

# Jak na to? Pacient s výboji ICD nebo arytmiickou bouří

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# Arytmická bouře – definice

- **Arytmická bouře** je definována jako 3 a více epizod komorových arytmií vyžadujících intervenci za 24 hodin.



ESC

European Society  
of Cardiology

European Heart Journal (2022) 00, 1–130  
<https://doi.org/10.1093/eurheartj/ehac262>

ESC GUIDELINES

## 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Developed by the task force for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death of the European Society of Cardiology (ESC)

Endorsed by the Association for European Paediatric and Congenital Cardiology (AEPC)



ESC

European Society  
of Cardiology

Europace (2024) 26, 1–36

<https://doi.org/10.1093/europace/euae049>

EHRA DOCUMENT

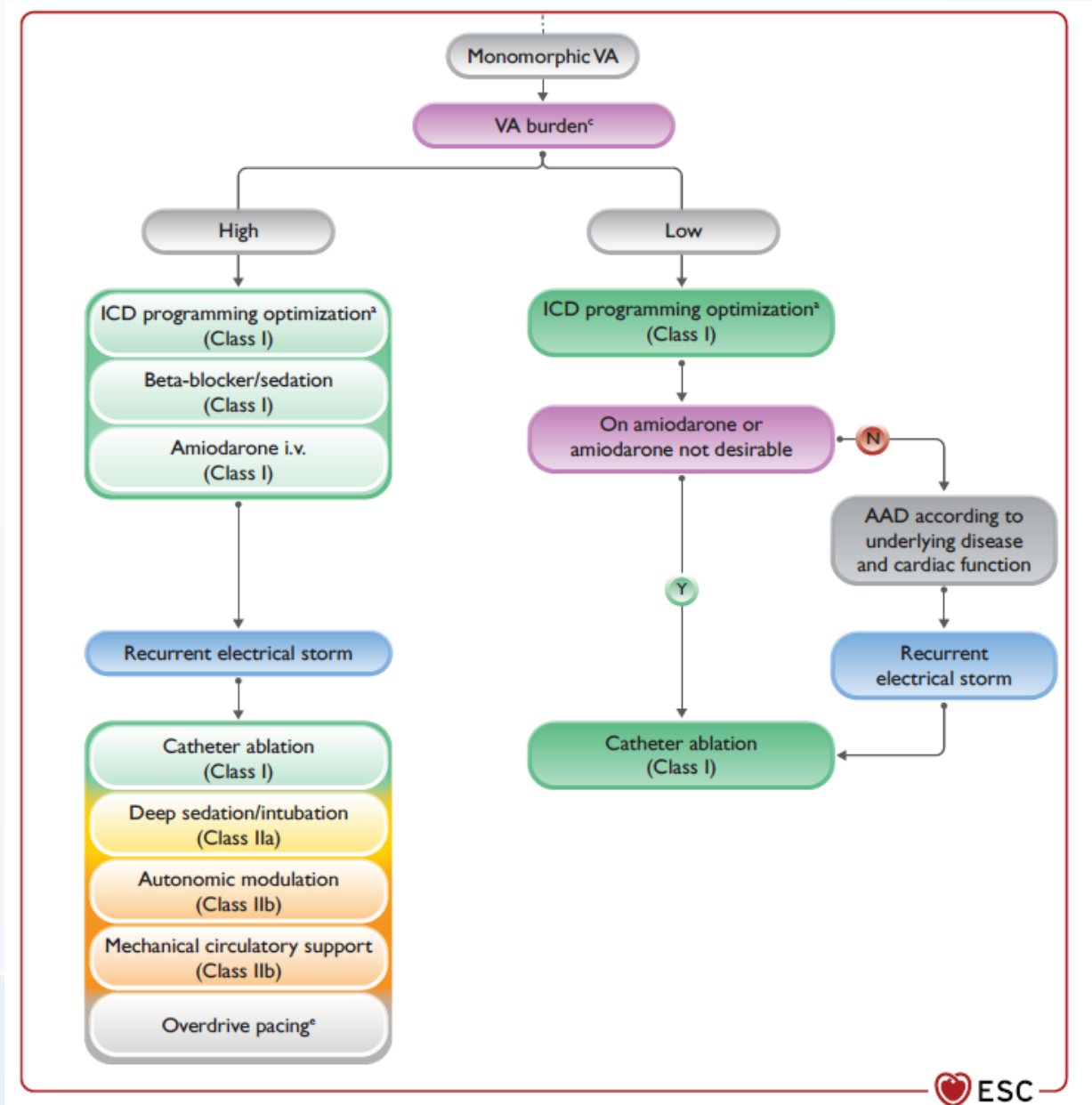
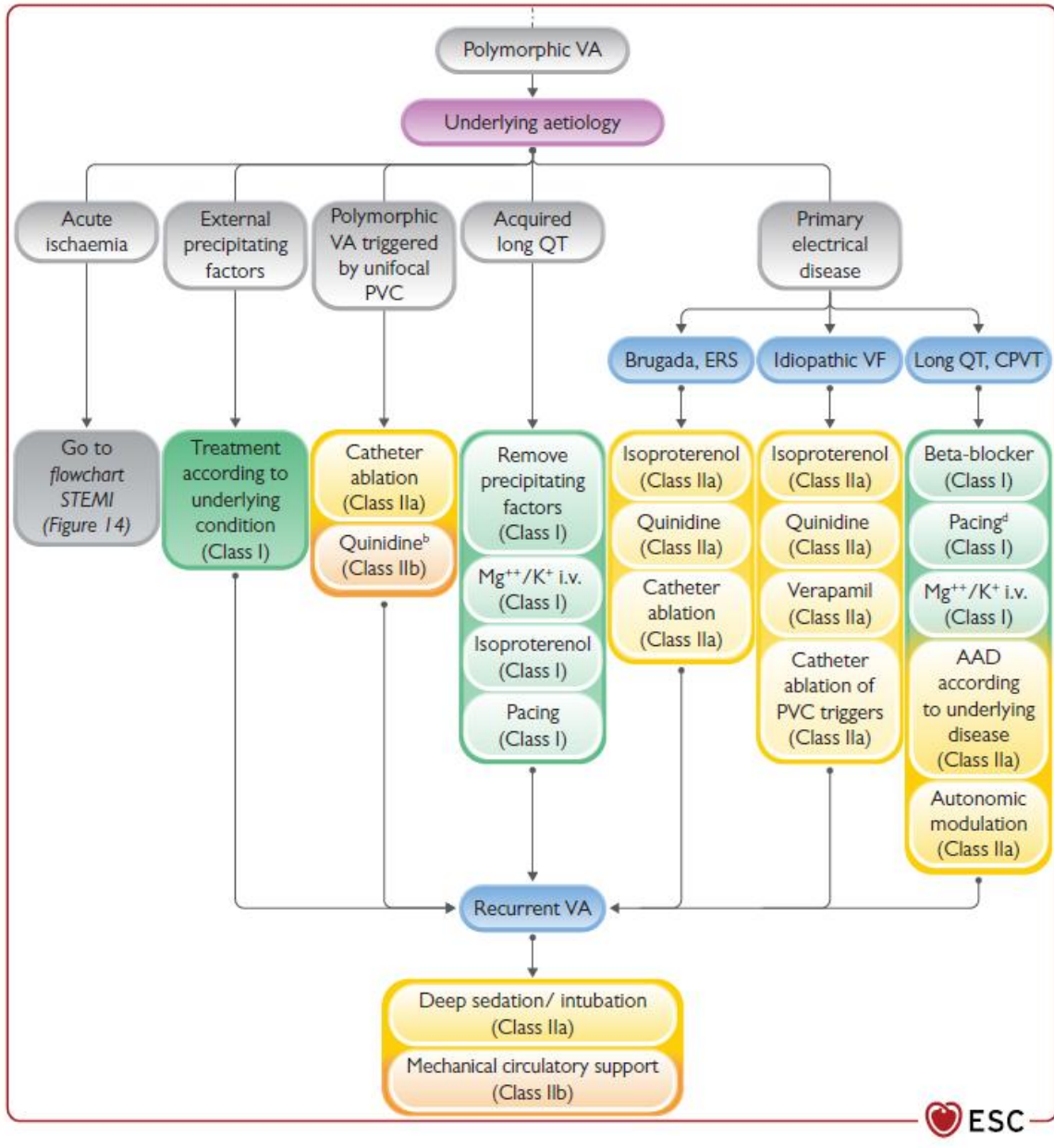


EHRA

European Heart  
Rhythm Association

**Management of patients with an electrical storm or clustered ventricular arrhythmias: a clinical consensus statement of the European Heart Rhythm Association of the ESC—endorsed by the Asia-Pacific Heart Rhythm Society, Heart Rhythm Society, and Latin-American Heart Rhythm Society**

# Řešení arytmiické bouře má být komplexní

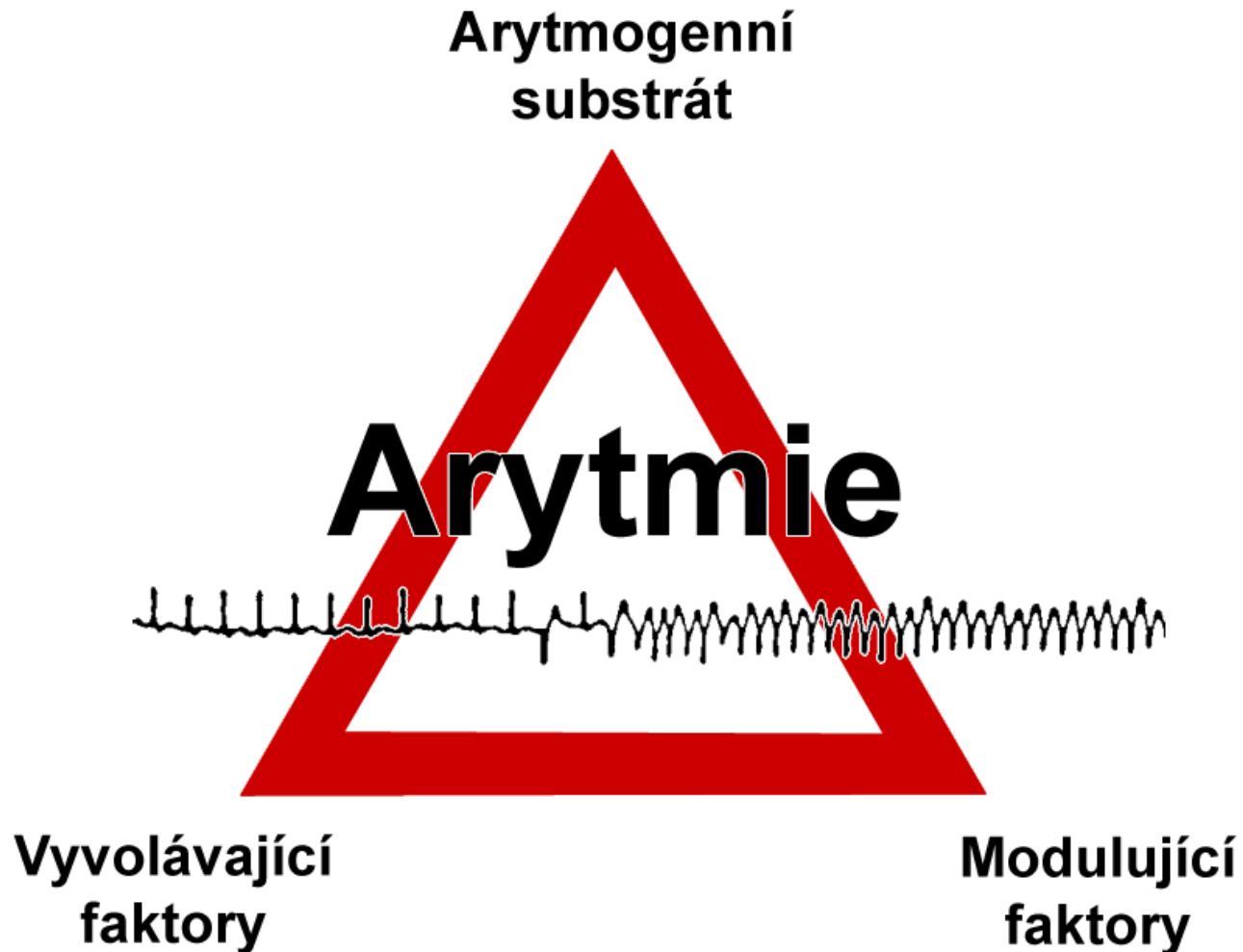


# Patofyziologie arytmii

## Trojúhelník arytmogeneze



Philippe Coumel  
(1935-2004)

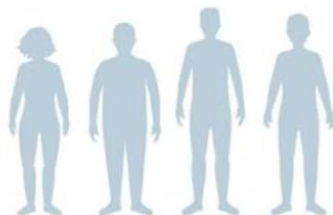


- **Arytmogenní substrát**
  - Jizva po infarktu myokardu
- **Vyvolávající faktory**
  - Spouštěcí extrasystola
- **Modulující faktory**
  - *Autonomní nervový systém*
  - Ischémie, hypokalémie

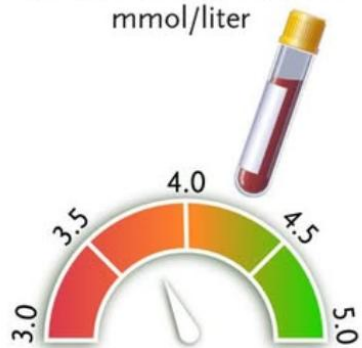
# Hypokalémie je arytmogenní!

## Participants

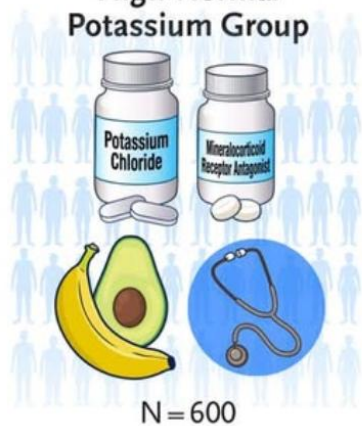
- 1200 adults
- Mean age, 63 years
- Men: 80%; Women: 20%



## Plasma Potassium Levels mmol/liter

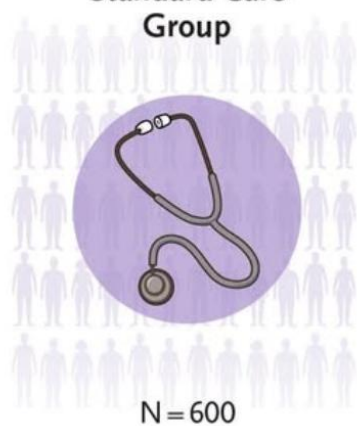


## High-Normal Potassium Group



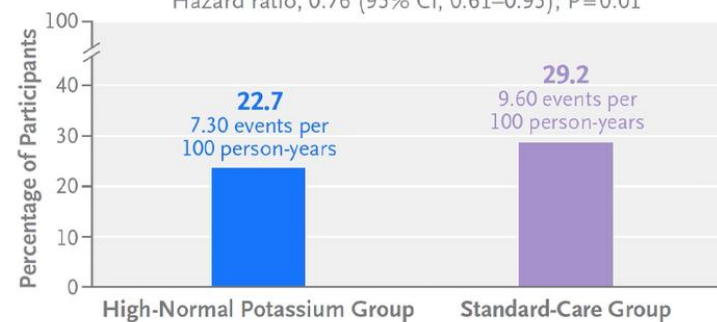
N = 600

## Standard-Care Group



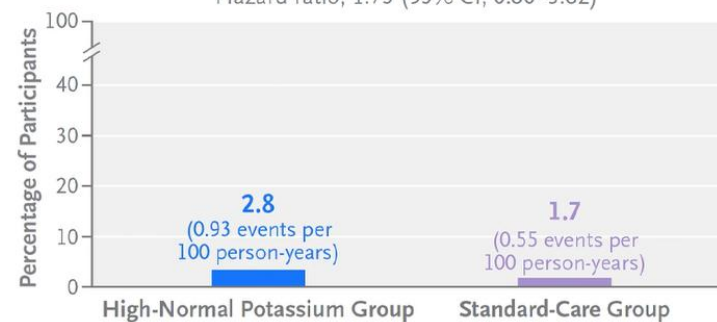
## Primary End-Point Events

Hazard ratio, 0.76 (95% CI, 0.61–0.95); P=0.01

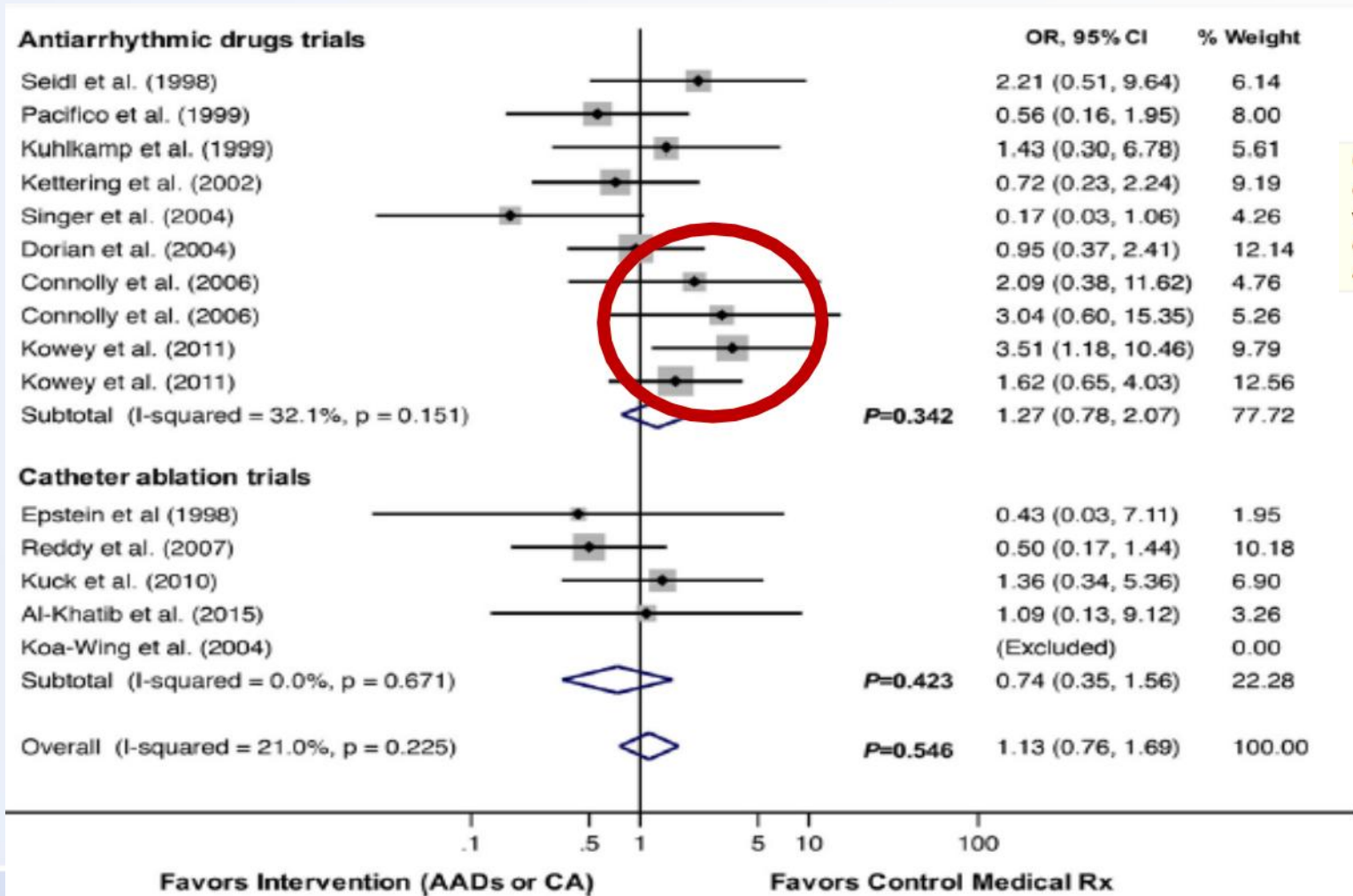


## Hospitalization for Hypokalemia, Hyperkalemia, or Kidney Failure

Hazard ratio, 1.75 (95% CI, 0.80–3.82)



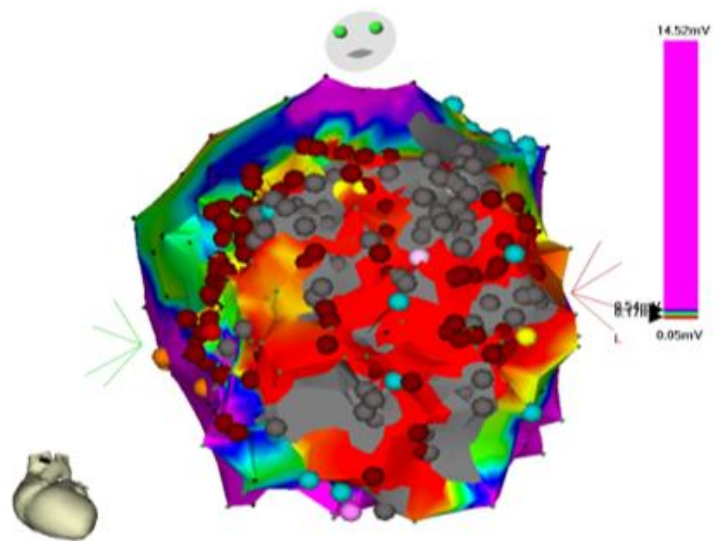
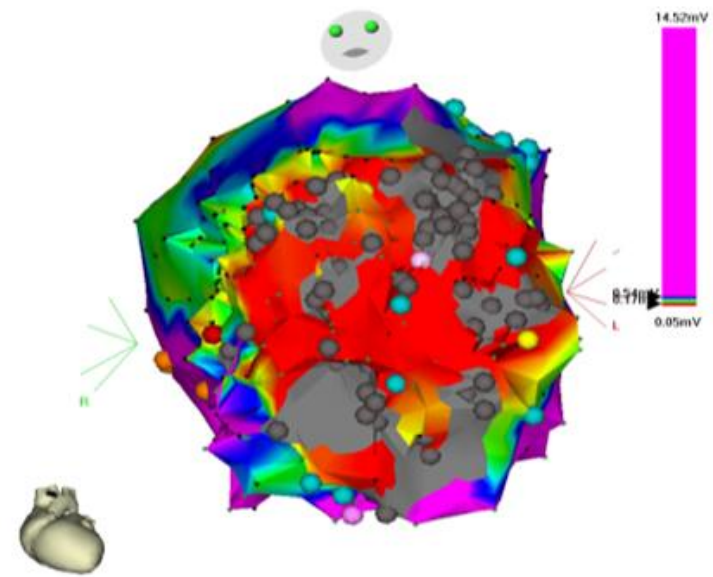
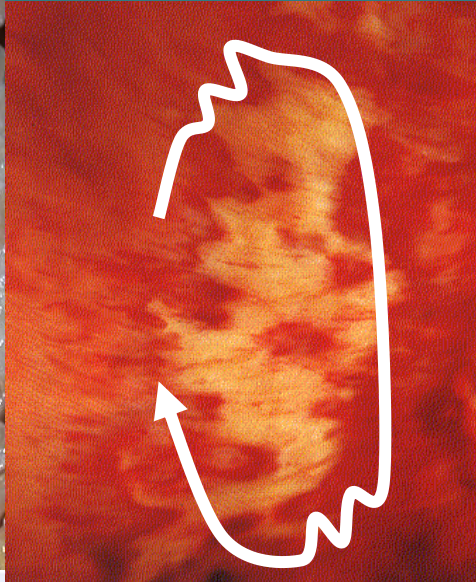
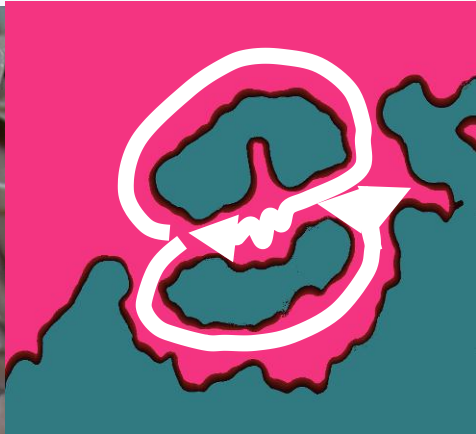
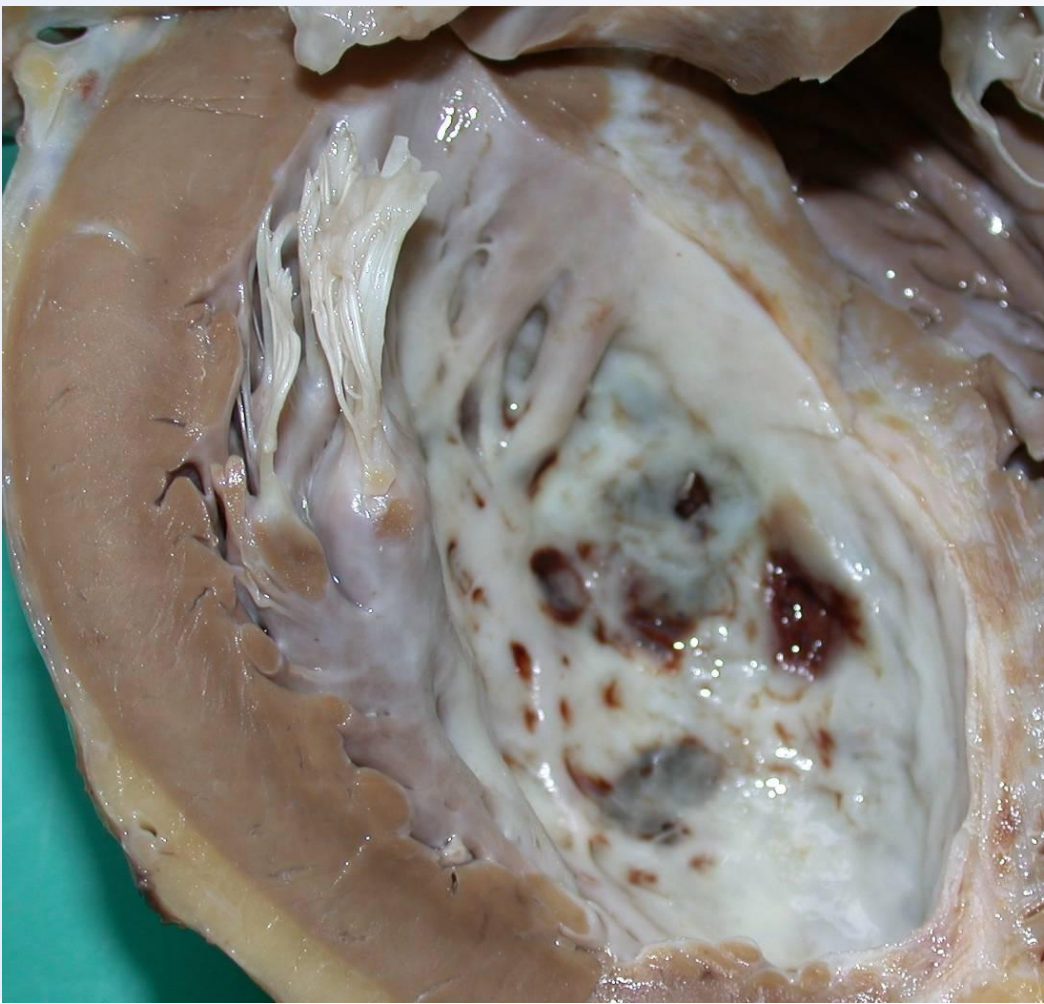
# Antiarytmika v léčbě KT



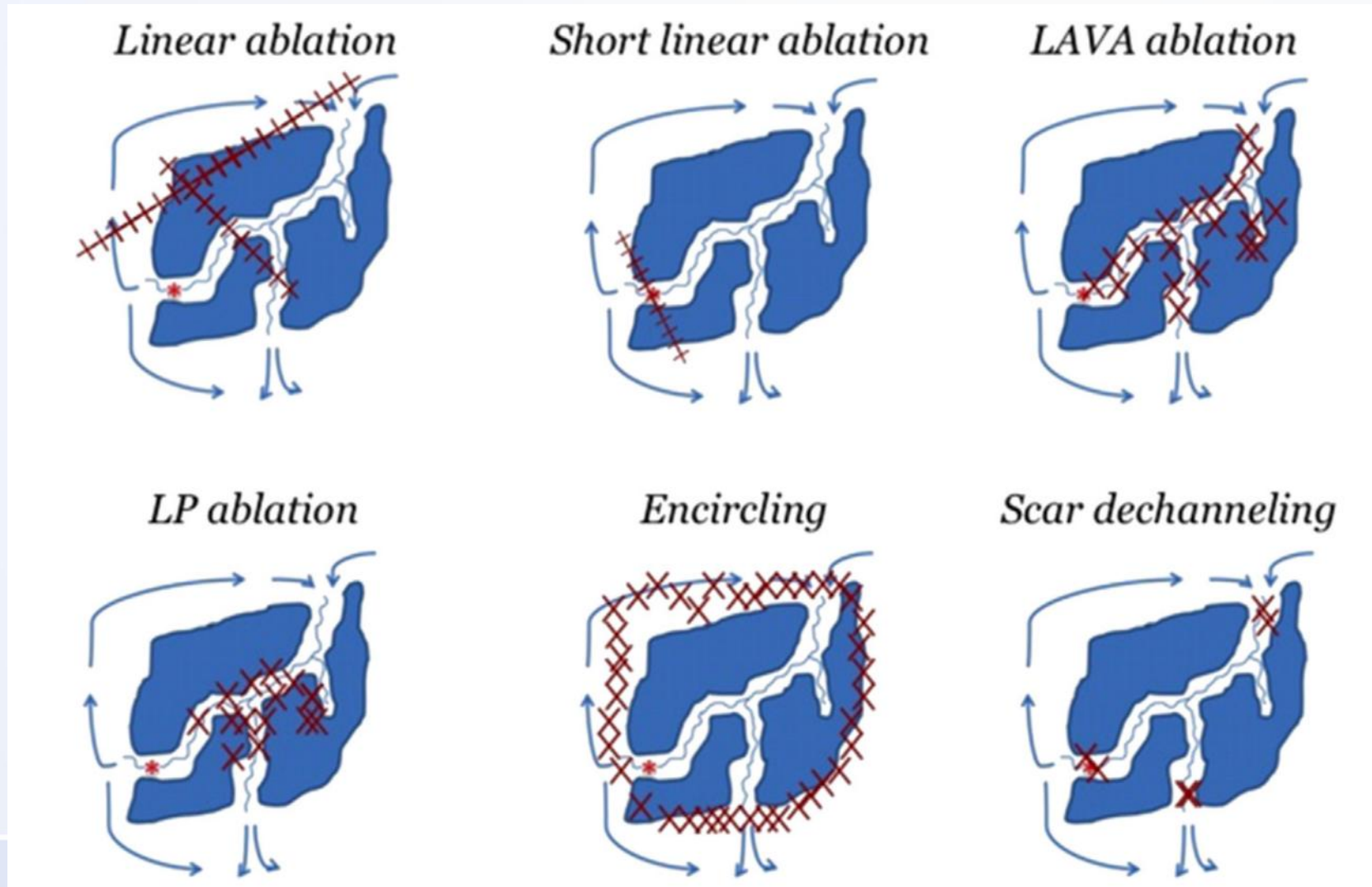
Comparative effectiveness of antiarrhythmic drugs and catheter ablation for the prevention of recurrent ventricular tachycardia in patients with implantable cardioverter-defibrillators: A systematic review and meta-analysis of randomized controlled trials

Amiodarone je asociován s horší mortalitou!

# Anatomický substrát pro KT

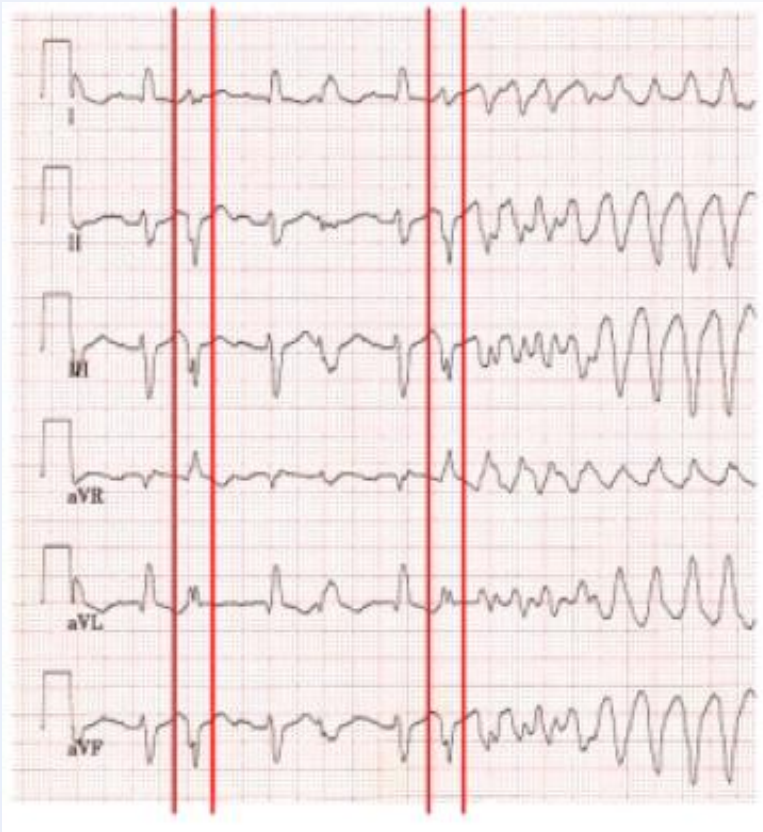


# Substrate based ablation strategies



# Ablation of focally triggered VT/VF in CAD

## Prague experience



- 22 subjects with VF after MI or CABG
  - 17 of them (77%) within 1 month after extensive MI
  - All in desperate condition, sedated, high dose of AA
- Catheter ablation was acutely successful in 19/22 (86%)
  - 8 (36%) early recurrences of ectopy
  - transient in 2 with spontaneous cessation
  - 4 pts successful reablation of a new focus
  - 2 pts deceased early after the procedure due to multiorgan failure
  - 77 % of pts no recurrence of ES during  $29 \pm 14$  mths,
  - 4 pts died due to progressive heart failure



# A co když dominuje srdeční selhání?



# Náš postup u elektrické bouře při strukturním postižení srdce

- Oddělení akutní kardiologie
- Garantovaný příjem
- Multidisciplinární péče (srdeční selhání, arytmolog)
- Posouzení reverzibilních příčin (a Rx)
- Stratifikace nemocných s KT bez reverzibilní příčiny

Hemodynamicky stabilní pacienti s EB nebo incesantní KT

Časná ablace

Hemodynamicky nestabilní pacienti s pokročilým SS a KT

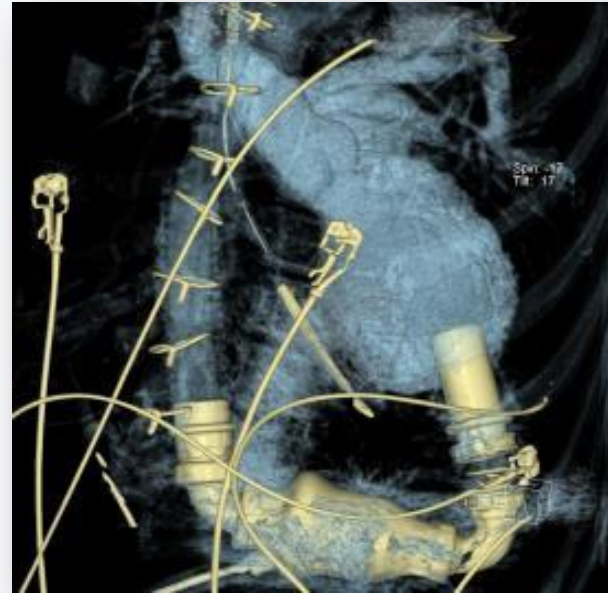
Léčba SS  
ECMO, LVAD, HTx

Hemodynamicky stabilní pacienti s nečetnými KT

Elektivní ablace  
během pobytu

## Drug therapy and catheter ablation for management of arrhythmias in continuous flow left ventricular assist device's patients: a Clinical Consensus Statement of the European Heart Rhythm Association and the Heart Failure Association of the ESC

Petr Pechl <sup>1\*</sup>, Antoni Bayes-Genis <sup>2</sup>, Thomas Deneke <sup>3</sup>,  
Ovidiu Chioncel <sup>4,5</sup>, Marta deRiva <sup>6</sup>, Maria Generosa Crespo-Leiro <sup>7</sup>,  
Antonio Frontera <sup>8</sup>, Finn Gustafsson <sup>9</sup>, Raphaël P. Martins <sup>10</sup>,  
Matteo Pagnesi <sup>11</sup>, Philippe Maury <sup>12</sup>, Mark C. Petrie <sup>13</sup>, Frederic Sacher <sup>14</sup>,  
and Offer Amir <sup>15</sup>



Difficult vascular access due to absence of pulsatility

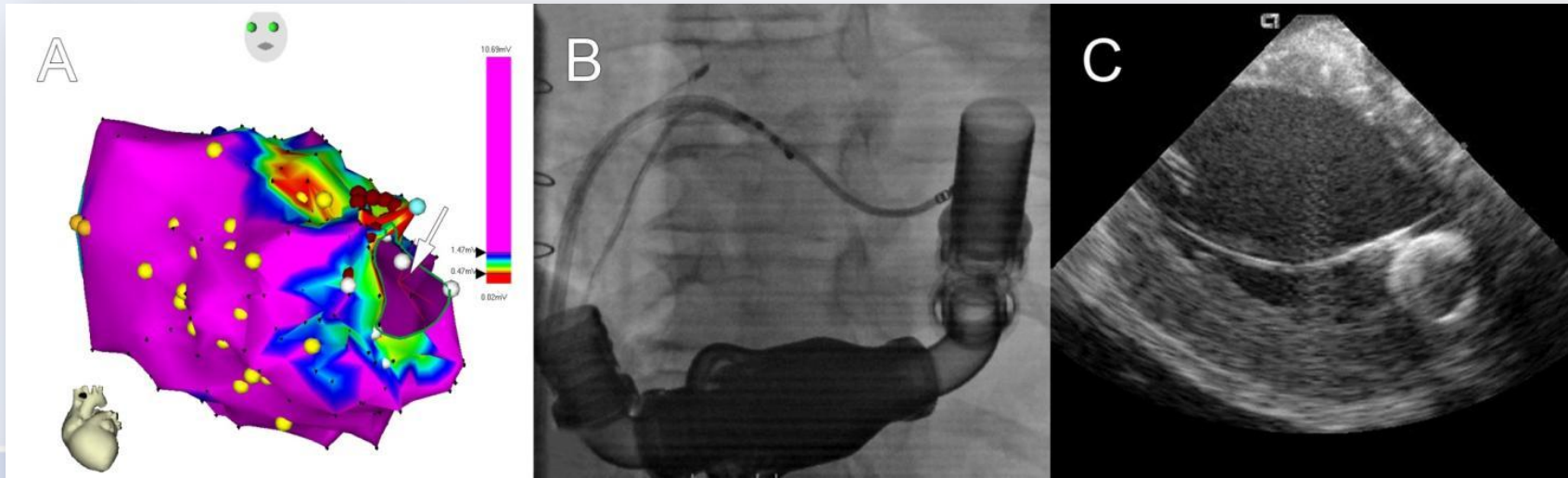
- US guided puncture recommended

Aortic valve may not open

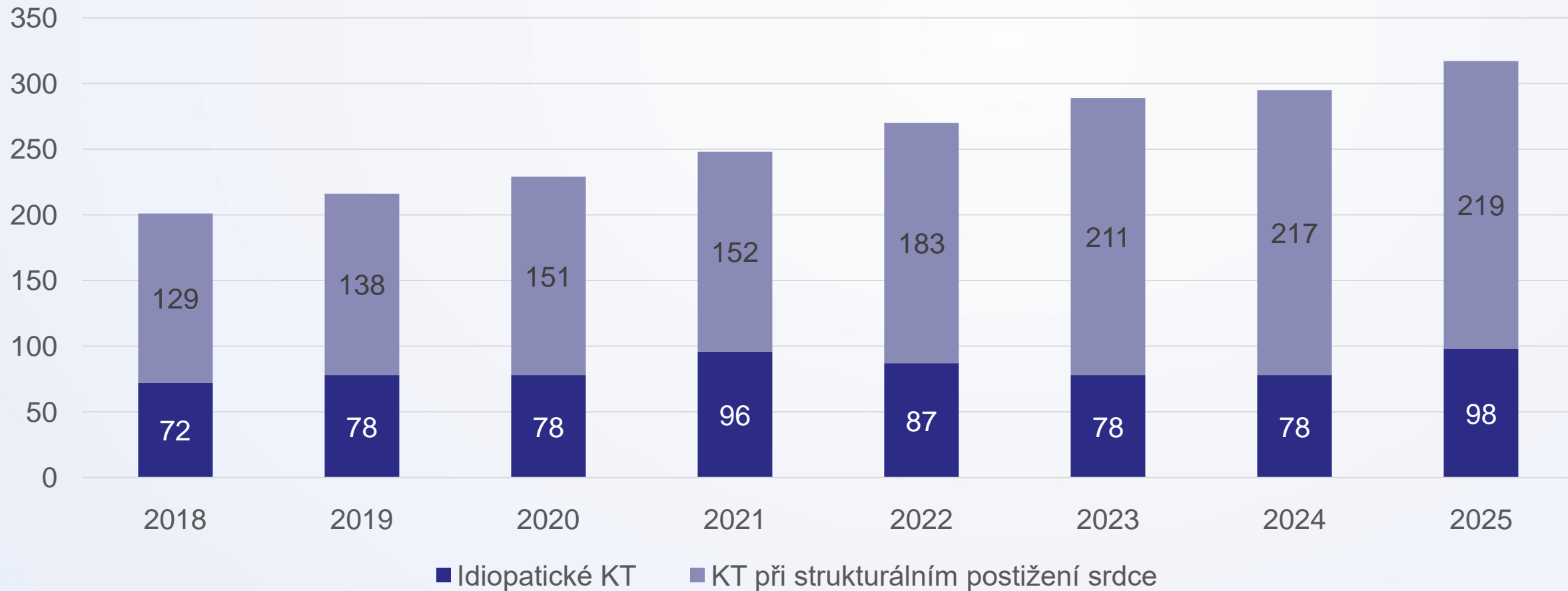
- TS approach preferred

Risk of catheter entrapment

HD support of LVAD allows mapping during ongoing VT

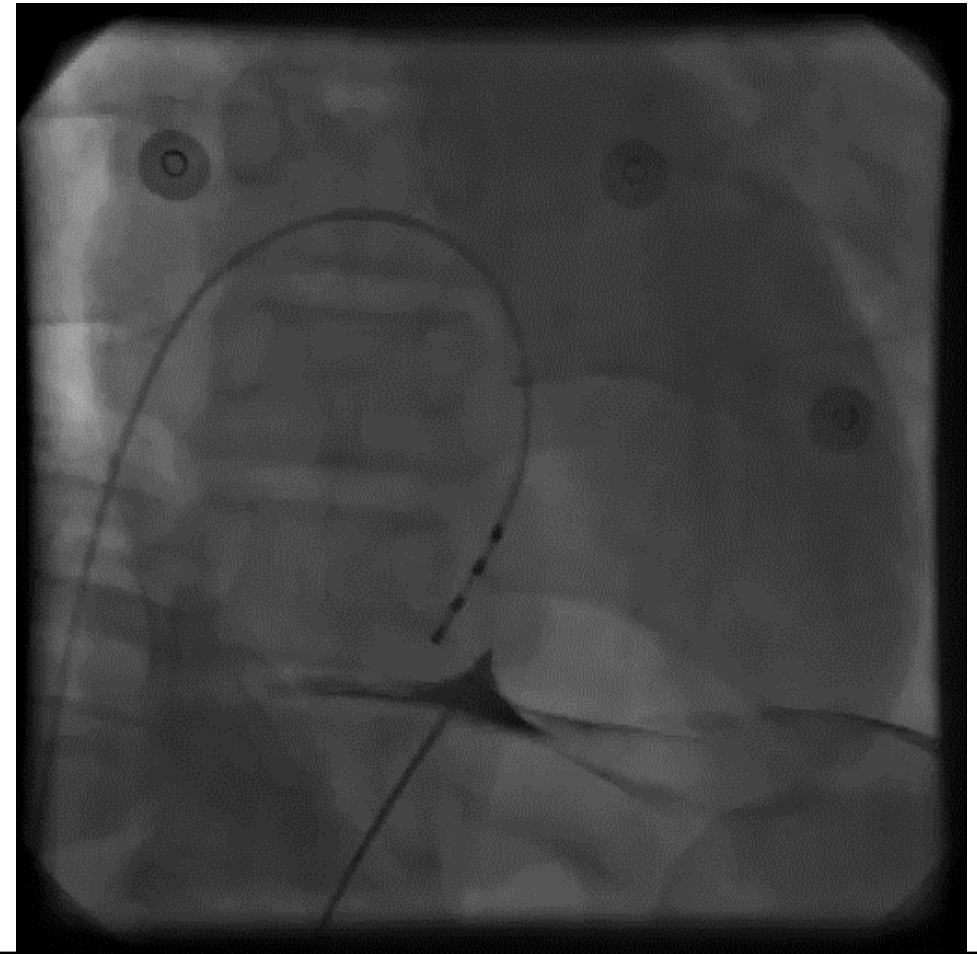
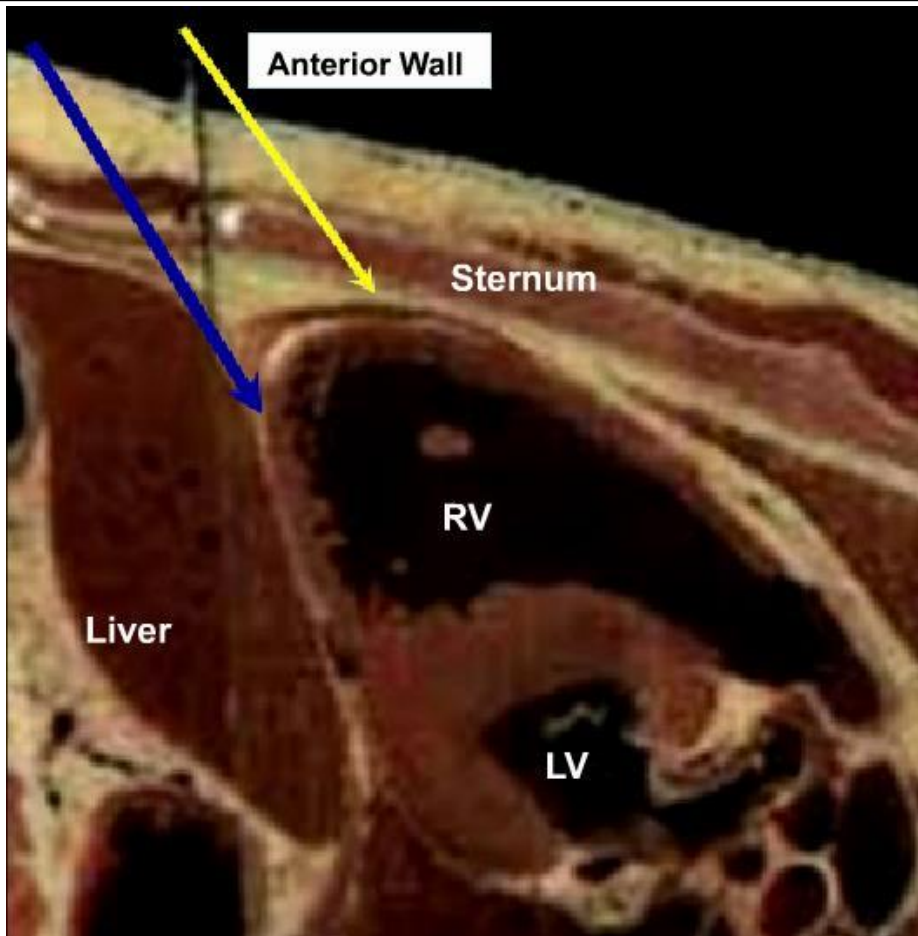


# Katetrizační ablace komorových tachykardií v IKEM



Pozn. Celkový počet ablací pro KT v roce 2023 ČR byl 970.

# Percutaneous epicardial access

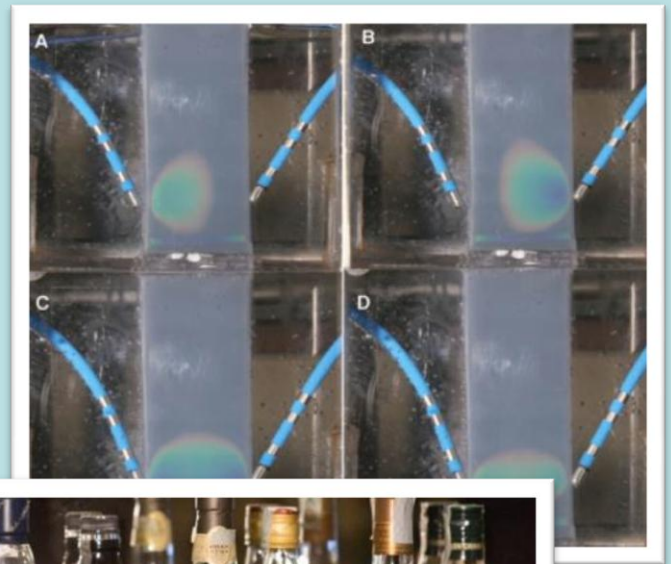


<sup>1</sup>E. Sosa *JCE* 1996

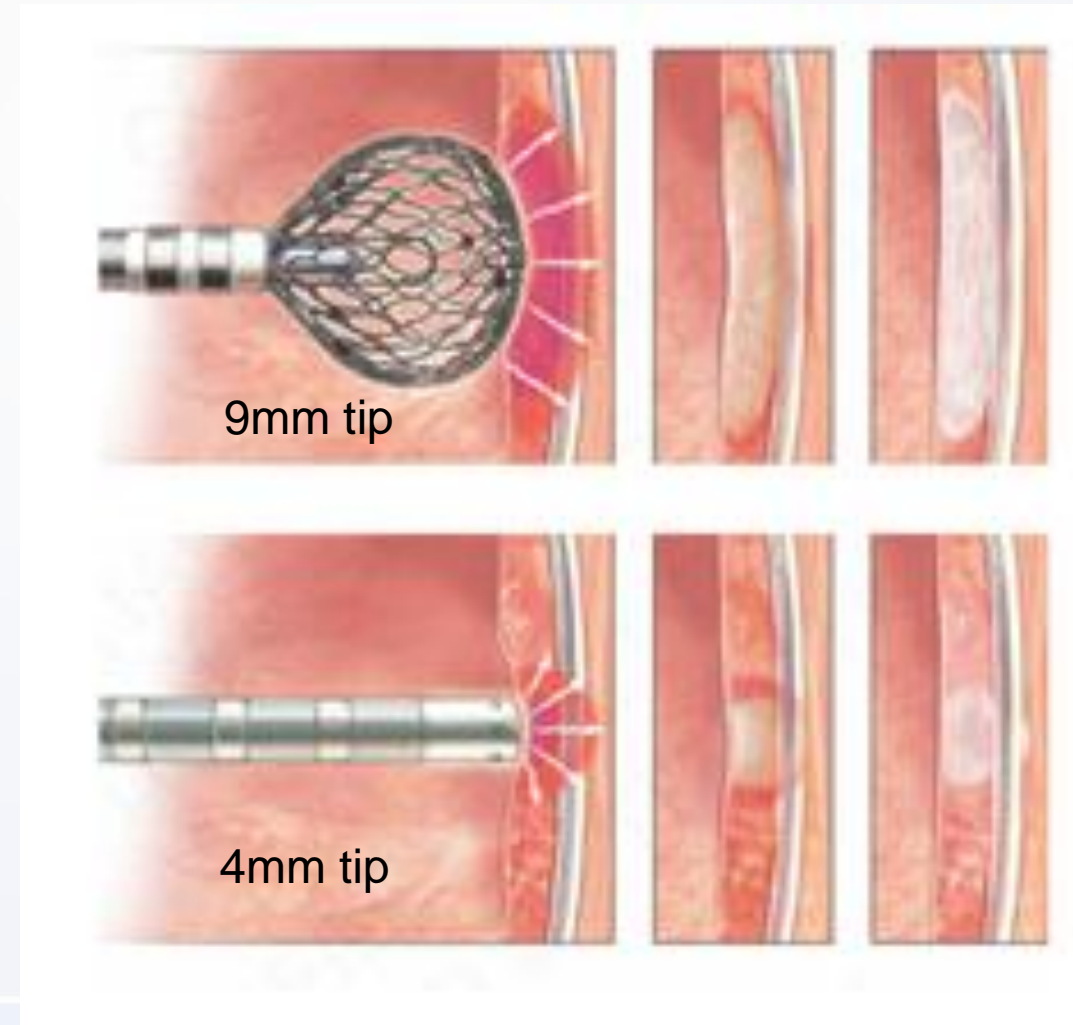
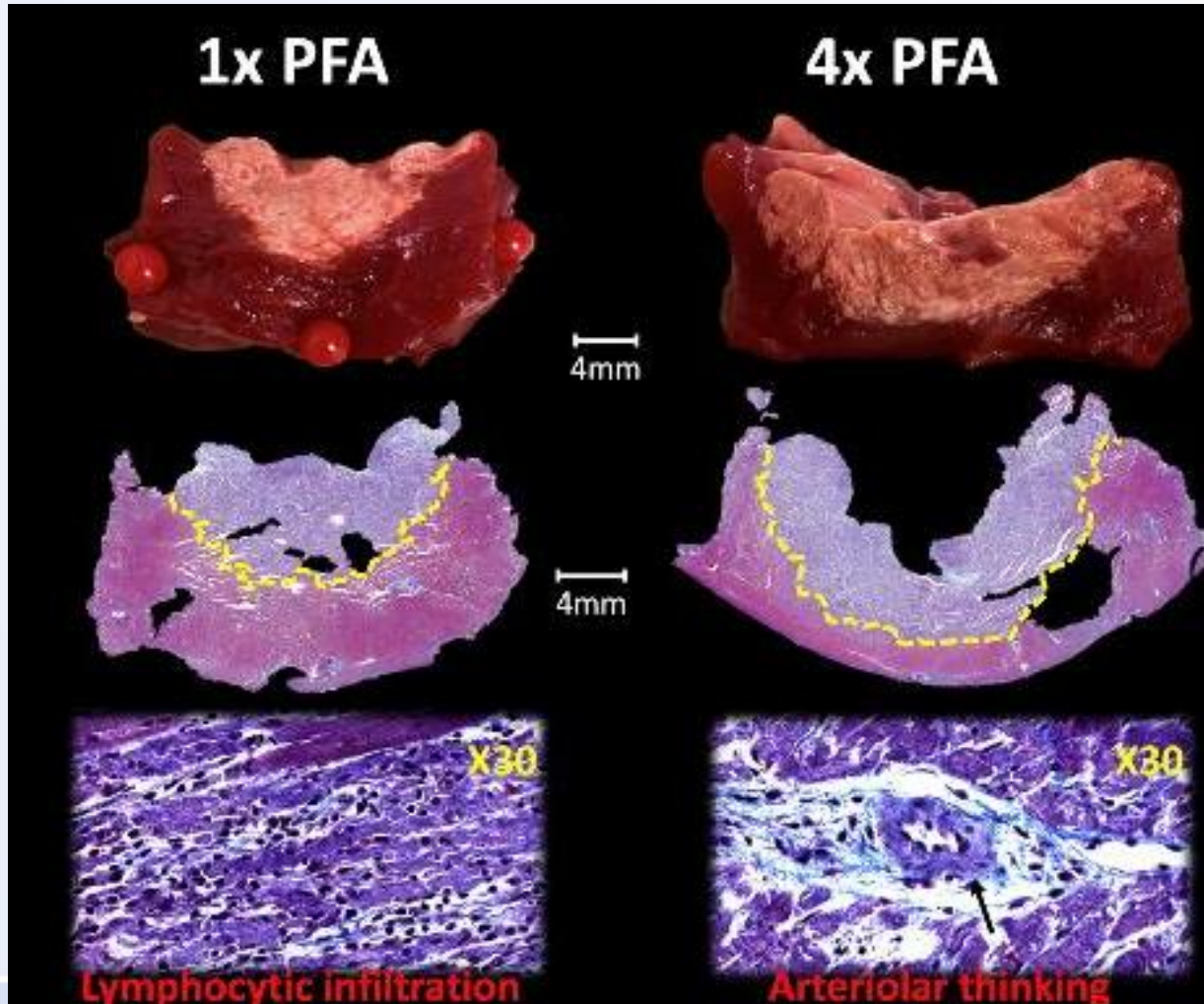
<sup>2</sup>E. Cronin *HR* 2019 Expert consensus on ablation of VT

# Bail out strategies

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



# System Affera (Medtronic)



# 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
<b>Total</b>	<b>45 (6.2%)</b>	<b>7 (2.8%)</b>	<b>38 (8.0%)</b>

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.

- 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%

# Závěry

- Léčba arytmičkou bouře má být komplexní
- U většiny pacientů s opakovanými intervencemi ICD by měla indikována katetrizační ablace (a to časně!)
- K úspěšné modifikaci arytmogenního substrátu a eliminaci KT je někdy třeba použít alternativních technik
- Vzhledem k charakteru péče by tato léčba měla být směřována do specializovaných center



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