15 **CARDIAC MAGNETIC RESONANCE (CMR) ASSESSMENT OF RIGHT VENTRICULAR-PULMONARY ARTERIAL COUPLING AND RIGHT VENTRICULAR TRABECULAR COMPLEXITY: IMPACT ON PROGNOSIS IN PATIENTS UNDERGOING LUNG TRANSPLANT ASSESSMENT**

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Introduction Right ventricular (RV) function strongly influences prognosis in pulmonary hypertension (PH), but it remains

Abstract 15 Table 1 CMR and echo variables, correlations and outcomes in patients undergoing lung transplant assessment

	All patients (n=84)		Alive (n=70)		Dead (n=14)		Alive vs dead p value	HR	CI	p value
	Mean/ median	SEM/IQR	Mean/ median	SEM/IQR	Mean/ median	SEM/IQR				
Demographics										
Age (years)	53	16	53	15	50	18	0,26			
Gender (M)	46		37		9		0,43			
BSA	1,78	0,02	1,78	0,03	1,79	0,05	0,84			
Ethnicity							overall 0.90			
White	72		60		12					
African	2		2		0					
Afro-Caribbean	6		5		1					
Asian	4		3		1					
Diagnosis										
Underlying lung disease							overall 0.46			
ILD	28		23		5					
Emphysema	32		27		5					
Cystic Fibrosis	15		14		1					
Bronchiectasis	5		3		2					
Other	3		2		1					
Pulmonary hypertension (echo diagnosis, n=51)	51		41		10		0,58			
Clinical classification of patients with PH (n=51)							overall 0.64			
Group 1	3		3		0					
Group 3	40		32		8					
Group 5	8		6		2					
Transplanted	22		15		7		0,03	2,06	0.68–6.22	0,20
MRI and Echo indices										
mPAP	27	11	26	10	33	23	0,04	1,05	1.01–1.09	<0.005
CMR LVEDVI	58	23	59	24	57	19	0,93			
CMR LVESVI	22	13	21	13	25	13	0,30			
CMR LV StVI	38	1,54	37	1,43	39	6,04	0,63			
CMR LVEF	62	1,07	63	1,14	58	2,77	0,06			
CMR RVEDVI	72	32	70	28	83	62	0,01	1,03	1.01–1.04	<0.005
CMR RVESVI	41	2,62	37	2,06	64	10,14	0,02	1,03	1.01–1.04	<0.005
CMR RV StVI	37	14	37	13	35	11	0,49			
CMR RVEF	51	18	53	15	38	17	,001	0,94	0.90–0.97	<0.005
CMR 4ch RAArea	16	7	16	6	20	6	0,11			
LGE	14		9		5		0,04	2,45	0.79–7.61	0,12
Non-insertion point LGE	7		5		2		0,38			
RV-PA coupling SV/ESV	1,03	0,72	1,12	0,67	0,57	0,48	,001	0,12	0.027–0.52	<0.005
Global FD	1,26	,004	1,26	,004	1,26	,012	0,49			
Maximal Basal FD	1,33	,007	1,32	,008	1,33	,017	0,35			
Mean Basal FD	1,26	,006	1,25	,007	1,28	,014	0,06			
Maximal Apical FD	1,30	,007	1,30	,008	1,30	,016	0,74			
Mean Apical FD	1,25	,007	1,25	,007	1,25	,016	0,80			

Correlations	RV EDVI	RV ESVI	RV SVI	RV EF	RA area	mPAP
SV/ESV						
r value	−0,407	−0,712	0250	0847	−0,231	−0,301
p value	<0.001	<0.001	,022	<0.001	,042	,014
Global FD						
r value	,319	,303	,130	-,203	,280	,290
p value	<0.005	,005	,238	,064	,013	,018
Maximal Basal FD						
r value	,389	,350	,226	-,196	,296	,267
p value	<0.001	<0.005	,039	,073	,008	,030
Mean Basal FD						
r value	,401	,373	,179	-,215	,350	,297
p value	<0.001	<0.001	,102	,050	<0.005	,016

BSA: body surface area; ILD: Interstitial lung disease; LVEDVi or RVEDVi: indexed left ventricular or right ventricular end-diastolic volume; LVESVi or RVESVi: indexed LV or RV end systolic volume; LV StVI or RV StVI: indexed LV or RV stroke volume; LVEF or RVEF: LV or RV ejection fraction; LGE: late gadolinium enhancement; FD: fractal dimension; HR: hazard ratio; CI: confidence interval, SEM/IQR: standard error of mean/interquartile range)

unclear what key metrics are most clinically relevant. The purpose of this study was to assess the clinical relevance of both RV trabecular complexity and adequacy of RV functional adaptation to increased afterload as assessed by CMR in patients undergoing lung transplant assessment.

Methods Between 2013 and 2018, 84 consecutive patients underwent lung transplant assessment with echocardiography and CMR (1.5T - Siemens Aera) to assess biventricular volumes and function as well as late gadolinium enhancement (LGE). RV trabecular complexity was assessed by its fractal dimension (FD) on CMR, using freely available code (FracAnalyse). RV functional adaptation to increased afterload was assessed with the RV-pulmonary arterial (PA) coupling index (stroke volume(SV)/end-systolic volume(ESV) ratio). Survival was analyzed using the Cox proportional hazard ratio with the primary outcome of time to death.

Results In total 84 patients (median age 53±16 years, 54% male) were included in analysis. Median follow up period was 19.3±17.2 months. Underlying lung disease was recorded in 98% of the study population. Tricuspid regurgitation was echo-detected in 66 patients; 77% (51pts) had echo-calculated pulmonary hypertension (PH) with an estimated RV systolic pressure >35 mmHg and estimated mean PA pressure of 30 ±10 mmHg. 78.4%, 15.7%, and 5.9% of PH patients were categorized to Groups 3, 5 and 1 of WHO PH classification respectively. Mean LV and RV ejection fraction were 62% ±1.07% and 51%±18% respectively.

Both SV/ESV and RV FD correlated to mPAP, CMR-derived right atrial area, RVEDVi and RVESVi (table 1). RV FD did not differ significantly in patients with PH. Survival was predicted by SV/ESV ratio, RVEF, indexed RV end-diastolic volume (EDVi), RV end-systolic volume (ESVi), and mPAP on univariate analysis (table 1; SV/ESV carried a hazard ratio of 0.12, p<0.005).

Conclusions In patients with underlying lung disease referred for lung transplant assessment, RV functional adaptation to afterload assessed by CMR seems to predict survival. Fractal analysis of RV trabecular complexity correlated with metrics influencing RV remodelling and contractility, although not survival. Assessment in a larger cohort is required to determine utility of these metrics.

16 MYOCARDIAL EXTRACELLULAR VOLUME IN PATIENTS WITH AORTIC STENOSIS UNDERGOING VALVE INTERVENTION: A *MULTICENTRE T1 MAPPING STUDY*

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Background Diffuse myocardial fibrosis is a key decompensation mechanism in advanced aortic stenosis (AS) and can be quantified using CMR T1 mapping techniques.

Purpose To assess T1 mapping measures of fibrosis in patients with severe AS referred for aortic valve replacement, and determine their associations with clinical characteristics, disease severity and clinical outcome.

Methods In this international prospective cohort study, patients with severe AS underwent CMR at 1.5T and 3T (Siemens/Philips) with T1 mapping prior to AVR. Image analysis was performed (CVI42, Circle) by a single core laboratory for three T1 mapping measures (native T1, extracellular volume fraction [ECV%] and indexed extracellular volume [iECV=LVMi*ECV%]).

Results Four-hundred patients (70±10 years, 60% male) from nine international centres (Canada/Germany/Korea/USA/UK) were enrolled (including 144 patients from BSCMR AS700 study). AVR was performed (SAVR: n=342, TAVI: n=58) 19 [4-61] days following CMR, with median of 3.8 [1.7–4.5] years follow-up and 40 deaths recorded.