Kepler Universitäts Klinikum

Best Abstracts Preisverleihung 2018

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Klinik für Kardiologie und Intensivmedizin

Poster-Preisverleihung

18 Poster aus ganz Österreich wurden heuer zur Bewertung durch das wissenschaftliche Programmkommitee abgegeben.

Punkte des Kommitees:

Prim. Priv.Doz. Dr. Clemens Steinwender

OA Dr. Jürgen Kammler

OA Dr. Simon Hönig

wurden auf die anonymisierten Poster vergeben und damit konnten die Preisträger bestimmt werden. Heuer waren die Poster erstmals als E-Poster über die Website einzureichen und diese können daher im Foyer auf zwei Monitoren genauer studiert werden.

Poster-Preisverleihung

Alle Abstrakts (inkl. Erstautorenliste) werden als Abstraktband im Rahmen eines Supplements sowohl online auf der Homepage www.kup.at als auch im Journal für Kardiologie – im Rahmen der nächsten Ausgabe - publiziert.

Wir wurden heuer bereits zum vierten Mal durch die Firma Bayer als Posterpreis-Sponsor unterstützt. Damit wurde es uns ermöglicht, die wissenschaftlichen Aktivitäten der akademischen Kollegenschaft großzügig zu würdigen und mittels hochkarätiger Preisvergabe zu prämieren.

Schreiten wir nun zur Preisvergabe !

3.Platz

Pharmacologically active storage solution for the preservation of myocardial function in transplantation

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Introduction

Heart transplantation is often the last life-saving therapeutic resort to an otherwise deadly condition for many patients with severe heart failure. An important factor for a successful transplantation is the quality of the donor heart. A major problem, however, is the limited extracorporeal durability of the donor heart during ischaemia due to hypoxia and lack of nutrients. Further harmful influences to which the graft is exposed to include ischaemia-reperfusion injury (IRI), as well as other factors such as acute and chronic allograft vasculopathy.

Leoligin and its derivatives are major lignans found in the alpine Edelweiss[1] which have proven to be highly promising candidates for therapeutic application in cardiovascular diseases. One of its derivatives, 5'-methoxyleoligin (5'-ML) has been shown to be an especially potent candidate structure in *in-vivo* cardiovascular disease models where it was not only able to reduce intimal hyperplasia in venous bypass grafts via inhibition of vascular smooth muscle cell proliferation[2], but also proved to preserve myocardial mass and promote arteriogenesis on infarcted rat hearts after LAD-ligature as well as inducing angiogenesis and angiogenic sprouting *in-vitro*[3].

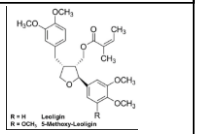

Figure 1. Structural formula of leoligin and 5'-methoxyleoligin

Objective

The aim of the study was to investigate whether 5'-ML has the ability to prevent IRI as a pharmacologically active addition to clinically used graft preservation solutions in a model of murine cervical heart transplantation.

Methods

Heart transplantations were carried out on non-genetically altered male inbred C57BL/6J mice using a cuffed heterotopic cervical technique as described by Oberhuber et al.[3]. Transplant recipients encompassed four groups with grafts which were kept in HTK-storage solutions with 30µM 5'-ML or DMSO (solvent control) under cold ischaemia for 6 or 9 hours before implantation to induce significant levels of IRI. On day 10 after transplantation, graft recipients were sacrificed and hearts were harvested for histological analysis. Following fixation and dehydration of the heart tissues, they were embedded in paraffin. Cross sections were stained with the Goldner's Masson trichrome (MTG) staining kit for the investigation of myocardium and fibrotic cardiac remodeling. For image analysis the Adobe Photoshop CC2018™software was used.

Results

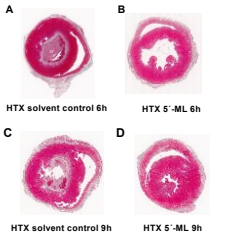

Figure 2. Representative images of Masson Trichrome stained control and 5´-ML treated heart sections (magnification 20x). The increase of the fibrotic area is represented by the grey staining, whereas the healthy myocardium is red.

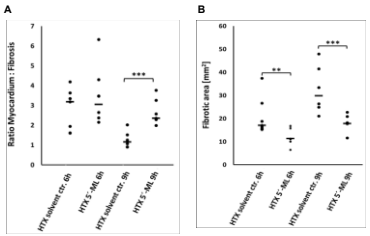

Figure 3. Histological analysis of control and 5´-ML treated heart sections (n=7 per group). Addition of 5'-ML to the preservation solution resulted in a ~1.6-fold reduction of fibrotic tissue after 9h of cold ischaemia compared to solvent controls (Figure 3 A, B). Asterisks indicate significant differences (** $p \leq 0.01$; *** $p \leq 0.001$).

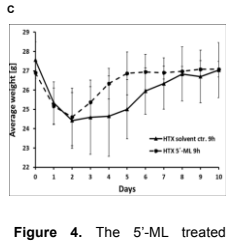

Figure 4. The 5'-ML treated group displayed an accelerated weight gain after 9 hours of cold ischaemia compared to the control group. This might be a systemic effect due to decreased IRI and reduced cardiac remodeling.

Conclusion

The obtained data point to significant protection against IRI by 5'-ML, which leads to an extension of the tolerance time against ischaemia. Thus this compound may be a useful additive in graft preservation solutions preventing ischemic damages to the heart and possible other organs. Further applications could be in the context of other ischemic events like myocardial infarction, or warm ischaemia during surgery.

Bibliography

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[2] Ute Reisinger et al. "Leoligin, the major lignan from Edelweiss, inhibits intimal hyperplasia of venous bypass grafts." In: Cardiovasc. Res. 82.3, (2009)

[3] Barbara Messner et al. "5-Methoxyleoligin, a Lignan from Edelweiss, Stimulates CYP26B1- Dependent Angiogenesis In Vitro and Induces Arteriogenesis in Infarcted Rat Hearts In Vivo." PLOS One 8.3, (2013).

[4] Rupert Oberhuber et al. "Murine Cervical Heart Transplantation Model Using a Modified Cuff Technique." J. Vis. Exp. 92 (2014).

2.Platz

Significant intraprocedural alterations of HV- and QRS-intervals during transcatheter aortic valve replacement

Authors:

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Background

Transcatheter aortic valve replacement (TAVR) is an established treatment option for patients with severe aortic valve stenosis. Despite the technological improvement of transcatheter valves, there is still a substantial rate of new-onset conduction disturbances necessitating pacemaker implantation after TAVR. Electrophysiological predictors of high grade atrioventricular conduction disorders have not been sufficiently determined yet.

Methods

Therefore, in our ongoing clinical trial, we prospectively assess intraprocedural HV- and QRS-interval dynamics as potential predictors of significant conduction disturbances by the use of a portable EP system (St. Jude Medical, WorkMate Claris 56 channel system w/EP-4-Stimulator), which is located in the cath lab. Via an additional venous puncture in the left groin, a HIS catheter is positioned in patients undergoing TAVR with consecutive real-time HV- and QRS-interval-monitoring during the procedure.

Results

After recruitment of 58 patients (36 female, 22 male) with a mean age of 80.14 years undergoing TAVR, statistical analysis of the recorded data by means of the Wilcoxon-test revealed significant intraprocedural increases of the mean HV-interval, both after balloon valvuloplasty as well as after implantation of the valve prosthesis *(Fig. 1)*. Furthermore, similar prolongations were seen when measuring QRS-complex durations *(Fig. 2)*. From the point of valve implantation to the end of the procedure, there was no further significant increase of the HV- or QRS-intervals *(Table 1)*.

Discussion

To the best of our knowledge, we are the first to measure intraprocedural changes in the cardiac conduction system by means of a portable EP-system in patients undergoing transcatheter aortic valve replacement. Evaluation of the HV-time interval has, so far, only been done by separate electrophysiology studies prior to as well as after TAVR. In the early analysis of our ongoing clinical trial, significant increases of intraprocedural HV- and QRS-intervals were observed. The main cause of these findings seems to be the direct impact of mechanical radial forces on the bundle of His as well as the left bundle branch induced by balloon dilatation as well as implantation of the valve prosthesis, as these events were significantly associated with an abrupt prolongation of HV- and QRS-intervals. As significant increases of these parameters already showed potential association with the delayed onset of conduction disorders in some of our patients, we are looking forward to the final analysis after recruitment and follow-up of the planned total study population.

HV interval			
#1	Baseline	55.2 +/- 11.1 ms	
#2	Post balloon valvuloplasty	62.7 +/- 13.3 ms	p <0.001 (#1 vs #2)
#3	Post valve implantation	71.6 +/- 14.6 ms	p <0.001 (#1 vs #3) p <0.001 (#2 vs #3)
#4	End of procedure	72.6 +/- 15.6 ms	p <0.001 (#1 vs #4) p <0.248 (#3 vs #4)
QRS interval			
#1	Baseline	99.5 +/- 21.0 ms	
#2	Post balloon valvuloplasty	113.4 +/- 27.3 ms	p <0.001 (#1 vs #2)
#3	Post valve implantation	129.5 +/- 29.9 ms	p <0.001 (#1 vs #3) p <0.001 (#2 vs #3)
#4	End of procedure	131.6 +/- 27.9 ms	p <0.001 (#1 vs #4) p <0.575 (#3 vs #4)

Table 1: Intraprocedural changes of HV- and QRS-intervals during transcatheter aortic valve replacement.

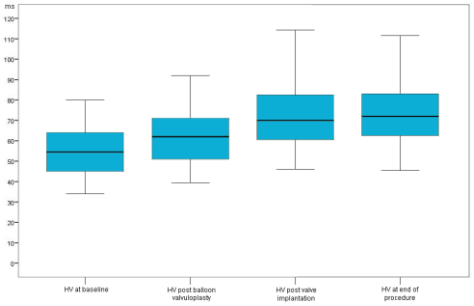

Fig. 1: Intraprocedural changes of HV-time interval.

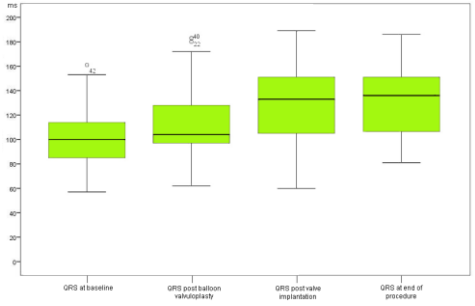

Fig. 2: Intraprocedural changes of QRS-complex duration.

1.Platz

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Determinants of bioprosthetic heart valve degeneration

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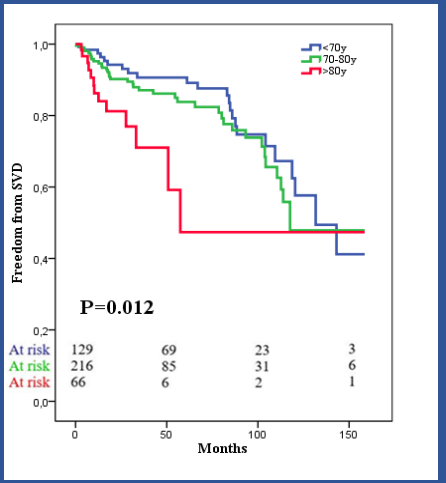
Background:

Bioprosthetic heart valves are increasingly used for valve replacement therapy. Structural valve degeneration (SVD) remains the major determinant of bioprosthetic valve durability. The present long-term prospective study investigated incidence and mode of SVD, as well as associated factors, using thorough echocardiographic and clinical follow-up.

	Univariate		Multivariate	
Parameter	Odds Ratio (95% CI)	*P*-value	Odds Ratio (95% CI)	*P*-value
Age @ surgery	0.997 (0.963-1.033)	0.997		
Sex, male gender	1.617 (0.966-2.705)	0.067		
BMI	0.998 (0.945-1.054)	0.944		
Hypertension	1.636 (0.812-3.293)	0.168		
Atrial fibrillation	1.174 (0.626-2.202)	0.617		
Diabetes	1.507 (0.825-2.752)	0.182		
Hyperlipidemia	0.915 (0.544-1.538)	0.738		
CAD	1.075 (0.623-1.855)	0.794		
COPD	1.769 (0.829-3.773)	0.141		
Concomitant CABG	0.656 (0.333-1.293)	0.223		
CCS ≥II @ surgery	0.767 (0.396-1.485)	0.431		
Crea>1,27 mg/dl @ surgery	2.065 (1.127-3.781)	**0.019**	2.038 (1.064-3.904)	**0.032**
PPM	2.456 (1.377-4.379)	**0.002**	2.262 (1.241-4.123)	**0.008**
Mitral position	2.455 (1.029-5.859)	**0.043**		
Stented AV	0.782 (0.336-1.817)	0.567		
Porcine tissue valve	2.800 (1.686-4.650)	**0.000**	2.474 (1.394-4.390)	**0.002**
Age @ FU	1.004 (0.972-1.037)	0.809		
CCS ≥II @ FU	2. 263 (0.678-7.561)	0.184		
Crea>1,27mg/dl @ FU	1.365 (0,787-2,366)	0.268		

Methods:

502 consecutive patients (73.4±7.9 years; 56.9% female) underwent surgical bioprosthetic aortic (n=466) or mitral (n=36) valve replacement between 1994 and 2014. Clinical assessment, transthoracic echocardiography, and laboratory testing were performed at baseline and follow-up. SVD was defined as mean transprosthetic gradient ≥30 mmHg for aortic, ≥10mmHg for mitral valves and/or at least moderate valvular regurgitation on echo. Patient prosthesis mismatch (PPM) was defined as an effective orifice area indexed to body surface area ≤0.8 cm²/m² for aortic and ≤1.2cm²/m² for mitral valves.



Results:

Patients were followed for a median of 112.3 (Interquartile range [IQR] 57.7-147.7) months. 78 patients (19.0%; 4.7% per valve year) developed SVD after a median of 31.0 months (IQR 10.0-91.9; stenosis: n=51; regurgitation: n=17; or both: n=10). Factors associated with SVD by multivariable regression analysis: serum creatinine >1.27mg/dl (OR=2.038; 95% confidence interval [CI] 1.064-3.904; p=0.032), PPM (OR=2.262; 95% CI 1.241-4.123; p=0.008), and porcine tissue valves (OR=2.474; 95% CI 1.394-4.390; p=0.002). Median delay to SVD was shorter in the elderly (<70y:47.4 months, 70-80y:40.5 months, >80y:22.0 months; p=0.005). By multivariable Cox regression, age, diabetes, concomitant CABG, and creatinine (p<0.05) were significantly associated with mortality.

Conclusions:

Based on echocardiography, every fifth patient developed SVD within 9 years of surgical bioprosthetic heart valve replacement. SVD was associated with PPM, renal impairment, and use of porcine tissue valves. Patients younger than 70 were not affected by faster SVD.

Figure Legends:

Figure 1: Uni- and multivariate binary logistic regression analyses assessing the association of factors with development of SVD.

Figure 2: Kaplan-Meier plot. Freedom from structural valve degeneration according to age. SVD indicates structural valve degeneration; y, years;

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