Periprocedural acute haemodynamic decompensation during substrate-based ablation of scar-related ventricular tachycardia: a rare and unpredictable event

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XXXIII. VÝROČNÍ SJEZD ČESKÉ KARDIOLOGICKÉ SPOLEČNOSTI

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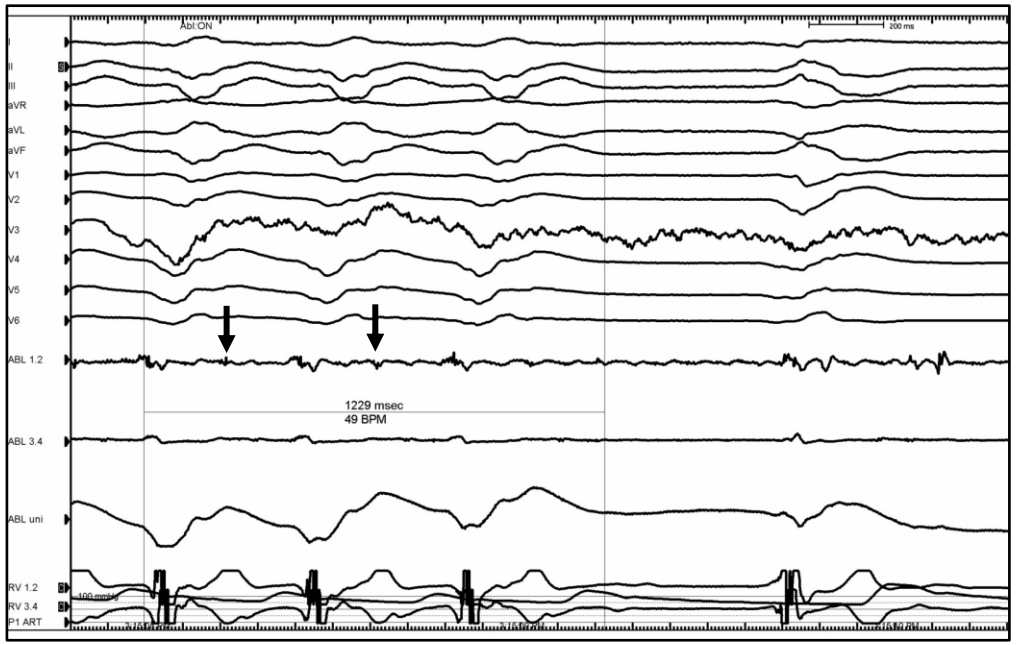
Introduction

- RF ablation is an established method for management of VT in patients with structural heart disease (SHD)
- Patients undergoing CA for SHD-VT are at considerable risk of periprocedural complications.
- Patients with acute hemodynamic decompensation (AHD) have poor outcome.
- PAINESD score as a predictor of AHD.



Patient selection and preprocedural risk assessment is important.

Methods

1124 PATIENTS

- ***First*** catheter ablation for VT
- Between ***2006 – 2020***
- Patients with implanted MCS were excluded

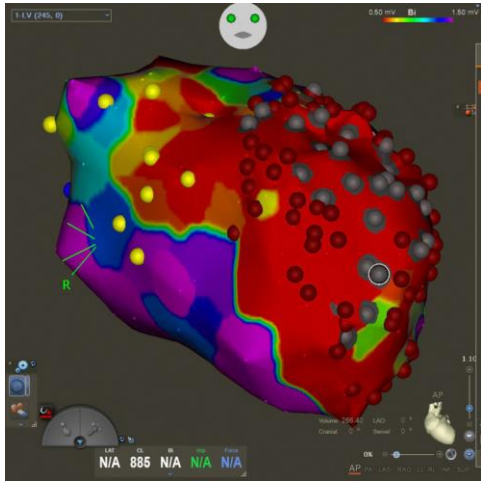
CATHETER ABLATION

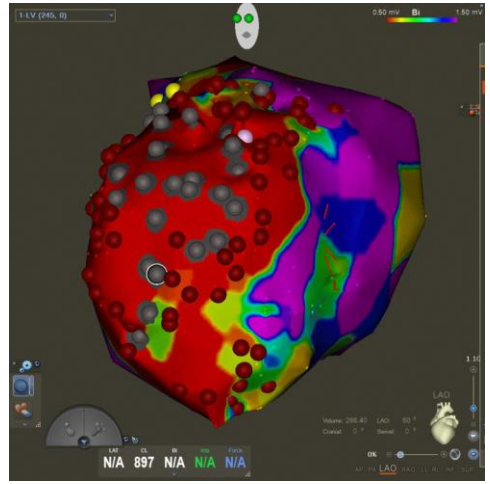
- Predominantly ***substrate-based*** ablation
- ***Conscious sedation*** with fentanyl and midazolam
- Intracardiac echocardiography in ***all patients***
- General anaesthesia in ***15%*** of patients

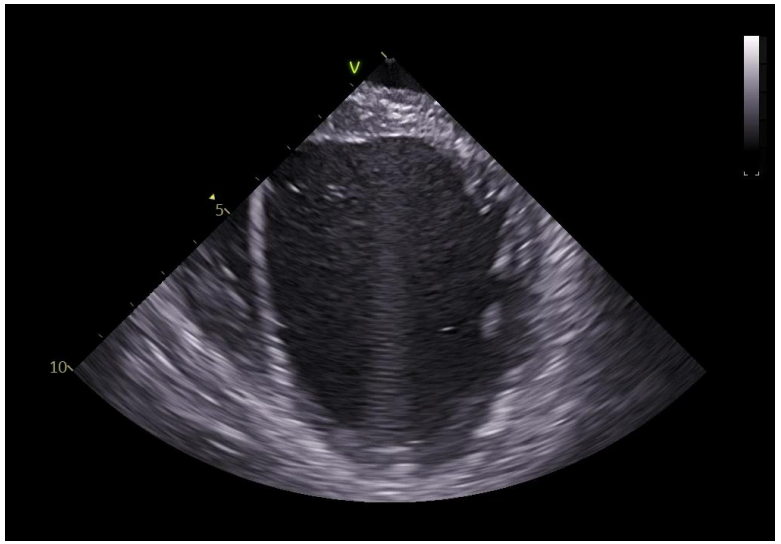
- 5-6 different opperators / same approach

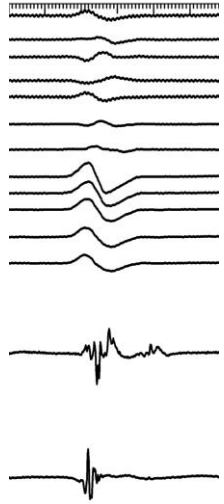
- ***Inducibility testing*** – baseline + end of the procedure

- Endo (retrograde/transseptal) /epicardial approach

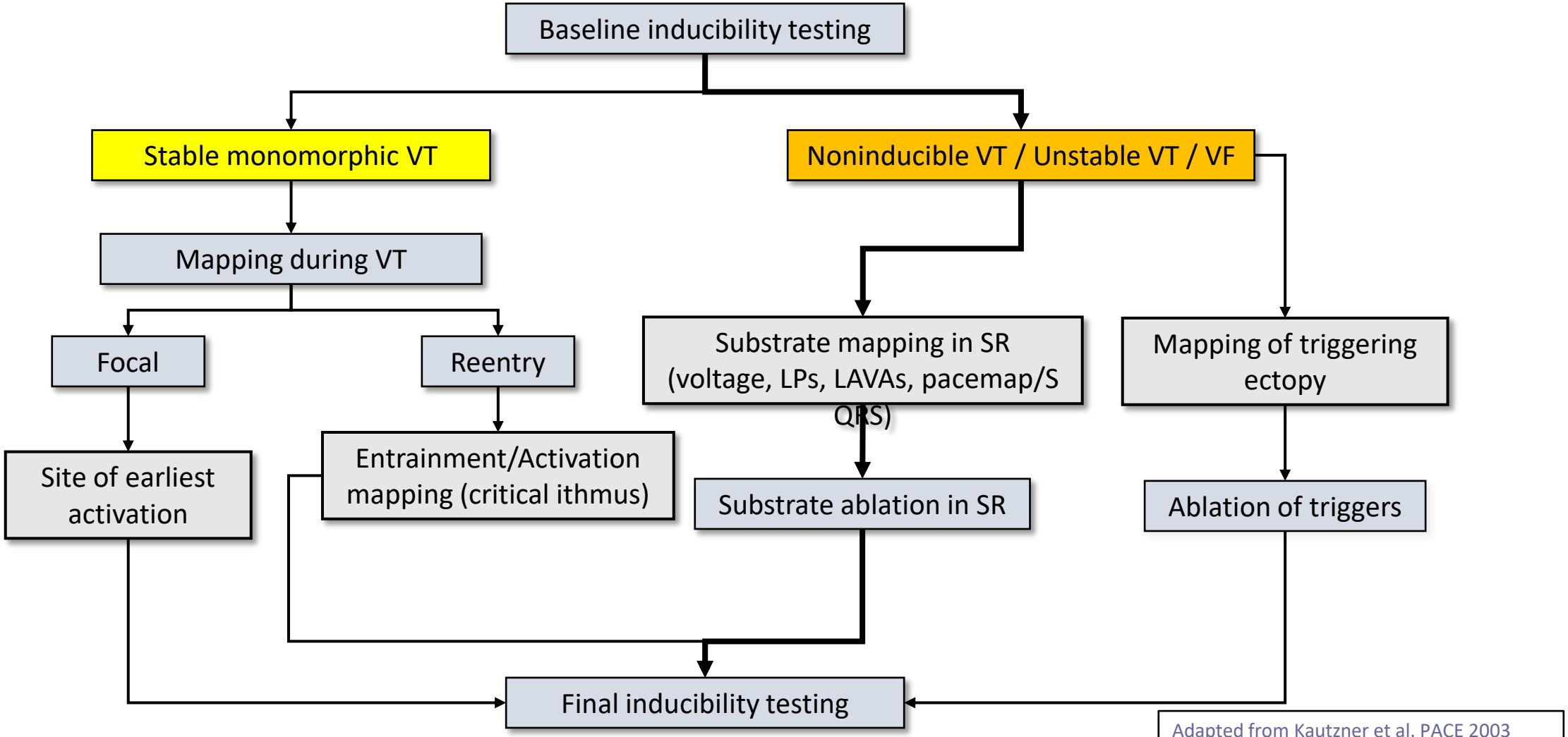








IKEM strategy of substrate-based approach in SHD-VT



Adapted from Kautzner et al. PACE 2003

Baseline and procedural characteristics

Baseline characteristic	N = 1124
Male (%)	87
Age (years)	63 ± 13
Age >60 years (%)	70
Body mass index (kg/m^2)	29 ± 5
Congestive heart failure (%)	93
CHA_2DS_2-VASc score	3.6 ± 1.7
Implantable cardioverter-defibrillator (%)	78
Cardiac resynchronisation therapy (%)	35
Arterial hypertension (%)	66
Diabetes mellitus (%)	31
Stroke / transient ischaemic attack (%)	12
Coronary (or peripheral) artery disease (%)	68
Chronic obstructive pulmonary disease (%)	12
NYHA Class	2.0 ± 1.0
NYHA Class ≥III (%)	**31**
Left ventricular ejection fraction (%)	34 ± 12
Left ventricular ejection fraction <25% (%)	**25**
Serum creatinine (μmol/L)	112 ± 48
Electrical storm (%)	**25**
PAINESD score	**11.4 ± 6.6**

Type of cardiomyopathy	N = 1124
Ischaemic cardiomyopathy (%)	67
Dilated cardiomyopathy (%)	18
Arrhythmogenic cardiomyopathy (%)	5
Hypertrophic cardiomyopathy (%)	1
Valvular cardiomyopathy (%)	11
Other cardiomyopathy (%)	13

Procedural characteristics	N = 1124
Radiofrequency time (min)	23 ± 16
Fluoroscopic dose (μGy.m^2)	1114 ± 1803
Fluoroscopic time (min)	10.4 ± 8.1
Procedure time (min)	**187 ± 79**
Major complications (%)	7.7
Major vascular access complications (%)	4.4
General anaesthesia (%)	**15.1**

Acute cardiac decompensation in 13/1124 pts (1.2%)

Definition of AHD:
Intraprocedural or early post-procedural (<12 h) development of acute pulmonary oedema or refractory hypotension requiring urgent intervention including (but not limited to) inotropic/vasoactive agents and/or artificial ventilation and/or MCS.

Procedure date	Age (years)	Chronic obstructive pulmonary disease	Ischaemic cardiomyopathy	NYHA	Left ventricular ejection fraction (%)	Electrical storm	Diabetes mellitus	PAINESD score	Type of hemodynamic deterioration
17/05/2007	54	No	Yes	III	25	Yes	No	17	Periprocedural pulmonary oedema
11/03/2009	40	No	No	III	15	Yes	No	14	Periprocedural hypotension, CPR
29/12/2011	69	No	Yes	II	40-45	No	Yes	12	Incessant VT, CPR
12/12/2013	73	No	Yes	IV	15-20	Yes	Yes	26	Incessant VF, CPR
14/09/2015	79	No	Yes	II	35-40	Yes	No	14	Incessant VT, CPR
04/07/2017	59	Yes	Yes	III	25-30	Yes	No	22	Postprocedural pulmonary oedema
14/09/2017	52	No	No	II-III	15-20	Yes	No	8	Refractory VF, CPR
06/10/2017	71	No	Yes	II-III	30-35	Yes	No	14	Postprocedural pulmonary oedema
18/12/2017	78	No	Yes	II-III	25-30	No	No	9	Postprocedural pulmonary oedema
24/01/2018	86	Yes	No	III-IV	35-40	No	No	14	Postprocedural pulmonary oedema
10/07/2019	67	No	Yes	*NK*	*NK*	No	Yes	12	Pulseless electrical activity, CPR, ECMO
22/08/2019	69	No	Yes	III	20-25	Yes	No	23	Postprocedural cardiogenic shock
25/09/2019	68	No	Yes	II-III	*NK*	No	No	9	Postprocedural pulmonary oedema

Comparison between AHD and rest of population group

	AHD	Rest of population	P value
Male	92.3%	87.1%	0.58
Age (years)	66.6±12.4	63.4±13	0.38
Ischaemic cardiomyopathy	76.9%	66.7%	0.44
Dilated cardiomyopathy	23.1%	17.8%	0.62
Arterial hypertension	69.2%	66.4%	0.83
Congestive heart failure	100%	92.7%	0.46
NYHA Class	**2.8±0.6**	**2.0±1.0**	**0.01**
Diabetes mellitus	23.1%	31,4%	0.52
Stroke / transient ischaemic attack	**30.8%**	**11,3%**	**0.03**
Coronary (or peripheral) artery disease	84.6%	68.2%	0.21
CHA_2DS_2-VASc score	4.3±1.5	3.6±1.7	0.28
Chronic obstructive pulmonary disease	15.4%	11.6%	0.67
Serum creatinine (umol/L)	136.9±56.3	112.2±47.9	0.07
Left ventricular ejection fraction (%)	27.6±9.3	34.2±12.5	0.08
Electrical storm	**61.5%**	**24.3%**	**0.002**
PAINESD score	14.9±5.6	11.4±6.6	0.05
Procedure time (min)	171±38	189±60	0.34
General anaesthesia (%)	23.1%	15.0%	0.42
Radiofrequency time (min)	27.6±15.8	22.7±15.5	0.31
Reablation during follow-up	23.1%	28.4%	0.67
MCS during follow-up	**23.1%**	**3.3%**	**0.0001**
Heart transplant during follow-up	0.0%	4.6%	0.43
Death	**76.9%**	**47.6%**	**0.04**

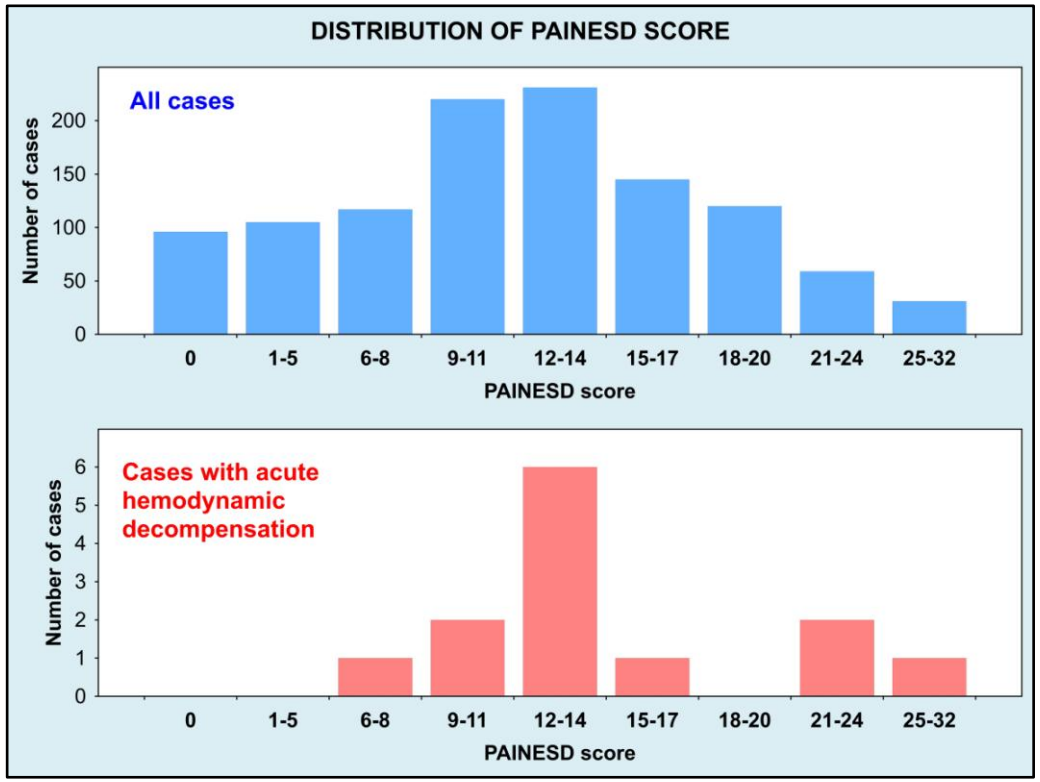
Comparisons between our experience and previously published data

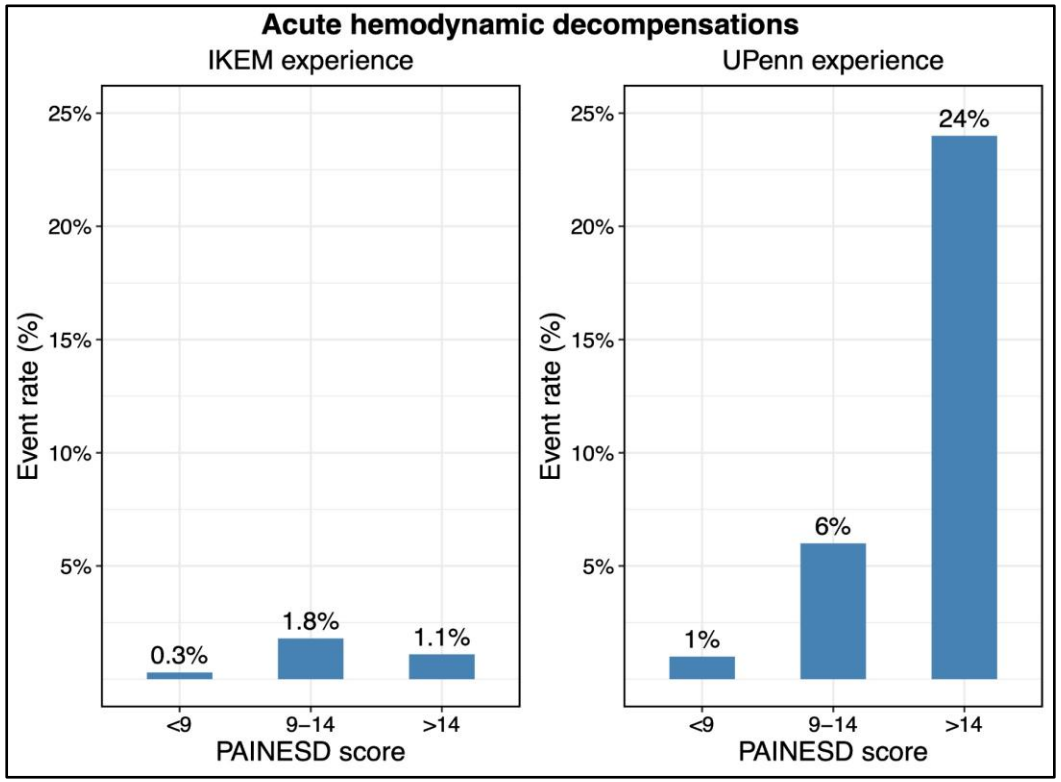
	IKEM experience	UPenn experience	International VT Ablation Center Collaborative group
Number of patients	1124	193	2061
Age (years)	63 ± 13	62±15	62 ± 13
Left ventricular EF (%)	34 ± 12	37±16	34 ± 13
Follow-up duration	4.2 years	21±7 months	1 year
Electrical storm (%)	25	47	35
PAINESD score	11 ± 7	*NA*	9.8*
Acute hemodynamic decompensation (%)	1.2	11	*NA*
Early (31-day) mortality (%)	2.9	*NA*	5
Late (21-month) mortality (%)	18	16	*NA*
Procedural time (minutes)	187 ± 79	480 (360-480)	284 ± 117

* - estimated based on a weighted average of three study groups (early mortality group, late mortality group and the rest of the population group)

In 75% of patients, procedural time was ≥ 6 hours!

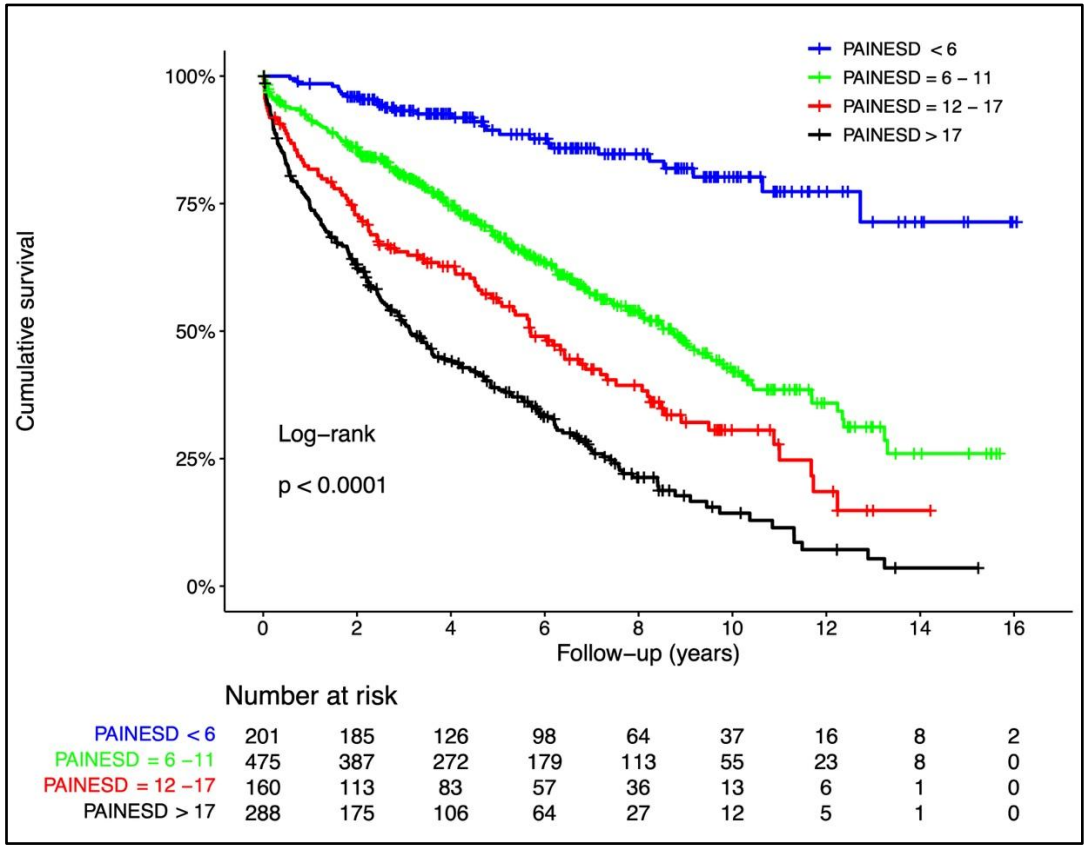
AHD didn’t acumulate in the upper tercile of PAINESD

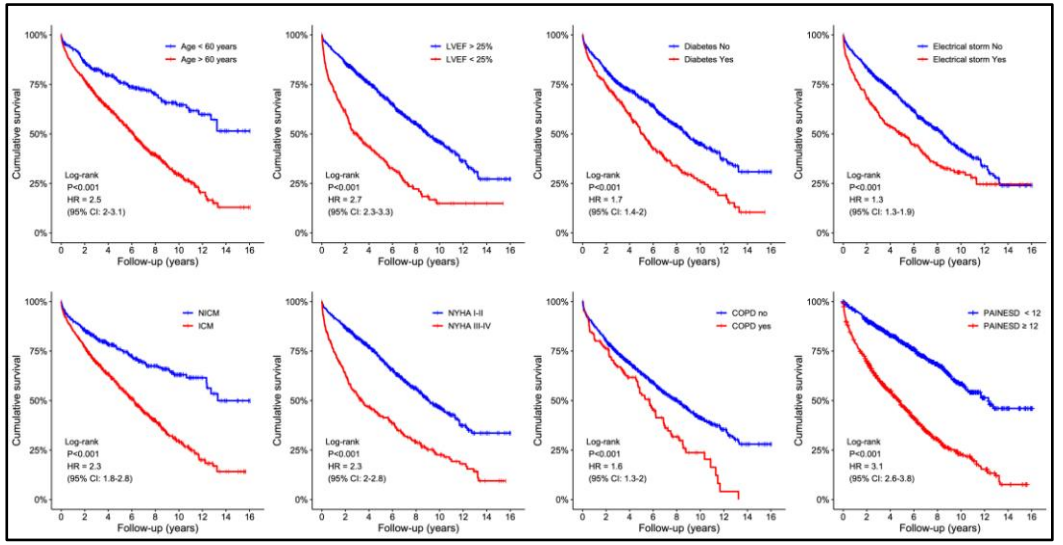




There were 191 (17%) patients with PAINESD >17.

PAINESD predicts mortality after CA





Conclusion

- In our large cohort of patients with CA of SHD-related VT, the incidence of AHD was *substantially lower* than previously reported.
- This observation may be explained by a strategy of *predominant substrate-based CA* under conscious sedation that prevents hypotension and prolonged low cardiac output state related to repeated VT induction and activation mapping.
- In such a scenario, the PAINESD score may lead to *unnecessary prophylactic use of MCS* during the CA of VT.

PAINESD score should not be used for the prediction of AHD and certainly not for the routine use of MCS devices.

Thank you!

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