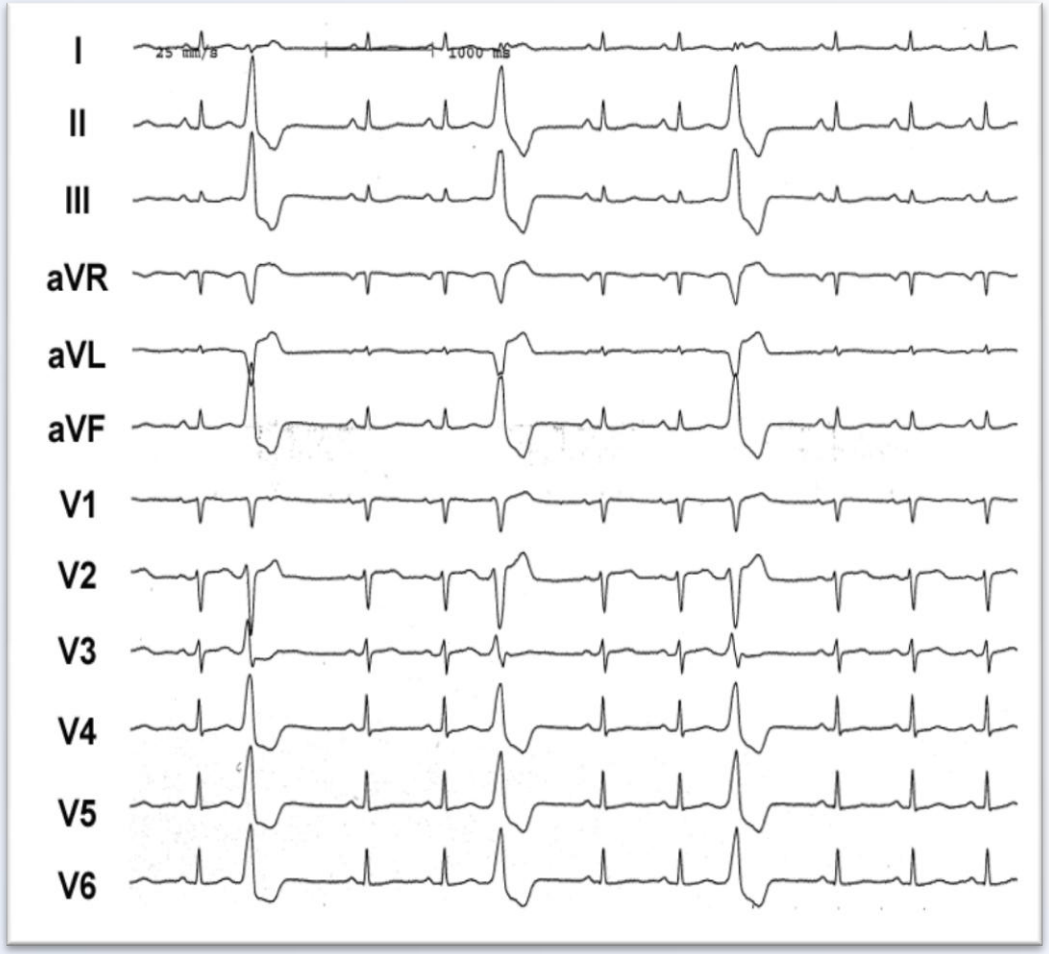
Možnosti léčby KT ve specializovaném centru

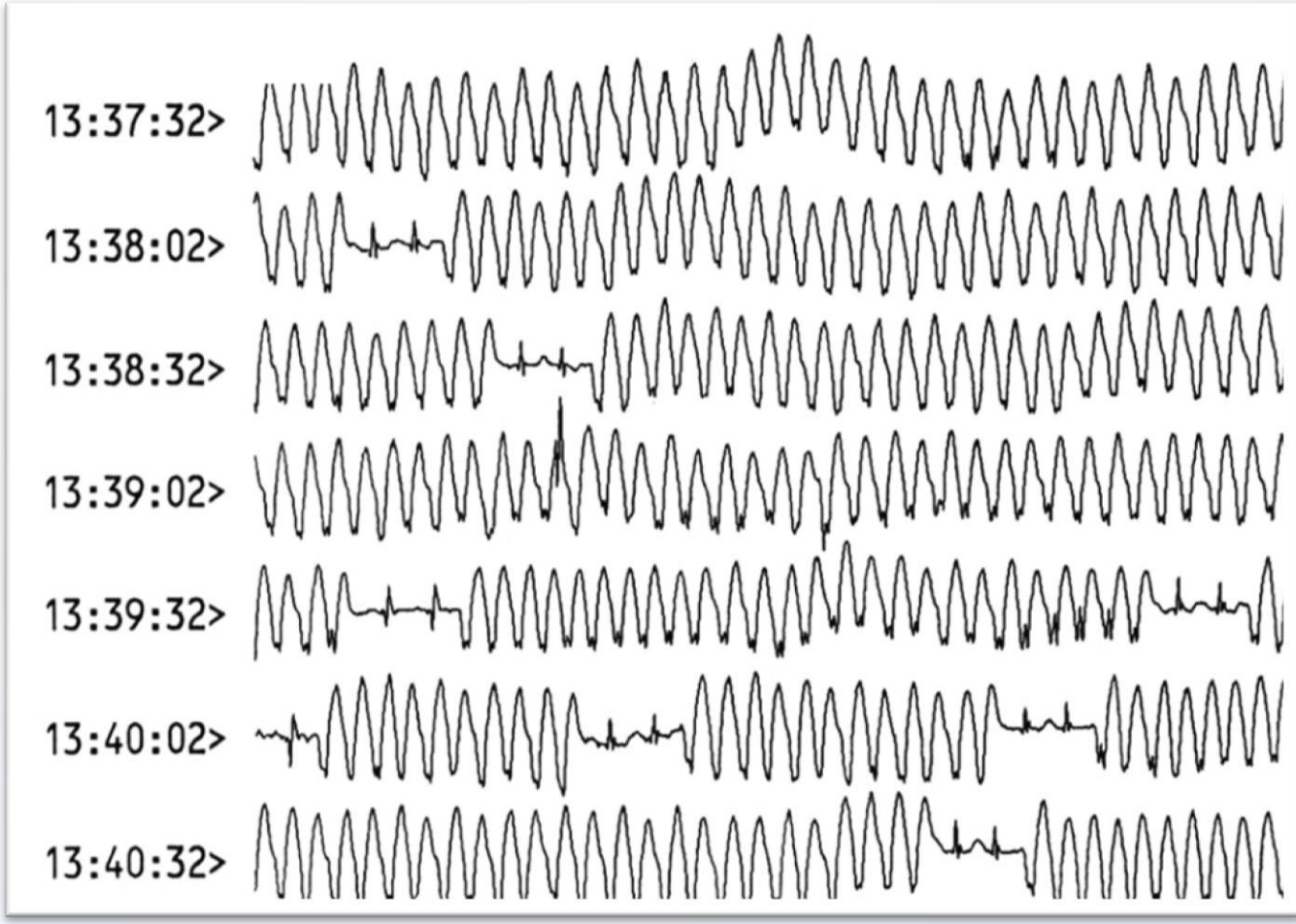
P. Peichl
Centrum komplexní léčby komorových arytmií
komorovky@ikem.cz

INSTITUT KLINICKÉ A EXPERIMENTÁLNÍ MEDICÍNY
KLINIKA KARDIOLOGIE
IK+E M

Spektrum komorových tachykardií



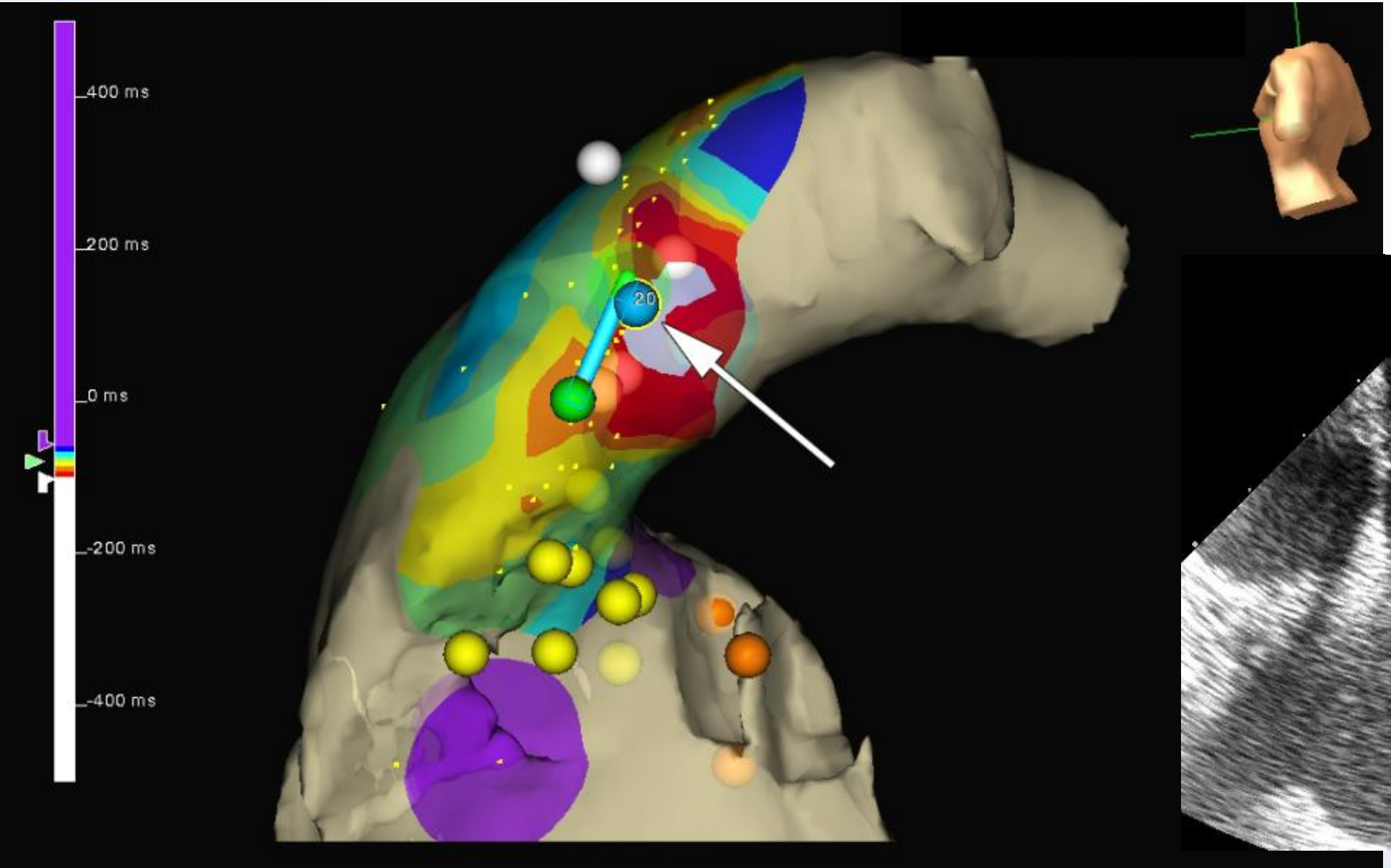
Četné komorové extrasystoly



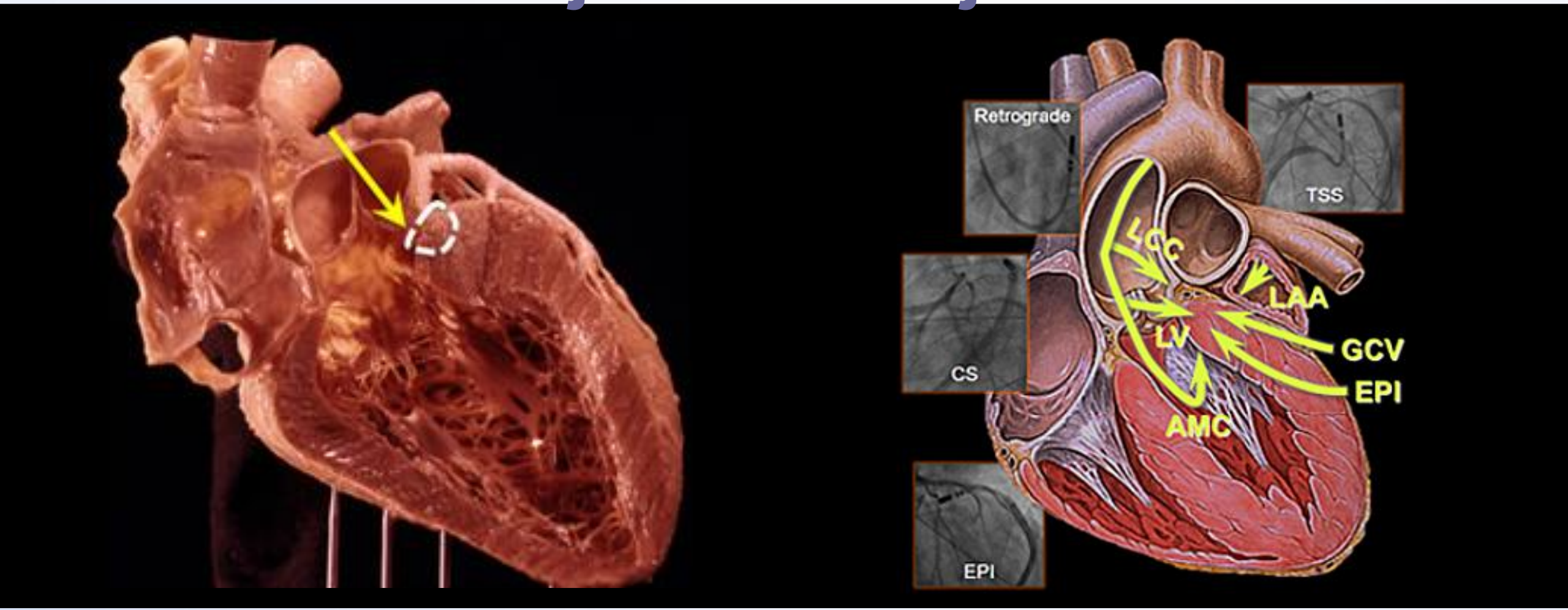
Běhy incesantní komorové tachykardie

Jaké jsou principy katetrizační ablace KT?

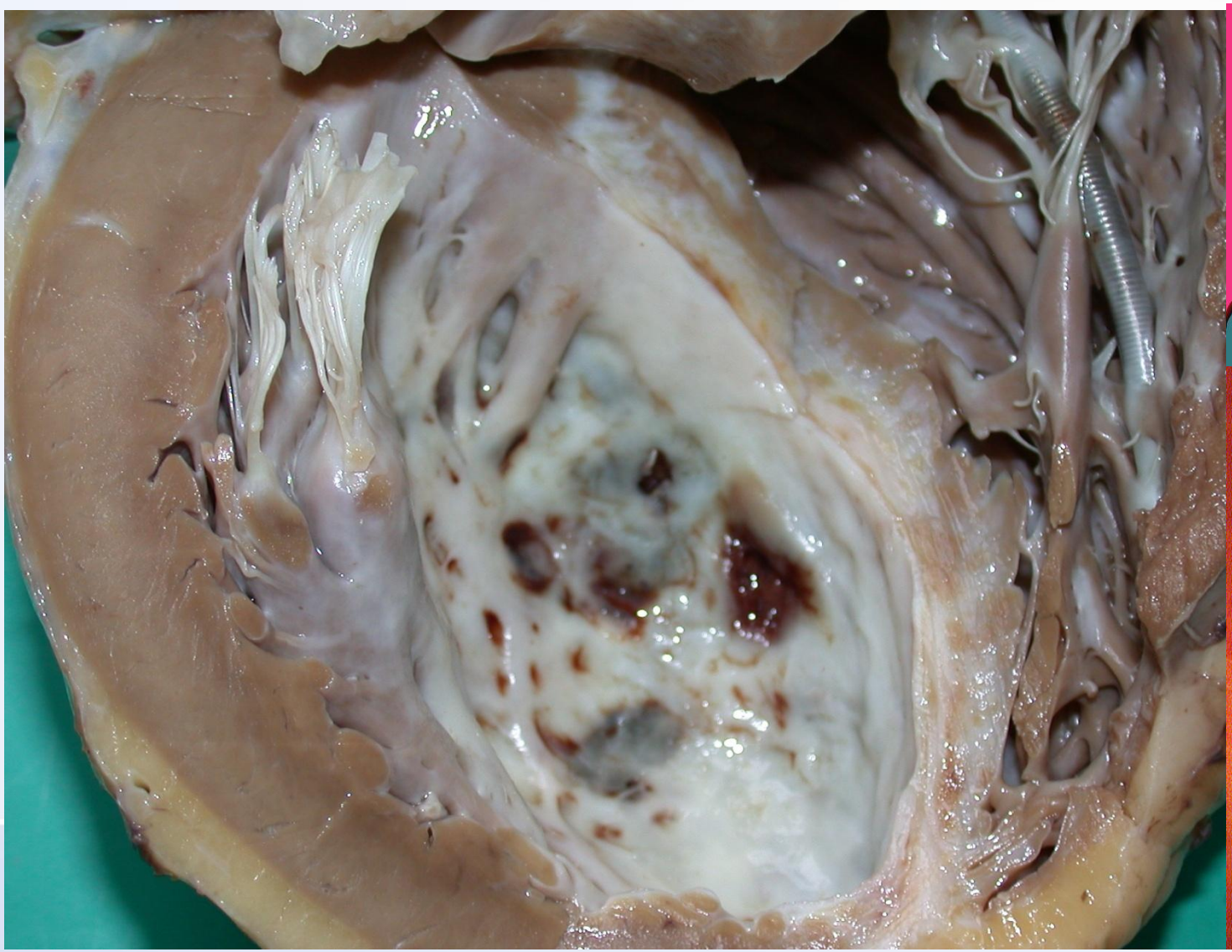
Ablace mnohočetné ektopie z RVOT

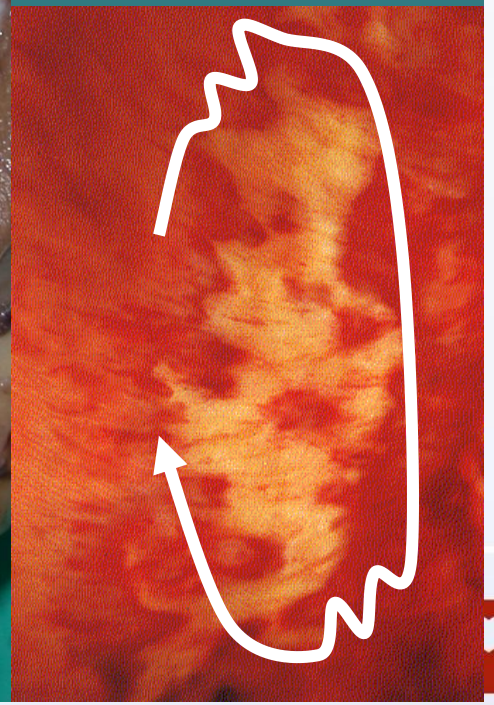


Ablace KES/KT ze summitu
LK jsou složitější…

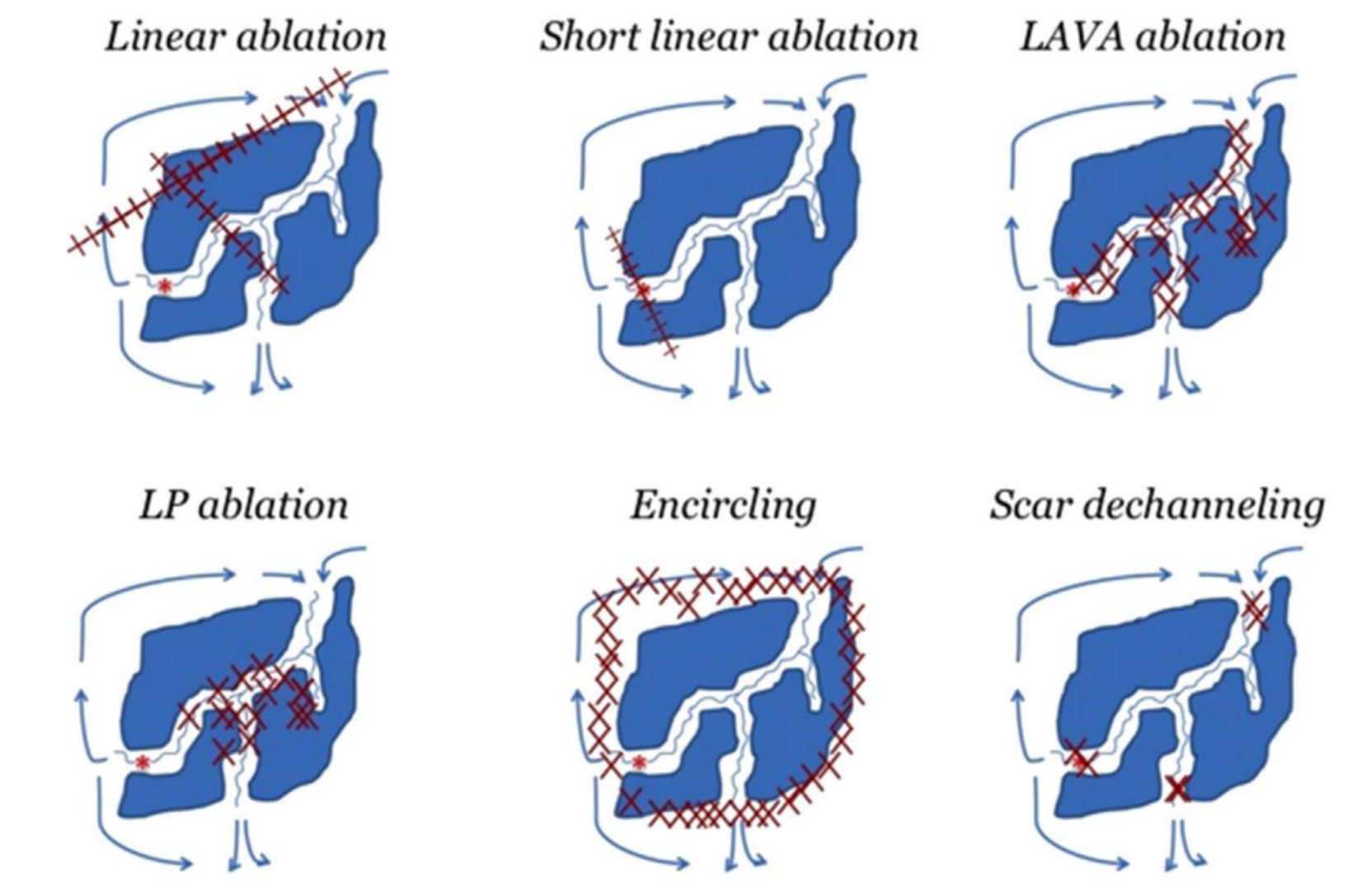


Arytmogenní substrát u ICHS



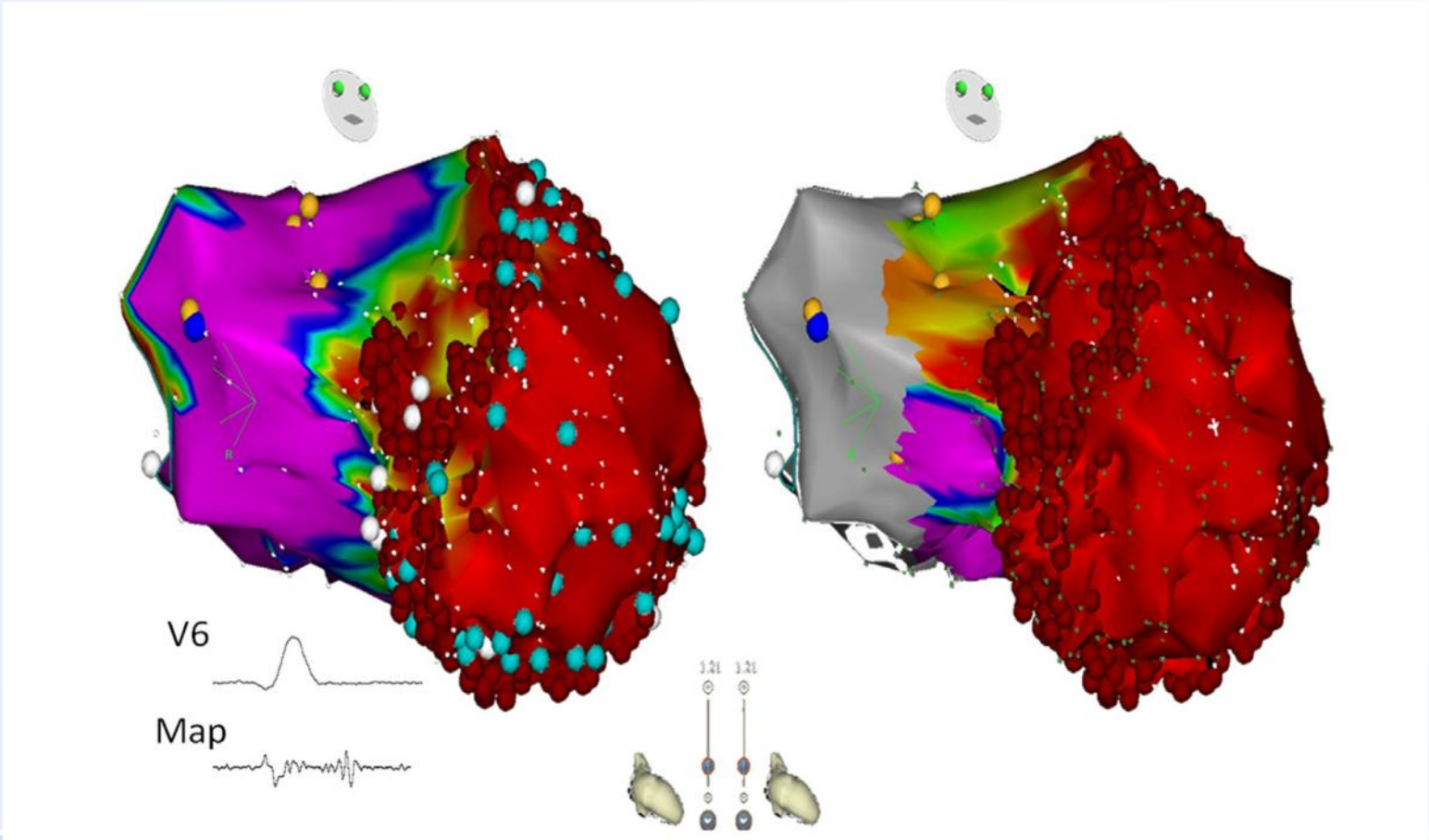


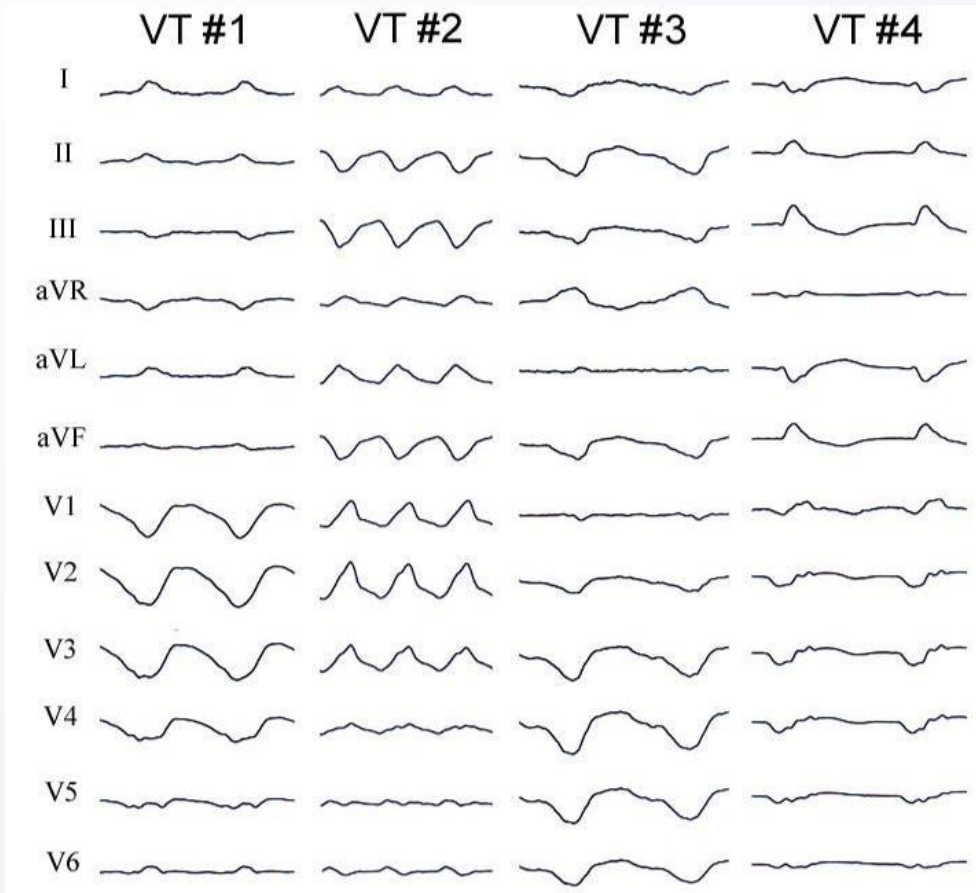
Substrate based ablation strategies



Fernandéz-Armenta Card Electrophysiol Clin 2015

Example of very large substrate and multiple VTs?



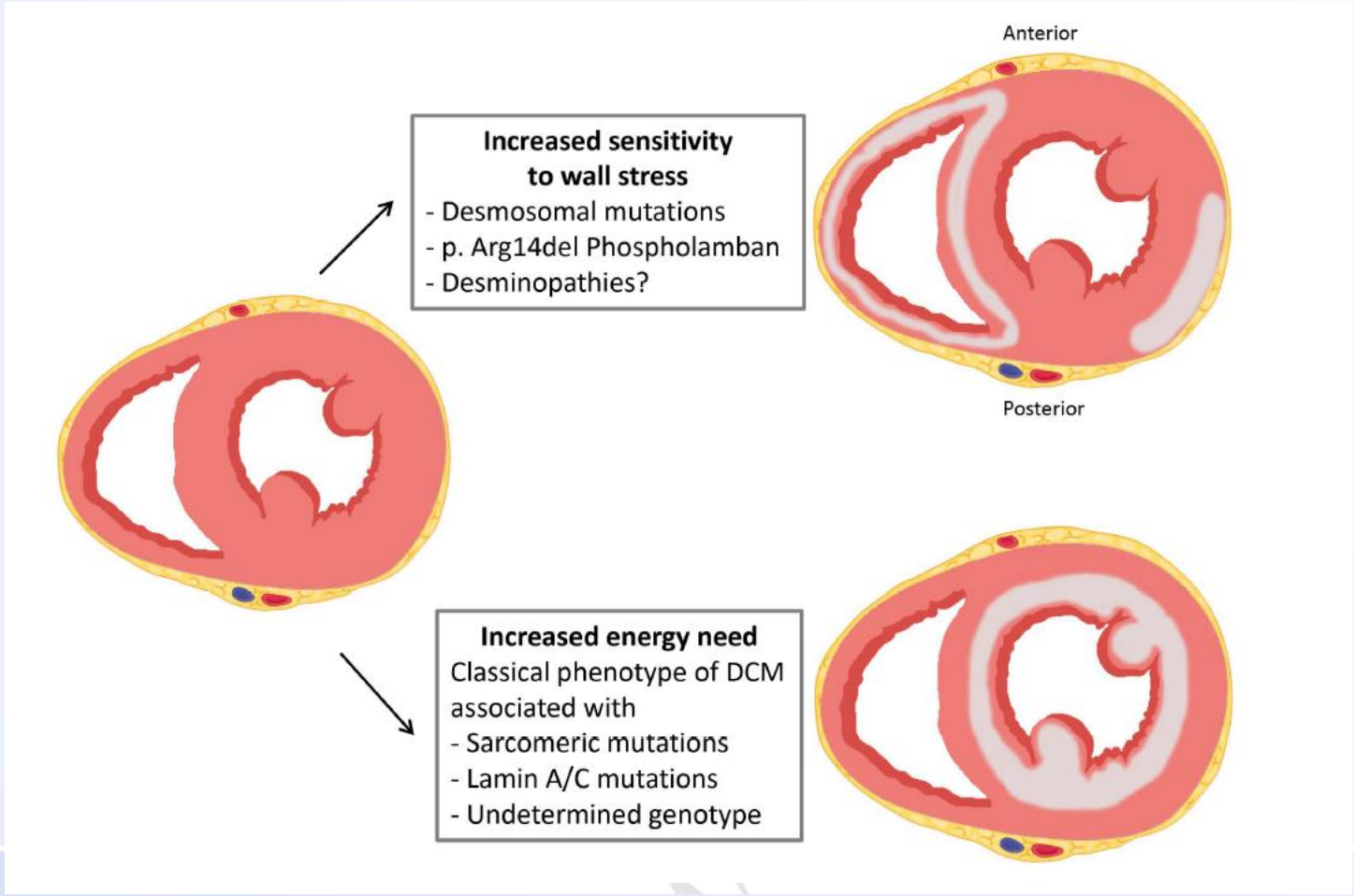


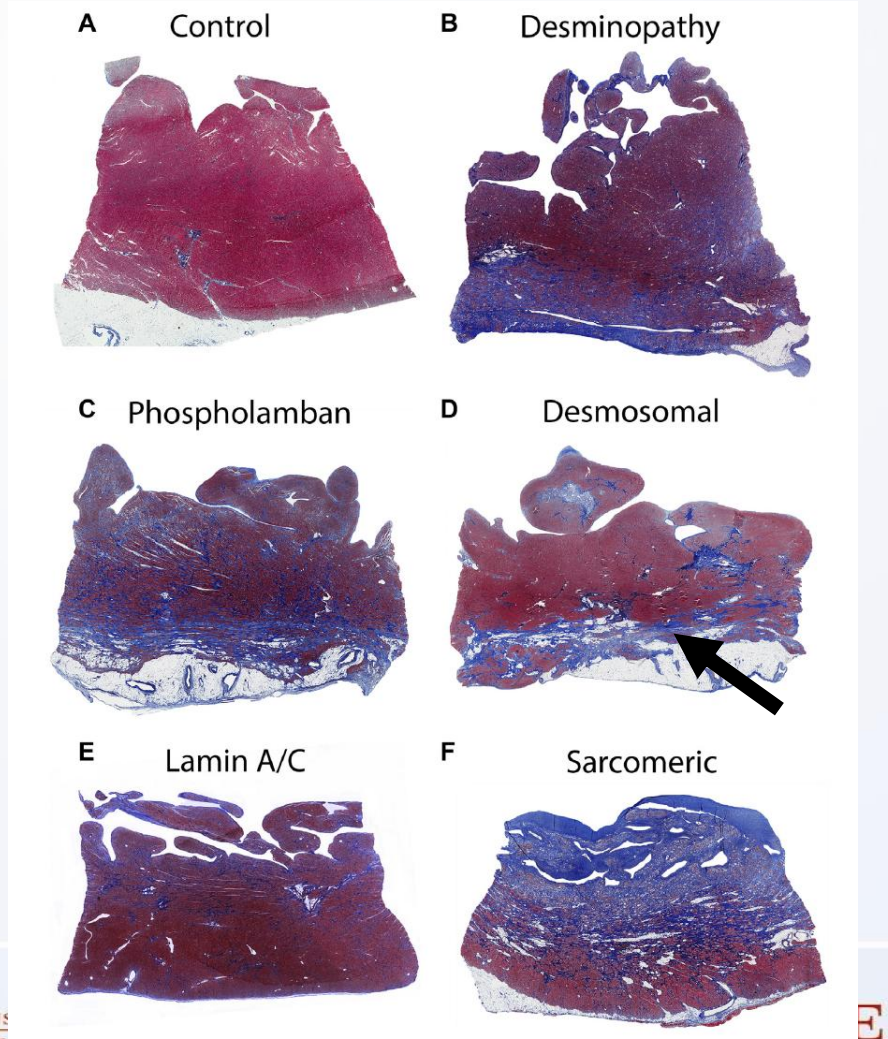
Nonischemic cardiomyopathy is different to post MI

Marrow JACC 2020;75:1196

NICM are have much more variable substrate…

Fenotypes of structural changes

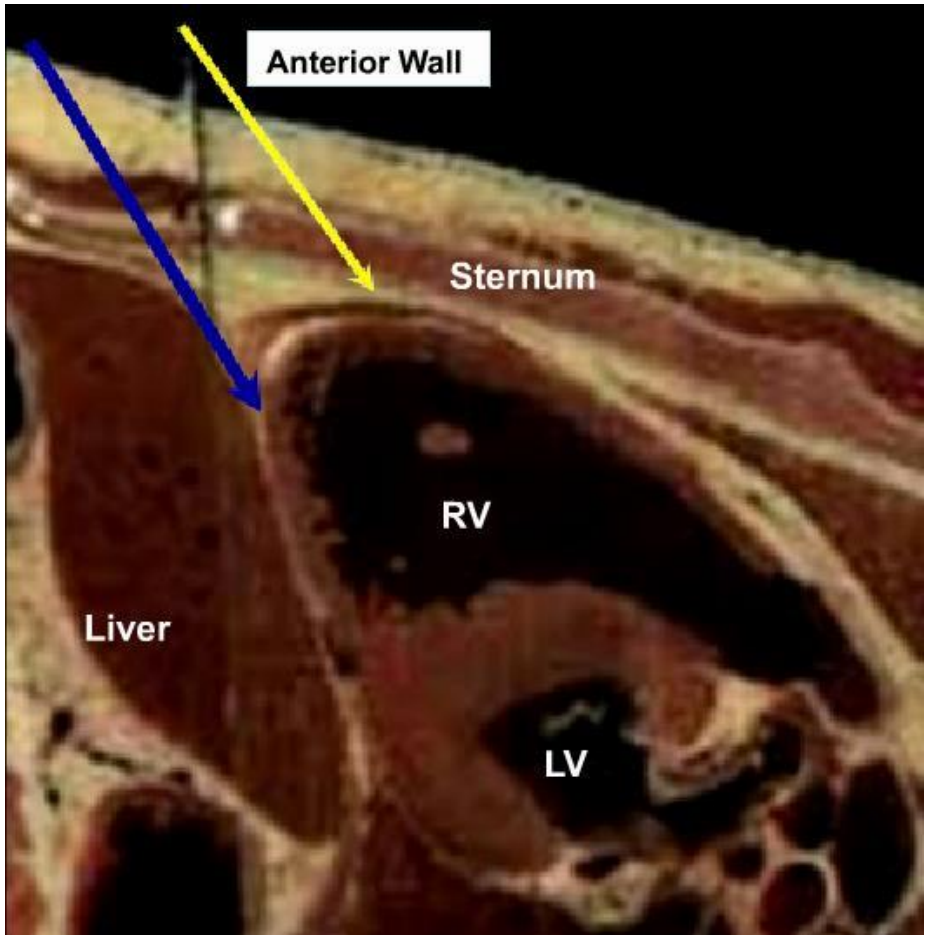


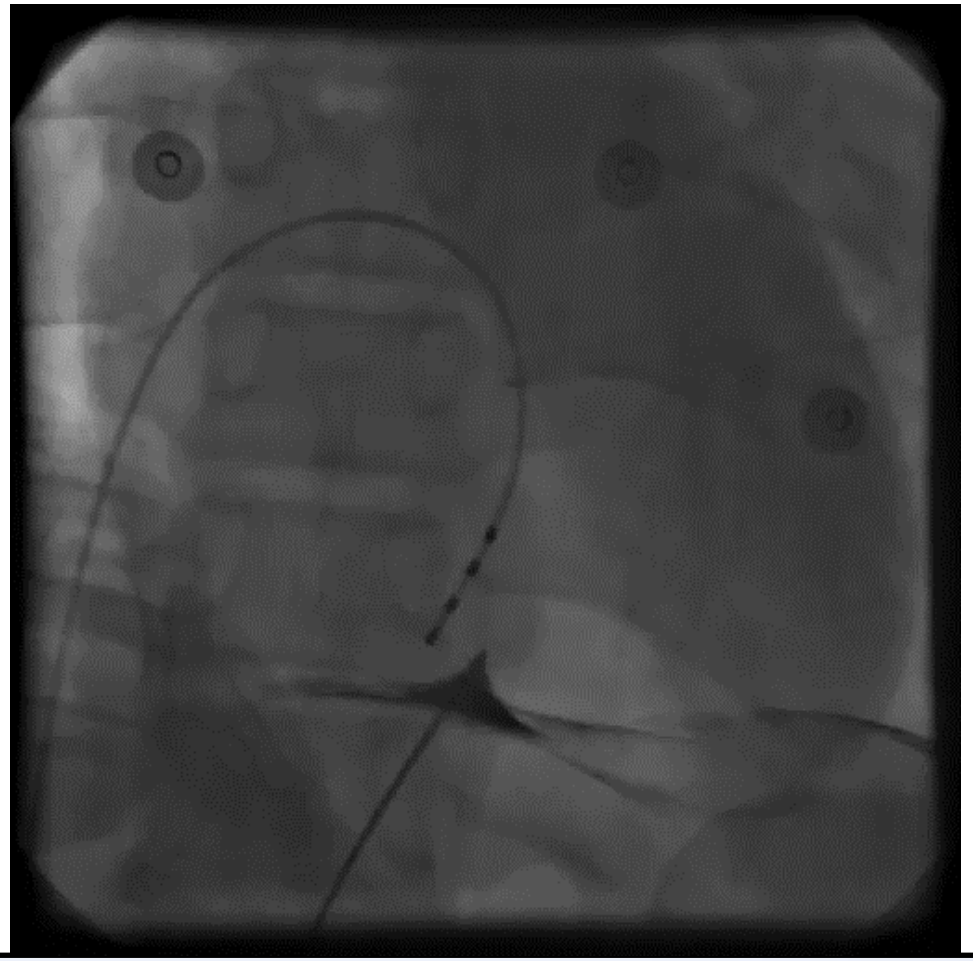


KLINIKA KARDIOLOGIE

Sepehrkhouy et al. HR 2017

Percutanneous epicardial access

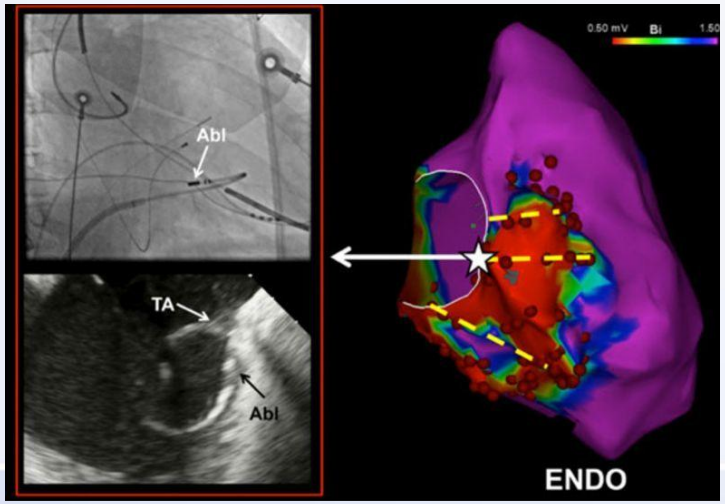


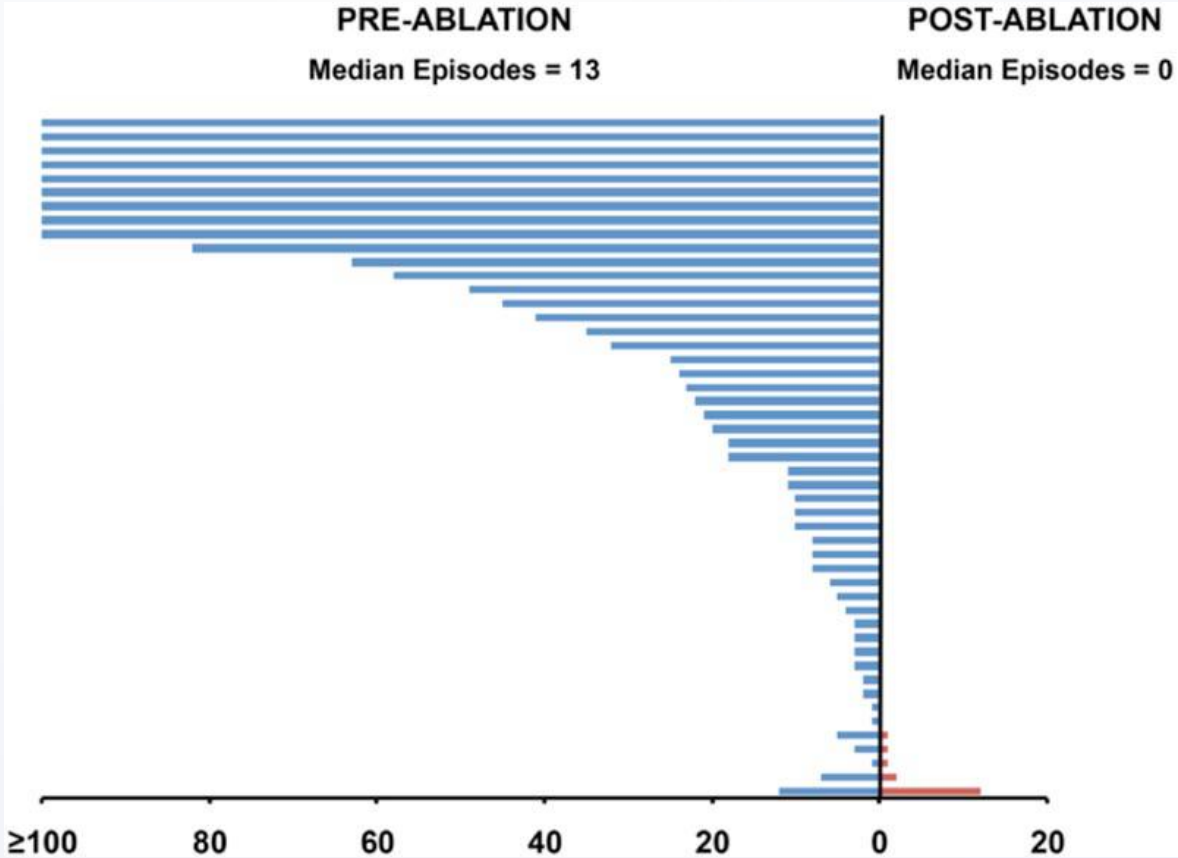


[1]E. Sosa *JCE* 1996
[2]E. Cronin *HR* 2019 Expert consensus on ablation of VT

Epicardial ablation was a game-changer for many nonischemic CMP patients

- 62pts with ARVC and VT ablation
- 63% required endo/epi access
- Follow up of 56±44 months
- 71% pts without VT recurrence
- Only 2 pts left on amiodarone during follow up





Number of VT episodes 1 year before/after ablation

INSTITUT KLINICKÉ A EXPERIMENTÁLNÍ MEDICÍNY
KLINIKA KARDIOLOGIE

IKEM

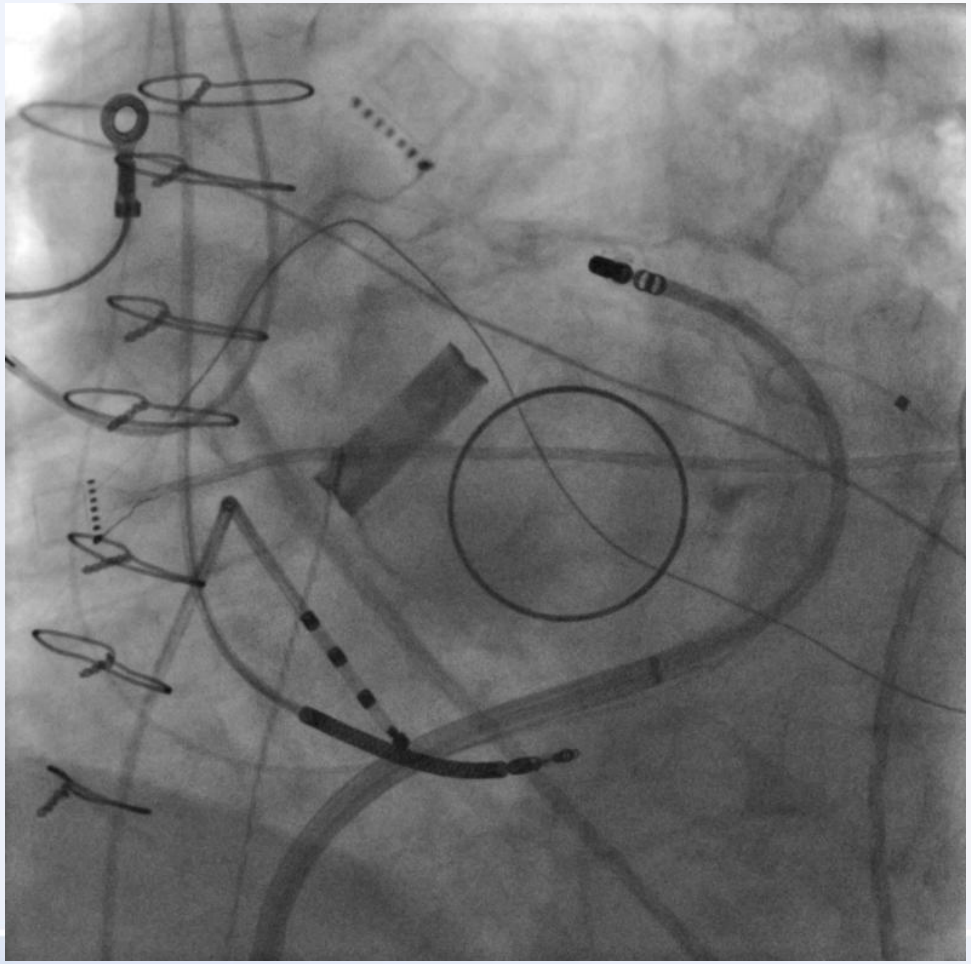
Santangeli P *Circ EP* 2015;8:1413-1421

IKEM Complications of epi acces
in 173 pts (2005-2021)

- Puncture of RV (no sequel) in cca 10%
- Extracardiac inadvert puncture
  - In 1 puncture of colon, 1 liver (no sequel), 1 stomach (clipping)
- Delayed tamponade after ablation in 3pts (1.7%)
  - Etiology? - extensive ablation, manipulation/mapping in pericardial space after previous cardiac surgery
- No complication requiring surgical intervention
- Failure to achieve access in 8pts (6%)
  - Adhesions from surgery, hemopericardium, idiopathic
- No complications and success in all 13pts (7.5%) with attempted repeated epi access

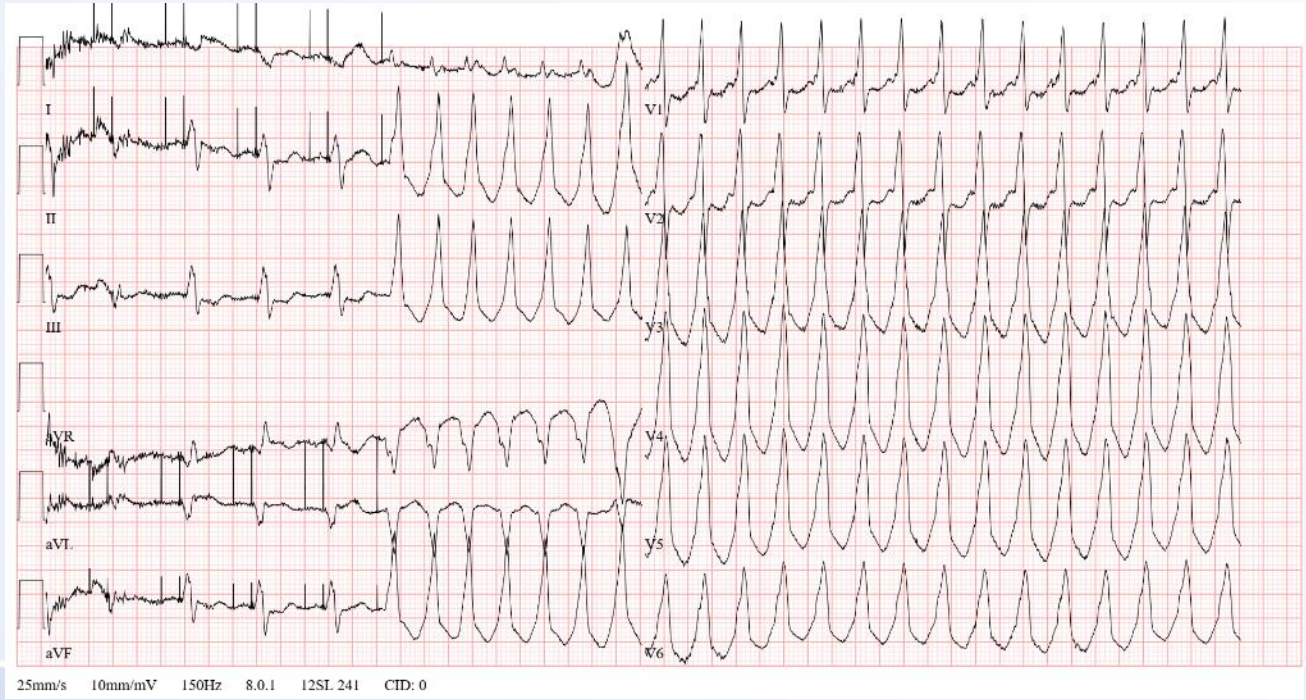
No entry LV

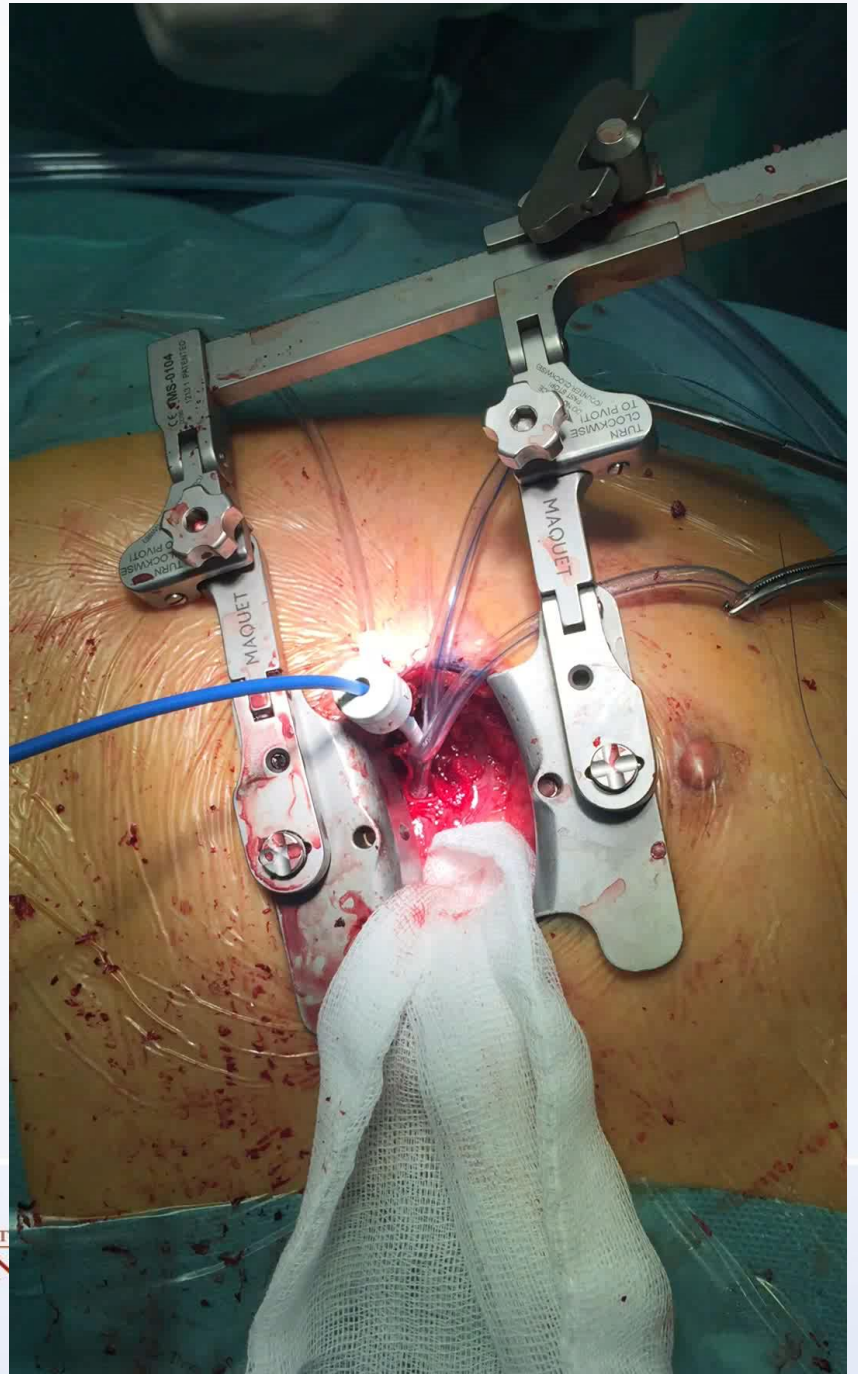
Mitral and Aortic mechanical prosthesis



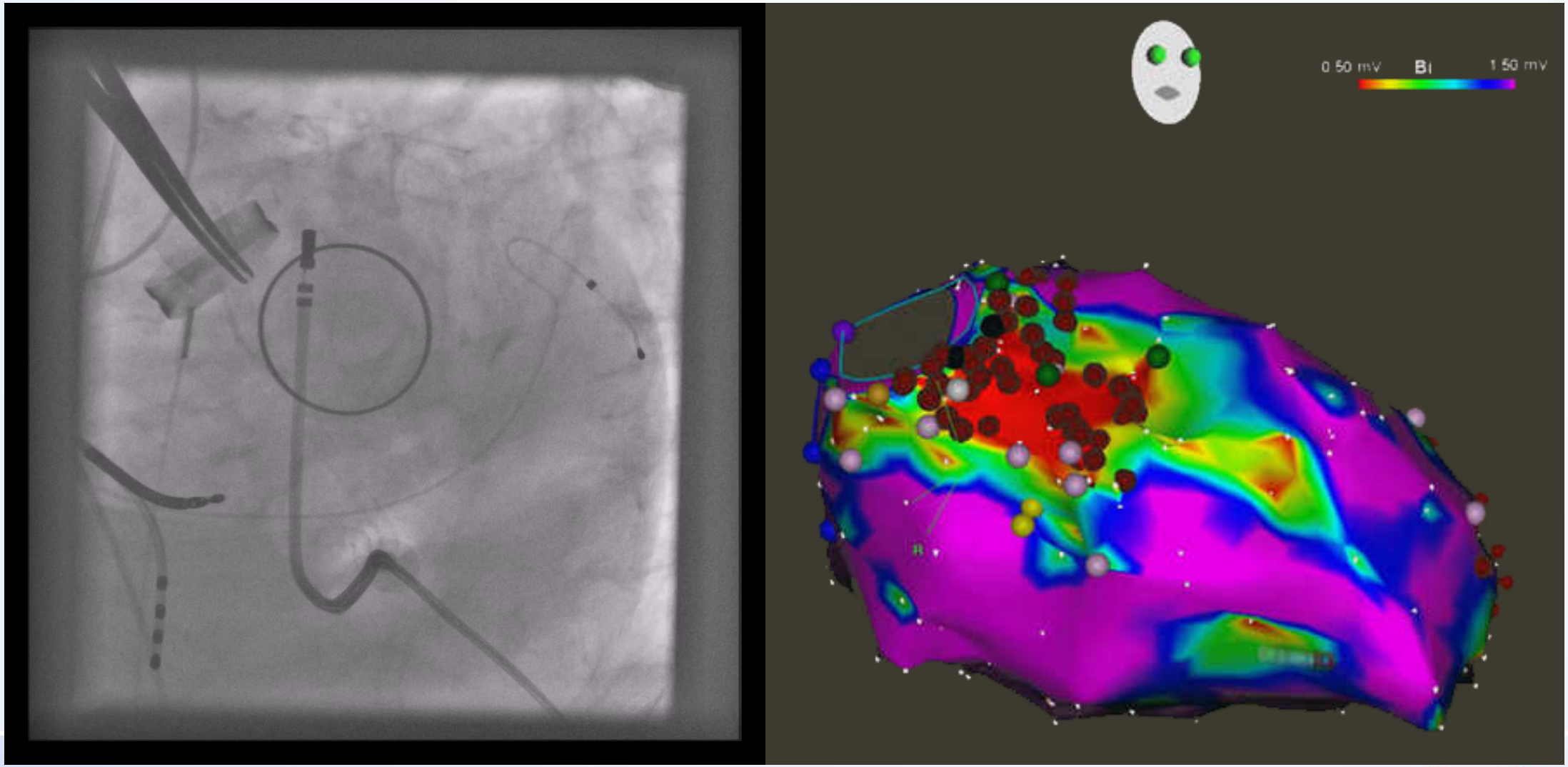
No entry LV

- 73-year-old male after CABG, AVR, MVR
- Recurrent VT despite medical treatment requiring intubation and deep sedation





Direct LV access via apical puncture



Bail out strategies

- Bipolar ablation
- Alcohol ablation
  - Arterial and venous
- Pulsed-field ablation
- Surgically facilitated access
- Radiotherapy
- Heart transplant
- Give up

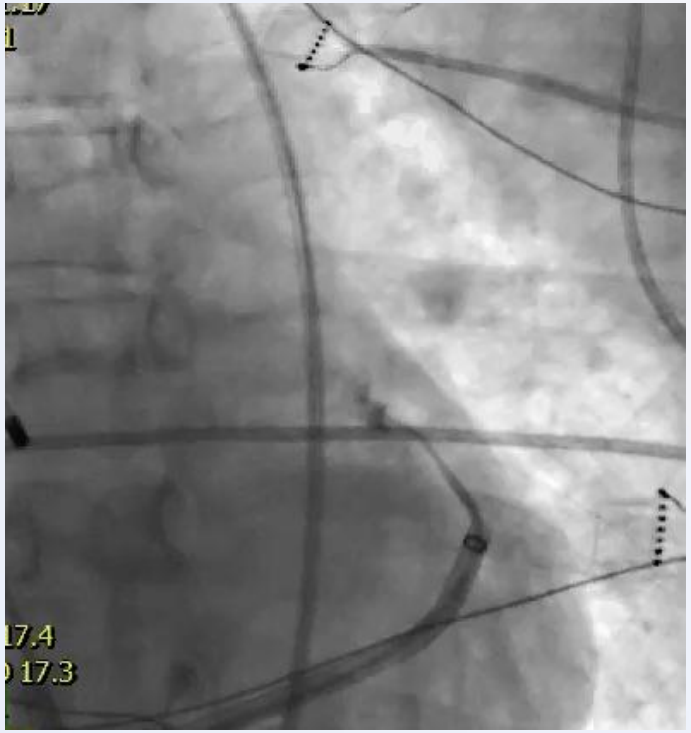
Anatomy of LV summit veins

Tavares et al. Heart Rhythm 2021 Sep;18(9):1557-1565
Patel et al. Circ EP 2022 5(8):e011017

Alcohol transcatheter ablation

Venous application in the branch of coronary sinus

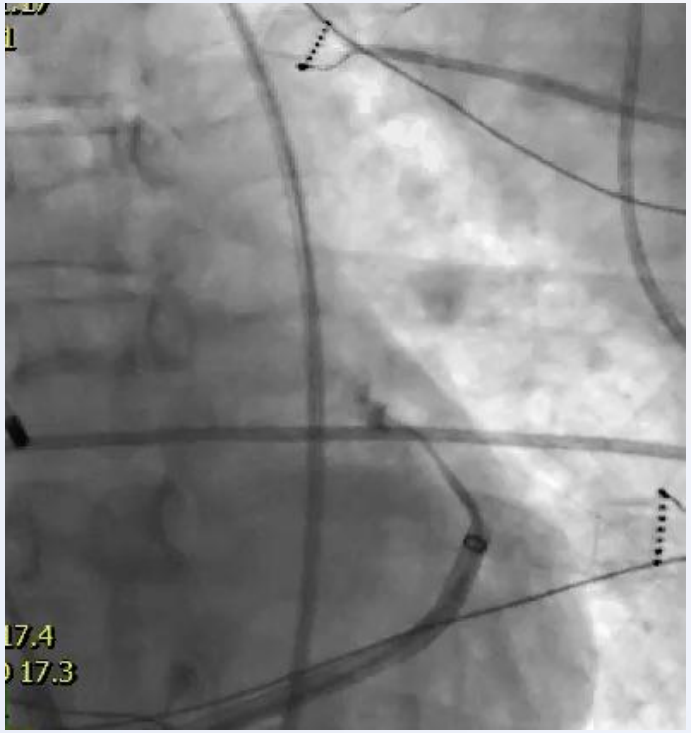
1. Venous angiogram



Alcohol transcatheter ablation

Venous application in the branch of coronary sinus

1. Venous angiogram



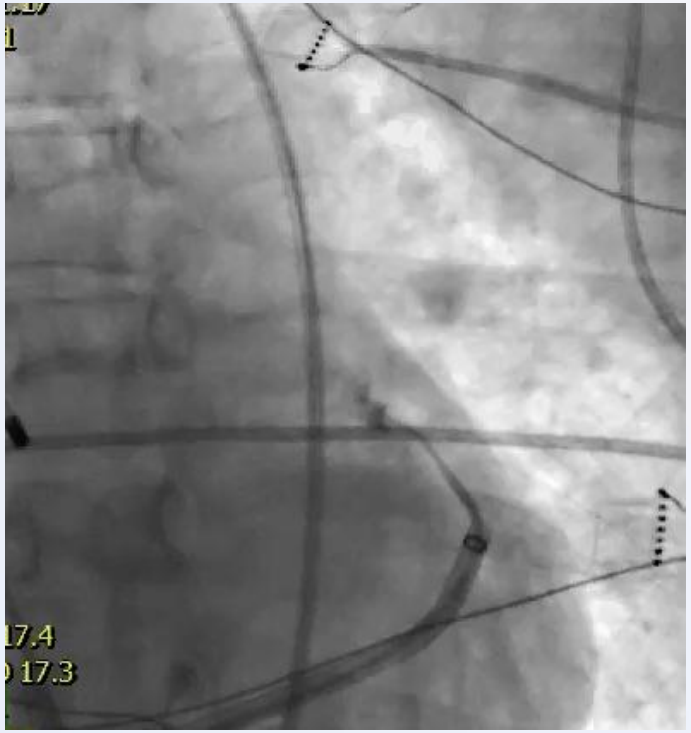
2. Wire mapping

Local electrogram

Alcohol transcatheter ablation

Venous application in the branch of coronary sinus

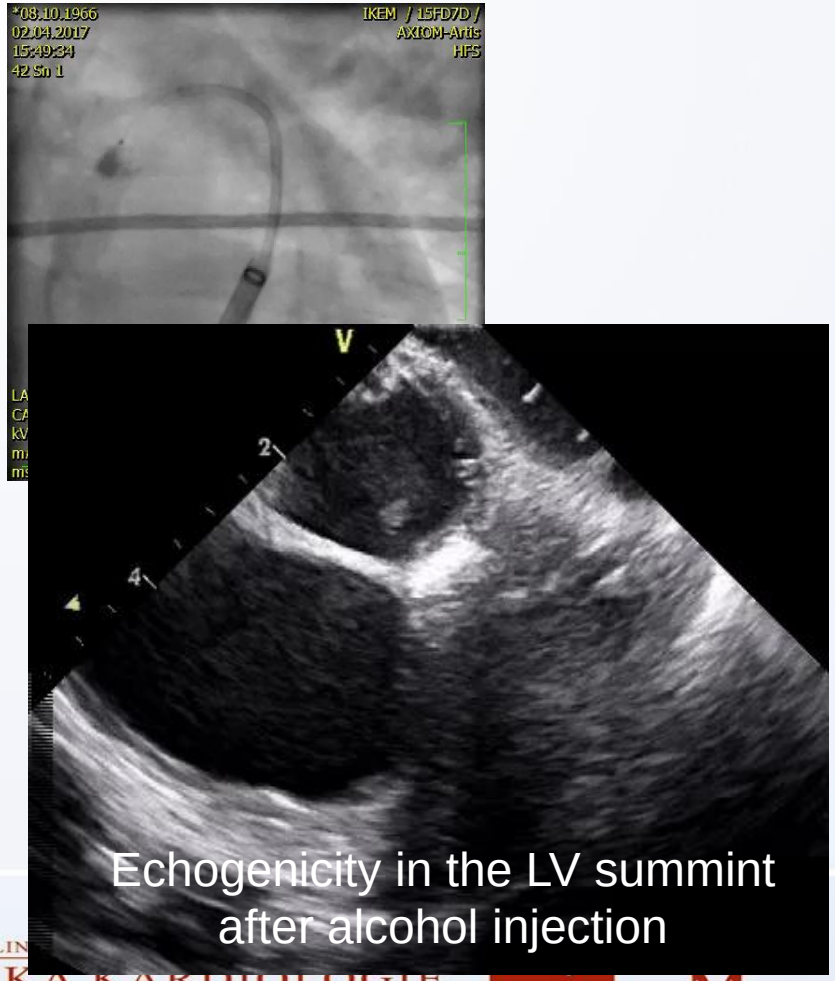
1. Venous angiogram



2. Wire mapping

Local electrogram

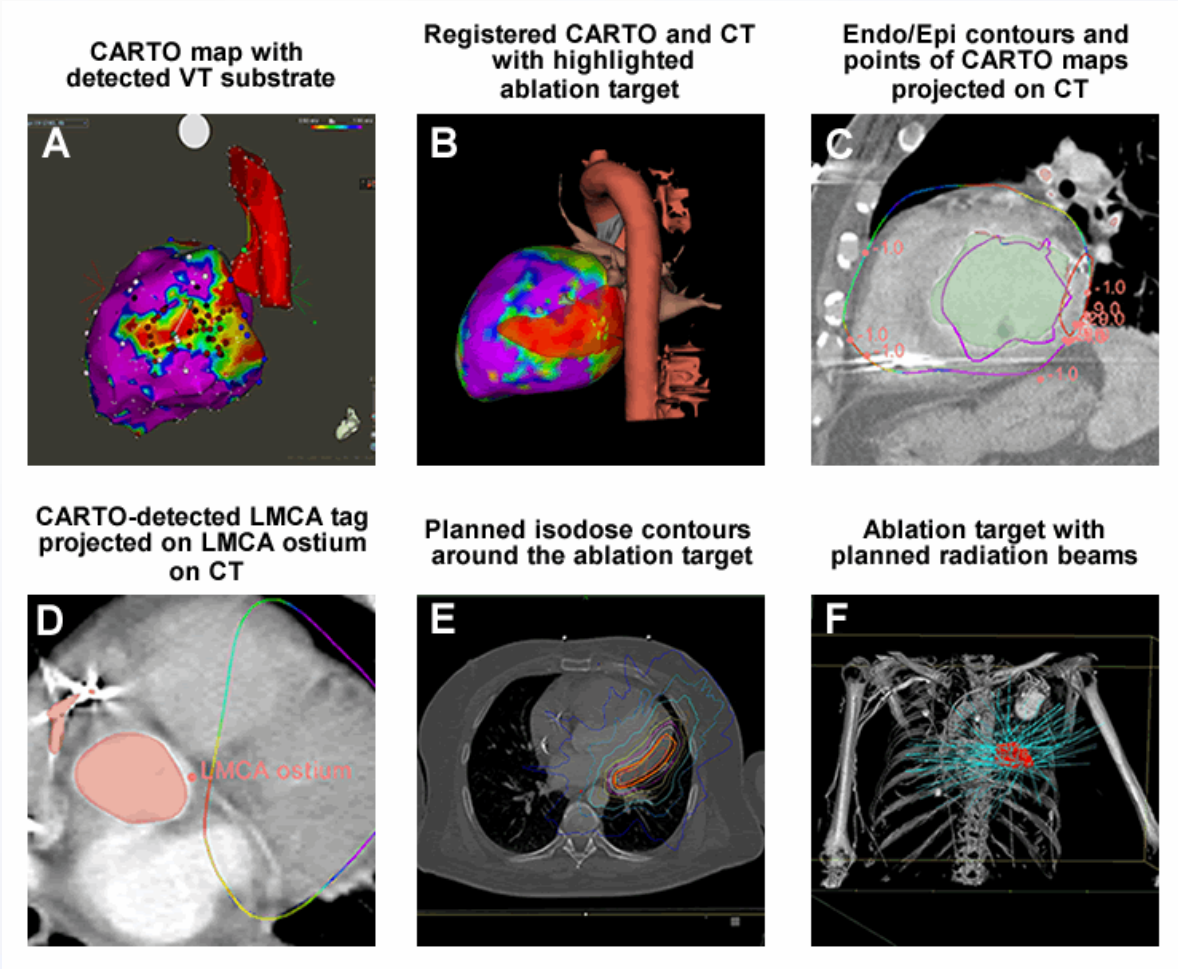
3. Alcohol administration



Echogenicity in the LV summint after alcohol injection

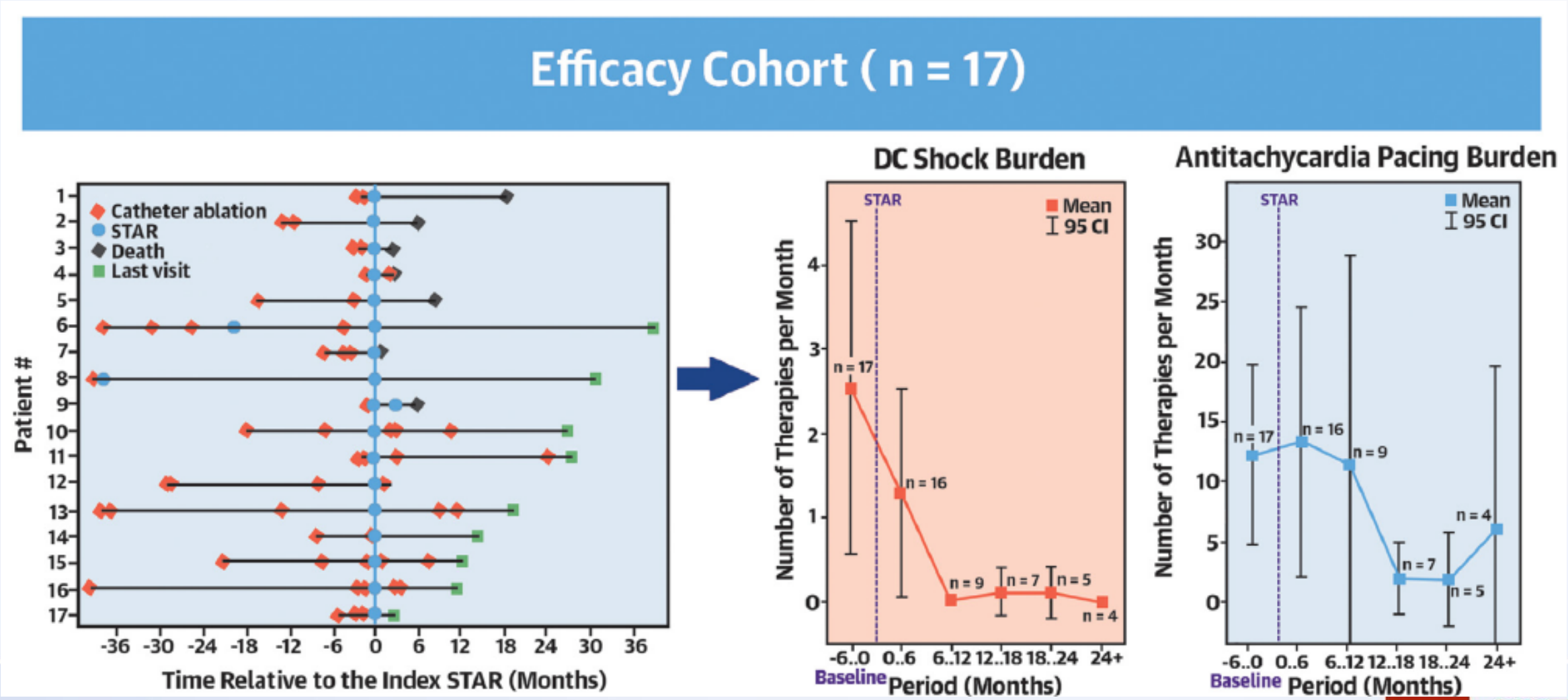
Stereotaktická radioablace

CyberKnife v FN Ostrava



Zkušenosti s SBRT

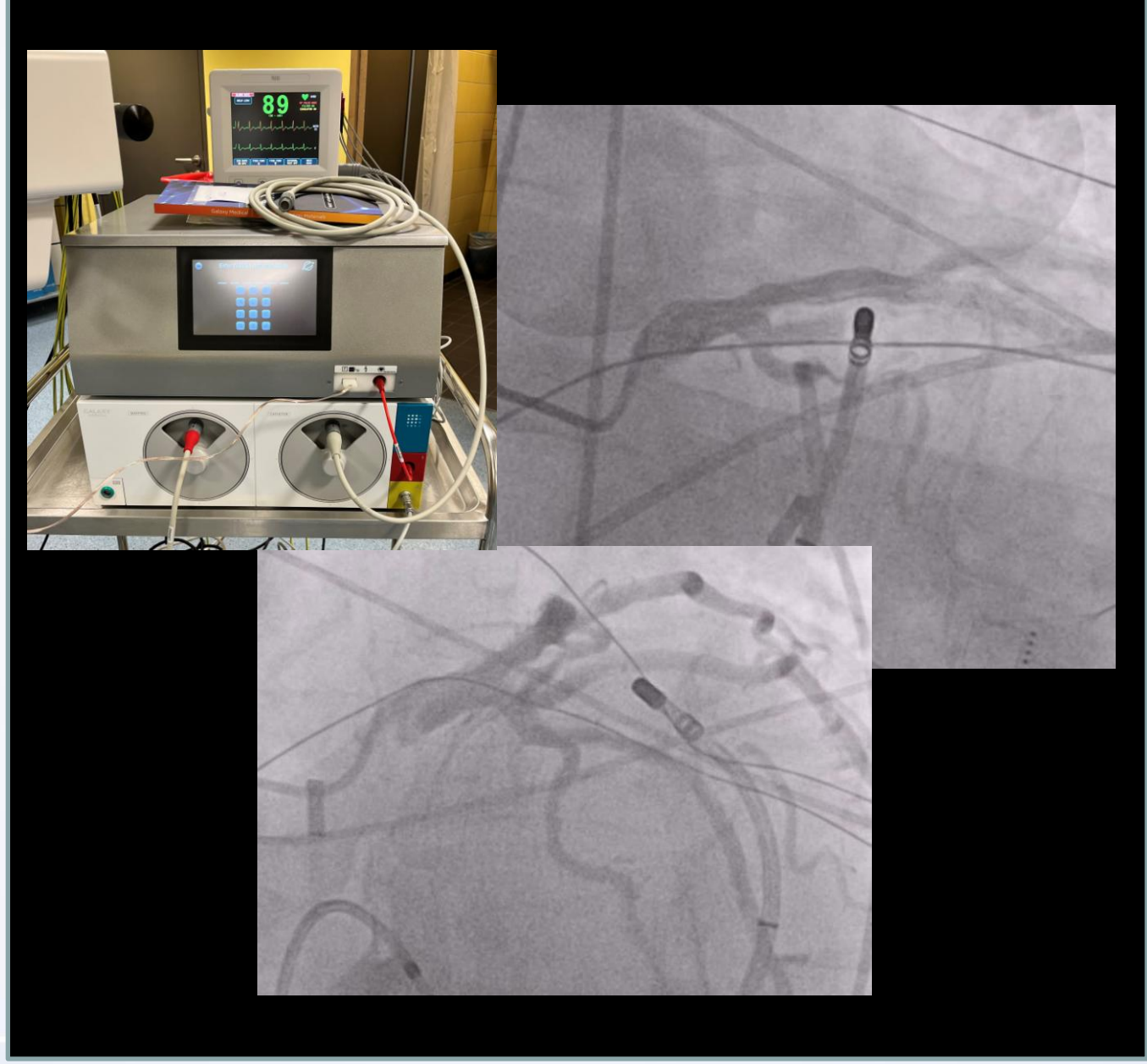
IKEM+Třinec+FN Ostrava



Hašková JACC EP 2024

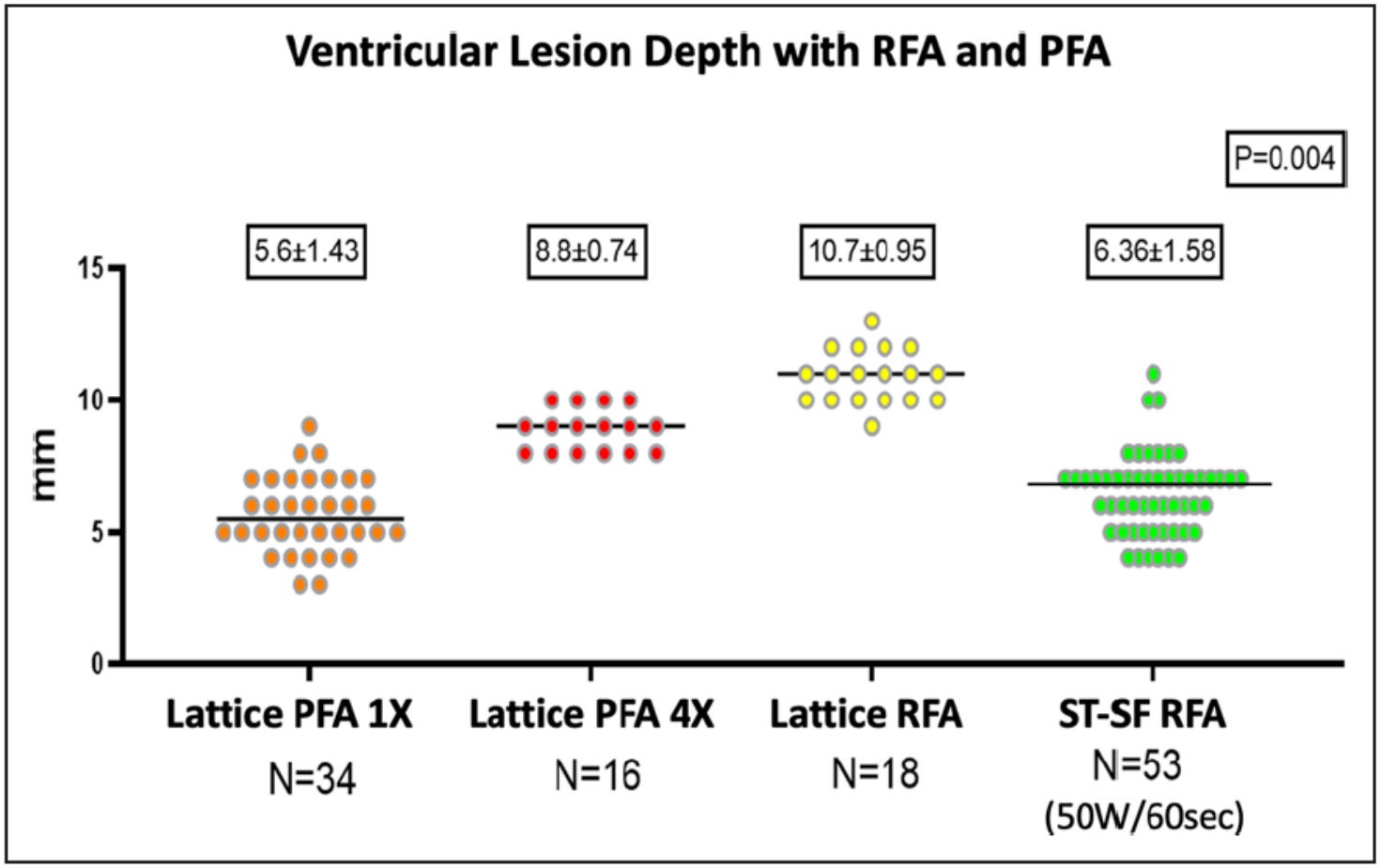
Ablace pomocí pulsního pole v CS pro KES/KT

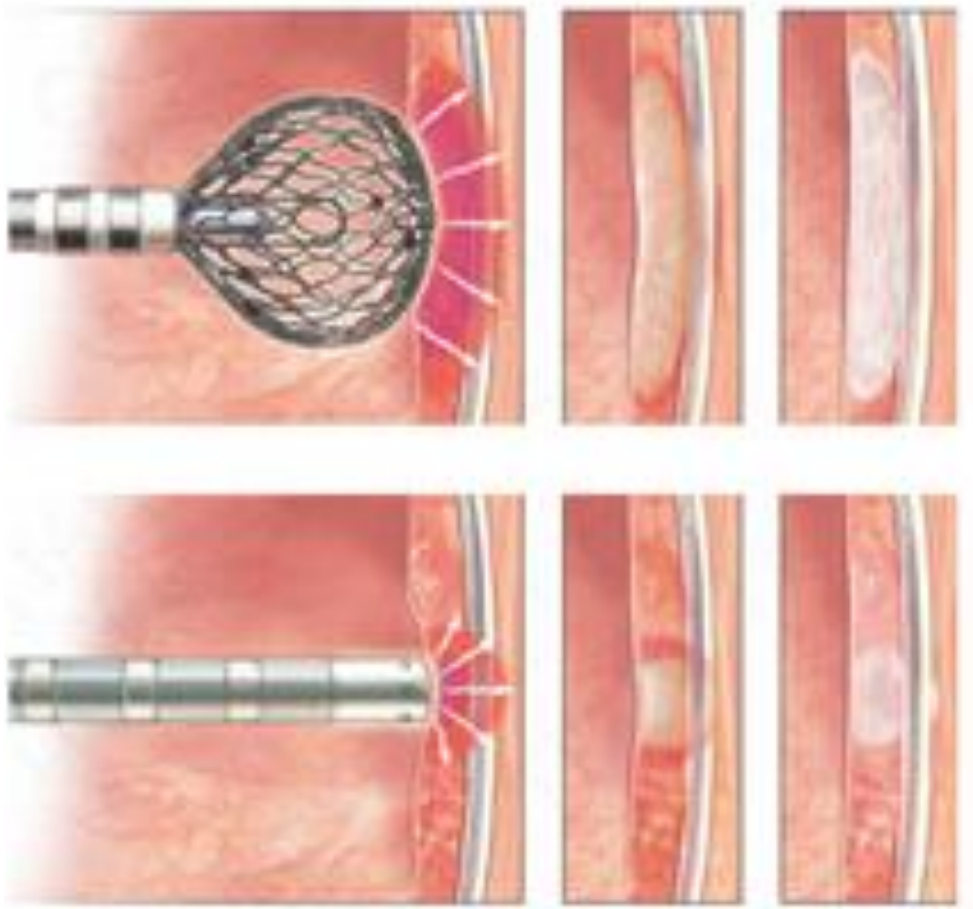
- **n=12 pts**
  - 75% previous failed RF ablations
- **Acute success 75%**
- Prematurity for successful applications **30±9ms**
- Distance to coronary artery **up to 2-6mm**
- **No major complications/ spasm** noted in any



Peichl and Bulava: Unpublished data

Affera by Medtronic

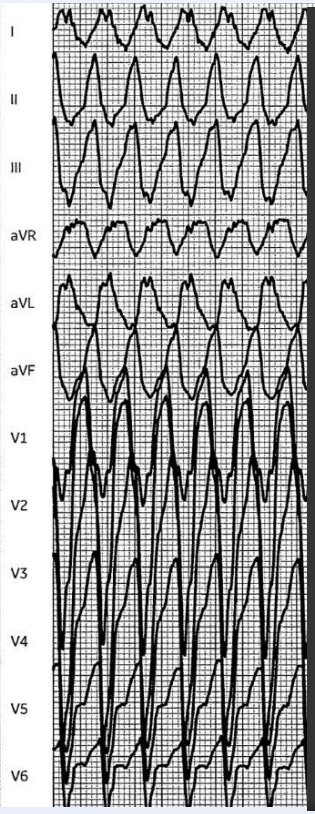




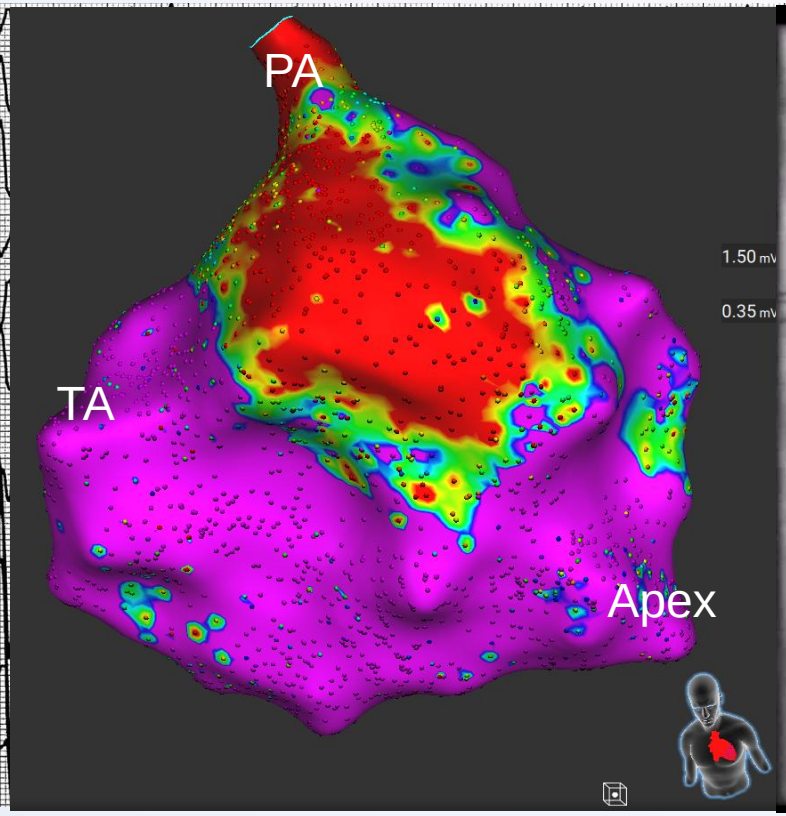
Barkagan Circ EP 2019
Yavin HD, Circ EP 2021

Affera – PF illustrative case

GUCHD pt with VT after previously failed RF ablation

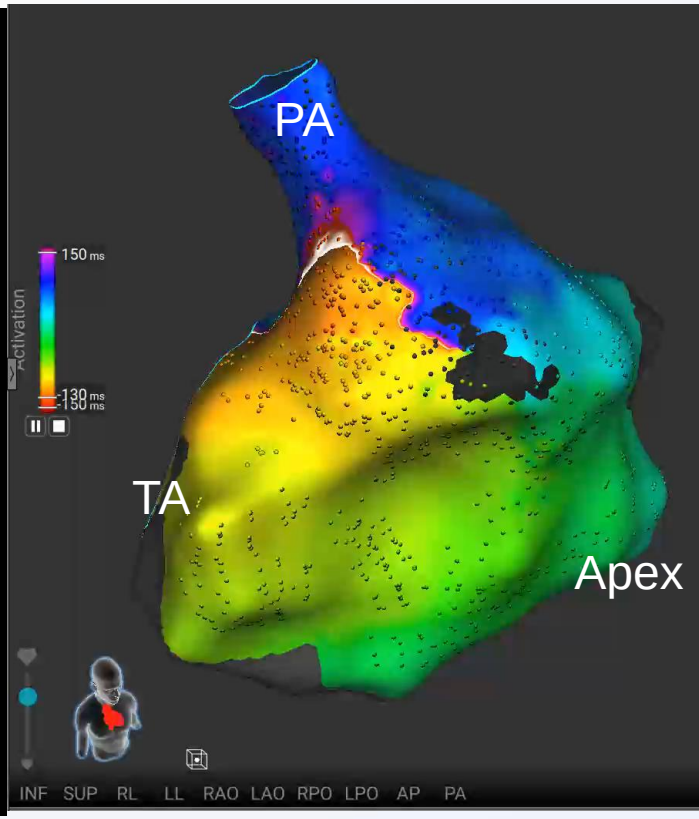


VT



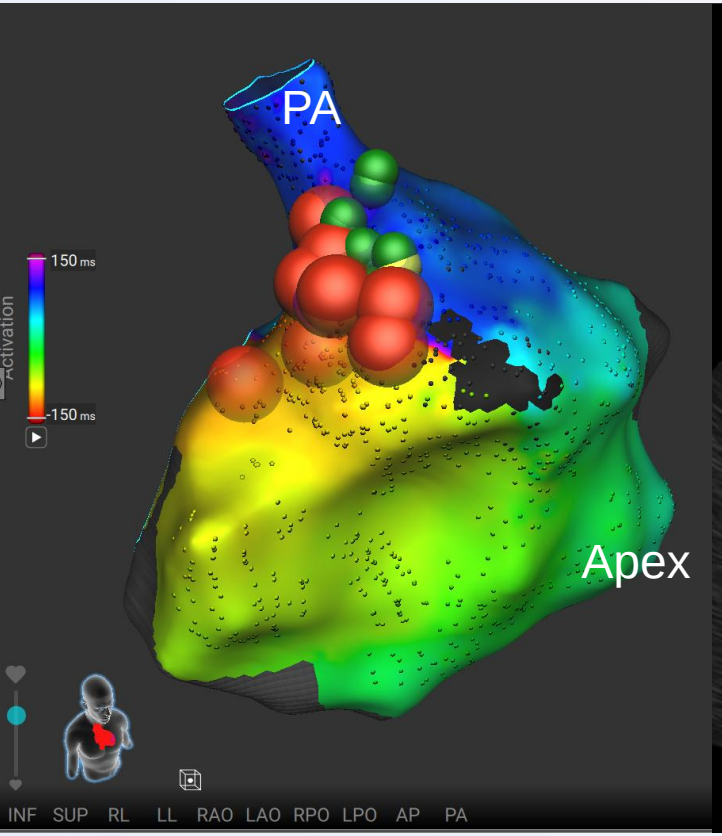
Voltage map with scar over RVOT

Transcatheter PV valve

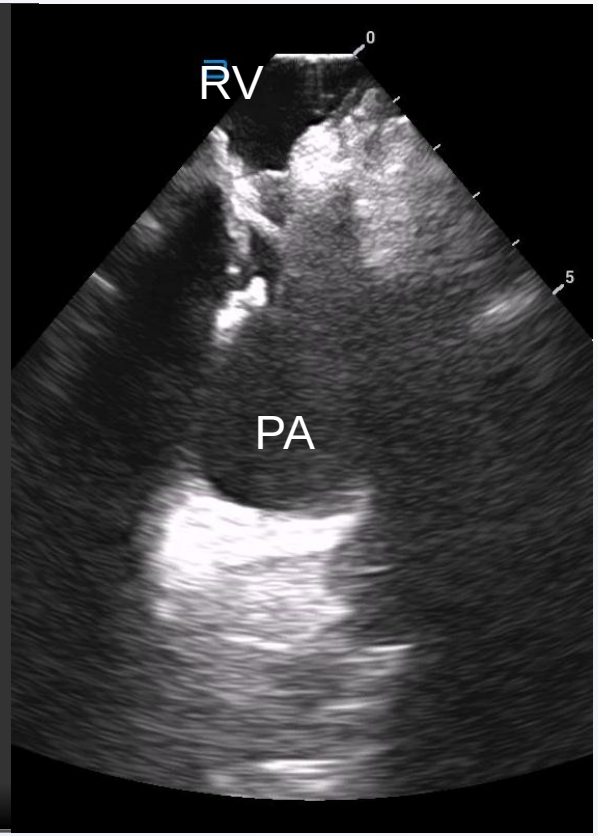


Activation during VT

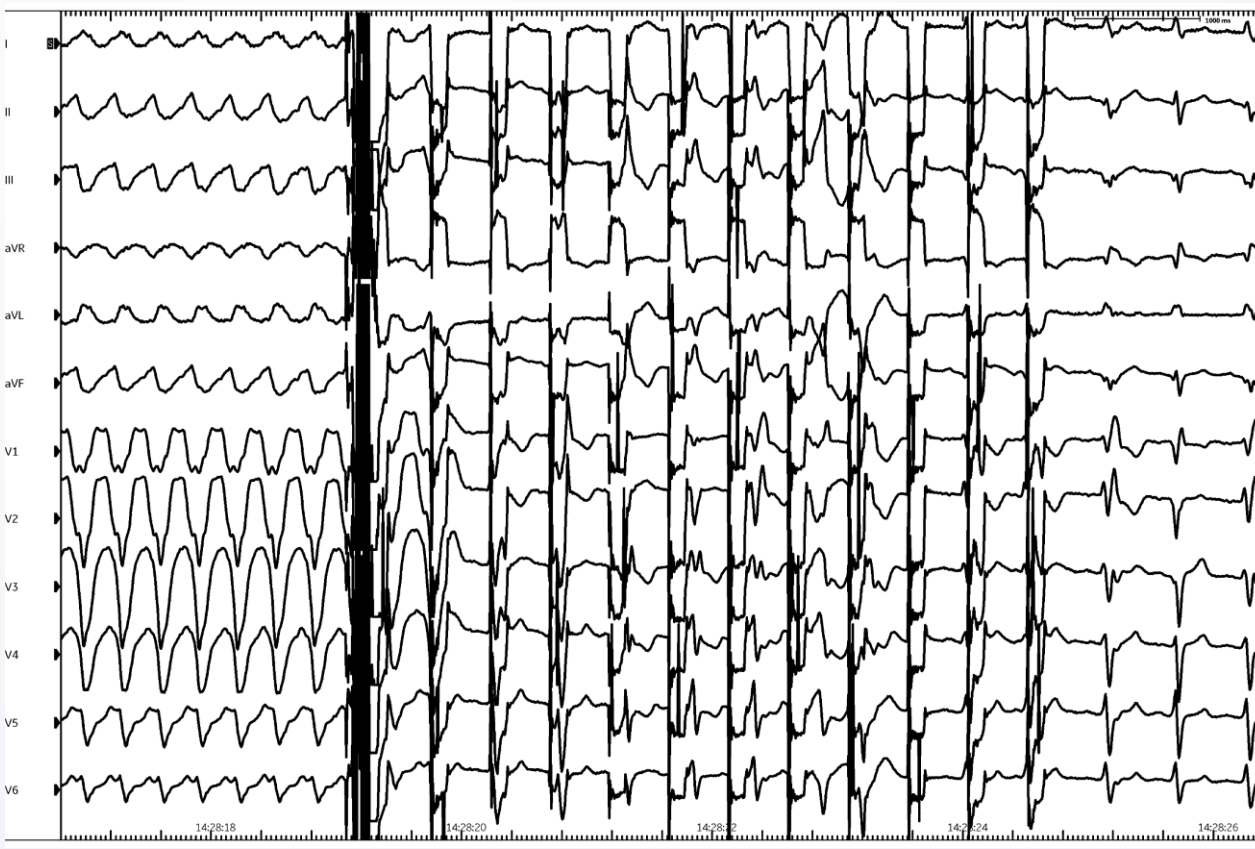
VT termination only after multiple PF lesions



Ablation in the „channel“

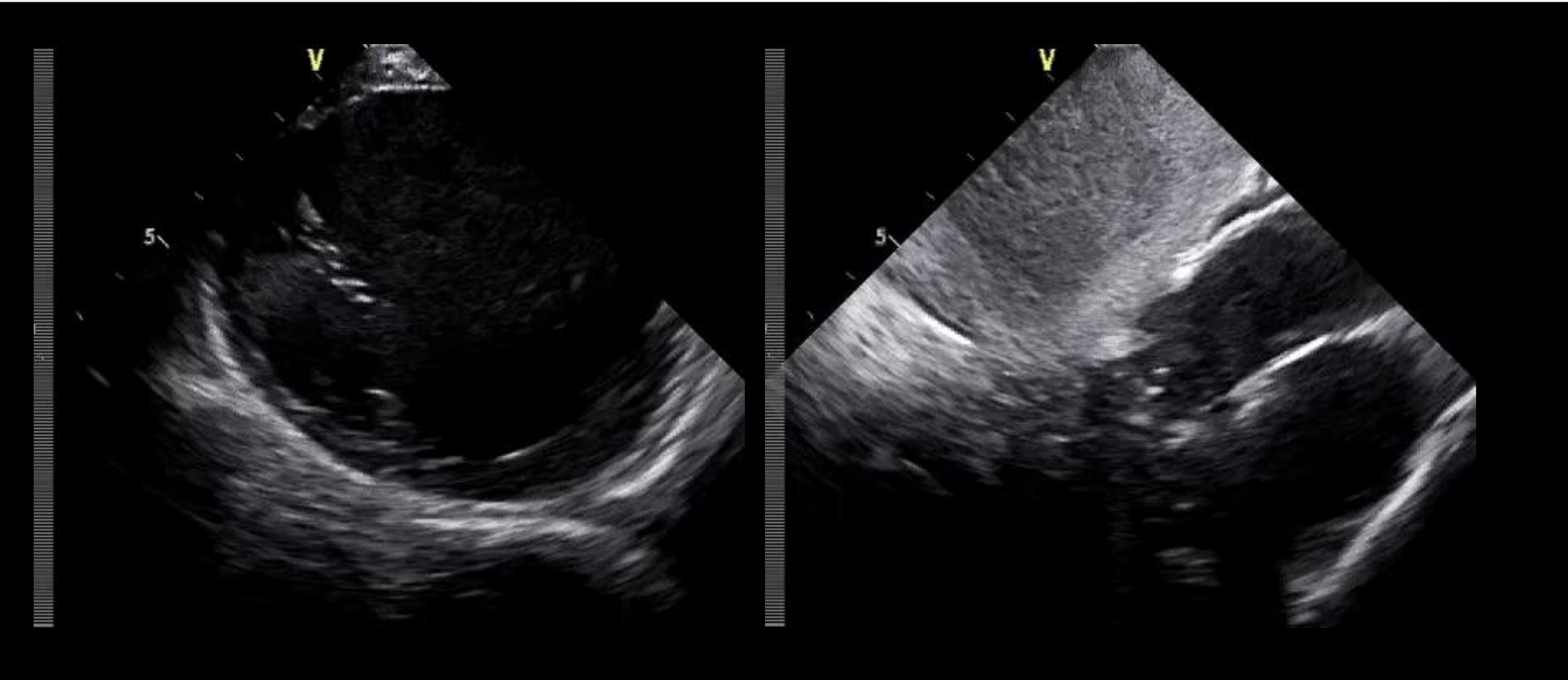


Sphere under the TPV



Termination with 3rd PF application

A co když dominuje srdeční selhání?



Acute hemodynamic decompensation during VT ablation

IKEM analysis

Population
Patients who had their **first** ablation for **SHD-related** VA between **August 2006 and December 2020** and followed up to September 2022

Baseline Characteristics (N = 1143)	
Age	63 ± 13 yrs
Males	87 %
Ischemic CMP	67 %
Electrical storm	25 %
NYHA	2.1 ± 1.0
LVEF	34 ± 13 %
Diabetes mellitus	32 %
COPD	12 %
Prior LVAD	2.4 %
PAINESD score	**11.4 ± 6.6**

Periprocedural Characteristics (N = 1143)	
Procedure time	187 ± 78 min
RF Time	23 ± 15 min
Major complications	7.5 %
Acute HF event	1.1 %

Clinical Outcome (N = 1143)	
Follow up	4.1 (IQR: 2.0 – 7.2) yrs
Reablation	28 %
New LVAD	2.7 %
Heart transplant	5.2 %
All-cause death	48 %

Stojadinovič Europace 2024

Characteristics of Ventricular Tachycardia Ablation in Patients With Continuous Flow Left Ventricular Assist Devices

Frederic Sacher, MD, PhD; Tobias Reichlin, MD; Erica S. Zado, PA-C; Michael E. Field, MD; Juan F. Viles-Gonzalez, MD; Petr Peichl, MD, PhD; Kenneth A. Ellenbogen, MD; Philippe Maury, MD; Srinivas R. Dukkipati, MD; Francois Picard, MD; Josef Kautzner, MD, PhD; Laurent Barandon, MD, PhD; Jayanthi N. Koneru, MD; Philippe Ritter, MD; Saagar Mahida, MBChB; Joachim Calderon, MD; Nicolas Derval, MD; Arnaud Denis, MD; Hubert Cochet, MD, PhD; Richard K. Shepard, MD; Jerome Corre, MD; James O. Coffey, MD; Fermin Garcia, MD; Meleze Hocini, MD; Usha Tedrow, MD; Michel Haissaguerre, MD; Andre d'Avila, MD; William G. Stevenson, MD; Francis E. Marchlinski, MD; Pierre Jais, MD

Difficult vascular access due to absence of pulsatility

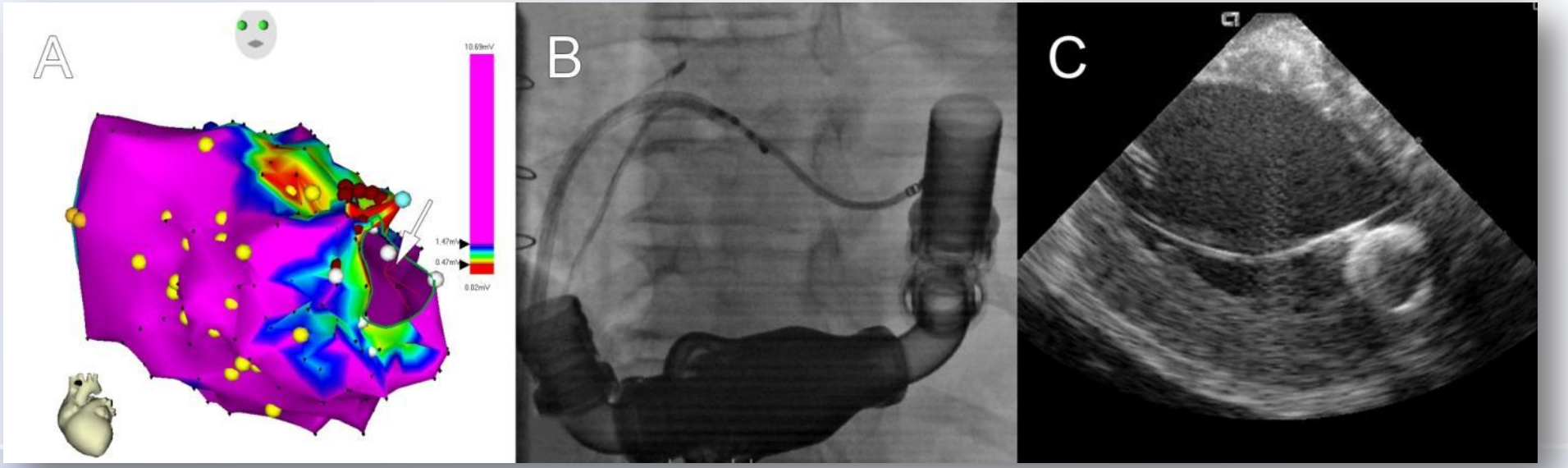
- US guided puncture recommended

Aortic valve may not open

- TS approach preferred

Risk of catheter entrapment

HD support of LVAD allows mapping during ongoing VT

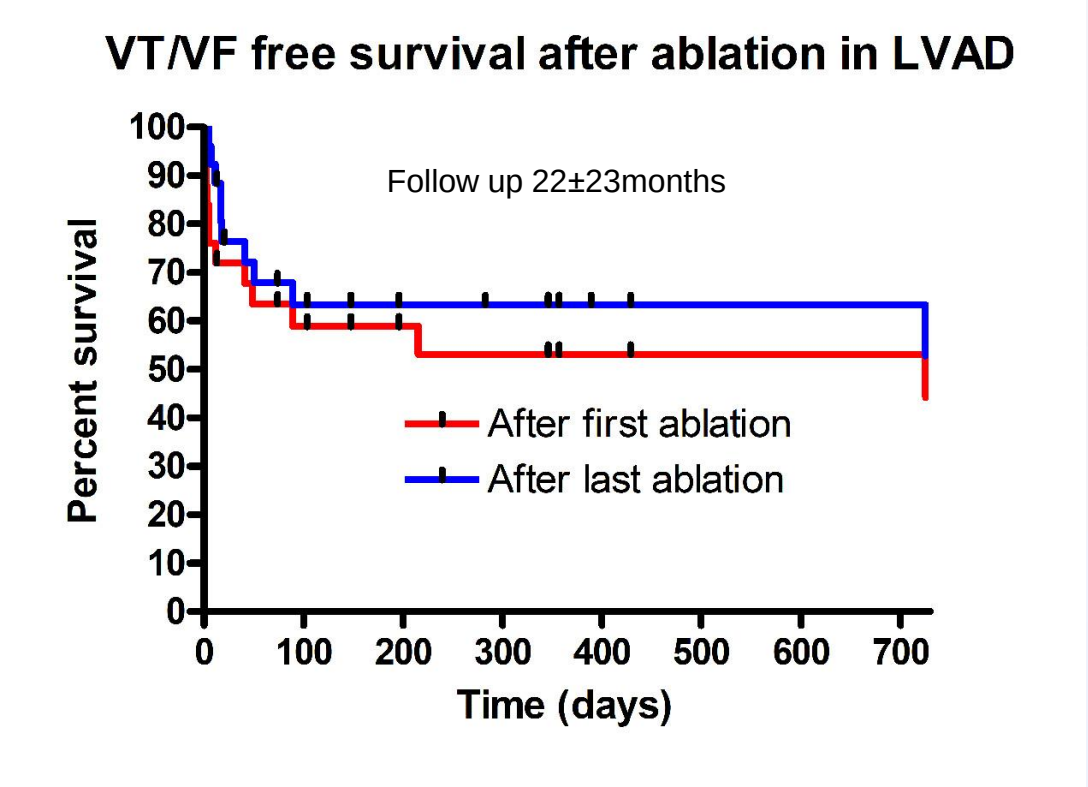


Sacher F *Circ EP* 2014

VT Ablation on LVAD (HM II / III)

Prague experience - 2010-2023

- **26pts** (3 women, aged 59±8years)
- 62% CAD pts
- Implantation of HM II (50%) or HM III (50%)
- 62% had sustained VA episodes prior implantation of LVAD (42% had VT ablation)
- VT ablation postLVAD implant (1.5±0.9ablations/pt)
- **No severe complications**
- **59% successfully transplanted**
- **54% died**



Unpublished data

Komplikace ablace KT

Type of Complication	Total (n=722)	Idiopathic VT (n=249)	SHD-VT (n=473)
Death	0	0	0
Perforation	3 (0.4%)	0 (0.0%)	3 (0.6%)
Tamponade	2	0	2
Hemopericardium	1	0	1
Thromboembolic event	5 (0.7%)	1 (0.4%)	4 (0.8%)
Stroke intraprocedural	2	0	2
TIA intraprocedural	1	1	0
TIA <7 d	1	0	1
Systemic embolism (legs)	1	0	1
Conduction system damage	7 (1.0%)	1 (0.4%)	6 (1.3%)
AV block	6	1	5
LBBB resulting in HF	1	0	1
Other	4 (0.6%)	1(0.4%)	3 (0.6%)
Pericarditis	1	1	0
RV lead dysfunction	1	0	1
CPR during the procedure	2	0	2
Vascular access	26 (3.6%)	4 (1.6%)	22 (4.7%)
Femoral pseudoaneurysm	14	2	12
Femoral AVF	5	2	3
Groin hematoma			
With surgical management	3	0	3
With transfusion needed	3	0	3
With conservative management	1	0	1
Total	45 (6.2%)	7 (2.8%)	38 (8.0%)

Values are counts (%). AV indicates atrioventricular; AVF, arteriovenous fistula; CPR, cardiopulmonary resuscitation; HF, heart failure; LBBB, left bundle branch block; RV, right ventricular; SHD, structural heart disease; TIA, transient ischemic event; and VT, ventricular tachycardia.

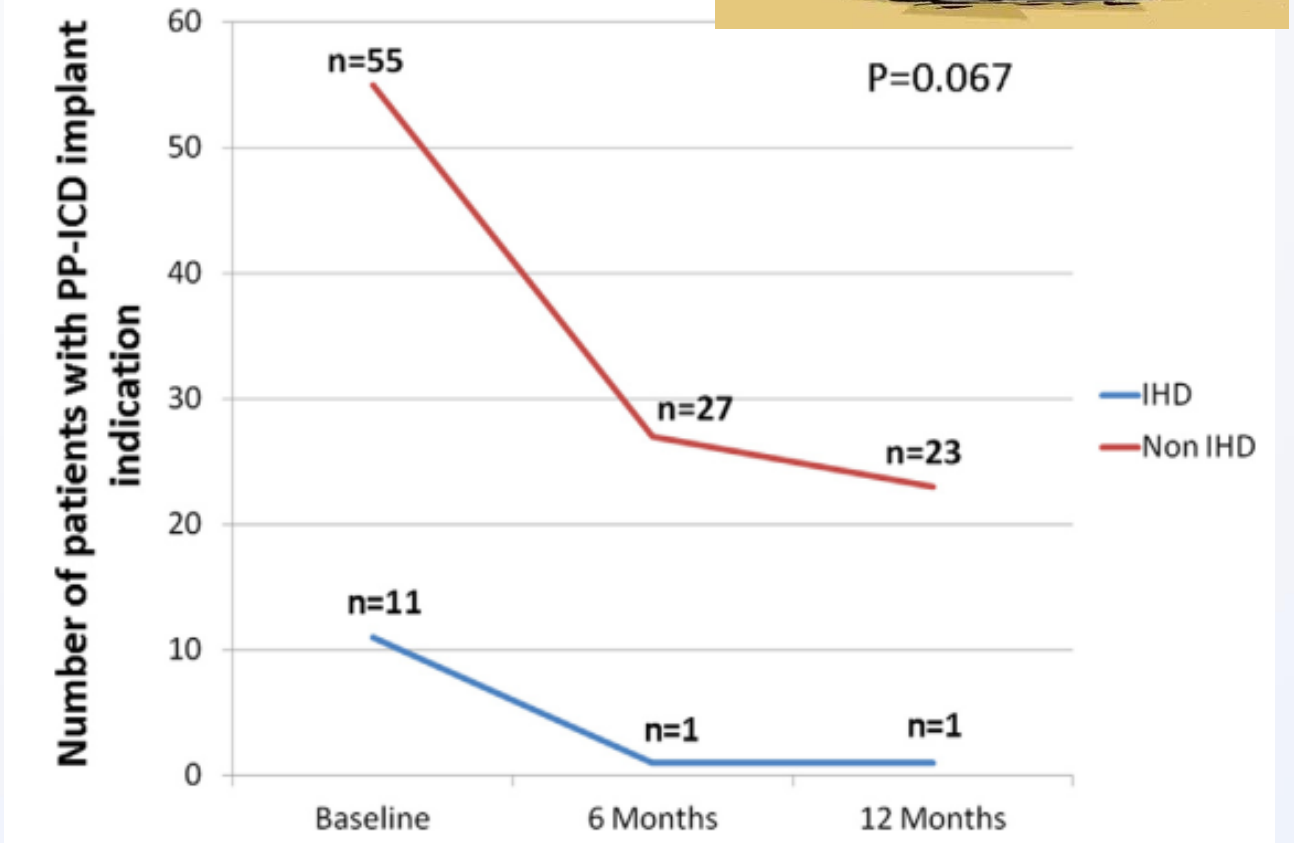
Peichl P, *Circulation EP*, 2014

- 722 pts s ablací KT v období 2006-2012
  - 249 idiopatických KT
  - 473 ablací u strukturálního srdečního onemocnění
- Celkové riziko komplikací 6.2%
- Nejčastější vaskulární
- Život ohrožující komplikace jako tamponáda či CMP <1%
- **Prediktory komplikací:**
  - Věk >70let
  - Kreatinin >115umol/l
  - Ejekční frakce <25%

Jaký je dopad ablace KES/KT pro pacienty?

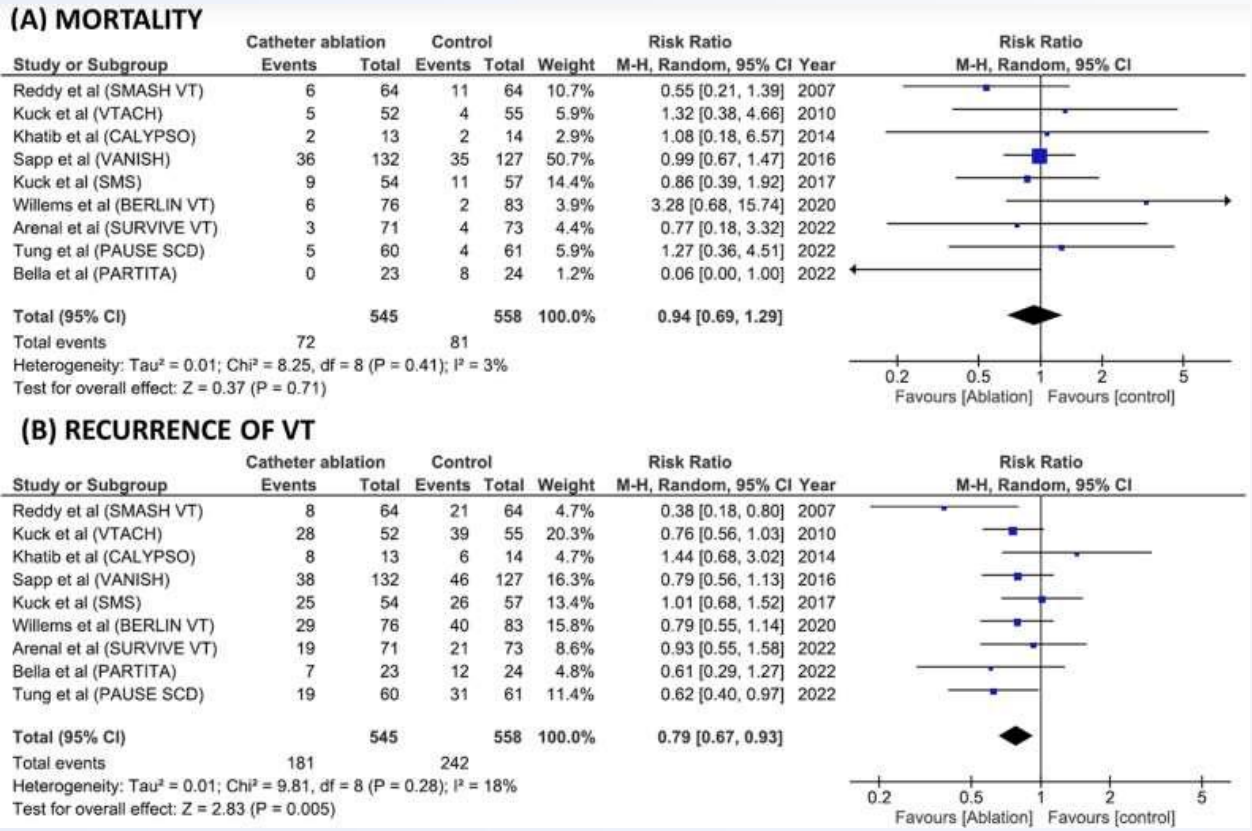
U pacientů s dysfunkcí LK a velmi četnou komorovou ektopií, ablace může zabránit implantaci ICD

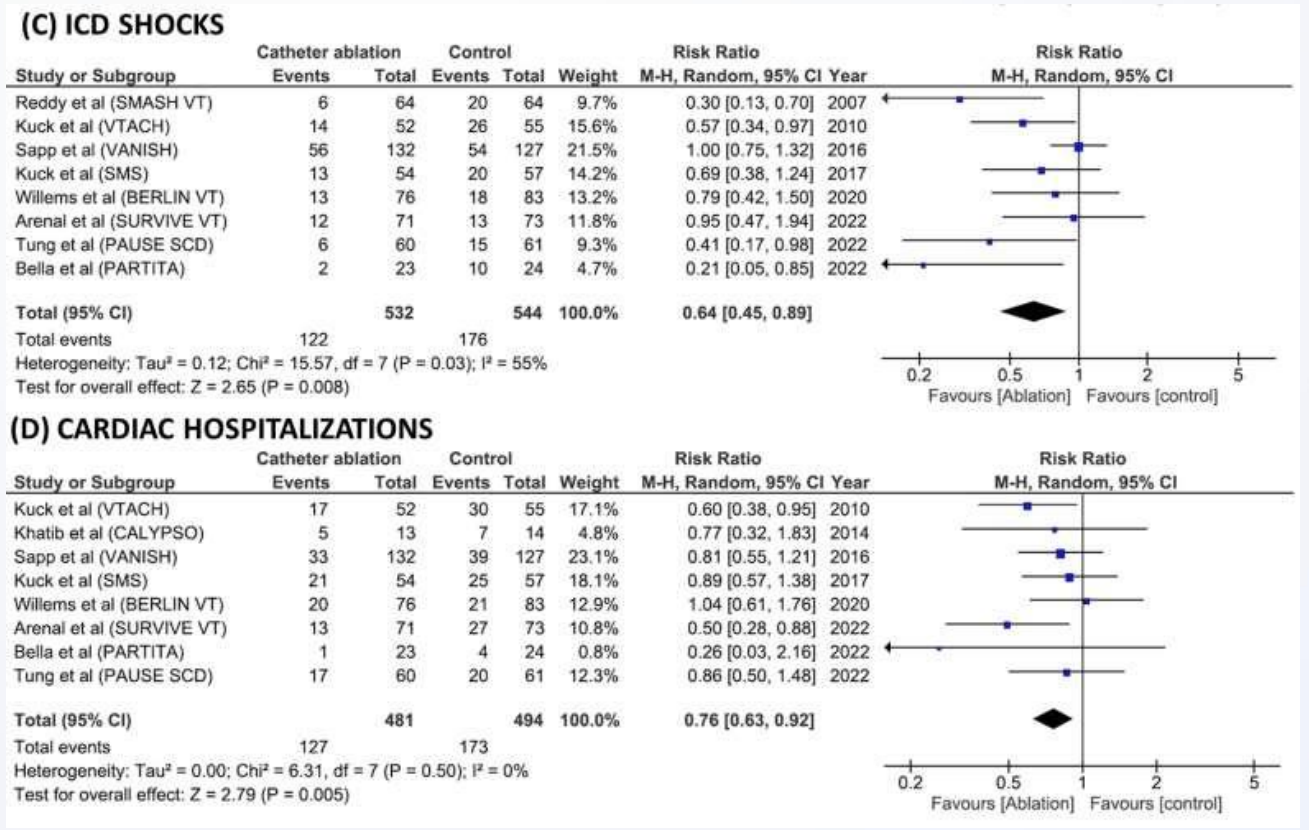
- 66pts with frequent PVCs, EF LV <35% suitable for primary prophylactic ICD implantation
- After ablation
  - EF LV improved from 28±4% to 42±12%
  - 42pts (64%) not fulfilled the indication criteria for ICD implant



Penela D Heart Rhythm 2015;12:2434

Ablace KT brání recidivám KT/výbojům ICD, snižuje počet hospitalizací…





Ravi V et al. J Interv Card Electrophysiol. 2023;66:161-175.

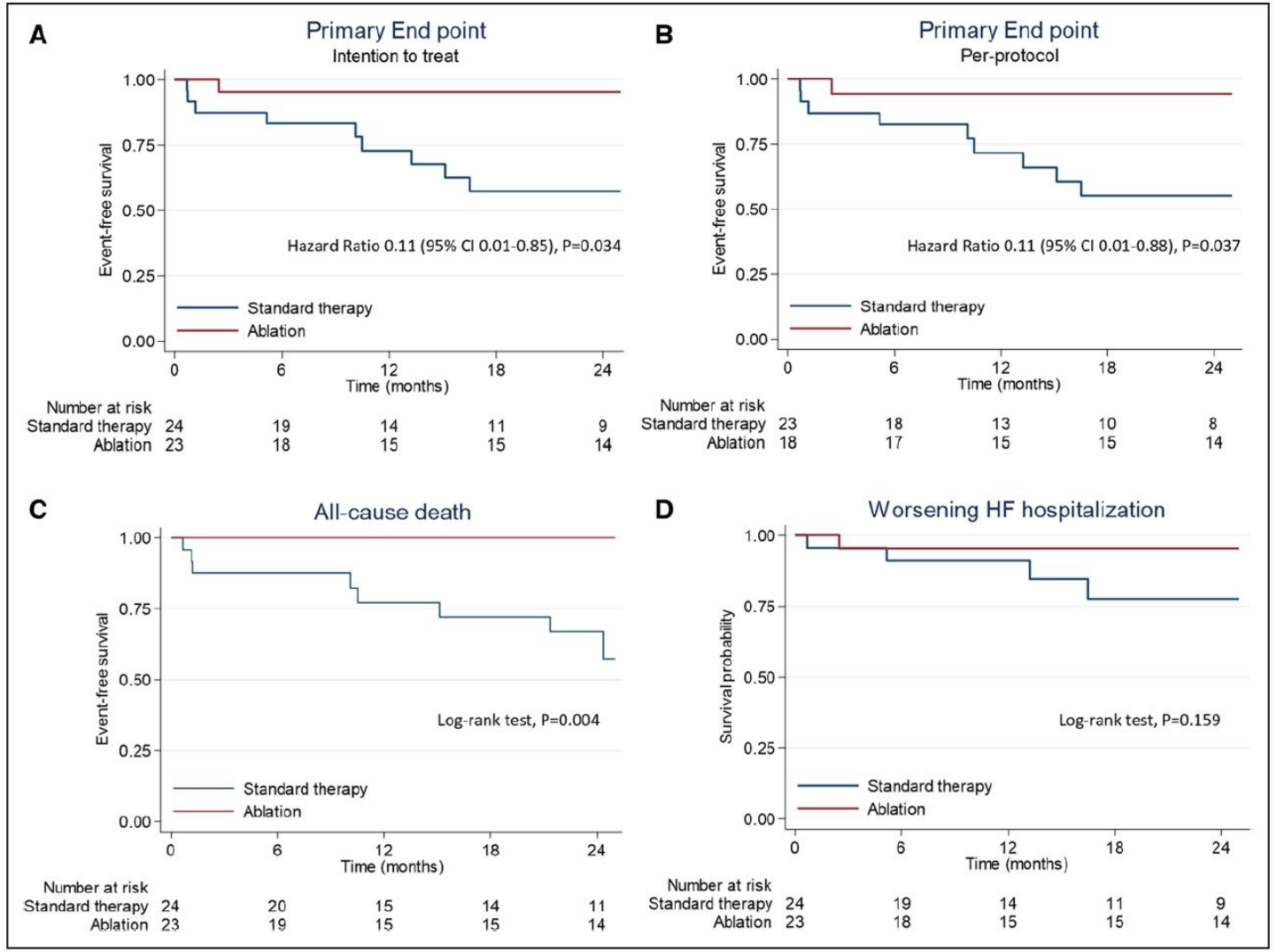
INSTITUT KLINICKÉ A EXPERIMENTÁLNÍ MEDICÍNY
KLINIKA KARDIOLOGIE

IKEM

PARTITA Study

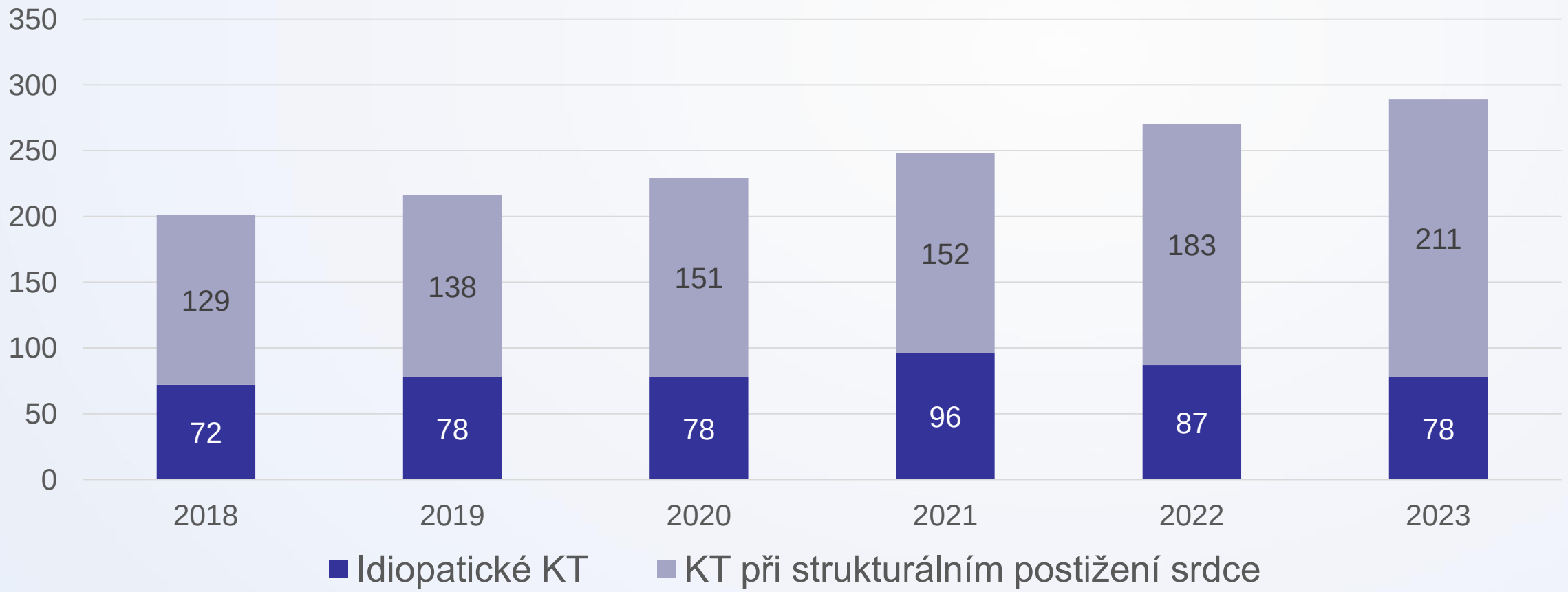
Early intervention after ICD shock improves prognosis

- 517 pts s ICD
- Pts that recieved ICD shock randomized to early ablation of standard care
- In interventional arm decrease in mortality and hospitalisation for HF

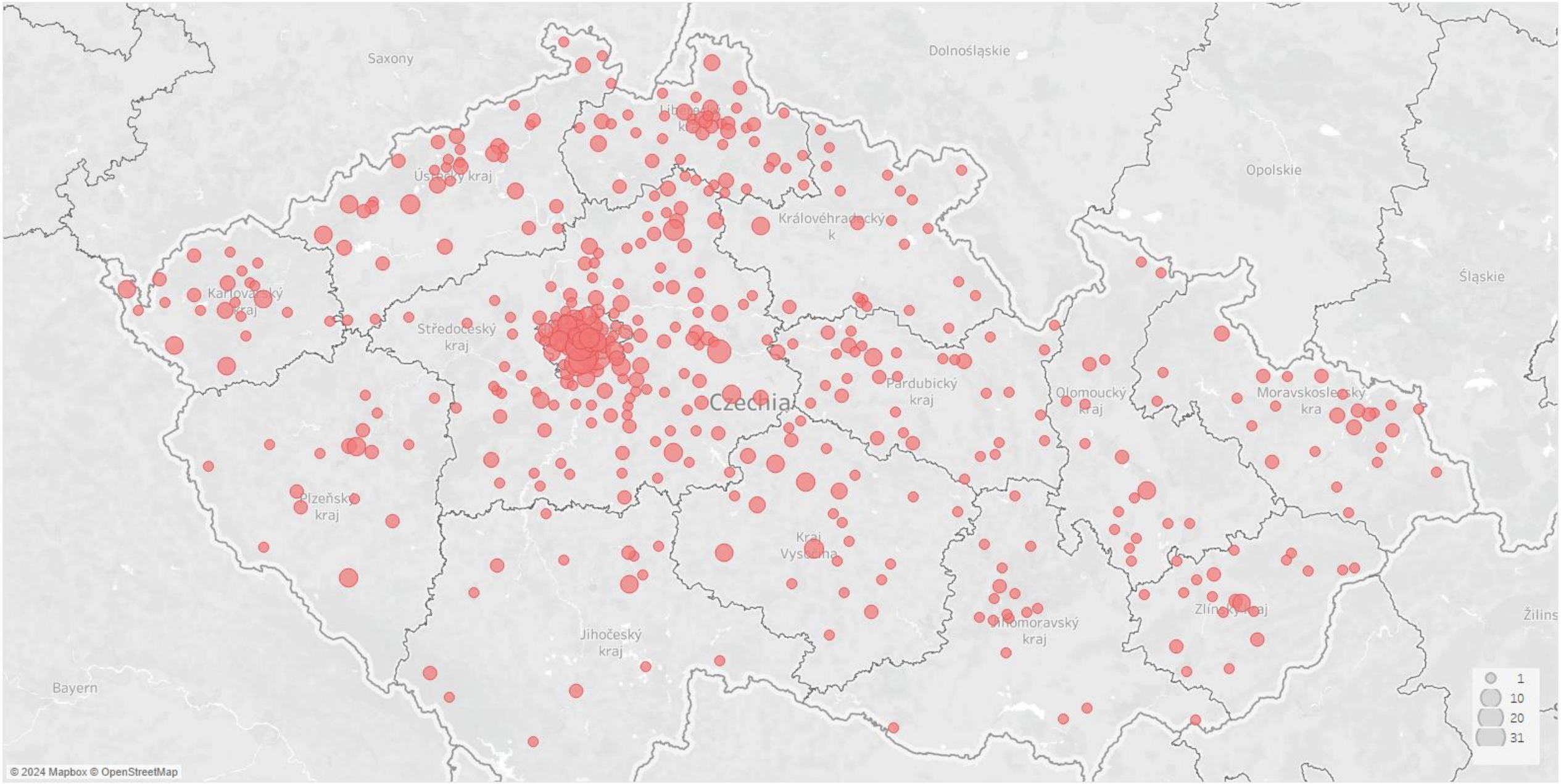


Della Bella P. Circulation. 2022;145:00–00.

Počty ablací KT v IKEM 2018-2023



Ablace KT v IKEM 2018-2023 podle místa bydliště pacienta



Závěry

- Na rozdíl od ablace fibrilace síní, může být arytmogenní substrát pro KT výrazně variabilní
- K úspěšné modifikaci arytmogenního substrátu a eliminaci KT je často třeba použít alternativních technik
- Vzhledem k specializovanému charakteru péče by tato léčba měla být směřována do specializovaných center

komorovky@ikem.cz