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Abstract 19

Impact of a Modified Preoperative Anticoagulation Policy in Patients Undergoing Elective Isolated Coronary Artery Bypass Grafting

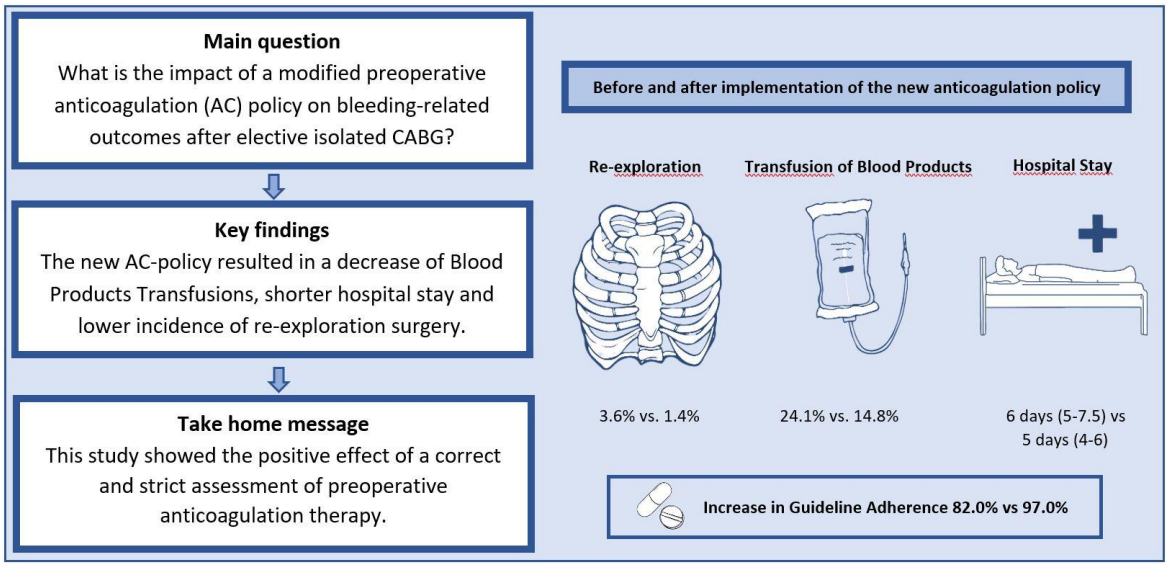
Presenting author: M.A. Bayon
Department: Cardiothoracic Surgery

M.A. Bayon (Catharina Ziekenhuis, 's-Hertogenbosch); M.A. Bayon (Catharina Ziekenhuis, 's-Hertogenbosch); L. Schuerman; S. Houterman; G.J. van Steenbergen; M. A. Soliman-Hamad

Purpose:
Postoperative bleeding remains an important issue in patients undergoing coronary artery bypass grafting (CABG), being associated with blood product transfusions (BPT) and re-exploration. A modified anticoagulation policy was implemented based on a previous study of our institution (Interact Cardiovasc Thorac Surg. 2021; 33(5): 702–709). The objective of the present study was to assess its impact on clinical outcomes.
Methods:
Patients who underwent elective isolated CABG between 2017 and 2022 at the Catharina Hospital Eindhoven were included and divided into two groups, based on whether or not they were treated according to the implemented policy. The primary endpoints were BPT and re-exploration for bleeding. Secondary endpoints included length of hospital stay, in-hospital stroke, myocardial infarction and 30-day mortality. Propensity score matching was used to compare outcomes of both cohorts.
Results:
A total of 1506 patients were included, of which 1064 belonged to the first cohort. The remaining 442 patients (second cohort) were treated according to the modified anticoagulation policy. In the 439 matched groups, the implementation of the new policy was associated to a decreased BPT (14.8% vs 24.1%, P = 0.001) and a shorter length of hospital stay (5 days [IQR 4-6] vs 6 days [IQR 5-7.5], P < 0.001), whereas the incidence of postoperative myocardial infarction and stroke did not differ. Re-exploration was less frequently observed in the second cohort (1.4% vs 3.6%, P = 0.052).
Conclusion:
The implementation of the modified anticoagulation policy resulted in decreased transfusions of blood products, shorter hospital stay and a clinically relevant decrease in re-exploration.

Keywords:
Re-exploration, Postoperative bleeding, Blood Product Transfusion

Figure:


Main question
What is the impact of a modified preoperative anticoagulation (AC) policy on bleeding-related outcomes after elective isolated CABG?
Key findings
The new AC-policy resulted in a decrease of Blood Products Transfusions, shorter hospital stay and lower incidence of re-exploration surgery.
Take home message
This study showed the positive effect of a correct and strict assessment of preoperative anticoagulation therapy.
Before and after implementation of the new anticoagulation policy
Re-exploration
Transfusion of Blood Products
Hospital Stay
3.6% vs. 1.4%
24.1% vs. 14.8%
6 days (5-7.5) vs 5 days (4-6)
Increase in Guideline Adherence 82.0% vs 97.0%

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Abstract 30

Early Mitral Valve Repair Surgery versus Active Surveillance in Patients with Asymptomatic Severe Primary Mitral Regurgitation; Insights from the Dutch AMR Registry

Presenting author: S. el Mathari
Department: Cardiothoracic Surgery

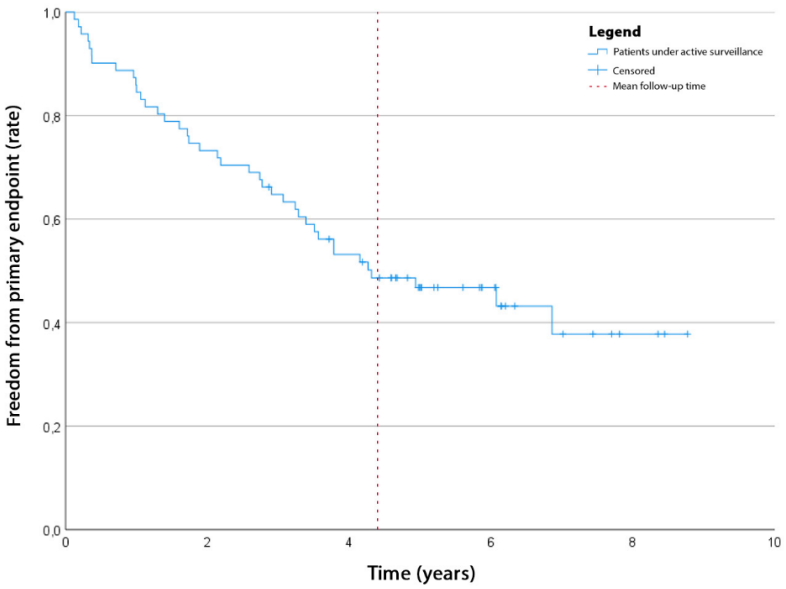
S. el Mathari (Amsterdam UMC, Amsterdam); S. el Mathari (Amsterdam UMC, Amsterdam); E.A. Hart; R. Jansen; A. Veld; J. Schaap; M.J. Cramer; M.L. Bots; S.A.J. Streukens; L. Wagenaar; M. Boekholdt; J. Kluin; S.A.J. Chamuleau

Purpose:
Management of asymptomatic severe mitral regurgitation (MR) patients with a preserved left ventricular function is challenging. Early mitral valve repair surgery and active surveillance with facilitated surgery are both possible treatment strategies. In the multicenter Dutch AMR registry we assess the percentage of MR patients undergoing facilitated surgery during active surveillance and 2) clinical outcomes of facilitated surgery in comparison to early surgery.
Methods:
Since 2013, 99 patients were included. Enrollment for early surgery or active surveillance was based on heart team decision. During follow-up, we assessed primary endpoints for both groups; atrial fibrillation, cerebrovascular accidents, heart failure, surgery and death.
Results:
71 Patients were allocated to active surveillance and 28 to early surgery. 39 Patients in the active surveillance group reached a primary endpoint, including 3 deaths (Figure 1A). In the early surgery group, 4 patients reached a primary endpoint, including 2 deaths. Over a mean follow-up time of 4.4 years, 51% of active surveillance patients underwent facilitated surgery due to symptomatic or asymptomatic triggers (Figure 1B).
Conclusion:
51% of MR patients under active surveillance needed facilitated surgery within 4.4 years. The other half of patients is still asymptomatic without surgical indication. This result shows that active surveillance can be safe. At the upcoming NVVC congress, we will further elucidate 1) whether MR patients can be stratified at baseline to either strategy based on additional testing (holter monitoring and cardiopulmonary exercise testing) and 2) whether facilitated surgery is non-inferior to early surgery in terms of clinical outcomes (data is currently being finalized).

Keywords:
Mitral regurgitation, early surgery, active surveillance

Figure:
Freedom of primary endpoint during active surveillance (A) and reasons for facilitated surgery in the active surveillance group (B).

A



B

Reasons for facilitated surgery in the active surveillance group			
	Number of patients		Number of patients
Symptomatic	**19**	**Asymptomatic**	**17**
Dyspnea / fatigue	*15*	Atrial fibrillation	*9*
Heart failure	*2*	LV dilatation	*3*
Endocarditis	*2*	LA dilatation	*2*
		Patient's request	*2*
		Pulmonary hypertension	*1*

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Abstract 32

The Ascyrus Medical Dissection Stent (AMDS) a Novel Technology to Treat Acute Type A Aortic Dissections

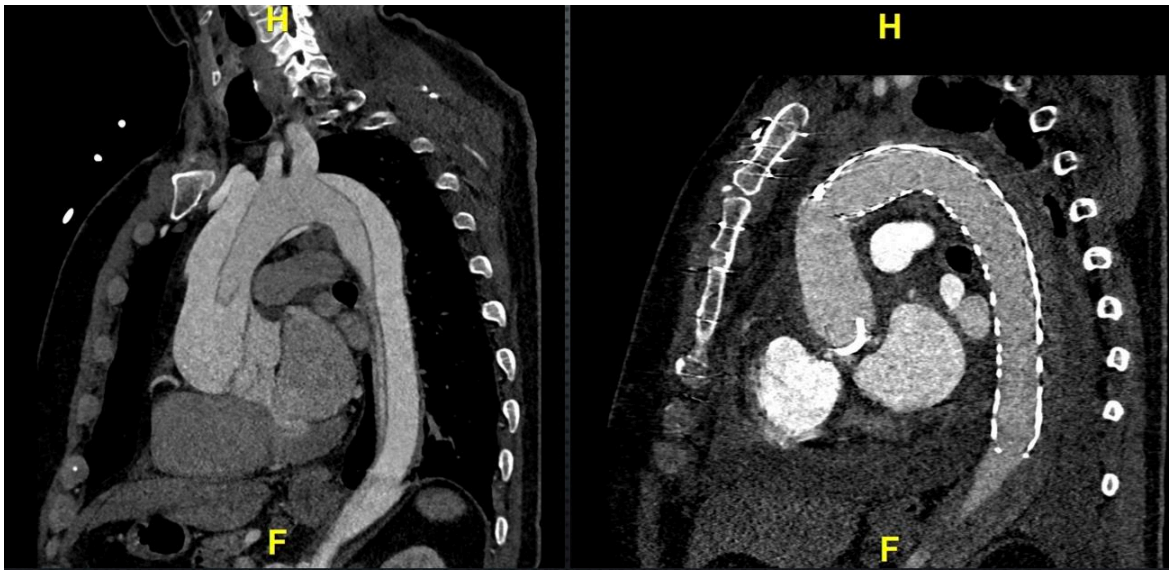
Presenting author: E. van der Weijde
Department: cardiothoracic surgery

G. Mecozzi (UMCG, Groningen); *G. Mecozzi (UMCG, Groningen); E. van der Weijde; M.A. Mariani*

Purpose:
To assess the safety and efficacy of the Ascyrus Medical Dissection Stent (AMDS) in type A aortic dissection of intramural hematoma (IMH) patients in preventing persistent false lumen flow.
Methods:
Data from all patients treated with an AMDS in our medical center from October 2022 until August 2023 were collected in a registry and analyzed retrospectively.
Results:
A total of 26 patients were treated with the AMDS to treat a type a dissection (n=23) or IMH (n=3). This cohort had a median age of 65 years and 85% was male. All but one were treated in an emergency setting, one patient developed a type A dissection perioperatively during an elective supracoronary ascending replacement. In hospital mortality was 7.7% (n=2), one patient (with a history of cardiac surgery) developed lungfibrosis and died due to respiratory failure caused by severe pneumonia and another patient developed progressive paraplegia 2 days after an initially uncomplicated procedure. No strokes were seen. Other postoperative complications were: rethoracotomy for bleeding or tamponade (n=7), renal failure requiring temporary dialysis (n=4) and bowel ischemia requiring sigmoid resection (n=1). In four patients the stentgraft did not deploy as expected, but was kinking, there were no clinical consequences. No distal anastomotic new entries were seen. One patient is scheduled to have a reoperation due to false lumen progression.
Conclusion:
The AMDS provides a safe and relatively simple alternative for the treatment of type A aorta dissection or IMH patients. Longer term follow-up and assessment of the behavior of the stentgraft is needed.

Keywords:
Dissection, Aorta, Stentgraft

Figure:
On the left a preoperative CT scan of a patient with type A aortic dissection on the right a controle CT scan after AMDS placement.



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Abstract 36

First Results of the Relation Between Pre-Existing Arrhythmogenic Substrate and Onset of De Novo Postoperative Atrial Fibrillation in Adults With Congenital Heart Disease

Presenting author: R.D. Zwijnenburg
Department: Cardiothoracic surgery

R.D. Zwijnenburg (Erasmus MC, Rotterdam); N.L.M. de Kruijf (Erasmus MC, Rotterdam); M.S. van Schie (Erasmus MC, Rotterdam); C. Zhang (Erasmus MC, Rotterdam); Y.J.H.J. Taverne (Erasmus MC, Rotterdam); A.J.J.C. Bogers (Erasmus MC, Rotterdam); N.M.S. de Groot (Erasmus MC, Rotterdam)

Purpose:
The most common complication after cardiac surgery is postoperative atrial fibrillation (PoAF), but data on PoAF in adults with congenital heart disease (ACHD) is very limited. It is unknown whether quantified atrial electrophysiological parameters measured in ACHD patients are related to development of PoAF.
Methods:
Intra-operative, epicardial high resolution and density mapping of the right and left atrium, including Bachmann's Bundle was performed during sinus rhythm (SR). Unipolar potentials were classified as single-, short or long double- and fractionated potentials. Unipolar potential voltages, local conduction velocities and prevalence of conduction block (CB) areas were measured. PoAF was defined as development of AF within 5 days after surgery.
Results:
De novo PoAF developed in 8/64 (12%) patients. ACHD patients with PoAF were significantly older than patients who remained in SR (43±13 vs 60±6 years, $p<0.001$). PoAF was associated with a lower percentage of singles potentials (75.3 ± 14.4 vs 82.0 ± 7.6, $p=0.045$). No significant differences in conduction velocity, low voltage areas, percentage of long double potentials, fractionation or CB were observed (Table 1).
Conclusion:
The prevalence of new-onset PoAF in our ACHD population was 12%. Patients with PoAF were significantly older and seemed to have more pre-existing substrate, but future studies with a larger sample size are necessary to confirm the accuracy of these findings.

Keywords:
Adult congenital heart disease, Postoperative atrial fibrillation, Cardiac surgery

Figure:

Parameters	No PoAF	PoAF	p-value
CV (cm/s)	93.4 ± 5.8	94.2 ± 6.6	0.794
CB (%)	1.63 [0.95-2.49]	2.45 [0.99-4.58]	0.361
Voltage (mV)	5.84 ± 1.75	5.68 ± 1.11	0.794
LVA (%)	4.81 [2.97-7.69]	5.59 [2.32-8.55]	0.730
Potential characteristics			
Singles (%)	82.0 ± 7.6	75.3 ± 14.4	0.045
Short doubles (%)	12.1 ± 4.2	13.2 ± 4.0	0.473
Long doubles (%)	2.5 [1.4-4.9]	4.6 [2.0-10.1]	0.180
Fractionation (%)	3.9 [2.4-6.9]	6.8 [3.2-15.7]	0.155

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Abstract 38

The Effect of Prehabilitation on the Incidence of Modifiable Risk Factors in Patients undergoing Cardiac Surgery

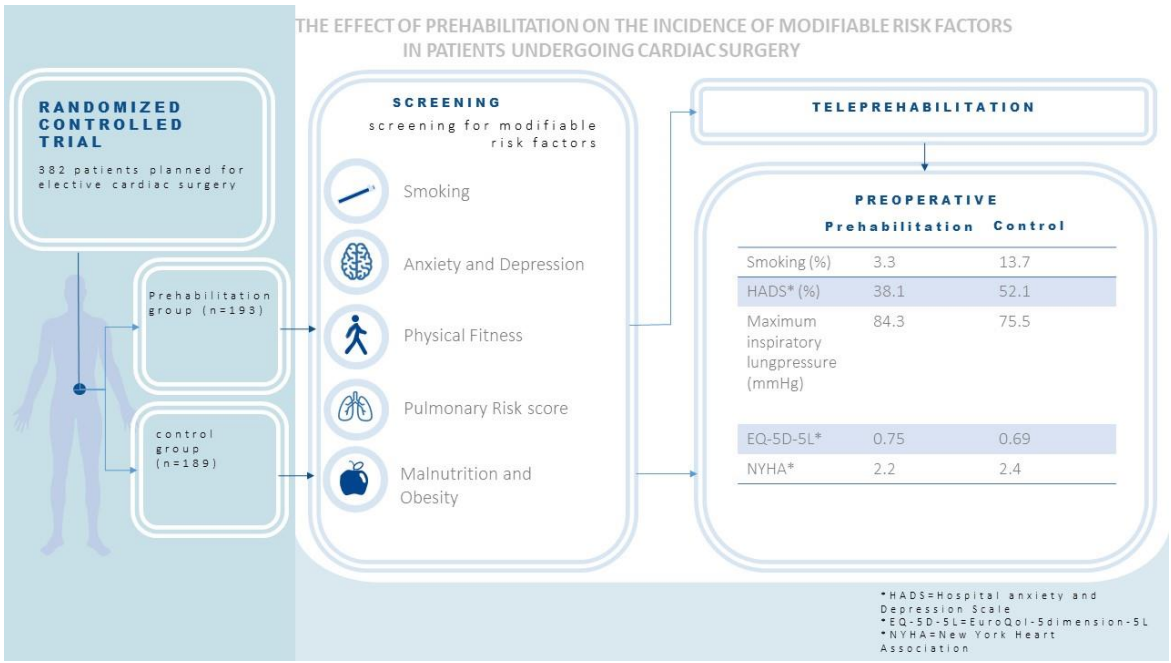
Presenting author: J. Heertjes
Department: Cardiothoracal Surgery

J. Heertjes (MUMC, Maastricht); B. Scheenstra (MUMC, Maastricht); L. van Susante (MUMC, Maastricht); B. Bongers (Maastricht University, Maastricht); M. Imkamp (Maastricht University, Maastricht); B. Kietselaer (Maastricht University, Maastricht); J. Maessen (Maastricht University, Maastricht); A. van 't Hof (Zuyderland, Heerlen); P. Sardari Nia (MUMC, Maastricht)

Purpose:
The preoperative period presents a unique opportunity to motivate patients to improve their lifestyle and optimize perioperative risk factors. Teleprehabilitation offers the possibility of providing personalized programs remotely and may be a valuable addition to center-based programs. The aim of the current study is to describe the incidence of modifiable risk factors, participation rate in the different modules and the effect of the multimodal teleprehabilitation program on these risk factors.
Methods:
394 adult patients scheduled for elective cardiac surgery were randomized 1:1 to tele-prehabilitation or control after providing informed consent. All patients were screened for five modifiable risk factors (physical fitness, anxiety and depression, malnutrition and obesity, pulmonary riskscore, and smoking). Treatment was delivered through blended care, supported by eHealth and a multidisciplinary treatment team. The effect on these risk factors and physical parameters was assessed before the surgery.
Results:
381 patients were included, of which 90% had at least one modifiable risk factor. Patients participating in the teleprehabilitation program had an improved risk profile as well as a better quality of life compared to the control group (smokers 3.3% vs 13.7%; elevated anxiety or depression 38.1% vs 52.1%; max inspiratory lungpressure 84.3 mmHg vs 75.5 mmHg; Eq-5D-5L score 0.75 vs 0.69; and NHYA 2.2 vs 2.4)
Conclusion:
Teleprehabilitation has a positive effect on the incidence of modifiable risk factors, physical parameters and quality of life in patients undergoing cardiac surgery. Implementing teleprehabilitation could therefore improve perioperative outcomes and reduce the risk of future events.

Keywords:
Teleprehabilitation, Cardiac Surgery

Figure:


THE EFFECT OF PREHABILITATION ON THE INCIDENCE OF MODIFIABLE RISK FACTORS IN PATIENTS UNDERGOING CARDIAC SURGERY
RANDOMIZED CONTROLLED TRIAL
382 patients planned for elective cardiac surgery
Prehabilitation group (n=193)
control group (n=189)
SCREENING
screening for modifiable risk factors
Smoking
Anxiety and Depression
Physical Fitness
Pulmonary Risk score
Malnutrition and Obesity
TELEPREHABILITATION
PREOPERATIVE
Prehabilitation Control
Smoking (%) 3.3 13.7
HADS* (%) 38.1 52.1
Maximum inspiratory lungpressure (mmHg) 84.3 75.5
EQ-5D-5L* 0.75 0.69
NYHA* 2.2 2.4
*HADS=Hospital anxiety and Depression Scale
*EQ-5D-5L=EuroQol-5dimension-5L
*NYHA=New York Heart Association

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Response Variance between Right and Left Ventricular Myocardium to Inotropic and Vasoactive Drugs: a Living Myocardial Slices Study

Presenting author: S.J.J. Langmuur
Department: Cardiothoracic Surgery

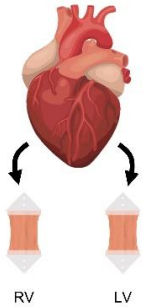
S.J.J. Langmuur (Erasmus MC, Rotterdam); S.J.J. Langmuur (Erasmus MC, Rotterdam); J.H. Amesz (Erasmus MC, Rotterdam); K.M. Veen (Erasmus MC, Rotterdam); O.M. Manintveld (Erasmus MC, Rotterdam); Y.J.H.J. Taverne (Erasmus MC, Rotterdam)

Purpose:
Right ventricular (RV) failure is a complex clinical syndrome, which is currently being treated in a similar fashion as left ventricular (LV) failure, despite differences in aetiology of the disease, organogenesis and physiology. Therefore, this study aimed to investigate whether the effect of inotropic and vasoactive drugs is different in the RV versus LV.
Methods:
Living myocardial slices (LMS) with intact 3D microarchitecture under electromechanical stimulation were used to test the effect of routine drugs (dobutamine, noradrenaline, adrenaline, levosimendan and enoximone) (0-10 µM) on human heart failure tissue from the RV and LV. Data on maximum contraction force, slopes, contraction durations and peak area were extracted (Figure 1).
Results:
64 slices (33 RV, 31 LV) were produced from 5 patients. At baseline, RV LMS had a higher maximum contraction force, shorter contraction duration, time to peak and time to relaxation, steeper slopes and a larger peak area than LV LMS (Figure 1), which increased over time. When administering dobutamine, a larger increase in contraction force (236% vs. 399%, p=0.026), peak area (172% vs. 358%, p=0.017) and positive (243% vs. 458%, p=0.021) and negative slopes (239% vs. 513%, p=0.016) was observed for the RV compared to the LV. Adrenalin, noradrenalin, levosimendan and enoximone showed less prominent differences between ventricles.
Conclusion:
The biomechanical contraction profile differed between LMS from the RV versus the LV. Routine inotropic and vasoactive drugs, especially dobutamine, had a different biomechanical effect on both ventricles, advocating for a distinct approach when treating right or left ventricular failure.

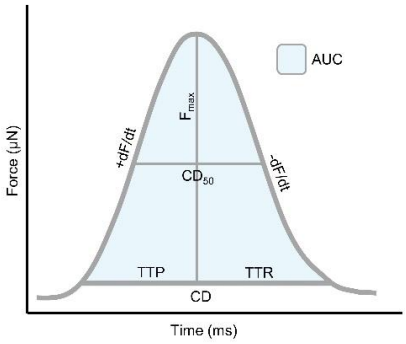
Keywords:
Living myocardial slices, Right ventricle, Heart failure

Figure:
Figure 1. Baseline differences in biomechanical parameters for left (LV) vs. right ventricular (RV) slices. Baseline measurement was performed before each drug administration and all measurements were included in this table.
Fmax: force amplitude; CD: contraction duration; CD50: contraction duration at 50% of the amplitude; TTP: time-to-peak; TTR: time-to-relaxation; +dF/dt: positive slope; -dF/dt: negative slope; AUC: peak area under the curve.
*Data are presented as median (interquartile range) and all p-values were <0.001.

Living myocardial slices



Biomechanical parameters



Baseline differences

Parameter	LV (n=175)	RV (n=194)
F_{max} (µN) *	1246 (621, 2528)	2067 (1115, 4102)
CD (ms) *	557 (496, 642)	469 (405, 523)
CD_{50} (ms) *	287 (254, 317)	242 (211, 275)
TTP (ms) *	204 (180, 257)	162 (136, 196)
TTR (ms) *	357 (304, 411)	302 (261, 333)
+dF/dt (µN/s) *	7880 (3944, 16875)	16870 (8013, 37665)
-dF/dt (µN/s) *	-6031 (-11555, -2806)	-10390 (-22265, -5980)
AUC (µN.s) *	368 (201, 755)	562 (292, 1043)

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Open Repair for Thoraco(-abdominal) Aortic Aneurysm: Contemporary Multimodal Approach in a Specialized High-volume Setting

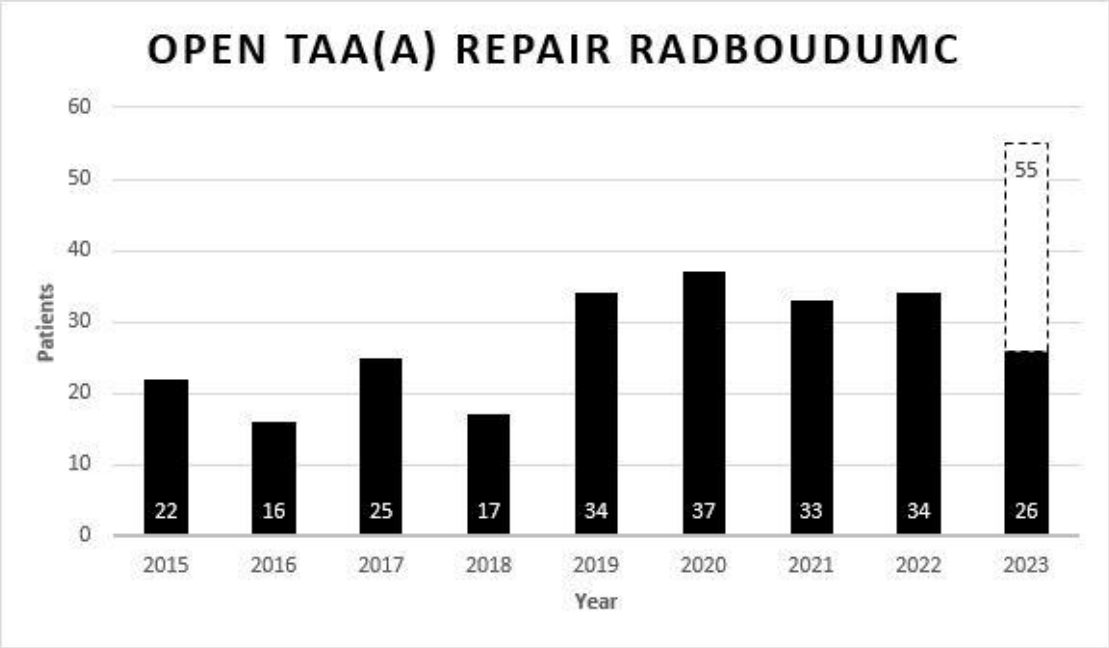
Presenting author: M. Smulders
Department: Cardiothoracale Chirurgie

M. Smulders (Radboudumc, Nijmegen); N. Hasami (Radboudumc, Nijmegen); W.W. L. Li (Radboudumc, Nijmegen); G.S.C. Geuzebroek (Radboudumc, Nijmegen); T. Smith (Radboudumc, Nijmegen); M.W.A. Verkroost (Radboudumc, Nijmegen); W.J. Morshuis (Radboudumc, Nijmegen); R.H. Heijmen (Radboudumc, Nijmegen)

Purpose:
Given the formidable challenges that open repair for thoracic- (TAA) and thoracoabdominal aortic aneurysms (TAAA) entails, best outcomes may be achieved in high-volume experienced centers providing spinal cord and end-organ protection. In this study, we describe our single-center results since the start of a dedicated surgical program for TAA(A) repair in 2015.
Methods:
We conducted a retrospective analysis of all patients who underwent open TAA or TAAA repair between 01/2015-06/2023. Aside demographic and aorta-related characteristics, we evaluated mortality and morbidity rates including neurological, pulmonary, renal, and other adverse events.
Results:
A total of 242 patients underwent open TAA (28.5%) or TAAA repair (71.5%), of which 37 (15.3%) were operated in an urgent setting. Aortic aneurysms were mostly degenerative (47.1%), post-dissection (40.9%), or due to (non-)infectious aortitis (9.9%). Crawford extent of aortic resection in TAAA patients was type I (26.0%), type II (23.1%), type III (17.9%), type IV (28.9%), or type V (5.8%).
Thirty-day mortality was 7.0%. New stroke was observed in 4.5%. Spinal cord injury occurred in 2.9%, being permanent at discharge in only 3 patients (1.2%). Acute kidney failure requiring dialysis and prolonged ventilation requiring tracheostomy was noted in 6.2% and 2.9%, respectively.
Conclusion:
In a specialized high-volume setting using a contemporary multimodal approach, open surgical repair of TAA(A) can be performed with acceptably low mortality and morbidity. Although challenged by emerging endovascular approaches, open repair should still be considered the gold standard.

Keywords:
Thoracic aorta aneurysm, Thoracoabdominal aorta aneurysm, Open surgical repair

Figure:


OPEN TAA(A) REPAIR RADBOUDUMC
Patients
60
50
40
30
20
10
0
22
16
25
17
34
37
33
34
26
55
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year

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Abstract 62

Trends and Outcomes of Coronary Artery Bypass Grafting in the Netherlands 2005 – 2020: A Netherlands Heart Registration Registry-based Study

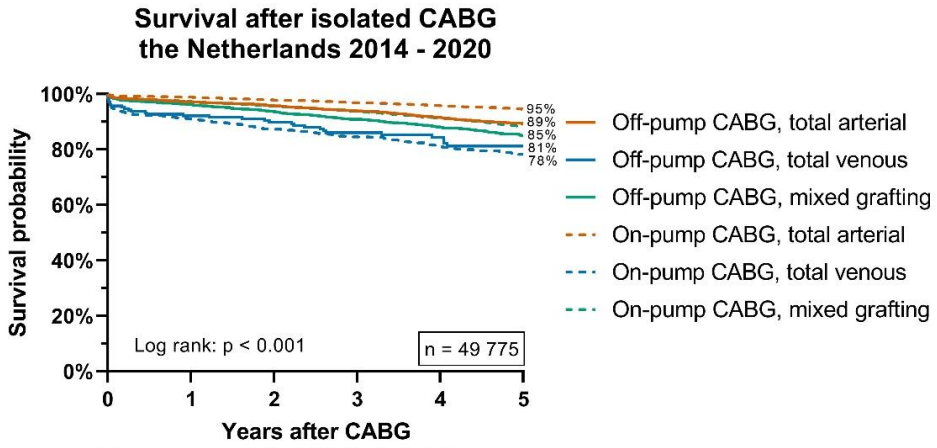
Presenting author: F.R. Halfwerk
Department: Dept. of cardio-thoracic surgery

F.R. Halfwerk (Medisch Spectrum Twente, Enschede); F.R. Halfwerk (Medisch Spectrum Twente, Enschede); T. Płonek (Medisch Spectrum Twente, Enschede); S. Meinema (Medisch Spectrum Twente, Enschede); M. Roefs (Nederlandse Hart Registratie, Utrecht); J.G. Grandjean (Medisch Spectrum Twente, Enschede); R.G.H. Speekenbrink (Medisch Spectrum Twente, Enschede); Cardiothoracic Surgery Registration Committee of the Netherlands Heart Registration (Nederlandse Hart Registratie, Utrecht)

Purpose:
The aim is to describe trends of isolated coronary artery bypass grafting (CABG) practice in the Netherlands from 2005-2020, with 30-day major adverse cardiac and cerebrovascular events (MACCE) and 5-year survival and freedom from coronary reintervention for 2014-2020.
Methods:
Adult patients receiving isolated CABG between 2005 – 2020 and registered in Netherlands Heart Registration were included. Trends in off-pump (OPCABG), on-pump CABG (ONCABG), and type of graft were analysed with linear regression. Casemix corrected 30-day MACCE (mortality, revascularisation, perioperative myocardial infarction, stroke) was analysed with logistic regression, and 5-year endpoints with Kaplan-Meier and Cox regression.
Results:
No decrease in OPCABG (14% in 2005, 17% in 2020), $p = 0.29$, and an increase in total arterial CABG (17% in 2005, 28% in 2020, $p = 0.001$) with dominant practice for ONCABG with mixed grafting (65%) were found (n=120000). MACCE increased for venous ONCABG ($p < 0.001$), was reduced for arterial ONCABG ($p = 0.002$), mixed and venous OPCABG ($p < 0.001$ and $p = 0.02$), and not significantly reduced for arterial OPCABG ($p = 0.23$), n=49775. Longest 5-year survival times were for ONCABG with arterial grafting (95%), and shortest for ONCABG with venous grafting (78%), a significant difference between all CABG subtypes ($p < 0.001$). A significant increase in revascularisation was observed for all but arterial ONCABG ($p = 0.09$).
Conclusion:
This is the first study to analyse Dutch national CABG practice. ONCABG total arterial grafting showed consistent good outcomes, but might be biased by OPCABG practice differences and missing data.

Keywords:
Off-pump CABG, Total arterial grafting, Registry-based study

Figure:
Kaplan-Meier curve after isolated CABG with CABG subtypes as strata (n = 49 775). Significant differences between subtypes were demonstrated by a Log rank test (p < 0.001) with survival at 5 year of 95% for on-pump CABG with total arterial grafting (95%), and lowest survival for on-pump CABG with total venous grafting (78%). CABG = Coronary artery bypass grafting



	Years post procedure / Patients at risk					
	0	1	2	3	4	5
Off-pump CABG, total arterial	4525	3620	2905	2370	1724	534
Off-pump CABG, total venous	208	169	152	115	85	28
Off-pump CABG, mixed grafting	3447	2910	2464	2050	1473	489
On-pump CABG, total arterial	8065	6340	5126	4143	3173	1108
On-pump CABG, total venous	1225	955	786	632	470	167
On-pump CABG, mixed grafting	32305	26467	21174	16554	11947	4056

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Structural Left Atrial Remodeling after Mitral Valve Repair in Patients with Severe Mitral Valve Regurgitation: Insights from the ALIVE Trial

Presenting author: S. el Mathari
Department: Cardiothoracic Surgery

S. el Mathari (Amsterdam UMC, Amsterdam); S. el Mathari, J. Kluin, M. Bosma, L.H.G.A. Hopman, M.A.P. Oudeman, A.B.A. Vonk, S. Eberl, A.J. Nederveen, R.J.M. Klautz, S.A.J. Chamuleau, P. van Ooij, M.J.W. Götte

Purpose:
Mitral regurgitation (MR) is often accompanied by left atrial (LA) remodeling. This remodeling process may ultimately lead to the development of LA fibrosis, which is associated with an increased risk of adverse events. Surgical mitral valve repair (MVR) is the gold standard solution for severe MR, and timely intervention results frequently into reversed LA remodeling. Although atrial fibrosis is an established hallmark of LA remodeling, its role within the context of MVR remains unknown. To address this knowledge gap, our study investigated the relationship between MVR and LA fibrosis.

Methods:
Patients with symptomatic severe MR and without atrial fibrillation underwent 3D late gadolinium enhancement cardiac MRI two weeks prior to and three months after MVR to assess 3D LA volume and LA fibrosis. Wilcoxon signed-rank tests were used for statistical analysis.

Results:
17 patients eligible for MVR were included (mean age: 70±7 years, 53% male). Preoperative 3D LA volume was 138±36 ml, LA fibrosis surface area 11.7±9.8 cm2 and LA fibrosis percentage 9.2±10.3%. Postoperative assessment showed a reduction of 3D LA volume to 78±28 ml ($p<0.001$), an increase in median LA fibrosis surface area to 29.8±12.3 cm² ($p=0.003$) and an increase in fibrosis percentage 36.6±18.3% ($p<0.001$).

Conclusion:
This is the first study demonstrating that LA fibrosis is present in patients with severe MR. After MVR, a significant reduction in LA volume was observed, while the amount of fibrotic tissue was significantly increased. The clinical consequence of increased surface area with fibrotic tissue needs follow-up data to be determined.

Keywords:
Mitral valve repair, left atrial fibrosis, atrial remodeling

Figure:
Figure 1. Analysis of per-patient pre- and postoperative LA volume (panel A), LA fibrosis surface (panel B) and LA fibrosis percentage (panel C). Results are plotted for every patient with a mean for all results. Panel D & E demonstrate a typical example of left atrial size and fibrotic tissue prior to (panel D) and after mitral valve repair (panel E).