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Rapid Fire: Cardiac Surgery Abstract Session

O64–O75

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O64

Vein graft failure and intraoperative storage solutions: which is the best in preserving graft function?

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Introduction: In vitro and animal model data suggest that intraoperative preservation solutions may influence endothelial structure and vein graft failure after coronary artery bypass graft surgery. A convincing statement for the best solution for storage of saphenous vein grafts (SVGs) after harvesting is lacking.

Methods: We assessed the role of standard preservation solutions, physiological saline solution (PSS) and heparinized autologous blood (HAB) as well as the role of the new DuraGraft® solution in preserving the endothelial structure of SVGs by evaluating cell apoptosis in an ex-vivo experiment. We used the DeadEnd™ Fluorometric TUNEL System to measure the nuclear DNA fragmentation of apoptotic cells and the fluorescence microscopy to visualize the fluorescein-12-dUTP labelled DNA. Two incubation time sets were tested for each vein preservation solution: 2 hours and 4 hours from vein harvesting.

Results: After 2 hours incubation time, the comparison between the DuraGraft® treatment and the HAB proved that the DuraGraft® solution is slightly better to protect SVGs, though this trend did not reach the statistical significance ($p = 0.193$). At the same time, comparing the DuraGraft® versus the PSS the new solution allows a better preservation of structural integrity being associated with a lower rate of cell apoptosis ($p = 0.002$). After 4 hours incubation time, none of the solutions has proved to be better in maintaining the structural integrity of SVGs ($p = 0.168$). Comparing the DuraGraft® and the HAB solutions there was not a difference between the 2 treatments ($p = 0.786$). At the same time, the DuraGraft® solution continued to be better than the PSS; however, the data was not significant ($p = 0.110$). Moreover, the time has been a relevant factor to maintaining the structural integrity of SVGs related to solutions ($p = 0.010$). In fact, after 2 hours the DuraGraft® was the best treatment to preserve SVGs; contrarily, after 4 hours none of the solutions showed a superiority to preserve vein graft structures.

Conclusion: DuraGraft® solution provides a good short-term vein endothelium protection against structural and functional damage and better protects the SVGs against ischaemia induced apoptosis when compared to the most common storage solutions at 2 hours incubation time. A prolonged period of vein ischemia is associated with an extended endothelium damage and none of the studied storage solutions protect the SVGs endothelium structure and function.

O65

Postoperative administration of tranexamic acid as approach to reduce blood loss after open-heart surgery

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Introduction: The administration of tranexamic acid (TXA) reduces blood loss and transfusion requirements among patients undergoing open-heart surgery. In contrast to its use before and during cardiopulmonary bypass, the administration of TXA following open-heart surgery is scarcely investigated. Furthermore, there are concerns about an increased risk of thromboembolic events like myocardial infarction, stroke and acute kidney injury.

Methods: In a retrospective cohort study at the University Heart Center Dresden, patients who underwent elective or urgent on-pump open-heart surgery and received regularly 1 g TXA before cardiopulmonary bypass were included. Patients with postoperative administration of 1 g TXA were compared to patients without. Primary endpoint was the postoperative blood loss within 24 hours. Secondary endpoints included transfusion requirements, reoperations, hospital mortality and adverse events.

Results: Among 2.179 patients undergoing open-heart surgery at the University Heart Center Dresden between July 1, 2013 and October 31, 2014, 92 or 4.2% received TXA postoperatively. The logistic regression revealed a highly significant correlation between postoperative blood loss and use of TXA ($p < 0.00001$). After coarsened exact and nearest neighbor matching with replacement, 71 patients with postoperative administration of TXA were compared to 71 without ($n = 142$). On the one hand, postop-

Figure: O65-1. Characteristics before postoperative administration of TXA.

	Before matching N = 2.179				z	After matching N = 142				z	Plot (z)
	Control N = 2'087		TXA N = 92			Control N = 71		TXA N = 71			-3.5 0 3.5
Demographic											
Male — n (%)	1'504	(72.1)	78	(84.8)	-3.285	56	(78.9)	58	(81.7)	-0.422	
Age — a	68.4	± 9.6	69.7	± 8.2	-1.495	70.2	± 9.2	70.2	± 8.2	-0.048	
BMI — kg/m²	28.4	± 9.9	27.7	± 4.4	1.286	27.5	± 4.2	28.1	± 4.4	-0.908	
Cardiovascular characteristic											
NYHA III/IV — n (%)	1'002	(48.0)	51	(55.4)	-1.402	43	(60.6)	41	(57.7)	0.342	
Ejection fraction ≤ 30%	165	(7.9)	12	(13.0)	-1.443	6	(8.5)	8	(11.3)	-0.564	
Coronary artery disease	1'532	(73.4)	75	(81.5)	-1.951	61	(85.9)	56	(78.9)	1.106	
Recent myocardial infarction	415	(19.9)	22	(23.9)	-0.889	17	(23.9)	18	(25.4)	-0.195	
Non-cardiovascular characteristic											
eGFR — ml/min. / 1.73 m²	70.5	± 19.8	66.0	± 20.5	2.087	69.6	± 17.3	67.0	± 20.6	0.818	
Renal dysfunction — n (%)	69	(3.3)	4	(4.3)	-0.482	1	(1.4)	2	(2.8)	-0.584	
Diabetes mellitus	810	(38.8)	30	(32.6)	1.240	24	(33.8)	24	(33.8)	0.000	
COPD	107	(5.1)	5	(5.4)	-0.128	5	(7.0)	2	(2.8)	1.168	
Pulmonal hypertension	42	(2.0)	3	(3.3)	-0.665	6	(8.5)	2	(2.8)	1.467	
Cerebrovascular disease	268	(12.8)	8	(8.7)	-1.369	10	(14.1)	5	(7.0)	1.374	
Risk and operative variables											
EuroSCORE II	4.0	± 6.1	6.5	± 8.9	-2.571	5.7	± 7.1	6.0	± 8.3	-0.219	
Repeat surgery — n (%)	120	(5.7)	12	(13.0)	-2.056	8	(11.3)	7	(9.9)	0.273	
CABG	1'010	(48.4)	40	(43.5)	0.931	34	(47.9)	30	(42.3)	0.676	
Valve	578	(27.7)	17	(18.5)	2.214	15	(21.1)	15	(21.1)	0.000	
CABG + valve	467	(22.4)	33	(35.9)	-2.655	21	(29.6)	25	(35.2)	-0.719	
LIMA	1'212	(58.1)	63	(68.5)	-2.096	47	(66.2)	48	(67.6)	-0.178	
Operative time — min	160.5	± 46.3	169.5	± 50.3	-1.686	180.2	± 64.1	169.5	± 48.6	1.116	

erative administration of TXA did not result in decreased blood loss (MD 146.7 ml; p = 0.064), less red blood cell transfusions (RR 0.98 [0.77-1.24]; p >0.99) or lower risk for reoperation (RR 0.70 [0.38-1.27]; p = 0.325). On the other hand, there was no evidence of an increased risk for thromboembolic complications like myocardial infarction (RR 1.00 [0.21-4.79]; p = 1.000), stroke (RR 1.00 [0.14-6.90]; p = 1.000), acute kidney injury requiring dialysis (RR 1.00 [0.26-3.84]; p = 1.000) or higher hospital mortality (RR 1.00 [0.26-3.84]; p = 1.000).

Conclusions: The postoperative administration of TXA did neither reduce blood loss nor transfusion requirements nor the rate of reoperations. The use of TXA was shown to be safe in terms of thromboembolic events and hospital mortality. It is recommended to carry out a randomized controlled trial investigating the postoperative administration of TXA. Unless there is no evidence, the postoperative use of TXA should be restricted to patients with massive blood loss and signs of hyperfibrinolysis only.

Figure: O65-2. Primary and secondary outcomes.

ml	Control N* = 71		TXA N = 71		MD	95% CI	p
Blood loss							
At 24 h	1'383.7	± 596.5	1'530.4	± 598.8	146.7	[145.8–147.6]	0.064
At 48 h	1'715.5	± 842.2	1'891.2	± 804.3	175.7	[174.8–176.6]	0.083
At 120 h	2'002.7	± 1'357.2	2'083.5	± 1'078.6	80.7	[80.2–81.5]	0.132
n (%)	**Control N* = 71**		**TXA N = 71**		**RR**	**95% CI**	**p**
Transfusions							
RBC	47	(66.2)	46	(64.8)	0.98	[0.77–1.24]	> 0.99
FFP	15	(21.1)	21	(29.6)	1.40	[0.79–2.49]	0.335
TC	1	(1.4)	4	(5.6)	4.00	[0.46–34.91]	0.366
PPSB	8	(11.3)	6	(8.5)	0.75	[0.27–2.05]	0.778
Fibrinogen	11	(15.5)	11	(15.5)	1.00	[0.46–2.16]	1.000
Reoperation for bleeding by cause							
Total	20	(28.2)	14	(19.7)	0.70	[0.38–1.27]	0.325
Surgical	14	(19.7)	8	(11.3)	0.57	[0.27–1.28]	0.246
Hemostatic	2	(2.8)	3	(4.2)	1.50	[0.26–8.71]	> 0.99
Death and complications							
Death	4	(5.6)	4	(5.6)	1.00	[0.26–3.84]	1.000
Myocardial	3	(4.2)	3	(4.2)	1.00	[0.21–4.79]	1.000
Renal	21	(29.6)	33	(46.5)	1.57	[1.01–2.43]	0.057
Dialysis	4	(5.6)	4	(5.6)	1.00	[0.26–3.84]	1.000
Cerebrovascular	2	(2.8)	2	(2.8)	1.00	[0.14–6.90]	1.000
Use of recources							
ICU ≥ 48 h	50	(70.4)	51	(71.8)	1.02	[0.83–1.26]	> 0.99
Hospital ≥ 14 d	23	(32.4)	25	(35.2)	1.09	[0.69–1.72]	0.859
Intubation ≥ 24 h	9	(12.7)	13	(18.3)	1.44	[0.66–3.16]	0.465
Reintubation	6	(8.5)	5	(7.0)	0.83	[0.27–2.61]	> 0.99
Wound infection	5	(7.0)	8	(11.3)	1.60	[0.55–4.65]	0.562

* After matching with replacement

O66

Impact of low-moderate and high-moderate hypothermic circulatory arrest on perioperative transfusion and outcome in aortic surgery

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Objective: The study aim was to examine the impact of hypothermia grade on perioperative transfusion rate and the impact of blood product transfusion on early and late outcome in patients undergoing aortic surgery with hypothermic circulatory arrest (HCA).

Methods: From January 2009 to June 2017, 406 consecutive patients who underwent aortic replacement were classified into two groups: ≤ 24°C low-moderate hypothermia (n = 147, 36%) and >24°C high-moderate hypothermia (n = 259, 64%). Multivariable analysis was performed to

evaluate the impact of temperature and transfusion rate on short- and long-term outcome.

Results: Hemiarch replacement was performed in 78% (n = 315) of cases, isolated ascending aorta was performed in 18% (n = 75) and total arch in 4% (n = 16) of cases, respectively 72% (n = 106) Overall median circulatory arrest time was 13 min, (inter quartile range (IQR) 11-16 min), 15 min (12 to 18.5) and 12 (11 to 15 min) in the low-moderate and in high moderate group, respectively (p<0.001).

There was a trend to more overall blood product transfusion during intervention in the group with lower temperature which did not become significant as compared to the group with higher temperature (p = 0.06). Rates of transfusion of red blood cell concentrates (p = 0.32), fresh frozen plasma (p = 0.52), and platelet concentration (p = 0.28) were similar in both groups. In the multivariate analysis, intra-operative transfusion was associated with higher perioperative mortality (p<0.001), cardiac death during hospitalization (p = 0.002), acute kidney injury (p = 0.005), stroke and heart failure (p = 0.001), independently of hypothermia grade. Mean follow up was 2.7±2.4 years, and intraoperative transfusion was associated with reduced survival after 4 years, in the low-moderate (p<0.001), and in the high-moderate (p = 0.001) group.

Conclusion: Intraoperative administration of blood products during aortic arch surgery in moderate HCA is associated with elevated hospital mortality as well as with reduced survival rate at the mid-term. Additionally, transfusion was associated with higher incidence in acute kidney injury, stroke, and cardiac failure.

O67

Impact of a "lean flow" strategy on target perfusion flows in obese patients: sex-related differences

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Background: Calculation of target perfusion flow (PF) is based on the Body Surface Area (BSA). In obesity (Body Mass Index (BMI) over 30 kg/m^2) there is a high fat to Lean Body Mass (LBM) ratio and consequently a high BSA to LBM ratio.

Consensus is building up towards a new calculation based on the LBM in these patients (pts). A recent paper[1] suggested to calculate the a lean flow based on a lean BSA, considering the grade of obesity (BMI >30 & <40), sex (and age over 60 years for males): morbidly obese pts are adjusted to a BMI of 28 obese pts to a BMI of 25 for the same height. To the "new body weight" (corresponding to the new BMI) is added ¼ of the excess body weight. Finally a "new" BSA is calculated and multiplied by a Cardiac Index of 2.4 L/min/m^2 for the target lean target PF .

We retrospectively applied this approach to evaluate its impact in a group of our patients.

Methods: Stored perfusion data of a whole year were considered for this study. Data were exported into a spreadsheet for all needed calculations and imported into STATA (v. 15/Mac) for statistical evaluation (summary statistics, mean comparisons and linear regression analysis). Data distribution was checked by histogram inspection and by

Figure: O67-1. Regression line: target PF - BMI for males over 60 yrs.

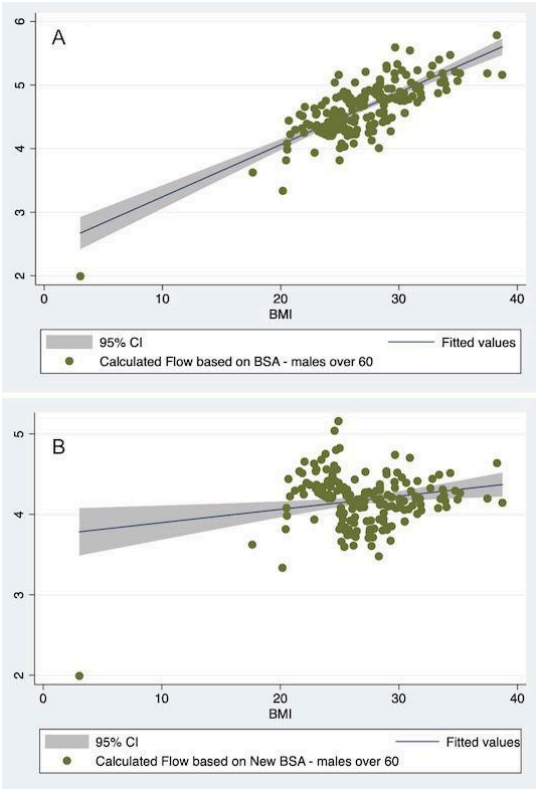
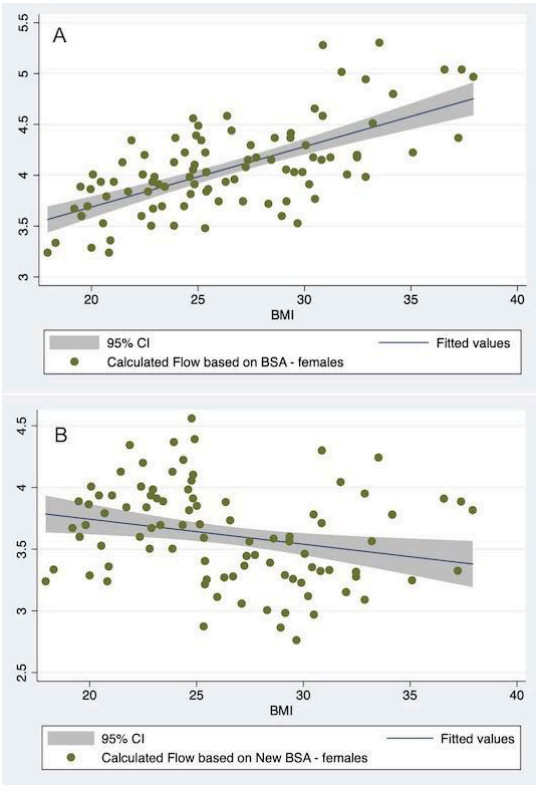


Figure: O67-2. Regression line: target PF - BMI for females.



the Shapiro-Wilk normality test. Consequently a Wilcoxon rank-sum test was used. A p-level of 0.05 was considered statistically significant.

Results: A total of 338 perfusion records were analyzed, corresponding to 232 male (M) and 106 female (F) pts at a mean age of 69 ± 11 years (M) and 73 ± 11 years (F) (p = 0.0005). Mean BMI (kg/m^2) was 27 ± 4 (M) and 26.5 ± 5 (F) (n.s.), mean BSA (m^2) was 1.9 ± 0.2 (M) and 1.7 ± 0.2 (F) (p<0.001). Traditionally calculated target PF (l/min) were 4.7 ± 0.5 (M) and 4.1 ± 0.4 (F) (p<0.001). Obese were 50 M (22%) and 28 F (26%) (n.s.). All obese F and obese M over 60 years of age (n = 39) were qualified for the calculations of the lean PF: the calculated lean PF (l/min) was 4.2 ± 0.2 (M) and 3.5 ± 0.4 (F) (n.s.). The mean difference between traditional and lean PF for the qualified patients was 22 ± 4% (p<0.001), divided by sex it was 19 ± 2% (M) and 26 ± 2% (F) (p<0.001). The fitted values of both traditional and lean PF by means of linear regression analysis are shown in Figures O67-1 and 2.

Conclusions: Calculation of a lean target PF based on LBM in obese pts results in significantly lower values. The difference is more evident for obese female pts.

O68

Perioperative geriatric characterization of TAVI patients age 70+

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Introduction: Transcatheter Aortic Valve Implantation (TAVI) is a minimalist approach for the replacement of the aortic valve. Compared to conventional replacement, TAVI was shown to reduce risk of death in high-risk patients and specifically in frail patients. However, TAVI candidates are still not screened for frailty systematically and broad and comprehensive geriatric characterization of senior TAVI patients is lacking.

Methods: Cross-sectional analysis of senior patients (age 70+) undergoing TAVI observed in perioperative care at Zurich University Hospital between November 2017 and September 2018. The prevalence of frailty (Fried phenotype), impaired mobility (Short Physical Performance Battery (SPPB) ≤ 7 points (abnormal), impaired gait speed <1.2 m/s, dysmobility <0.6 m/s), increased risk for delirium (Delirium Rudolph Score >= 2), cognitive impairment (Mini Mental State Examination <25), risk of depression (short Geriatric Depression Scale >= 5), low quality of life (SF1) and risk of malnutrition (Mini-Nutritional-Assessment <12) was assessed using validated tools and cutoffs.

Results: Out of 65 evaluated patients 51 provided consent and were included in the analysis. Mean age was 81.7 (sd 5.5), mean BMI was 27.2 (sd 5.5), 53% (27/51) were men. Mean Sangha comorbidity score was significantly higher in women (9.48 vs. 7.46, p-value 0.04). In total, 17.6% (9/51) had abnormal mobility (SPPB ≤ 7) with higher prevalence in women (33.3% (8/24) vs. 3.7% (1/27) in men, p-value 0.009). Most patients (89%, 43/48) had impaired gait speed, not sufficient to cross the street safely (<1.2 m/s) while 8.3% (4/51) qualified for dysmobility (<0.6 m/s). Overall prevalence of frailty was 30% (15/50) and 44% (22/50) were pre-frail. In total, 25% (13/51) were at increased risk for delirium, 22% (11/51) had at least mild cognitive impairment, 12.5% (6/48) were at risk of depression, 35% (18/51) had low self-reported quality of life and 37% (19/51) were malnourished or at risk of malnutrition.

Conclusions: While a large part of senior TAVI were well selected to benefit from the intervention, we also found a significant prevalence of key geriatric conditions. We suggest that senior TAVI patients may benefit from a comprehensive perioperative geriatric assessment with tailored recommendations both to support their resources and to diminish their risks.

O69

30-days outcome of valve sparing aortic root replacement with the re-implantation technique in acute type A aortic dissection: a single center experience

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Introduction: Acute type A-dissection is a life threatening condition with a high associated mortality indicating emergent operative treatment. The optimal handling of a dissected aortic root in this setting however remains controversial. The aim of the present study was to analyze our short-term outcomes in patients who have received a valve sparing aortic root replacement using the re-implantation technique in acute type A dissection.

Methods: We retrospectively analyzed the 30-day outcomes of all patients who underwent an emergent operation for an acute type A dissection with root involvement in our center between January 2008 and December 2016. The patients were then divided into two groups depending on how the dissection in the aortic root was handled. Group I received a valve sparing re-implantation procedure while Group II had a different surgical management of the root. The two groups were then propensity score matched, taking the following variables into account: age, sex, pre-operative critical state (defined as the need for reanimation or mechanical ventilation) and need for concomitant aortic arch surgery.

Results: A total of 192 patients were included in the analysis. Group I included 51 patients with a mean age of 54 ± 11 years, 84% were male, 24% were in a critical pre-operative state and 29% needed arch surgery. Group II included 141 patients with a mean age of 64 ± 11 years, 57% were male, 52% were in a critical preoperative state and 82% needed concomitant arch surgery. In group I postoperative echocardiography revealed no aortic insufficiency in 80%, an aortic regurgitation grade I in 13% and grade II in 5% of the patients. There were no significant differences in the postoperative outcome regarding the need for re-exploration for bleeding (8% vs. 14%; p = 0.6), neurological complications (1% vs. 6%; p = 0.9), renal failure (1% vs. 4%; p = 0.9), sepsis (0% vs. 3%; p = 0,9) and respiratory

failure (16% vs. 35%, p = 0,06). Group I however had a significant lower 30 day mortality rate (8% vs. 24%, p = 0,02). This survival benefit remained significant even after propensity score matching.

Conclusion: In selected patients with acute type A aortic dissection, valve sparing aortic root replacement with the re-implantation technique performed in experienced centers results in inferior 30 day mortality compared to other aortic root management strategies.

O70

Rapid-deployment aortic valve implantation with concomitant new aortic annulus stabilization technique: 1-year follow-up

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Objective: Rapid deployment aortic valve implantation with the Intuity valve system represents an alternative to standard bioprosthesis while saving surgical and CPB time. However, there is a risk of postoperative paravalvular leak that has been reported at 5-10%. The new aortic annulus stabilization technique was developed to prevent this complication. We report the 30-day and 1-year outcomes and echocardiographic follow-up of our cohort of patients.

Methods: All patients implanted with the Intuity valve system with concomitant new aortic annulus stabilization technique, that have reached the 1-year echocardiographic control follow-up were included in the present study. Thirty-day and 1-year outcomes and echocardiographic control data were prospectively collected and retrospectively analysed.

Results: Forty consecutive patients (mean age 75±6.7years; 14 ladies) suffering from aortic valve stenosis (36; 90%) or regurgitation (4; 10%) underwent Intuity aortic valve system implantation alone (21 cases; 52.5%) or in combination with other major cardiac procedures (19 cases (5 valves, 14 CABG; 47.5%). Mean Euroscore II was 4.8. The new annulus stabilization technique was performed in all cases (100%). Mean valve size was 23.8±1.9mm and 52.5% of cases were performed through an upper mini-sternotomy. CPB and cross-clamp times were 84.5±27min and 64.5±21.5min, respectively.Surgical mortality was 0%, one patient required a revision for bleeding, two patients had acute renal failure and 7 patients received a new pacemaker. At discharge, echocardiograms showed absence of detectable paravalvular leak in all patients with peak and mean transvalvular gradients of 18.7±6.5 and 10.2±3.5mmHg, respectively, with LVEF of 57.2±9.6%. At 1-year follow-up, one patient died of haematological disorder. Echocardiograms after one year confirmed the absence of detectable paravalvular leak in all patients, and peak and mean gradients of 14.8±5.2 and 8.3±2.8mmHg, respectively, with LVEF of 59.4±7.3%. Clinically, all patients were in NYHA class I or less.

Conclusions: This report shows that the new aortic annulus stabilization technique performed during rapid deployment aortic valve implantation with the new Intuity valve system is safe and prevents paravalvular leak at mid-term follw-up.

O71

Coronary artery bypass grafting using microplegia and minimal extracorporeal circulation versus off-pump coronary artery bypass grafting

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Introduction: We routinely use for coronary artery bypass grafting (CABG) the minimal extracorporeal circulation system (MiECC) with our refined microplegia applied by the Myocardial Protection System® (MPS®). Aim of the study was to compare parameters of myocardial damage of this concept with results from off-pump coronary artery bypass grafting (OPCAB).

Method: This was a single center study including 531 patients undergoing isolated CABG surgery between 1stFebruary 2010 and 31stDecember 2018. We used propensity modelling to calculate inverse probability of treatment weights (IPTW) to adjust for possible confounding by indication. Primary endpoints were peak values of high-sensitivity cardiac troponin T (hs-cTnT) during hospitalization and first values on postoperative day one. Furthermore, we assessed creatine kinase (CK) and creatinine kinase-myocardial type (CK-MB) as well as safety endpoints.

Results: We included 531 patients into the analysis. After IPTW, 362 patients were analysed, of which 207 patients had received OPCAB surgery and 155 patients microplegia. Standardized differences indicated comparability of treatment groups with respect to pre-treatment characteristics after IPTW. There were no significant differences between peak values of hs-cTnT (geometric mean (reference range) 186.7 (162.3, 214.9) vs. 253.5 (213.2, 301.3) for OPCAB and microplegia, respectively; p = 0.689) and CK-MB (13.1 (11.0, 15.6) vs. 16.4 (14.2, 19.0); p = 0.185). Peak values of CK were significantly lower in the microplegia group (662.7 (587.8, 747.3) versus 563.3 (503.5 to 630.2); p = 0.022). There were no significant differences for the values of hs-cTnT, CK and CK-MB on first postoperative day (p = 0.433; p = 0.766; p = 0.419). Postoperative atrial fibrillation (21% vs. 23%; p = 0.690) and major adverse cardiac and cerebrovascular events (MACCE) occurred with equal frequency (7.8% vs. 3.2%; p = 0.079).

Conclusion: Though OPCAB surgery is known to release only little markers of cardiac damage, the combined use of our institutionally refined microplegia and the MiECC was non-inferior to OPCAB surgery in regard to perioperative myocardial damage reflected by postoperative values of hs-cTnT, CK and CK-MB. Comparable results were seen for postoperative atrial fibrillation and MACCE. In terms of myocardial markers, postoperative atrial fibrillation and MACCE, we regard this new MiECC concept as an alternative to OPCAB surgery.

O72

Skeletonized bilateral mammary arteries for myocardial revascularization in elderly patients (>70 years of age): a new "standard of care"?

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Introduction: Patients aged 70 years or greater constitute a growing segment of our population whose relatively good health may be marred by symptomatic coronary disease. Several clinical studies have recently shown a long-term survival benefit from multiple arterial grafts use during coronary artery bypass grafting (CABG). Despite this evidence, surgeons are reluctant to routinely use skeletonized bilateral internal mammary arteries (BIMA) in elderly patients. We reviewed and analysed surgical outcomes of patients aged 70 or greater who underwent CABG operations with BIMA grafts in our center.

Methods: Beetween January 2001 and December 2018, 665 patients received BIMA grafts. Among them, 132 (20%) were 70 years old or older. In all patients mammary arteries were harvested in a skeletonized fashion. There was a tendency not to use BIMA in patients with increased risk of sternal wound complications. Clinical data were prospectively collected and retrospectively analysed. A follow-up was conducted during the last year.

Results: Mean age was 74.5±3.6 years (70-82), 39.5% of patients were in CCS class ≥3 and mean ejection fraction was 57±10%. Twenty five patients (19%) were diabetics (4 with insulin) and 15 (11%) cases required combined procedures. Mean number of grafts per patient was 3.4. 49 patients (37%) underwent urgent procedures and 20% were performed off-pump. Mean cardio-pulmonary bypass time and aortic cross-clamp time were 69±44 and 44±29 min, respectively. Hospital mortality was 0.7% (1 pts). With regards to postoperative complications, two patient suffered from a stroke and 2 patients needed permanent dialysis. In 8 cases (6%) a re-exploration for bleeding was required. Sternal wound dehiscence rate was 7% (8 pts.). Among them, there was only 1 deep sternal wound infection (0.8%). At a mean follow-up time of 8.4±4.8 years, 10 patients (7.6%) underwent re-hospitalization for repeated revascularization by PCI (8) and for pacemaker implantation (2). During follow-up period, 6 patients died: 2 for non-cardiac causes and 4 unknown. Kaplan Mayer survival revealed 96% at 3 years and 95% at 15 years.

Conclusions: In our experience with BIMA grafts in patients aged 70 years or greater, we observed good hospital outcomes comparable to younger populations, with no increased risk of postoperative complications. Long-term results on survival and repeated revascularization are also encouraging in extending the indication of BIMA use in elderly patients.

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Real-time multimodality fusion imaging platform to optimize catheter-based mitral valve interventions

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Background: Preclinical translational animal models are fundamental for the development of mitral valve (MV) interventions. The feasibility of a pre-clinical multimodality imaging platform to optimize MV interventions and test new imaging technologies has never been reported.

Methods: This pilot study was conducted in hybrid animal facility, in the context of a training project for transcatheter MV leaflet repair with the MitraClip system (Abbott Vascular, MN, USA). After inducing MV Flail, 5 swine underwent cardiac computed tomography (CT), cardiac magnetic resonance imaging and transesophageal echocardiography (TEE). MitraClip was guided by means of TEE, intracardiac echocardiography (ICE) and echo- and CT-fluoro fusion imaging with investigational prototypes. Report on procedural outcomes, selective contribution of every imaging modality and virtual planning are discussed step-by-step.

Results: Central significant MV regurgitation (vena contracta 6.1±0.4 mm) was induced in all animals and the transseptal puncture was correctly achieved, although in one a re-crossing was required. MitraClip was accomplished transfemorally in all the animals except one, where the clip was not implanted in the target region. Mean procedure time of 69±15 min and mean fluoroscopy time of 47±12 min. Neither periprocedural adverse events nor post-mortem examination anomalies were documented. The ICE technology played a major role when the interatrial septum and the postero-medial aspect of the MV annulus need to be visualized, TEE can be suboptimal in this regard. New real-time echo- and fluoro-fusion 3D segmentation was correctly used to navigate in the heart chambers, focusing on different anatomical targets.

Conclusion: A translational preclinical multimodality-imaging platform is feasible in real-time for all the technologies tested, except for CT which should be calibrated. It can help to develop interventional training programs for the full spectrum of mitral interventions, also serving as bench-mark for next generation imaging technologies.

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Downstream Aorta remodelling in DeBakey I acute aortic dissection following modified frozen elephant trunk procedure

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Introduction: Dilatation and aneurysm formation following surgicla repair of acute DeBakey I aortic dissection in the downstream Aorta is frequent late complications, being responsible for a relatively high reoperation rate.The modified frozen elephant trunk (mFET) approach has been applied successfully in patients with DeBakey I acute dissection providing stabilization of the distal aorta. Main aim of

this study was to evaluate the impact of mFET on aorta remodeling following acute DeBakey I aortic dissection.

Methods: We included 204 patients (mean age of 62.5 ± 12.6 years) with DeBakey I acute aortic dissection, in period from January 2009 and February 2017. 68 patients underwent modified frozen elephant technique (mFET), and 136 patients, underwent a standard Approach with replacement of the ascending aorta and/or hemi-arch replacement (iAoA).

The CT scan was performed after intervention, before discharge, 6 and 12 months after intervention and 1.5, 3, and 5 years at our outpatient clinic. The diameter of the aorta was evaluated at the following levels at the aortic arch (AoA), thoracic aorta at the level of the stent (mThA), at the thoraco-abdominal junction (ThAbd), and at the coeliac trunk level (AbdA) level.

Results: Mean follow-up was 3.1 ± 2.7 years. In-hospital mortality was 13% (n = 27), 6% in mFET and 17% in iAoA group (p = 0.029). Overall 5-year survival was 85% (95%CI 71% to 93%) and 75% (65 to 82%) and freedom from aorta-related reoperation was 100% and 95% (88 to 98%) for mFET and iAoA respectively. At AoA the average difference in diameter change per year between mFET vs. iAoA was for total lumen 0 mm, (CI 95%: -0.95 to 0.94 mm, p = 0.99) and for true lumen it was 1.23 mm (CI 95%: -.09 to 2.55 mm) per year, p = 0.067. False lumen demonstrated a decrease of diameter in mFET as compared to iAoA by -1.43 mm (CI 95%: -2.75 to -0.11 mm), p = 0.034.

Conclusion: Our institution performs mFET on a regular basis and this is the first-line approach even in complex DeBakey I dissections. It seems that at mid-term the more complex procedure, leads to equivalent early outcomes and may provide aortic remodelling benefits that may show significant benefit in reintervention rates at long term. Thus we hypothetise that the mFET procedure, with its protective effect on secondary aortic dilatation and consequent low reinterevention rate, may be considered as valuable surgical approach in acute De Bakey I aortic dissection.

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A rare case of persistent anti-PF4/heparin antibodies successfully managed with cangrelor in a patient undergoing cardiac surgery

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Heparin-induced thrombocytopenia (HIT) in patients requiring cardiac surgery is a challenging situation. We present a rare case of persisting anti-PF4/heparin antibodies (HIT abs) 8 years after the diagnosis of HIT in a 66-year-old female needing cardiac surgery with cardiopulmonary bypass (CPB). In 2010, she was initially treated for thrombotic thrombocytopenic purpura with i.v. heparin. Subsequently, she developed HIT confirmed by the identification of HIT abs and a positive functional assay.

In 2018, she was referred for CABG. Because of the HIT history, we dosed HIT abs and surprisingly, the concentration was 0.38 U/ml using CLIA, the PAGIA titer was 2 and IgG specific ELISA was strongly positive. Functional HIPA and PAT tests were negative.

One strategy during CPB in case of HIT is the use of heparin combined with a potent platelet inhibitor. Because of its short half-life, we combined standard heparin with the new $P2Y_{12}$ receptor inhibitor cangrelor.

After sternotomy, we gave an i.v. bolus of 30 µg/kg of cangrelor followed by an infusion of 4 µg/kg/min. A multiplate ADP assay showed adequate platelet inhibition. Baseline platelet reactivity was low (23 AU), reflecting residual clopidogrel effect which was stopped six days prior to surgery. Three minutes after cangrelor, ADP assay dropped to 12 AU. Heparin was given 10 minutes after the cangrelor bolus and titrated during CPB as usual.

The patient underwent triple CABG using a standard CPB circuit and monitoring of platelet inhibition with multiplate assays. CPB time was 56 min. Cangrelor was stopped at the start of protamine administration. Multiplate showed a rapid recovery of platelet function to baseline values after protamine. There were no complications, and the patient was extubated at the end of surgery.

Argatroban was used for postoperative prophylactic anticoagulation and dual antiplatelet therapy was started on postoperative day 1 (POD 1). 6, 24 and 48 h chest tube drainage was in the normal range. On POD 3, 2 units of RBC were transfused. There were no thrombotic complications. ICU and hospital length of stay were 24 hours and 11 days. Platelet count was 128 G/l at baseline, 139 G/l on POD 1 and rose to 473 G/l on POD 10. Despite brief heparin administration, the titer of HIT abs increased to 14.22 U/ml by CLIA on POD 11 with a positive functional HIPA test, putting the patient at high risk of developing delayed-onset HIT, which fortunately did not occur. HIT Abs are still present at POD 40.

1 Blessing JM, Riley JB. Lean Flow: Optimizing Cardiopulmonary Bypass Equipment and Flow for Obese Patients-A Technique Article. J Extra Corpor Technol. 2017;49(1):30–5. PubMed.