

How to manage the VT storm

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The timing (?) of Catheter ablation

Sympathetic blockade



Electrical storm

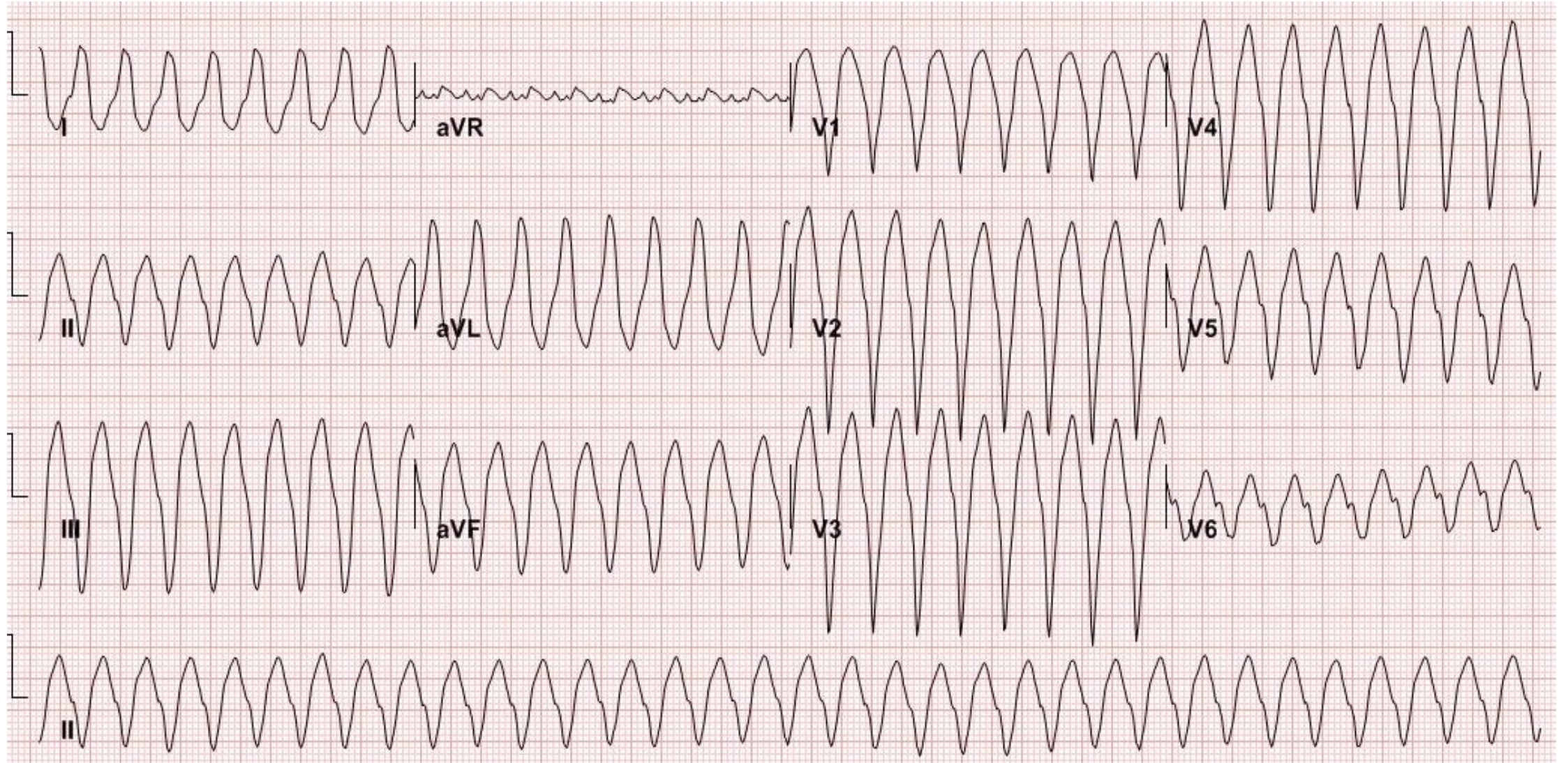
Def : arrhythmic storm, refers to a clinical condition characterized by 3 or more arrhythmia episodes of VT or VF leading to ICD therapies, occurring over a single 24 h period

Incidence : 10%-40% in secondary prevention
3.5%-4% in primary prevention

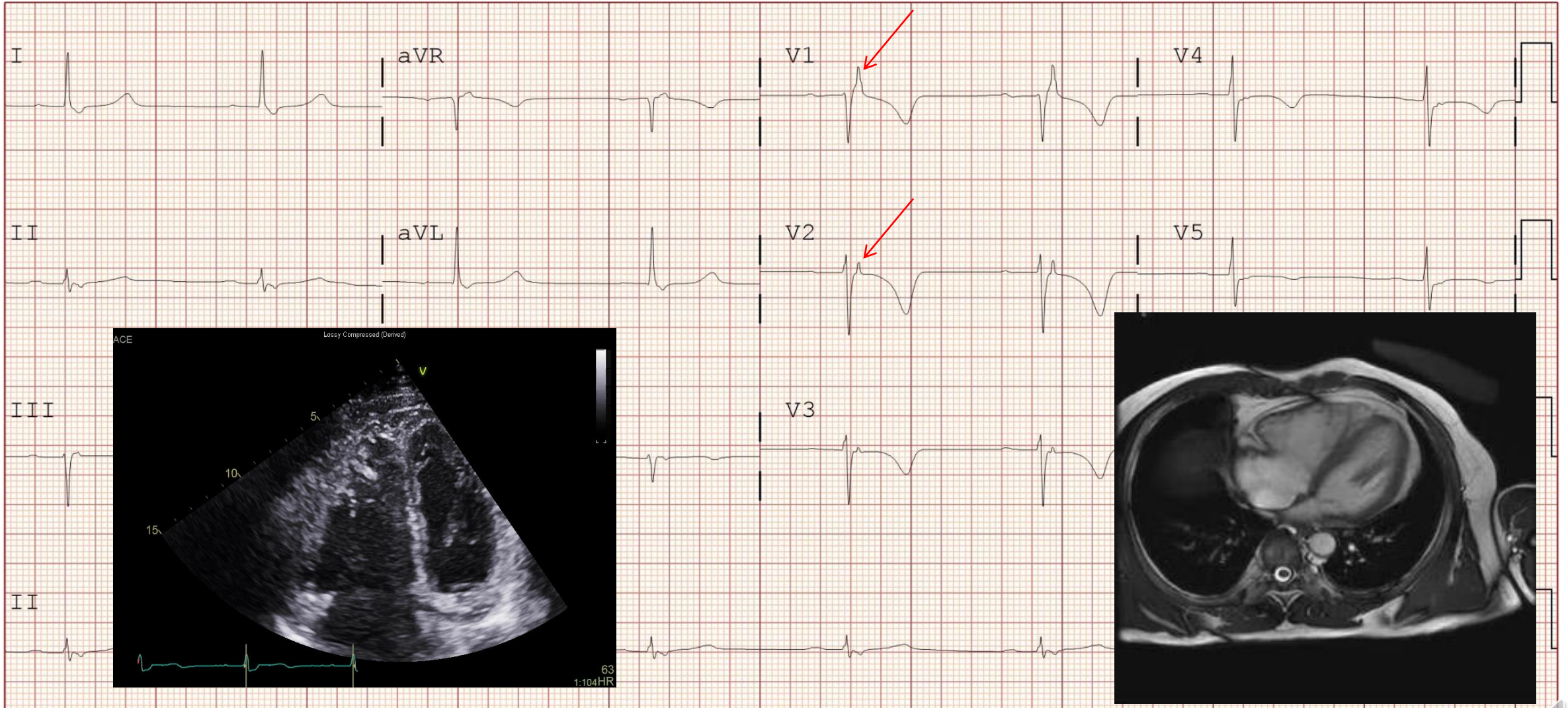
Mortality : odds ratio - 3.87 (CI 2.5-5.99)



53 YO Male, VT → ICD



Frequent ICD shock in ARVD



Catheter ablation in Electrical storm

Author/Year	# Pts ICM	# Pts NICM and other	Mortality ICM	Mortality NICM and other	VT Recurrence ICM	VT Recurrence NICM and other	Storm Recurrence ICM	Storm Recurrence NICM and other	Follow-up Duration (months)
Sra 2001 ¹⁰⁶	19				37%				7 ± 2
Silva 2004 ⁶³	9	6			13%				12 ± 17
Carbucicchio 2008 ¹⁰⁷	72	23			34%		8%		Median 22
Arya 2010 ⁸³		13				38%			Med 23
Pluta 2010 ¹⁰⁸	21				19%		0	0	3
Deneke 2011 ⁶⁶	17	14			29%	35%	0	14%	Med 15
Kozeluhova 2011 ⁸²	38	12			52%		26%		18 ± 16
Kozluk 2011 ¹⁰⁹	18	6			34%		12%		28 ± 16
DiBiase 2012 ¹¹⁰	92				34%				25 ± 10
Izquierdo 2012 ⁶⁷	19	4					35%		Med 18
Jin 2015 ¹¹¹	40				53%				17 ± 17
Muser 2017 ⁸⁴	196	71	29%	27%	46%	52%	5% 7% at 60 mo	6% 9% at 60 mo	Median 45
Kumar 2017 ²⁹	186	101	25% at 12 months	28% at 12 months	49% at 12 months	64% at 12 months	32/186	27/101	51 ± 46, median 42

27%

27.5 %

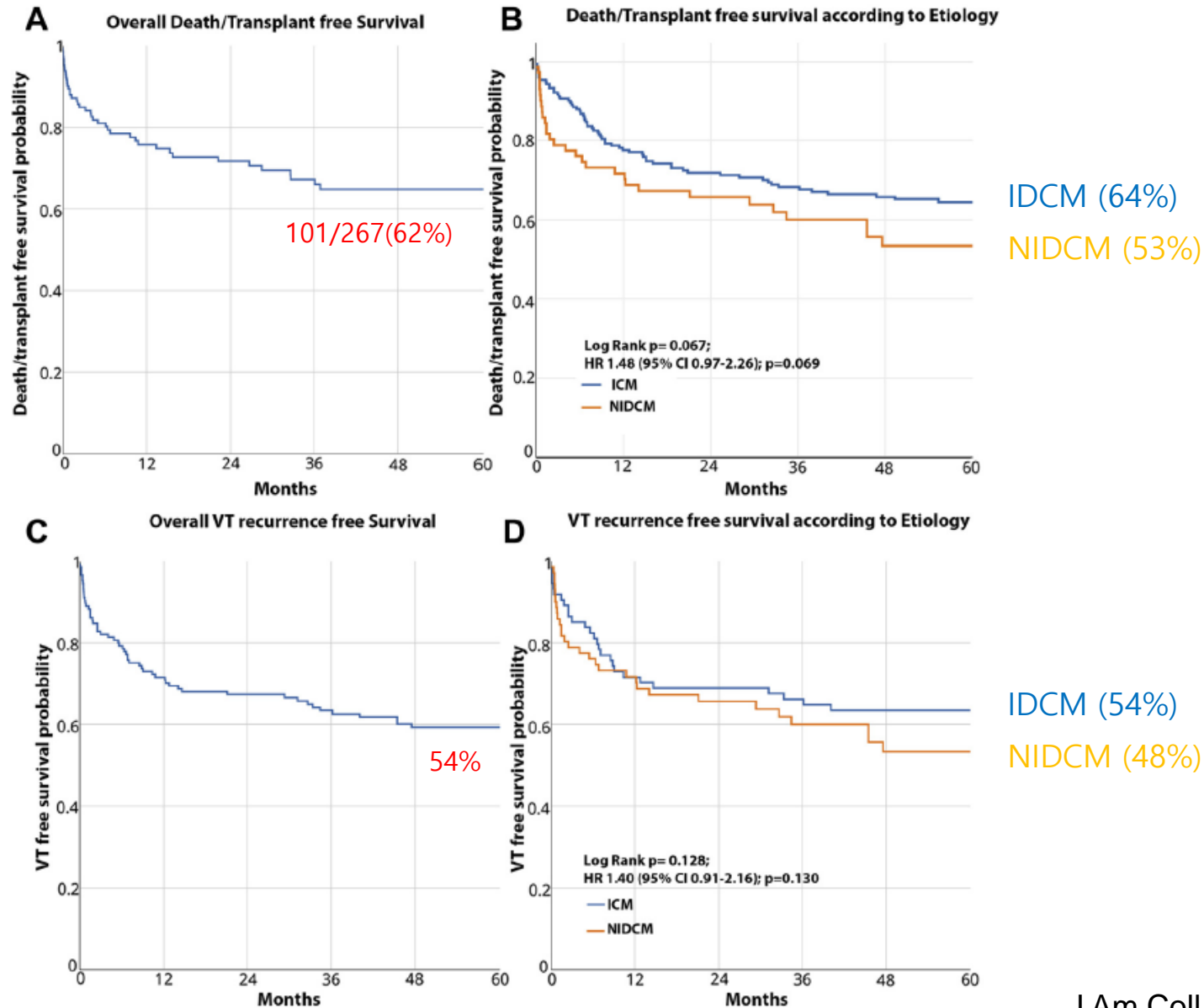
47.5 %

59 %



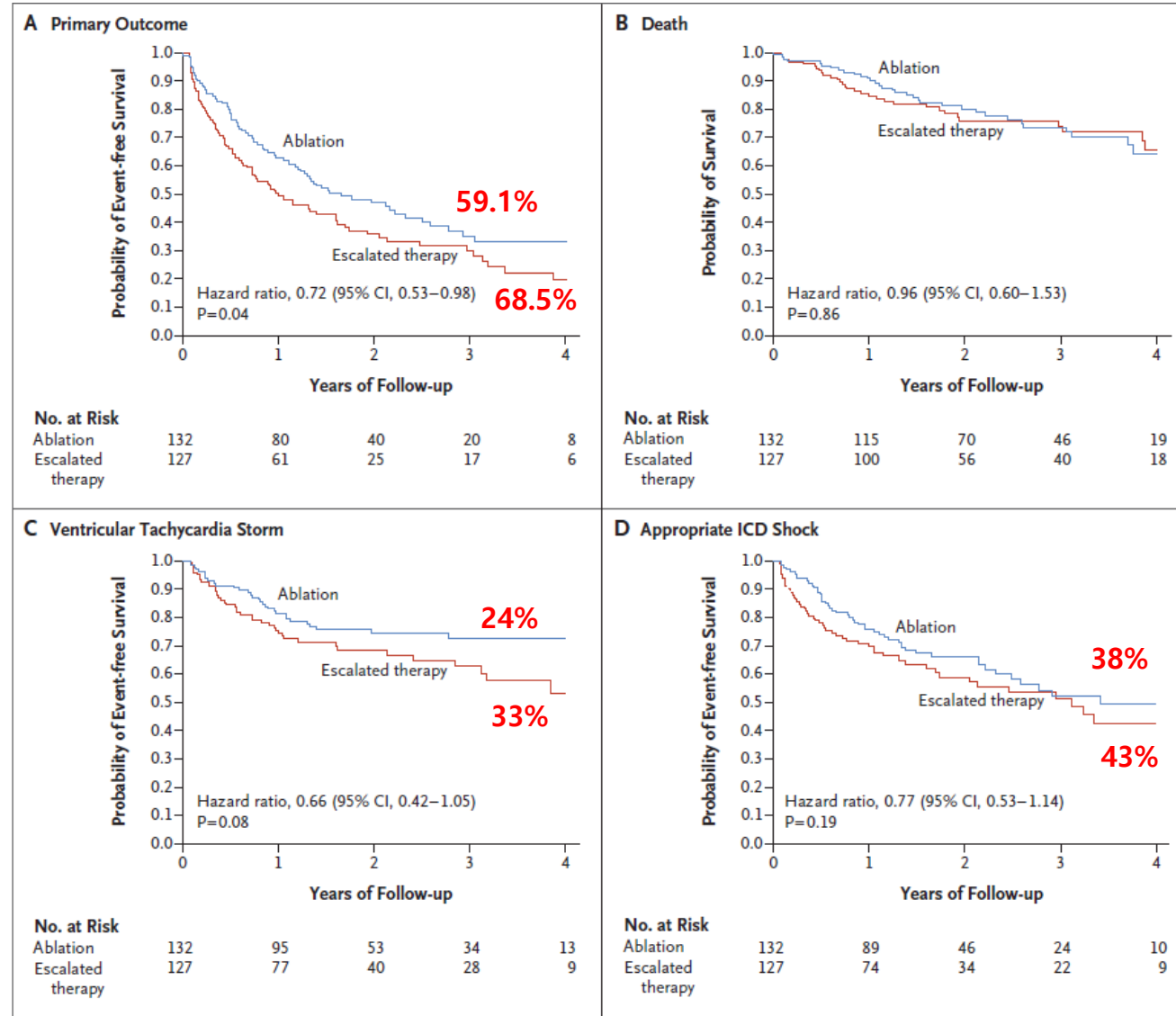
Catheter ablation in Electrical storm

267 pts
IDCM 196 pt – EF 28%,
NIDCM 71 Pt - EF 32%
FU : 45 month



Who first ; Catheter ablation or medication

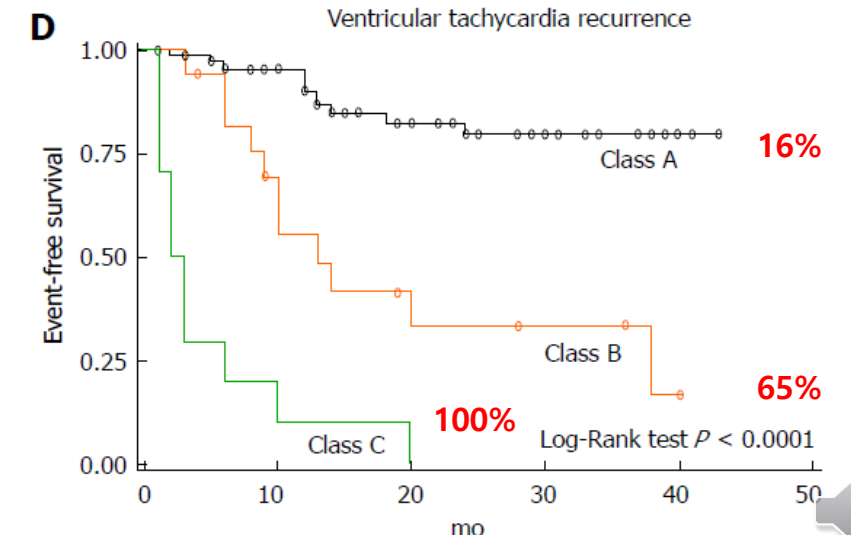
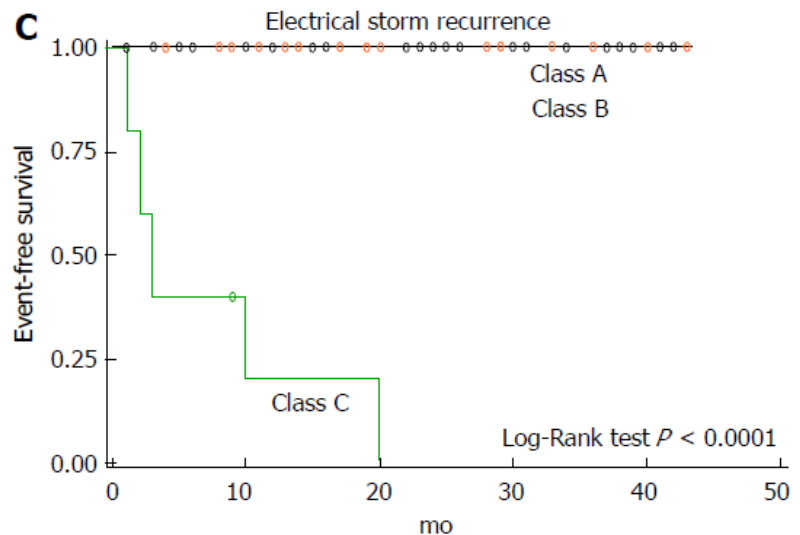
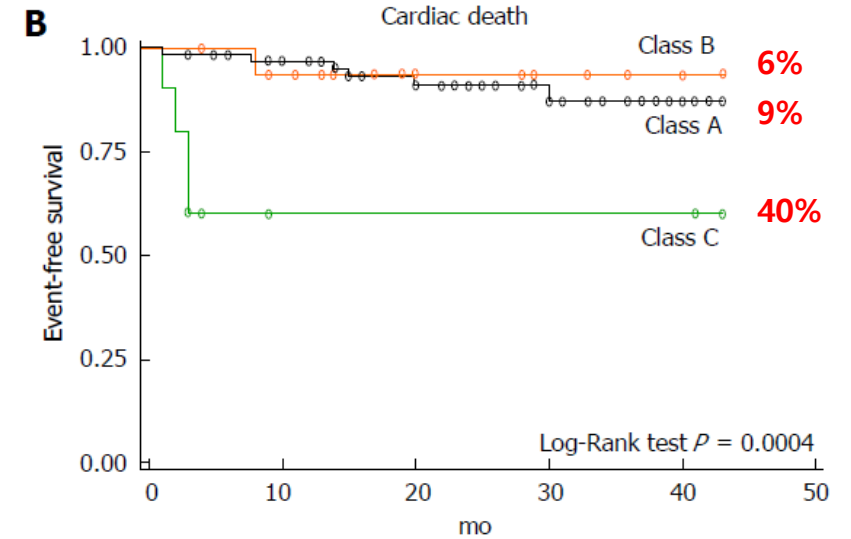
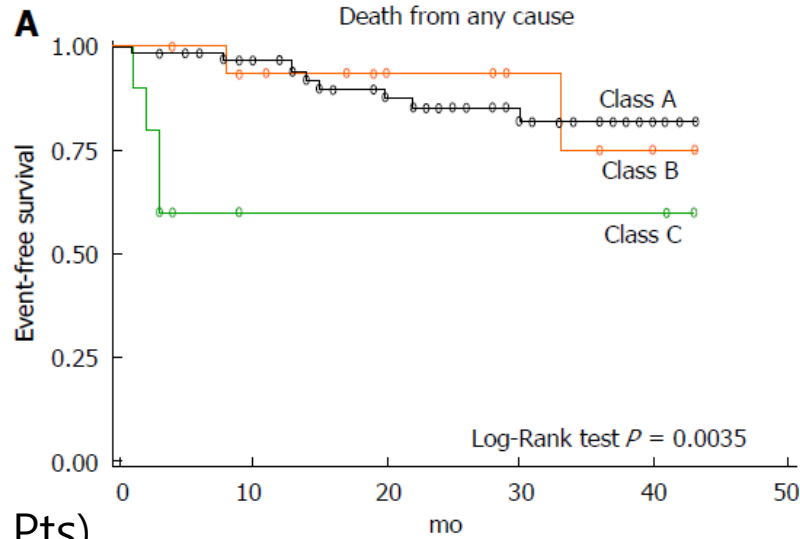
259 pts
 with VT refractory to AAD
 127 Pt – escalated tx
 (amiodarone 300mg+mexiletine)
 132 Pt - ablation
 FU : 28 month
 1' endpoint : death, VT storm, shock



Success vs failure during Catheter ablation

95 pts with drug-refractory ES
 IHD 72 Pt,
 DCM 10 Pt,
 ARVD 13 Pt
 FU 22 mo

A: non-inducibility (62 Pts)
 B: inducibility of nonclinical VA (17 Pts)
 C: induction of clinical VA (10 Pts)



Sympathetic blockade

Increased sympathetic tone in LQTS, CPVT

→ key factor of initiation and maintenance of ES

Procedure

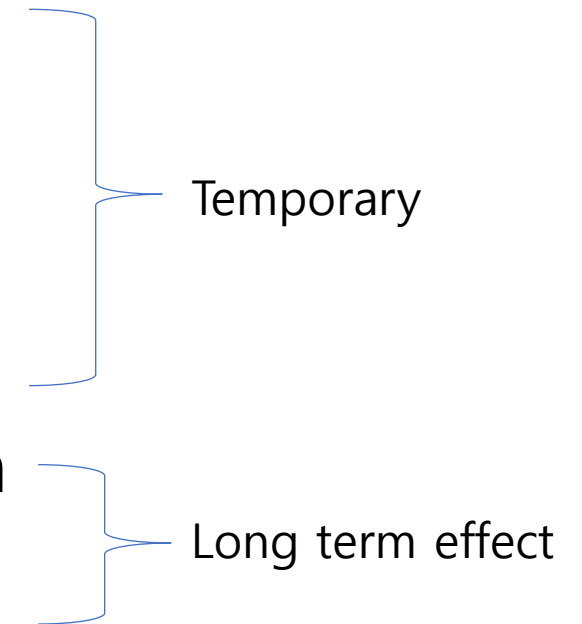
Sedation

Thoracic epidural anesthesia

Stellate Ganglion blockage

Surgical Cardiac sympathetic denervation

Renal sympathetic denervation

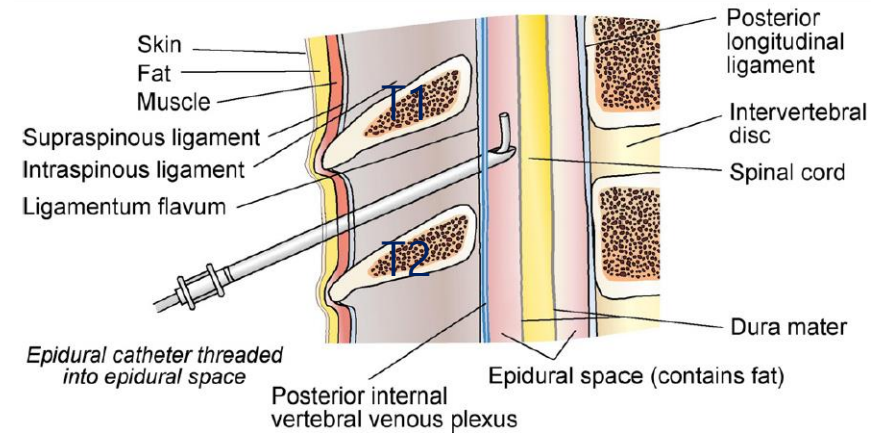
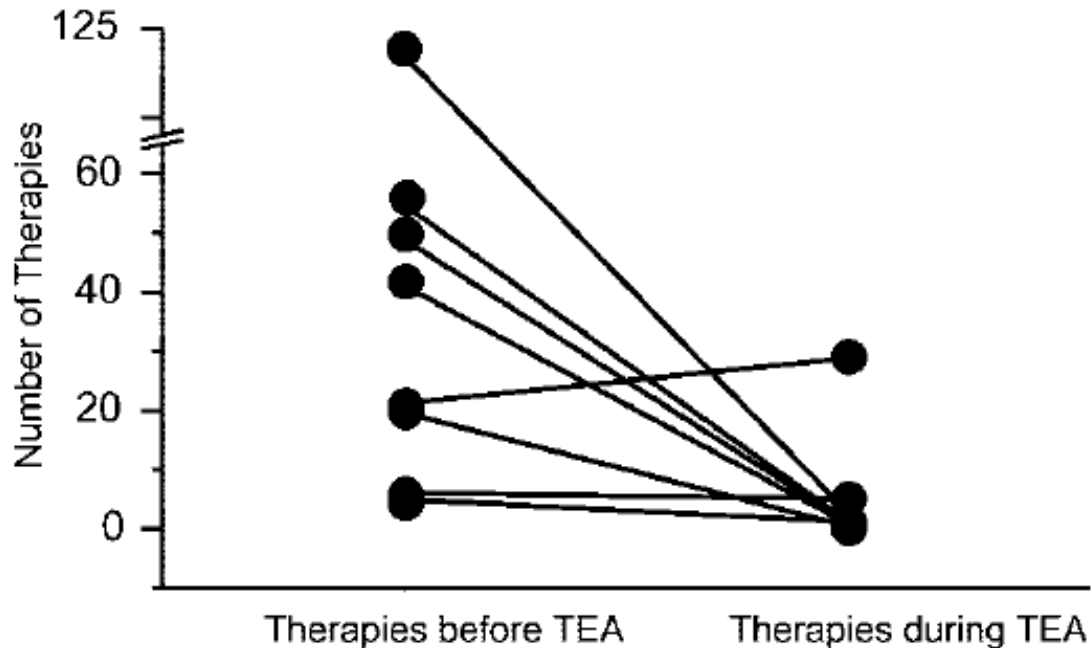


Thoracic epidural anesthesia

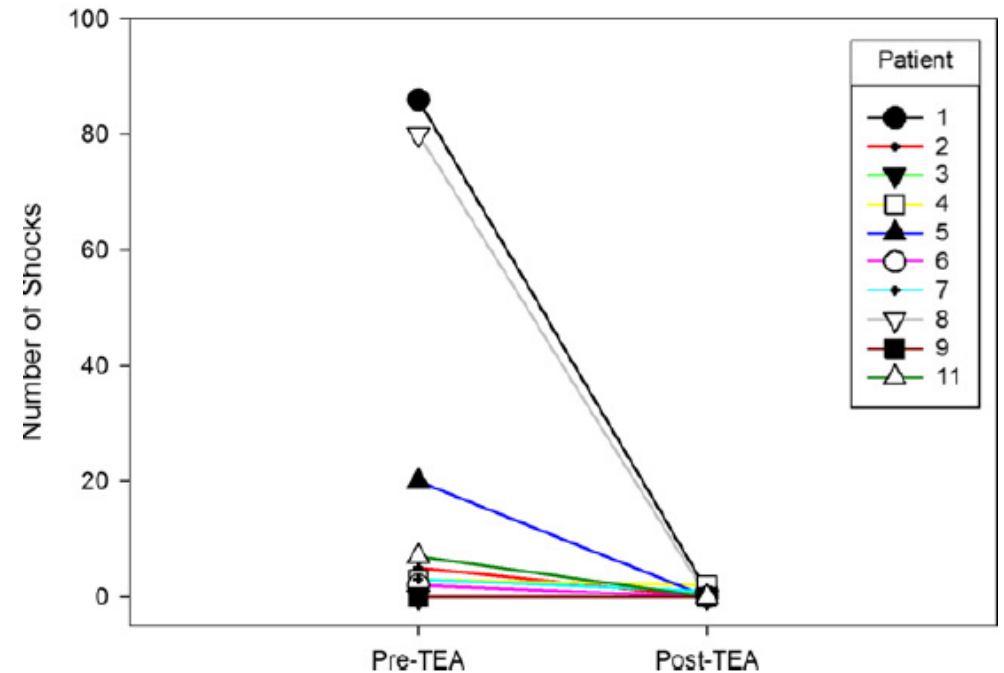
Rationale

: Direct blocking of sympathetic neurotransmission to heart

14 Pts (ICMP 4 pts, NICMP 4 pts, HCM 3pts, ARVD)
 TEA – 8 pts, LCSD-9 pts
 --> 6 pt > 80% reduction, Death 3 pts



11 Pts (ICMP 3 pts, NICMP 5 pts, Brugada, HCM)
 --> Death 4 pt

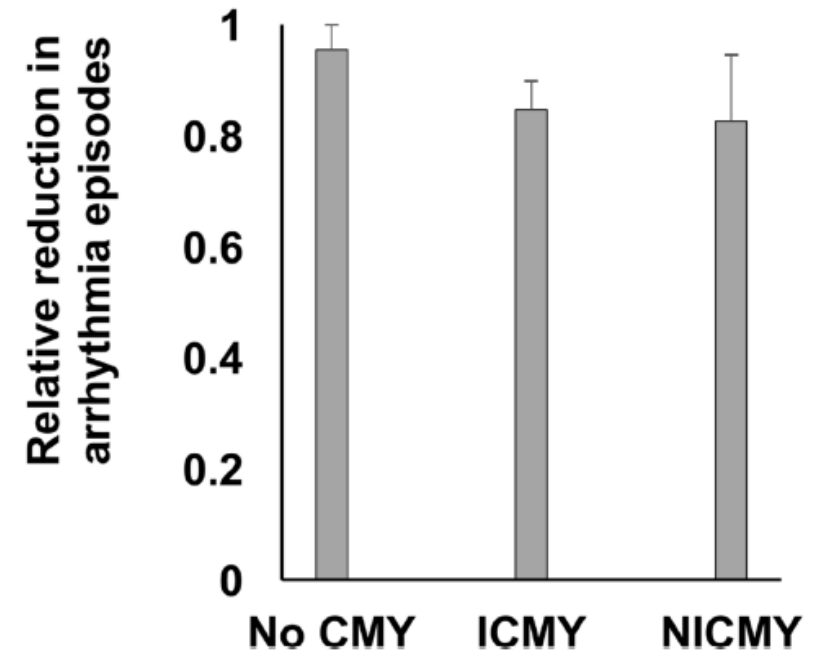
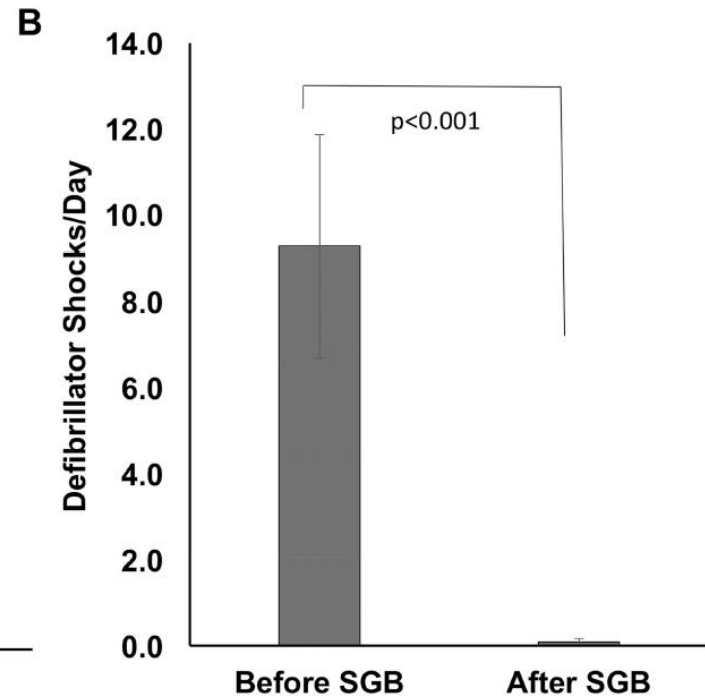
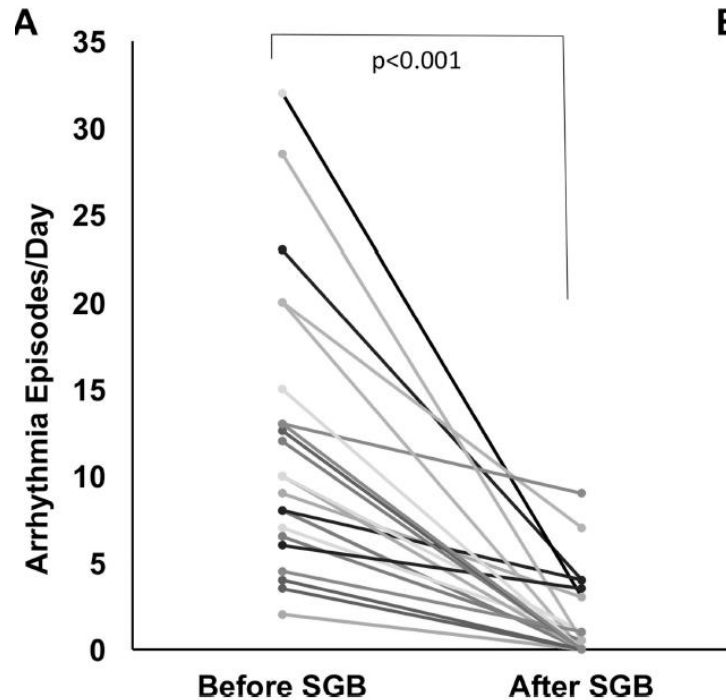


Stellate ganglionic block

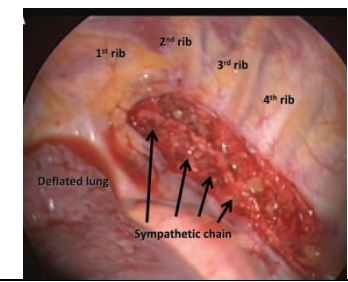
Stellate (cervicothoracic) GB : APD prolongation

→ transmural repolarization heterogeneity ↓, ERP ↑, VF threshold ↓

Systemic review : 38 Pts (AMI 15Pt, LQT 7Pts) with electrical storm, EF 31%
Bupivacaine (0.25-0.5%), Lt SGB (34 Pt) or both SGB (4Pt)

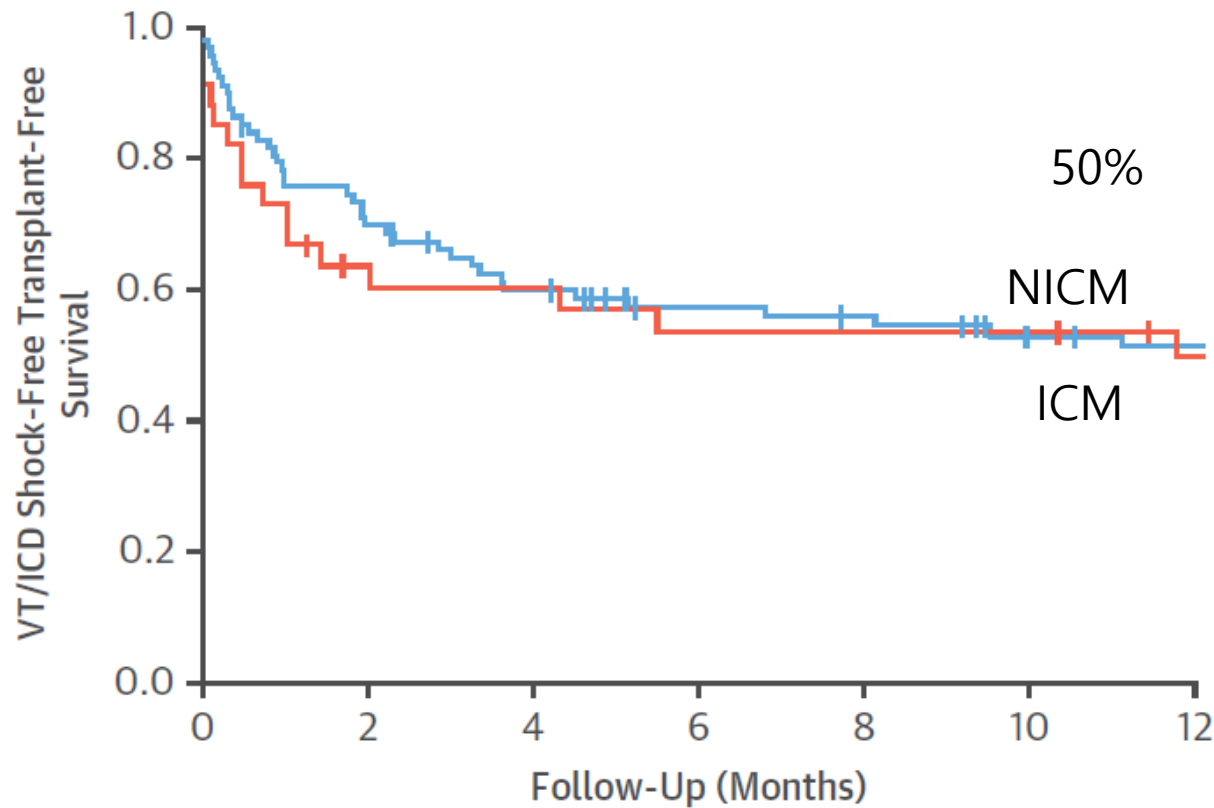


Cardiac sympathetic denervation

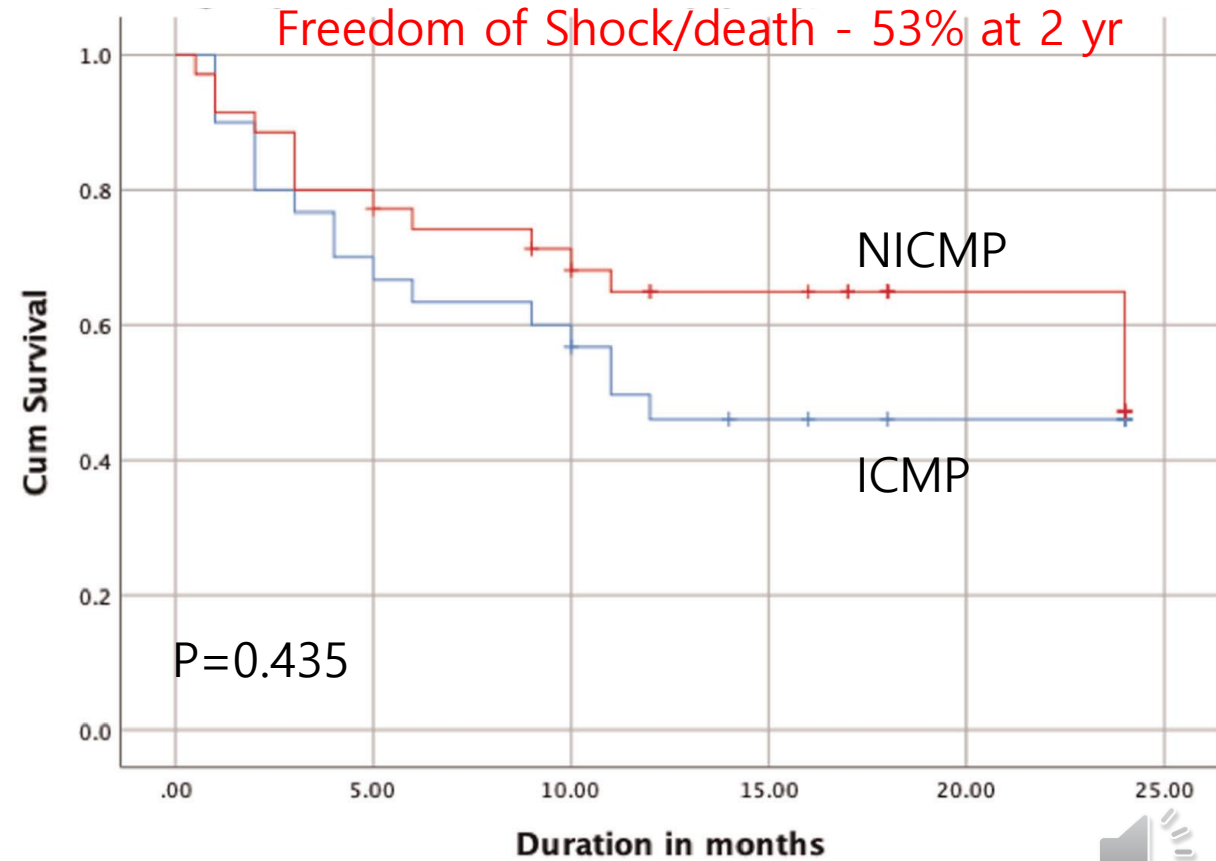


T1-4

121 Pts (ICMP 33 pts, NICMP 86 pts),
prior Ablation 66%
bilateral (98 pt) or Lt (23 pt) CSD → FU 1.5 yr



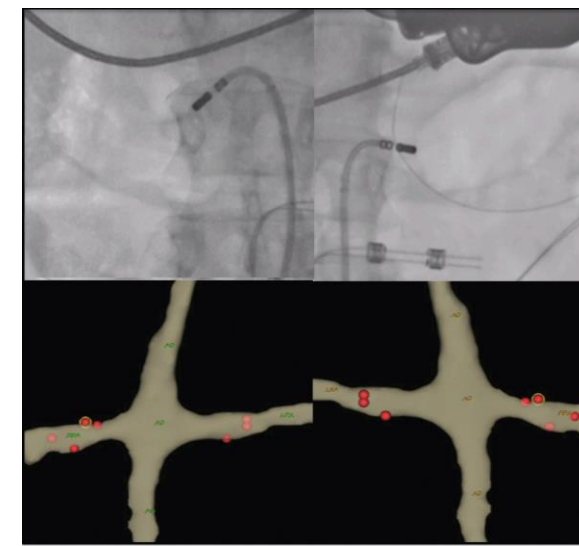
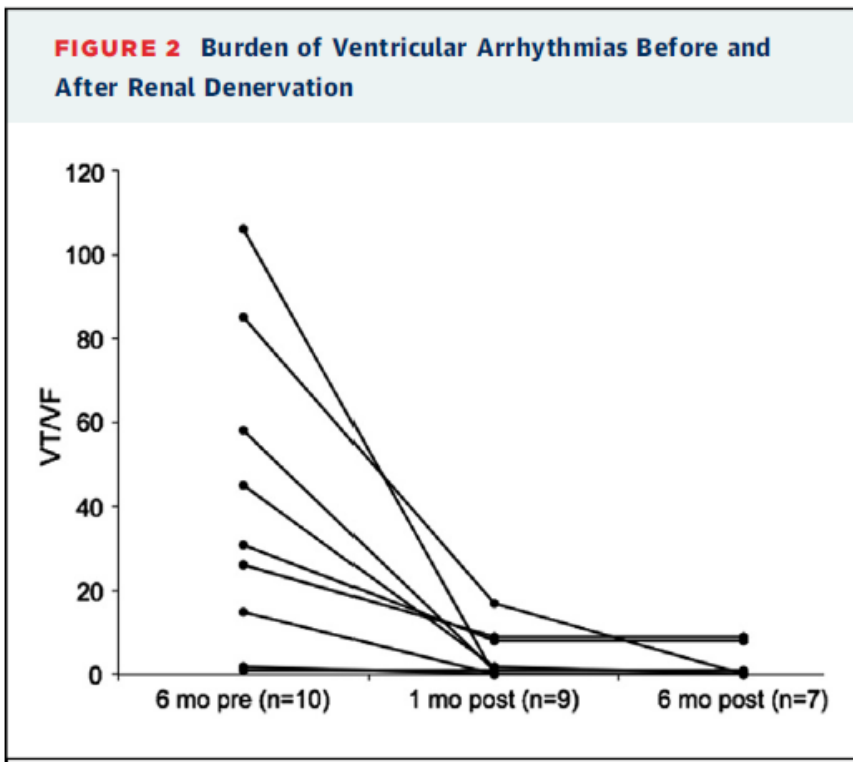
65 Pts (ICMP 30 pts, NICMP 35 pts), prior Ablation 22%
bilateral CSD → FU 27mo
47 Pt (72%) –complete response(>75% reduction of VT)



Renal sympathetic denervation

- RSD → decreased sympathetic activity

10 Pts with refractory VA
(ICMP 2 pts, NICMP 2 pts, Chagas disease 6pt)
FU : 6 mo --> Death 3 pts



32 Pts with refractory VA
Catheter ablation (16pt) vs CA+RSD (16 pt)
FU 15 mo

→ VT/VF episode (CA vs CA+RSD)

3 mo : 12.8 vs 2.4 (P < 0.05)

6 mo : 6.1 vs 2.3 (P < 0.05)

12 mo : 5.9 vs 2.2 (P < 0.05)

18 mo : 5.6 vs 1.8 (p < 0.05)

→ Mortality : similar



Back to patient

4 mo ICD FU

POD 3 day : SG block



* Mode : VVI (ICD) * Lower rate : 40 bpm

	Threshold		Pacing		Sensing(R)	Impedance
	Amplitude	V	Amplitude	V		
Atrium	-	V	-	V	-	ohms
Ventricle	1.25	V	3.0 → 2.5	V	11.7	360 ohms

* Longevity : 7.7 months/years, Cell voltage : 91% Charge time 7.1 sec

* Pacing rate : AS-VP % AS-VS % AP-VP % AP-VS %

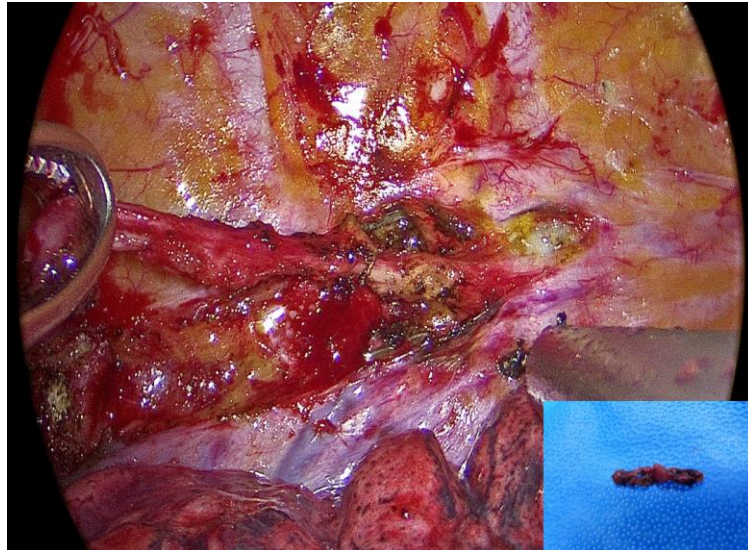
	pacing		sensing		Impedance		Battery state
	Atrium	Ventricle	Atrium	Ventricle	Atrium	Ventricle	
Well		0		0		0	0
Bad							

*Comment

up 1.8%

No Episode!

POD 13 day : bilateral CSD



1 Yr ICD FU

* Mode : VVI (ICD) * Lower rate : 40 bpm

	Threshold		Pacing		Sensing(R)	Impedance
	Amplitude	V	Amplitude	V		
Atrium	-	V	-	V	-	ohms
Ventricle	1.25	V	2.5	V	11.7	390 ohms

* Longevity : 7.4 months/years, Cell voltage 88% charge time : 7.5 sec

* Pacing rate : AS-VP % AS-VS % AP-VP % AP-VS %

	pacing		sensing		Impedance		Battery state
	Atrium	Ventricle	Atrium	Ventricle	Atrium	Ventricle	
Well		0		0		0	9
Bad							

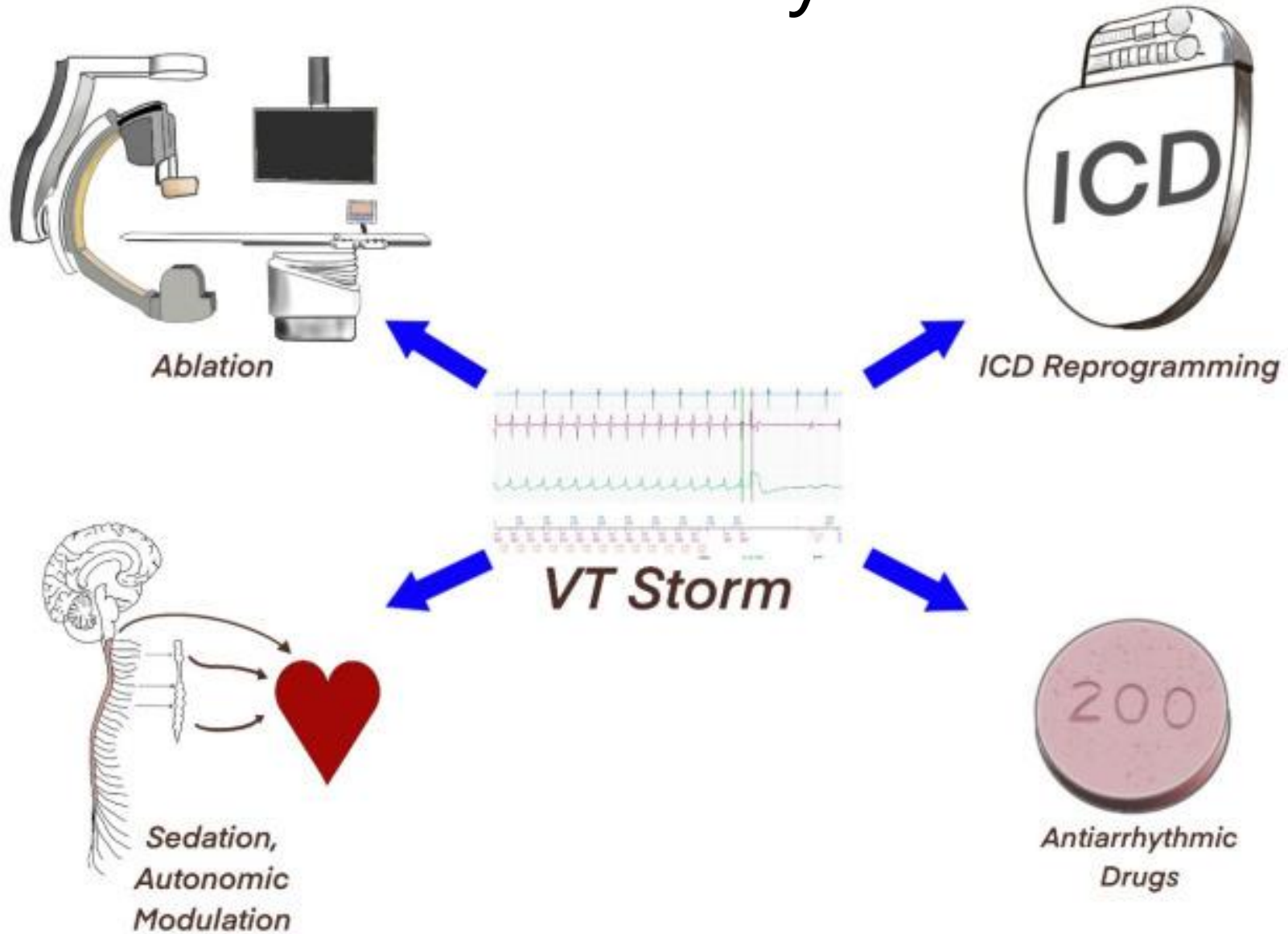
*Comment

up < 1%

No Episode!



Summary



Thank you for your attention !!!!

