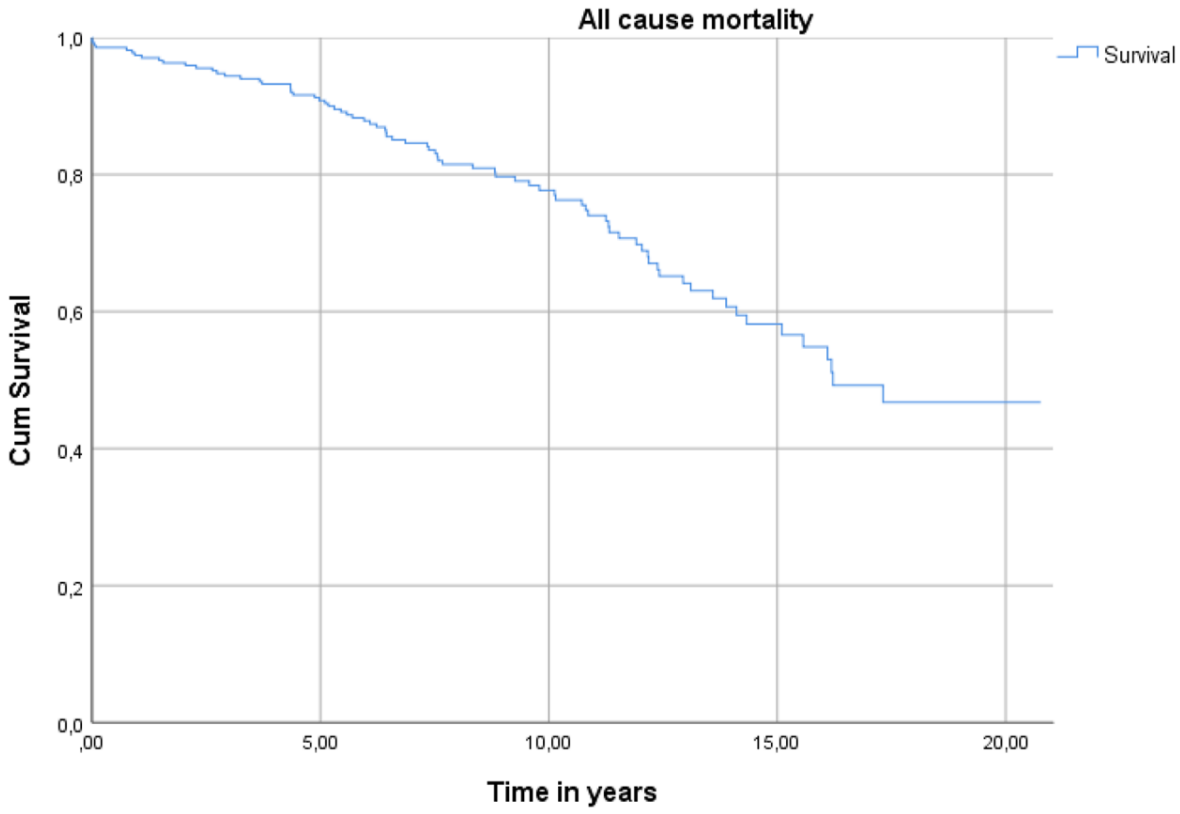
15:00 – 16:30 uur

Figure:



At risk:	285	219	109	38	4

Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Prophylactic Impella CP versus VA-ECMO in Patients Undergoing Complex High-risk Indicated PCI

Presenting author: D.M.F. van den Buijs
Department: Cardiologie

D.M.F. van den Buijs (Ziekenhuis Oost-Limburg, Genk); A. Wilgenhof (Ziekenhuis Netwerk Antwerpen Middelheim, Antwerpen); P. Knaapen (Amsterdam UMC, Amsterdam); C. Zivelonghi (Ziekenhuis Netwerk Antwerpen Middelheim, Antwerpen); T. Meijers (Isala Ziekenhuis, Zwolle); P. Vermeersch (Ziekenhuis Netwerk Antwerpen Middelheim, Antwerpen); F. Arslan (Leids Universitair Medisch Centrum, Leiden); N. Verouden (Amsterdam UMC, Amsterdam); A. Nap (Amsterdam UMC, Amsterdam); K. Sjauw (Medisch Centrum Leeuwarden, Leeuwarden); F. S. van den Brink (Leids Universitair Medisch Centrum, Leiden)

Purpose:
To prevent hemodynamic instability in complex high risk indicated PCI (CHIP), various mechanical circulatory support (MCS) systems are available. However, comparable data on different forms of MCS are not at hand. This multicenter observational study aimed to compare two different forms of MCS in CHIP: the Impella CP system and veno-arterial extracorporeal membrane oxygenation (VA-ECMO).
Methods:
In this multicenter observational study, we retrospectively evaluated all CHIP procedures between 2017 and 2020 with support of an Impella CP or VA-ECMO, who were declined surgery by the heart team. Major adverse cardiac events (MACE), mortality at discharge and 30-day mortality was evaluated.
Results:
A total of 41 patients were included, of which 27 patients were supported with Impella CP and 14 patients with VA-ECMO. Baseline characteristics were well balanced in both groups. No significant difference in peri-procedural hemodynamic instability was observed between both groups (3.7% vs. 14.3%; p = 0.22). Composite outcome of MACE showed no significant difference (30.7% vs. 21.4%; p=0.59). Bleeding complications were higher in the Impella CP group, but showed no significant difference (22.2% vs. 7.1%; p=0.22) and occurred more at the non-Impella access site. In-hospital mortality was 7.4% in the Impella CP group versus 14.3% in the VA-ECMO group and showed no significant difference (p=0.48). 30-Day mortality showed no significant difference (7.4% vs. 21.4%; p=0.09).
Conclusion:
In patients with CHIP, there were no significant differences in hemodynamic instability and overall MACE between VA-ECMO or Impella CP device as mechanical circulatory support. Based on this study, the choice of either VA-ECMO or Impella CP does not alter outcome.

Keywords:
High-risk PCI, Mechanical circulatory support,

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Figure:
Table: Procedural Characteristics and Outcome.
ICU = intensive care unit; MACE = major adverse cardiovascular events; PCI = percutaneous coronary intervention

Procedural Characteristics and Outcome	Impella CP (n = 27)	VA-ECMO (n = 14)	P-value
Hemodynamic instability	1 (3.7%)	2 (14.3%)	0.22
Peri-procedural mortality	0 (0%)	0 (0%)	1.00
Mortality at discharge	2 (7.4%)	2 (14.3%)	0.48
Mortality at 30 days	2 (7.4%)	2 (21.4%)	0.09
MACE at 30 days	10 (37.0%)	4 (21.4%)	0.59
Bleeding complications (BARC ≥3)	6 (22.2%)	1 (7.1%)	0.22
Grade 3A	4 (14.8%)	0 (0%)	0.12
Grade 3B	2 (7.4%)	1 (0%)	0.98
Access site related	2 (7.4%)	0 (0%)	0.30
Limb ischemia	0 (0%)	0 (0%)	1.00
Successful revascularization	25 (92.6%)	14 (100%)	0.47
Renal function post-procedural (increase ≥1 stage above baseline)	4 (14.8%)	3 (21%)	0.80
Hb prior to PCI (mmol/l)	7.7 (5.3-9.9 +/- 1.2)	8.3 (6.9-9.8 +/-0.93)	0.13
Hb post PCI (mmol/l)	6.7 (5.2-8.6 +/- 1.1)	6.4 (5.1-7.5 +/-0.76)	0.35
Transfer to ICU	5 (18.5%)	0 (0%)	0.06
Mean stay in ICU (days)	1 (1-1 +/- 1)	0 (0-0 +/-0)	N/A
Mean stay in Hospital (days)	3 (1-23 +/- 4.76)	7 (2-28 +/- 7.2)	0.23

Abstract sessies NVVC Voorjaarscongres
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15:00 – 16:30 uur

Long-term Clinical Outcome of Paclitaxel-Coated Balloon Angioplasty versus Drug-eluting Stent in Acute Myocardial Infarction: Five-year Follow-up of the Revelation study

Presenting author: S.R. Niehe
Department: Cardiologie

S.R. Niehe (OLVG, Amsterdam); N.S. Vos (OLVG, Amsterdam); R.J. van Der Schaaf (OLVG, Amsterdam); G. Amoroso (OLVG, Amsterdam); J.P.R. Herrman (OLVG, Amsterdam); M.S. Patterson (OLVG, Amsterdam); T. Slagboom (OLVG, Amsterdam); M.A. Vink, MD (OLVG, Amsterdam)

Purpose:
In the randomized REVELATION trial a drug-coated balloon (DCB) strategy was compared to a drug-eluting stent (DES) in the setting of ST-segment elevation myocardial infarction (STEMI). A DCB strategy was shown to be non-inferior to a DES strategy in terms of fractional flow reserve assessed at 9 months and with sustained safety and feasibility after 2 years. In this article we present the long-term clinical outcome of this treatment strategy.
Methods:
In this single centre study, a total of 120 patients presenting with STEMI, with a non-severely calcified culprit lesion in a native coronary artery and a residual stenosis of <50% after predilatation, were randomized to treatment with a DCB or DES between October 2014 and November 2017.
Results:
Complete clinical follow-up at two years was available for 107 patients (89.2%) and vital status was available for all patients.
A major adverse cardiac event (MACE) defined as cardiac death, recurrent myocardial infarction (MI), or target-lesion revascularization (TLR), occurred in 3 patients (5.0%) in the DCB-group and 2 patients (3.3%) in the DES-group, respectively (HR 1.39, 95% CI 0.23 - 8.29, p=.720). Between 2 and 5 years only one new event occurred (MI), in a patient randomized to DES
Conclusion:
In this randomized study clinical outcome after 5 years was excellent with sustained safety and comparable between DCB and DES in selected patients presenting with STEMI, with sustained safety and feasibility of DCB strategy

Keywords:
Drug-coated balloon, Drug-eluting stent, STEMI

Abstract sessies NVVC Voorjaarscongres
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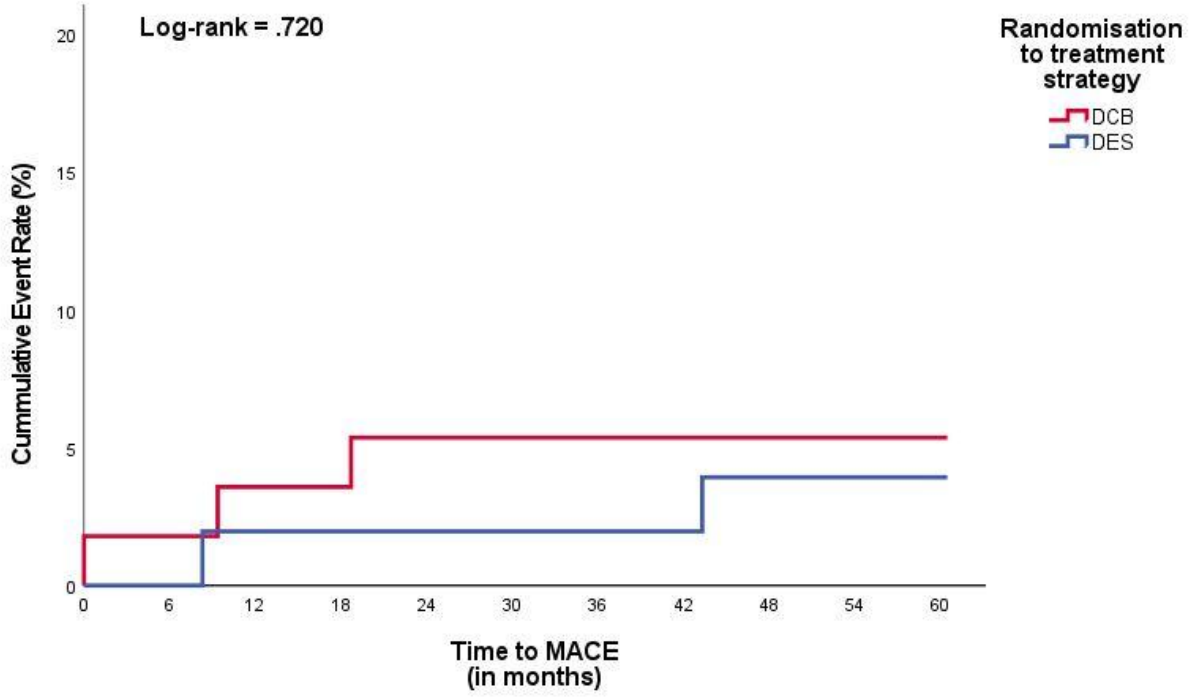
15:00 – 16:30 uur

Figure:
Figure 1. Five-year Kaplan-Meier curve for major adverse cardiovascular event (MACE) per drug-coated balloon (DCB) and drug-eluting stent (DES) strategies.



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

The Clinical Implementation of CYP2C19 Genotyping in Patients with an Acute Coronary Syndrome: Insights from the FORCE-ACS Registry

Presenting author: J. Azzahhafi
Department: Cardiology

J. Azzahhafi (Sint Antonius Ziekenhuis, Nieuwegein); J. Azzahhafi (Sint Antonius Ziekenhuis, Nieuwegein); W.W.A. van den Broek (Sint Antonius Ziekenhuis, Nieuwegein); D.R.P.P. Chan Pin Yin (Sint Antonius Ziekenhuis, Nieuwegein); J.M. ten Berg (Sint Antonius Ziekenhuis, Nieuwegein)

Purpose:
Current guidelines recommend prasugrel and ticagrelor in patients undergoing percutaneous coronary intervention (PCI), however these potent P2Y12-inhibitors are associated with a higher bleeding risk when compared to clopidogrel. The study aimed to assess the feasibility of a CYP2C19 genotype-guided de-escalation strategy in acute coronary syndrome (ACS) patients treated with dual antiplatelet therapy.
Methods:
ACS patients receiving genotype-guided antiplatelet therapy from August 2021 onwards were eligible. Genotyping was done using buccal swabs in a point-of-care (POC) device or by venous blood samples in the lab. The primary endpoint is maintenance therapy with P2Y12 inhibitors, with secondary endpoints being therapy changes, and time until genotype results. Therapy changes based on genotyping method were assessed using the Chi-square and Mann-Witney U test.
Results:
In total, 1,530 patients were included in the registry from June 2021 to January 2023, with 738 ticagrelor treated patients receiving a CYP2C19 genotype test. The results showed that 35% of patients carried a CYP2C19 loss-of-function allele. The median time to genotype results was 6.2 hours, with 84.6% known within 24 hours for the total population, and 91.4% for the POC analysis and 20.9% for blood analysis. Of 478 patients eligible for de-escalation, 90.4% were successfully de-escalated to clopidogrel within 24 hours in 70.9% of patients and within 48 hours in 93.1%. The time to de-escalation was significantly lower in patients analyzed using POC (25.4 hours) compared to blood analysis (58.9 hours).
Conclusion:
The implementation of routine genotyping is feasible and de-escalation rates to clopidogrel in non-carriers are acceptable. The quicker time-to-results and de-escalation highlights the potential benefits of using POC testing.

Keywords:
CYP2C19 genotyping, De-escalation strategy, Acute coronary syndrome

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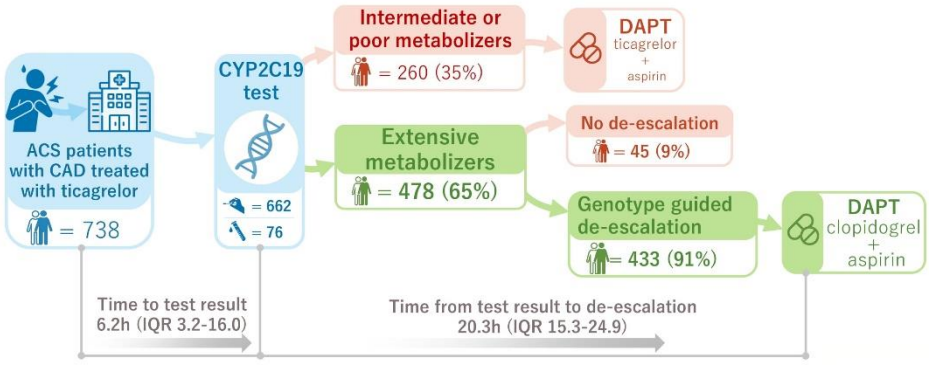
Figure:
Afbeelding 1. Overview of ticagrelor treated patients undergoing a genotype-guided de-escalation strategy



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Impact of Recurrent Ischemic and Bleeding Events on Quality of Life in Acute Coronary Syndrome Patients: Insights from the FORCE-ACS Registry

Presenting author: N.M.R. van der Sangen
Department: Department of Cardiology

N.M.R. van der Sangen (Amsterdam UMC, Amsterdam); N.M.R. van der Sangen (Amsterdam UMC, Amsterdam); J. Azzahhafi (St. Antonius Ziekenhuis, Nieuwegein); D.R.P.P. Chan Pin Yin (St. Antonius Ziekenhuis, Nieuwegein); J.P.S. Henriques (Amsterdam UMC, Amsterdam); J.M. ten Berg (St. Antonius Ziekenhuis, Nieuwegein); W.J. Kikkert (Tergooi MC, Blaricum)

Purpose:
Patients with acute coronary syndrome (ACS) remain at high risk for recurrent ischemic and bleeding events during follow-up. Our study aimed to quantify and compare the impact of these adverse events on quality of life (QoL).
Methods:
Data from ACS patients prospectively enrolled in the FORCE-ACS registry between January 2015 and December 2019 were used for this study. The primary ischemic and bleeding events of interest were hospital readmission for ACS and Bleeding Academic Research Consortium (BARC) type 2 or 3 bleeding during 12 months follow-up. QoL was measured using the EQ-5D visual analog scale (VAS) score and the 12-item Short Form Survey version 2 derived Physical Component Summary (PCS) and Mental Health Component Summary (MCS) scores at 12 months follow-up.
Results:
In total, 3339 patients (mean age 66.8 years, 27.9% women) were included. During follow-up, ischemic events occurred in 202 patients (6.0%) and bleeding events in 565 patients (16.9%). After adjustment for demographic and clinical characteristics, ischemic events remained independently associated with lower QoL regardless of metric used. Bleeding was also independently associated with lower EQ-5D VAS and PCS scores, but not with a lower MCS score. The QoL decrement associated with ischemic events was numerically larger than the decrement associated with bleeding.
Conclusion:
Ischemic and bleeding events remain prevalent and are independently associated with lower QoL at 12 months follow-up in patients previously admitted for ACS. The incidence and impact of these adverse events should be considered when balancing individual ischemic and bleeding risk.

Keywords:
ACS, Quality of life, Adverse events

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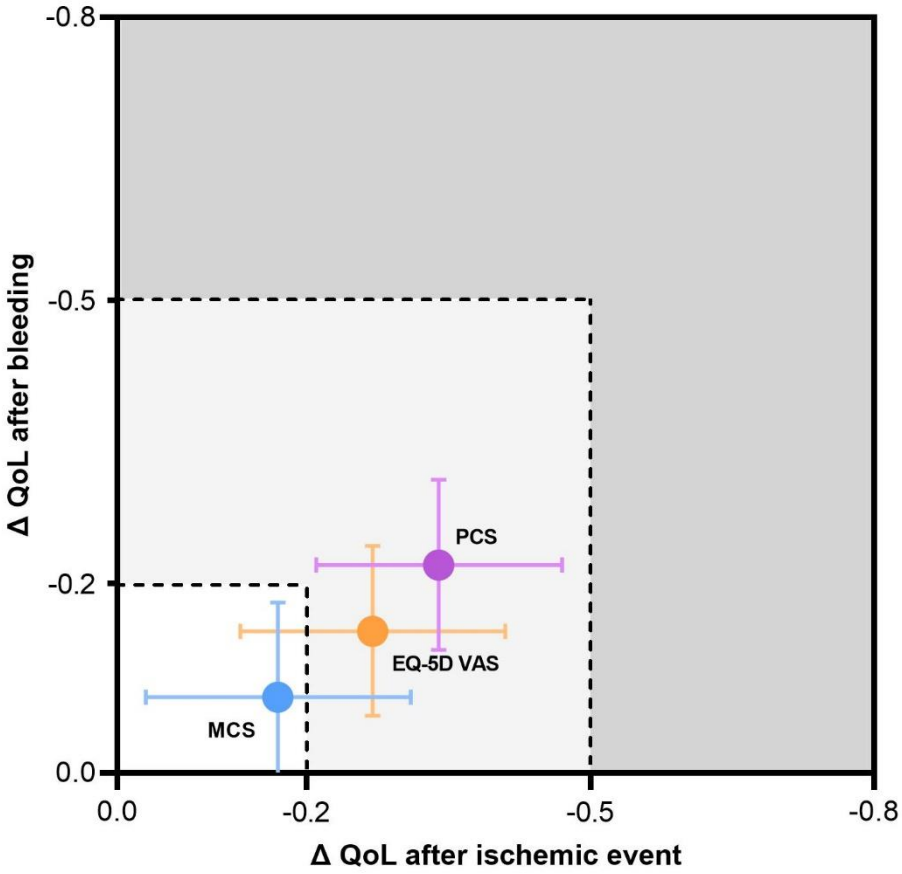
Figure:
Negative impact of ischemic and bleeding events on QoL at 12 months in patients previously admitted for ACS. Impact is expressed as Cohen's d using the effect estimates including 95% confidence interval of ischemic and bleeding events adjusted for age, sex, initial diagnosis, revascularization during initial hospital admission and presence of at least one concomitant chronic disease. MCS denotes Mental Health Component Summary, PCS Physical Component Summary, QoL quality of life and VAS visual analog scale.



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Conservative versus Invasive Management of Elderly Patients with Non-ST-elevation Myocardial Infarction

Presenting author: W.W.A. van den Broek
Department: Cardiologie

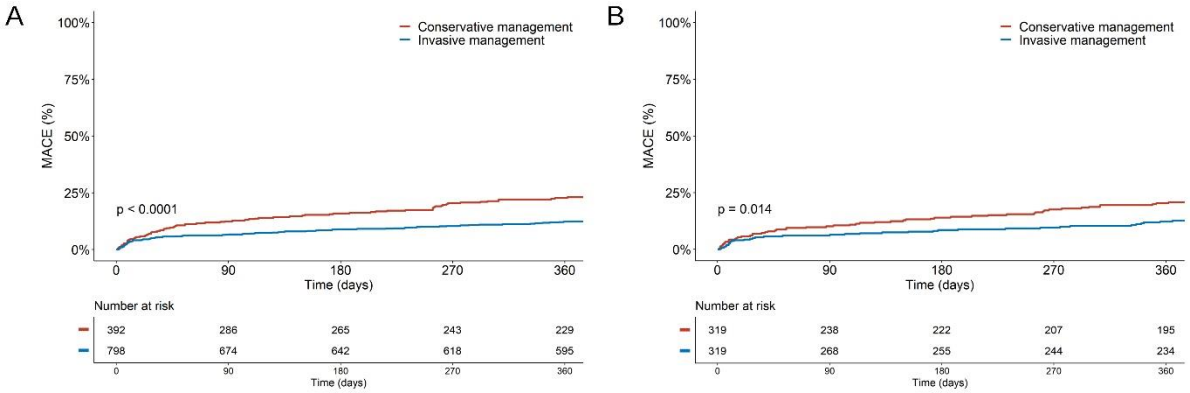
W.W.A. van den Broek (St. Antonius Ziekenhuis, Nieuwegein); W.W.A. van den Broek (St. Antonius Ziekenhuis, Nieuwegein); M.E. Gimbel (St. Antonius Ziekenhuis, Nieuwegein); D.R.P.P. Chan Pin Yin (St. Antonius Ziekenhuis, Nieuwegein); J. Azzahhafi (St. Antonius Ziekenhuis, Nieuwegein); R.S. Hermanides (St. Antonius Ziekenhuis, Nieuwegein); C. Runnet (St. Antonius Ziekenhuis, Nieuwegein); R.F. Storey (St. Antonius Ziekenhuis, Nieuwegein); D. Austin (St. Antonius Ziekenhuis, Nieuwegein); R.M. Oemrawsingh (St. Antonius Ziekenhuis, Nieuwegein); J. Cooke (St. Antonius Ziekenhuis, Nieuwegein); G. Galasko (St. Antonius Ziekenhuis, Nieuwegein); R. Walhout (St. Antonius Ziekenhuis, Nieuwegein); D.A.A.M. Schellings (St. Antonius Ziekenhuis, Nieuwegein); S.L. Brinckman (St. Antonius Ziekenhuis, Nieuwegein); S.H.K. The (St. Antonius Ziekenhuis, Nieuwegein); M.G. Stoel (St. Antonius Ziekenhuis, Nieuwegein); A.A.C.M. Heestermans (St. Antonius Ziekenhuis, Nieuwegein); D. Nicastia (St. Antonius Ziekenhuis, Nieuwegein); M.E. Emans (St. Antonius Ziekenhuis, Nieuwegein); A.W.J. van 't Hof (St. Antonius Ziekenhuis, Nieuwegein); H. Alber (St. Antonius Ziekenhuis, Nieuwegein); R. Gerber (St. Antonius Ziekenhuis, Nieuwegein); P.F.M.M. van Bergen (St. Antonius Ziekenhuis, Nieuwegein); I. Aksoy (St. Antonius Ziekenhuis, Nieuwegein); A. Nasser (St. Antonius Ziekenhuis, Nieuwegein); P. Knaapen (St. Antonius Ziekenhuis, Nieuwegein); C.J. Botman (St. Antonius Ziekenhuis, Nieuwegein); A. Liem (St. Antonius Ziekenhuis, Nieuwegein); J.C. Kelder (St. Antonius Ziekenhuis, Nieuwegein); J.M. ten Berg (St. Antonius Ziekenhuis, Nieuwegein)

Purpose:
Elderly patients are often underrepresented in clinical trials. The aim of this registry was to capture the medical and invasive management of elderly non-ST-elevation myocardial infarction (NSTEMI) patients and assess the impact of conservative versus invasive management on major adverse cardiovascular events (MACE).
Methods:
Patients ≥75 years of age presenting with NSTEMI were prospectively registered with a follow-up of one year. The population was stratified into invasively managed patients and conservatively managed patients, who did not undergo coronary angiography (CAG). These strata were compared using Cox proportional hazard regression in the total population and in a cohort after propensity score matching (PSM). MACE consisted of cardiovascular death, acute coronary syndrome (ACS) and stroke.
Results:
The total population consisted of 1190 patients ≥75 years with NSTEMI (median age 80 years, 43% female). Invasive management with CAG was performed in 67% (N = 798), two-thirds of whom underwent revascularization. Age, diabetes mellitus, reduced LVEF, Killip class and ST-depression at admission were independent predictors for MACE. After propensity score matching, 319 pairs of patients were successfully matched. MACE occurred more frequently in conservatively managed than in invasively managed patients, both in the total population (20% vs. 12%, adjHR 0.53, 95% CI 0.37–0.77, p = 0.001), and after PSM (18% vs. 12%, adjHR 0.50, 95% CI 0.31 - 0.81, p = 0.004).
Conclusion:
Conservatively managed patients had worse prognosis for MACE than invasively managed patients. Our real-world data argue for liberal invasive management in elderly patients presenting with NSTEMI, after careful assessment of the risk of ischemic and bleeding

complications.

Keywords:
non-ST-elevation myocardial infarction, invasive management, elderly

Figure:
Fig. Kaplan Meier Curve for major adverse cardiovascular events (MACE) for invasively and conservatively managed patients.
A. Kaplan Meier Curve for the total population before propensity score matching. B. Kaplan Meier Curve after propensity score matching.



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Sessie 5: INTERVENTION II

In Cardiogenic Shock, NSTEMI Patients Have Worse Outcome than STEMI Patients

Presenting author: E.J. Peters
Department: Department of Cardiology

E.J. Peters (Amsterdam UMC, Amsterdam); E. J. Peters (Amsterdam UMC, Amsterdam); S. ten Berg (Amsterdam UMC, Amsterdam); M. Bogerd (Amsterdam UMC, Amsterdam); M.J.C. Timmermans (Nederlandse Hart Registratie, Utrecht); A.E. Engström (Amsterdam UMC, Amsterdam); L.C. Otterspoor (Catharina Ziekenhuis, Eindhoven); A.P.J. Vlaar (Amsterdam UMC, Amsterdam); J.P.S. Henriques (Amsterdam UMC, Amsterdam); on behalf of the participating centers of the PCI Registration Committee of the Netherlands Heart Registration

Purpose:
Compared to patients with non ST-elevated myocardial infarction (NSTEMI), STEMI patients are at greater risk of developing cardiogenic shock (CS). It is however unclear whether outcome for the different etiologies of shock is similar, as literature on this topic is inconsistent. The aim of this study was to compare patient characteristics and mortality between STEMI and non-STEMI CS.
Methods:
Data from all patients undergoing percutaneous coronary intervention (PCI) in the Netherlands is prospectively registered in the Netherlands Heart Registration (NHR) database. Apart from the obligatory registration, additional data were collected for all patients with cardiogenic shock undergoing PCI between 2017 and 2021 in 14 Dutch hospitals. Details on baseline characteristics, treatment and outcome were compared for patients with STEMI and non-STEMI etiology of shock and logistic regression was performed after multiple imputation to determine the association between shock etiology and mortality.
Results:
A total of 2254 patients were identified of whom 313 (13.9%) had a non-STEMI and 1941 (86.1%) a STEMI etiology of shock. In this cohort, 30-day mortality was higher in NSTEMI patients than in patients presenting with STEMI (46.% vs. 38.2%, p=0.005) despite presenting with higher mean arterial pressures (78 mmHg vs. 74mmHg, p=0.015) and lower lactate levels (3.2 mmol/L, 6.1 mmol/L, p<0.001). Also, enzymatic infarct size was significantly bigger in patients presenting with STEMI CS. When adjusted for comorbidities, blood pressure and laboratory values on admission, non-STEMI etiology of CS was still independently associated with 30-day mortality (OR 1.6, 95%CI 1.22 – 2.15).
Conclusion:
In this Dutch cohort of cardiogenic shock patents undergoing PCI, 14% presented with NSTEMI and 86% with STEMI. CS patients presenting with NSTEMI are at higher risk for worse outcome despite their usually more benign hemodynamic presentation and smaller infarct size.

Keywords:
Cardiogenic shock, Mortality, STEMI NSTEMI

Abstract sessies NVVC Voorjaarscongres
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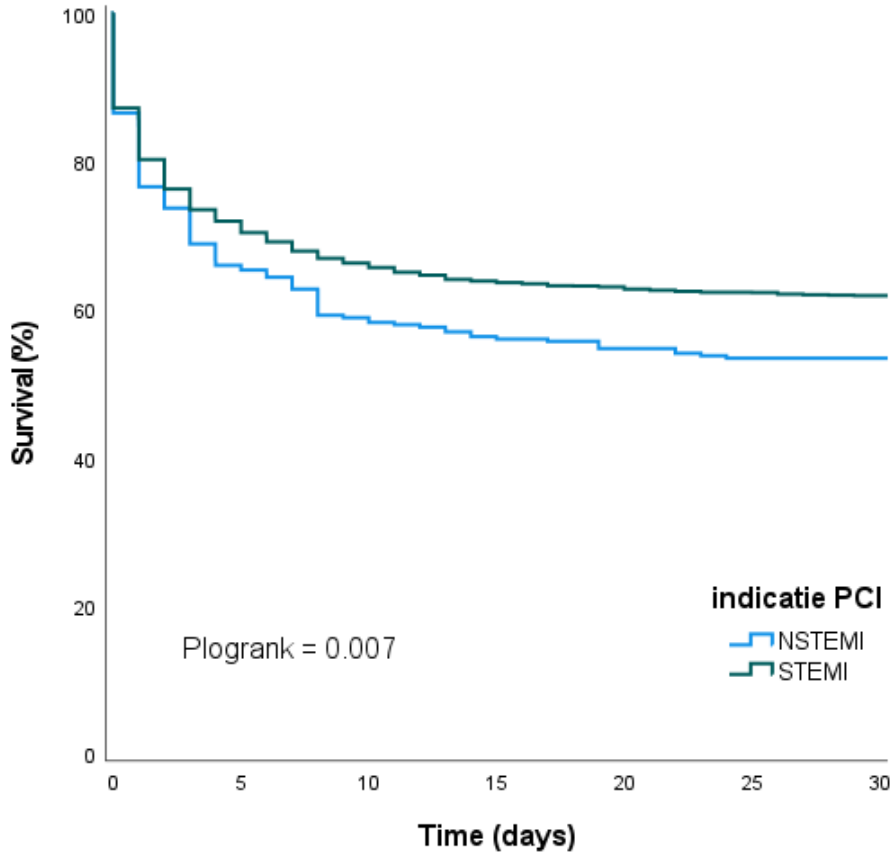
15:00 – 16:30 uur

Figure:
30-Day survival in STEMI and NSTEMI cardiogenic shock



Abstract sessies NVVC Voorjaarscongres
Donderdag 20 april 2023
15:00 – 16:30 uur

Use of Multiple Inopressors Associated with 30day Mortality in AMI Related Shock

Presenting author: S. ten Berg
Department: Cardiology / intensive care

S. ten Berg (Amsterdam UMC, locatie AMC, Amsterdam); E. J. Peters (Amsterdam UMC, locatie AMC, Amsterdam); M. Bogerd (Amsterdam UMC, locatie AMC, Amsterdam); M.J.C. Timmermans (Nederlandse Hart Registratie, Utrecht); L.C. Otterspoor (Catharina ziekenhuis, Eindhoven); A.E. Engstrom (Amsterdam UMC, locatie AMC, Amsterdam); A.P.J. Vlaar (Amsterdam UMC, locatie AMC, Amsterdam); J.P.S. Henriques (Amsterdam UMC, locatie AMC, Amsterdam); On behalf of the participating centers of the PCI Registration Committee of the Netherlands Heart Registration

Purpose:
Inotropes and vasopressors (inopressors) are commonly used in the treatment of cardiogenic shock, despite their lack of beneficial evidence. Also, inopressors are known for their association with arrhythmias, increased cardiac ischemia and even death in settings of sepsis and cardiac surgery. In this real world data study, we aimed to demonstrate the relation between the number of administered inopressors and 30-day mortality in acute myocardial infarction (AMI) related cardiogenic shock (CS) patients.
Methods:
Between 2017 and 2021, data on patients treated with PCI complicated by CS were registered within the Netherlands Heart Registration (NHR) by 14 Dutch hospitals. Those patients were classified into groups based on the number (0 to ≥3) of administered inopressors initiated within the first 24 hours after PCI. Multivariable logistic regression analysis was performed to evaluate the association between the number of inopressors administered and 30-day mortality, corrected for confounders.
Results:
A total of 2328 consecutive CS patients were included (mean age 66 ± 12 years, 27% female). In this cohort, 517 (23%) patients did not receive any inopressors post PCI. One, two and ≥three inopressors were administered in 776 (35%), 627 (28%) and 304 (14%) patients respectively. The overall 30-day mortality was 39% and was associated with the number of inopressors administered (percentage of death per number of inopressors administered, 0; 19%, 1; 34%, 2; 48%, 3; 62%). Even after multivariate adjustment for initial lacate and mean arterial pressure, age, a medical history of diabetes and post-TIMI flow, administration of one inopressor was not associated (OR 1.43, 95% CI 0.88-2.4), but administration of two (OR 2.01, 95% CI 1.23-3.36) and >three inopressors (OR 3.86, 95% CI 2.21-6.86) remained independently associated with 30-day mortality.
Conclusion:
In CS patients complicating AMI, administration of two or more inopressors within 24 hours after PCI was independently associated with 30-day mortality compared to no inopressors. Again, despite frequent use of inopressors in CS patients, the impact and effects should be questioned.

Keywords:
Cardiogenic shock, PCI, Inotropes

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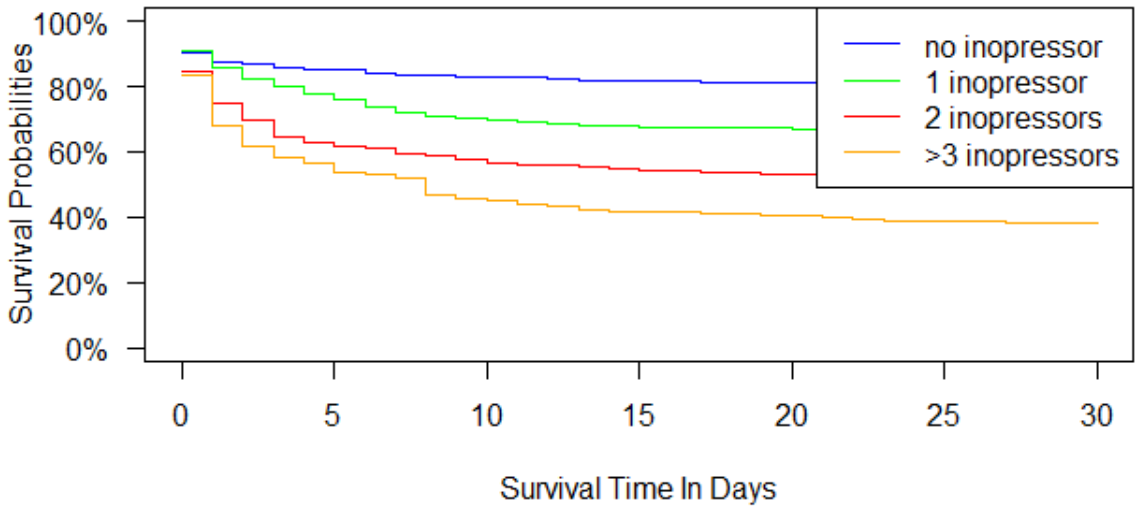
Figure:



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Greater Coronary and Myocardial Perfusion and Smaller Thrombus Burden at Initial Angiogram with Increasing Doses of Zalunfiban in Patients with ST-Elevation Myocardial Infarction

Presenting author: S.A.O.F. Rikken
Department: Cardiology

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Purpose:
Zalunfiban (RUC-4) is a novel, subcutaneously administered glycoprotein IIb/IIIa inhibitor designed for pre-hospital treatment to initiate reperfusion in the infarct-related artery (IRA) before primary percutaneous coronary intervention in patients with ST-elevation myocardial infarction (STEMI). Whether zalunfiban can improve reperfusion in the IRA at initial angiogram in patients with STEMI is unknown.
Methods:
This was a post hoc analysis from the open-label phase IIa study which investigated the pharmacodynamics, pharmacokinetics and tolerability of three increasing doses – 0.075, 0.090 and 0.110 mg/kg - of zalunfiban in STEMI patients. This analysis explored dose-dependent associations between zalunfiban and angiographic indices of the IRA, including coronary and myocardial blood flow and thrombus burden. Zalunfiban was administered in the cardiac catheterization laboratory prior to vascular access, ~10-15 minutes before initial angiogram.
Results:
24 out of 27 STEMI patients were evaluable for angiographic analysis (0.075 mg/kg [n=7], 0.090 mg/kg [n=9], and 0.110 mg/kg [n=8]). TIMI flow grade 2 or 3 was seen in 1/7 patients receiving zalunfiban at 0.075 mg/kg, in 6/9 receiving 0.090 mg/kg, and in 7/8 receiving 0.110 mg/kg (ptrend = 0.004, Figure 1). Similarly, greater myocardial perfusion was observed in patients receiving higher doses (ptrend = 0.005). Consistent with the dose-dependent trends in greater coronary and myocardial perfusion, lower thrombus burden was observed more frequently in patients receiving the highest dose of zalunfiban (ptrend = 0.02).
Conclusion:
Higher doses of zalunfiban given prior to vascular access were associated with greater patency of the IRA, greater myocardial perfusion, and lower thrombus burden.

Keywords:
Glycoprotein IIb/IIIa inhibitor, STEMI, zalunfiban

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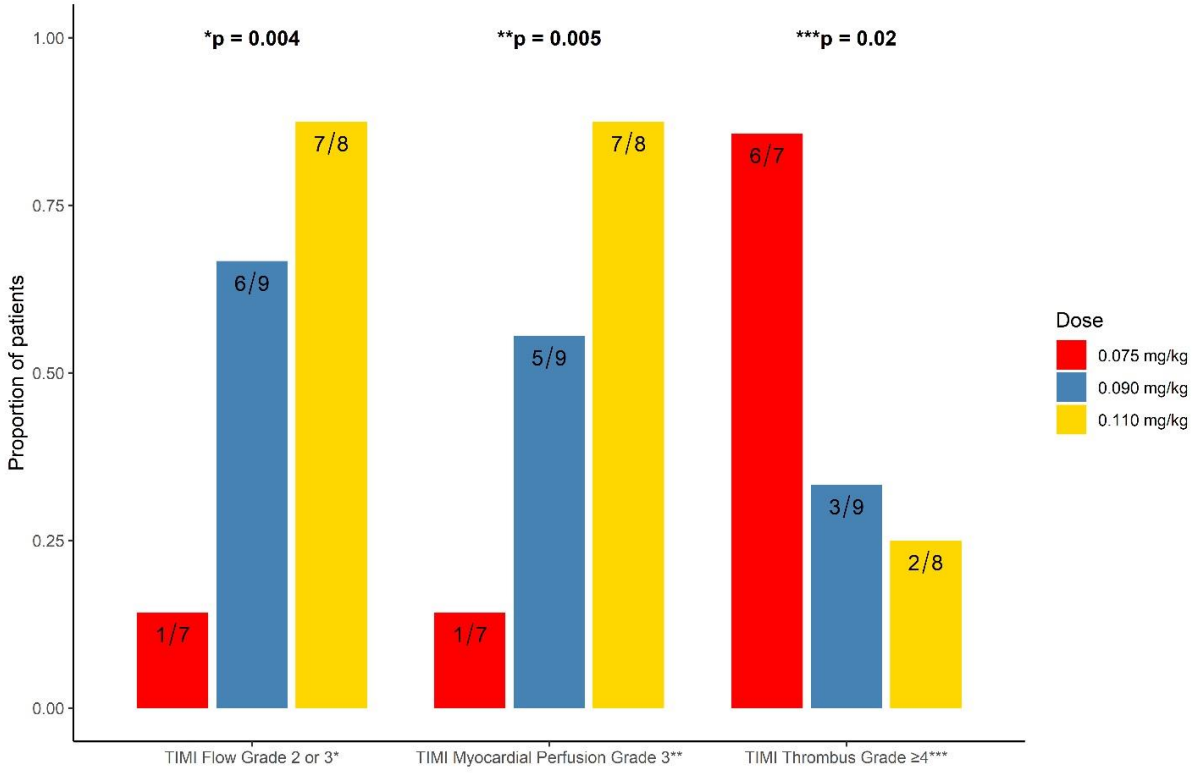
Figure:
Dose-dependent effects of zalunfiban on three angiographic indices.
TIMI; Thrombolysis In Myocardial Infarction.
Dose-dependent effects per angiographic outcome of interest were assessed with the Cochran-Armitage test.



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Outcomes after Native Vessel versus Bypass Graft PCI in Prior CABG Patients

Presenting author: I.T. Küçük
Department: Cardiology

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Purpose:
To investigate explanatory risk factors for native versus graft vessel PCI in patients with prior CABG and outcomes from a large nationwide prospective registry.
Methods:
We identified all patients who underwent PCI with a history of prior CABG from the Netherlands Heart Registration between 2017-2021. The primary endpoint of major adverse cardiac events (MACE) was a composite of all-cause death and target vessel revascularization (TVR) at one-year post PCI. Key secondary endpoint was a composite of all-cause death, myocardial infarction (MI), and TVR at 30 days.
Results:
Out of a total of 154,146 patients who underwent PCI during the study period, 12,822 (8.3%) had a prior CABG. ACS most strongly predicted the choice of bypass graft intervention, while chronic total occlusion (CTO) was predictive of a native vessel intervention. The primary outcome of MACE at one-year post PCI occurred more frequently in those undergoing bypass graft PCI compared with native vessel PCI, driven by both all-cause death and TVR. There was no difference in the incidence of the key secondary endpoint between bypass graft PCI and native vessel PCI.
Conclusion:
In this nationwide prospective registry, ACS is associated with PCI of a bypass graft and CTO with native vessel PCI in prior CABG patients. Clinical outcomes after 1 year were worse after PCI in bypass graft interventions compared with native vessel interventions.

Keywords:
CABG, PCI, Graft

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Figure:
* MACE is a composite of all-cause death and target vessel revascularization. OR is adjusted for age, diabetes, CKD, multivessel disease, CTO, prior MI, OHCA, and ACS.
† Key secondary endpoint is a composite of all-cause death, MI, and target vessel revascularization. OR is adjusted for age, diabetes, CKD, multivessel disease, CTO, prior MI, OHCA, and ACS.
OR denotes odds ratio; CI confidence interval; MACE major adverse cardiac events; Y year; TV target vessel; CKD chronic kidney disease; CTO chronic total occlusion; MI myocardial infarction; OHCA out of hospital cardiac arrest; and ACS acute coronary syndrome

	OR	P-value	95% CI
MACE <1Y*			
TV including a graft	1,302	<0,001	1,137 – 1,492
Key secondary endpoint†			
TV including a graft	0,799	0,055	0,636 – 1,005
Intervention with TV including a graft			
Age (per 1Y increase)	1,033	<0,001	1,027-1,039
Diabetes	1,155	0,004	1,049-1,273
CKD	1,093	0,084	0,988-1,209
Multivessel disease	1,145	0,034	1,011-1,297
CTO	0,441	<0,001	0,353-0,550
Prior MI	1,172	<0,001	1,067-1,287
OHCA	1,064	0,709	0,767-1,477
ACS	2,270	<0,001	2,063-2,498

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Correlation and Diagnostic Agreement of Quantitative Flow Ratio With Fractional Flow Reserve in Saphenous Vein Grafts

Presenting author: R.W. de Winter
Department: Cardiology

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Purpose:
The applicability of quantitative flow ratio (QFR), a non-hyperemic, invasive coronary angiography-derived computation of fractional flow reserve (FFR), has not been studied in coronary artery bypass grafts. We sought to explore the correlation and diagnostic agreement between QFR and FFR in saphenous vein grafts (SVGs).
Methods:
A total of 131 prospectively included patients (mean age 73±8 years, 86% male) with prior coronary artery bypass grafting underwent invasive coronary angiography and functional assessment with FFR in 151 non-occluded SVGs. QFR dedicated angiography images of the SVGs were recorded. QFR computation was performed offline and a threshold ≤0.80 was used to define functional significance.
Results:
QFR was successfully computed in 142 (94%) SVGs. QFR computation could not be performed in 9 bypass grafts due to panning (2%), poor contrast opacification (2%), foreshortening (1%), vessel overlap (1%) and hindered pathline/contour detection caused by sternal wires (1%). FFR showed obstructive disease in 49 (33%) SVGs, whereas QFR was ≤0.80 in 54 (36%) bypass grafts. We found a significant correlation between QFR and FFR ($r=0.71$, $p<0.001$, ICC 0.83, $p<0.001$). QFR exhibited a sensitivity and specificity of 84% and 83%, respectively, resulting in a diagnostic accuracy of 83% to diagnose FFR-defined significant vein graft disease. Lastly, QFR demonstrated an area under the receiver operating curve of 0.90 (95% CI 0.85-0.95).
Conclusion:
This study shows the potential applicability of contemporary QFR computation in venous bypass grafts with a moderate correlation and good diagnostic accuracy compared to functional assessment using FFR.

Keywords:
fractional flow reserve, quantitative flow ratio, saphenous vein grafts

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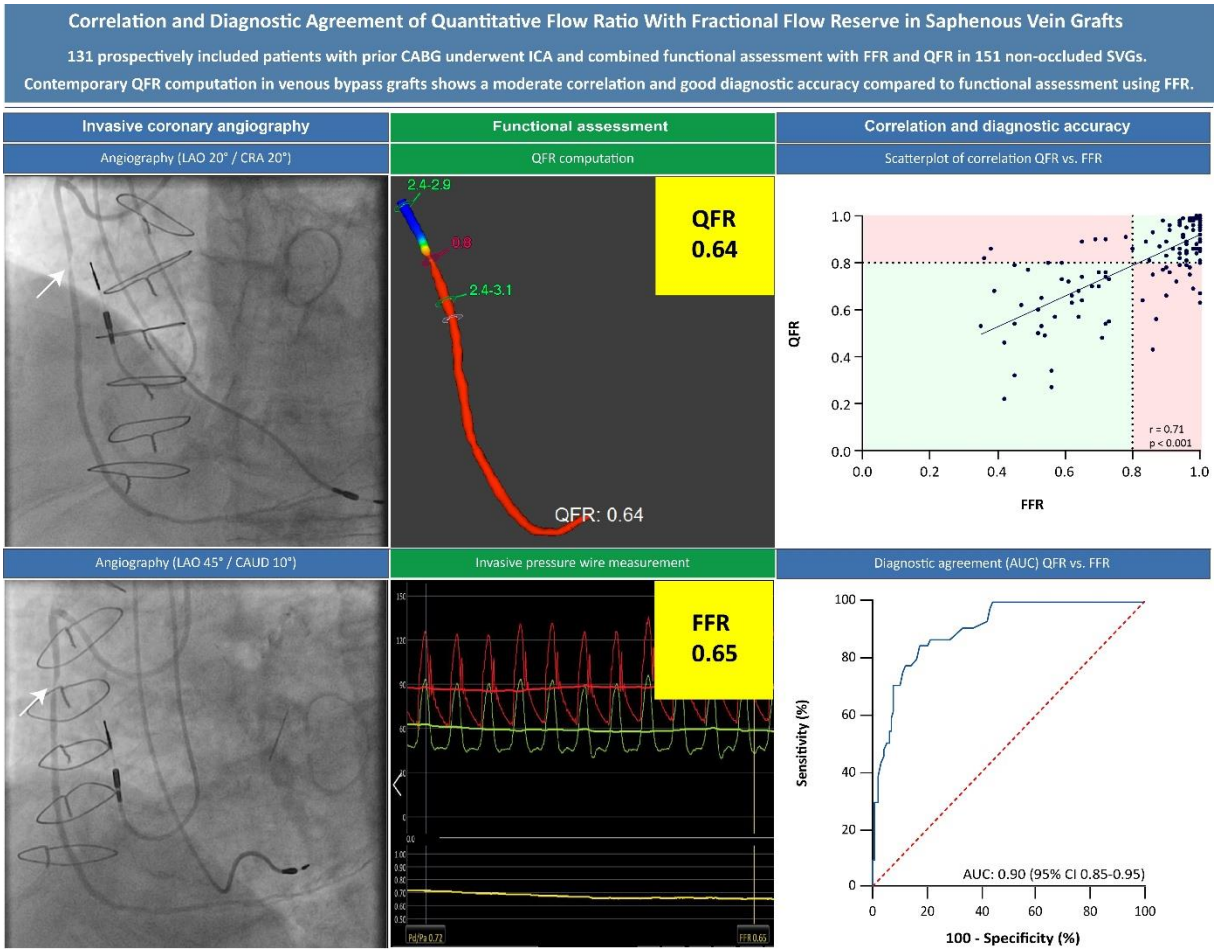
Figure:
Central illustration. This study shows the potential applicability of contemporary QFR computation in saphenous vein grafts with a moderate correlation and good diagnostic accuracy compared to functional assessment using FFR.



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Deep Learning-based Segmentation of the Coronary Artery Tree in X-ray Coronary Angiography

Presenting author: M.A. Molenaar
Department: Cardiology

M.A. Molenaar (Amsterdam UMC, Amsterdam); M.A. Molenaar (Amsterdam UMC); J.L. Selder (Amsterdam UMC); J.O. Bescós (Philips, Best); M.S. van Mourik (Philips, Best); Y. Zhao (Philips, Best); M.J. Schuuring (Amsterdam UMC); B.J. Bouma (Amsterdam UMC); S.A.J. Chamuleau (Amsterdam UMC); C.J. Verouden (Amsterdam UMC)

Purpose:
Visual assessment of stenosis grade in invasive coronary angiography (ICA) is highly operator-dependent due to vessel foreshortening, vessel overlap and poor image quality by low-dose x-ray radiation. Deep learning may assist in stenosis assessment. To enable stenosis assessment first robust coronary artery detection is needed as a prerequisite. Therefore, the aim of this study was to evaluate a deep learning algorithm to segment coronary arteries on ICA.
Methods:
ICA studies of patients who underwent ICA or percutaneous coronary intervention in a tertiary center between 2015-2017 were retrospectively collected. ICA cine runs were manually selected for each study in a way that all the major coronaries were clearly visible with minimum overlap in one of the cines runs and stenosis grade could be assessed (stenosis degree >50%). If the patient did not have any significant stenosis, ICA cine runs that would suffice to assess the coronary anatomy were selected. One ICA cine frame was selected per run with vessels filled with contrast agent and preferably in end-diastolic phase. Contrast-filled coronary arteries included in the Synergy between PCI with Taxus and Cardiac Surgery (SYNTAX) score were segmented using dedicated software. The nnU-Net segmentation method was used to train a convolutional neural network (CNN) to segment the coronary artery tree. Performance was evaluated on the unseen test set (20% of images) by visual inspection and the dice similarity coefficient (DSC), a metric of segmentation performance between 0 (poor) and 1 (excellent).
Results:
A total of 338 patients were included of which 1060 images (848 training set, 212 test set) were segmented. The deep learning method segmented the coronary artery tree in the test set with a mean DSC of 0.85. Discrepancy between the automated and manual segmentation were attributable to incorrect identification of the catheter as coronary artery and segmentation of low-contrast regions (Figure 1).
Conclusion:
By using deep learning it is possible to segment the coronary tree accurately in ICA. Further efforts are needed to automatically detect the separate coronary segments, lesions and lesion grade and eventually to perform objective and reproducible quantitative coronary angiography.

Keywords:
Coronary angiography, Coronary artery disease, Deep learning

Figure:
Figure 1: Representative examples of automatic identification of the coronary arteries in invasive coronary angiography images. In the first and second row examples of automated segmentation (nn-UNet) and corresponding manual segmentation are shown, respectively.

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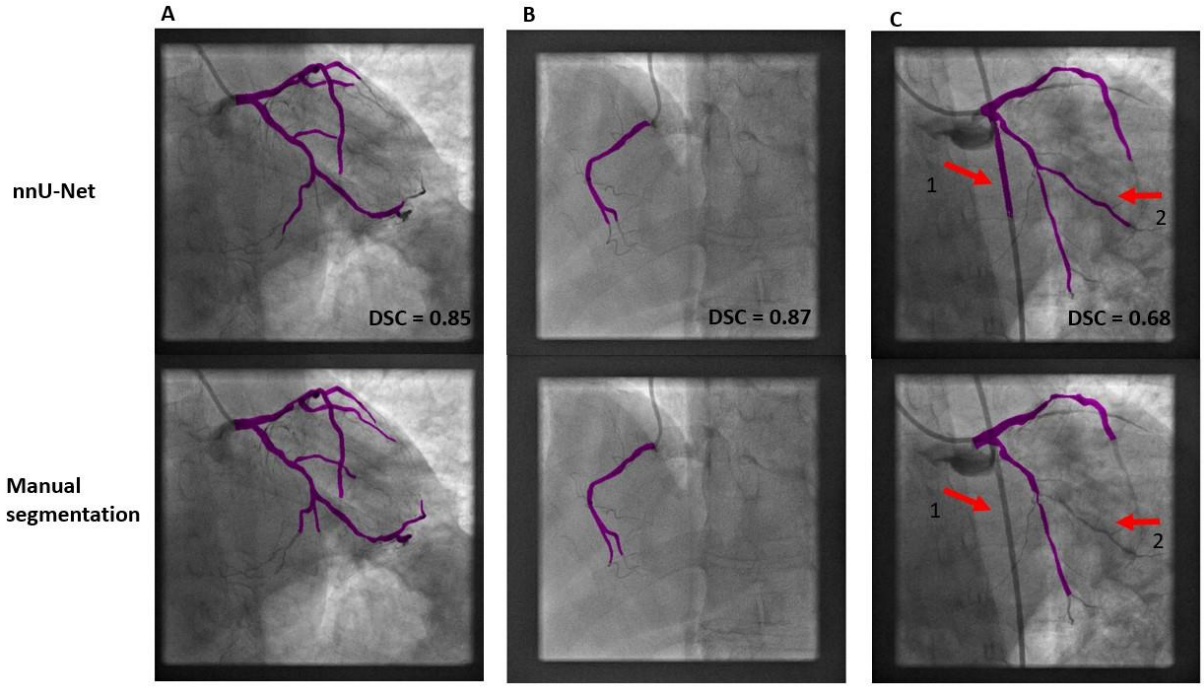
A/B. Good agreement between automated and manual segmentation. C. Discrepancy between the automated and manual segmentation: the catheter is incorrectly identified as coronary artery (1) and segmentation of a low-contrast region (2). DSC = similarity coefficient.



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Same Day Discharge After Large Bore Vascular Access in Percutaneous Coronary Intervention of Chronic Total Coronary Occlusions

Presenting author: Y.B.O. Somsen
Department: Cardiology

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Purpose:
Same day discharge (SDD) in patients undergoing percutaneous coronary intervention (PCI) of a chronic total coronary occlusion (CTO) appears safe, feasible, and carries economic advantage. However, SDD may be hampered by the application of large bore dual arterial access, due to its association with vascular complications. On the contrary, increasing French size augments therapeutic options and is therefore considered fundamental in complex CTO PCI. The present study investigated the feasibility of SDD in patients undergoing CTO PCI with large bore dual arterial access.

Methods:
Between 2013 and 2018, a total of 683 patients were prospectively enrolled in a single-center CTO registry and underwent single-vessel CTO PCI. Large bore arterial access was defined as the application of 7 and/or 8 French sheaths in at least one access site. Technical success was defined as Thrombolysis in Myocardial Infarction flow grade 3 and residual stenosis <30%. Vascular access complications were defined as a composite of clinically significant bleeding and/or hematoma, urgent transfusion, dissection, pseudoaneurysm, arteriovenous fistula formation, and thrombosis.

Results:
Mean age was 66 ± 11 years; 83% were male. Large bore arterial access was applied in 87%; the most common set-up was radial-femoral (68%) and bifemoral (23%) access. In 432 (62%) patients, SDD was achieved. Patients within the SDD group were younger and had lower rates of prior MI, prior CABG, renal insufficiency, and peripheral artery disease. A high Japanese CTO score (≥2) was less common in patients with versus without SDD (58% vs. 72%, p<0.001). In addition, technical success rate was higher in the SDD group (96% vs. 89%, p<0.001). Vascular access complications were found in 22 (3,2%) cases, with 17 (77,2%) occurring in the non-SDD group. Local access site bleeding was found to be the most common complication (82,4% of total vascular access complications). Finally, multivariable analysis showed that female gender (OR 2.22, 95% CI: 1.30 – 3.78) and local access site bleeding (OR 12.0, 95% CI: 4.37 – 33.21) were significantly associated with a lower probability of SDD.

Conclusion:
Our study demonstrates the feasibility of SDD in the majority of patients undergoing CTO PCI with large bore dual arterial access, with high rates of technical CTO PCI success and acceptable vascular access complication rates. Care should be taken to avoid local access

site bleeding since this hinders SDD.

Keywords:
Chronic Total Coronary Occlusion, Large Bore Vascular Access, Same Day Discharge

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MitraClip Treatment Survival Outcomes compared to Conservative and Surgical Treatment for High-surgical-risk Patients Suffering from Mitral Regurgitation

Presenting author: A. Mephtah
Department: Cardiology

A. Mephtah (Maastricht UMC/ Maastricht University, Maastricht); A. Mephtah (Maastricht UMC, Maastricht)

Purpose:
Approximately 25% of all native valvular diseases are composed of Mitral regurgitation (MR). Advanced MR shares an independent association with reduced survival outcomes. We made an examination of survival outcomes after treatment of patients that had priorly been discussed by a dedicated Mitral Valve team as there is a lack of definition when comparing the surgical or conservative treatment with the MitraClip treatment. All was done in a large multicenter real-life setting.
Methods:
: In a retrospective manner, a total 1676 patients were included which were all discussed by the dedicated heart team. From these patients 687 were allocated to a conservative treatment, 529 were allocated to an operational intervention and 187 patients were allocated to a catheter intervention. From this last allocation, 154 patients were treated with a MitraClip treatment.
Results:
The data had just recently been collected and is therefore yet to be analyzed. One of the main outcomes that will serve our focus will be the baseline characteristics and especially mortality.
Conclusion:
Based on the preliminary results, there are signals to suspect that further analysis might suggest a lower mortality hazard for MitraClip intervention in a high-risk population with symptomatic mitral regurgitation when compared with matched patients that underwent conservative or surgical treatment.

Keywords:
MitraClip, Mitral Regurgitation, mitral valve