

# " Video-assisted thoracoscopic cardiac denervation of refractory ventricular arrhythmias and electrical storms"

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## Introduction

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"Patients with refractory ventricular arrhythmias who are unresponsive to combined medical (beta-blockers), ablation and ICD therapy and those presenting with electrical storms are considered candidates for a VATS based therapy"

- 1899 - François-Franck - Proposed Sympathectomy for Angina
- 1916 - Thomas Jonnesco - First report of LSCD - for Angina
- 1929 - Leriche and Fontaine - 2 cases of Paroxysmal atrial tachycardia, vasodilatory effects for angina
- 1942 - First report of thoracoscopic Sympathectomy
- 1961 - Estes and Izlar - First series of BSCD
- 1971 - Moss and McDonald - First LSCD in LQTS

**CASE REPORT**

Video-assisted thoracoscopic cardiac denervation of refractory ventricular arrhythmias and electrical storms: a single-center series

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## Case Series Presentation

- 20x Colombian patients (average age 56.7 years)
- 9 Chagas, 7 Ischemic, 3 Dilated, 1 LQTS
- VATS-2-port BCSD
- VEFI 25%
- 15x patients registered sustained ventricular tachycardias (VT)
- 3x patients registered ventricular fibrillations (VF)
- 2x patients registered mixed VT/VFs
- 6x patients had electrical storms.
- All twenty (N = 20) patients had beta-blocker (amiodarone) therapy, six (N = 6) had pacemakers and nineteen (N = 19) had Implanted Cardioverter defibrillators (ICDs).



Arrhythmia	Shocks 1 month Prior to VATS-BCSD	Shocks At 3-months Post-Vats	Response
Ave. Shocks	47 (2.3/p)	2	90%
Electrical Storms	6 patients	0	100%
Prior Ablation	12 patients	1	92%
VF	4	0	100%
Chagas	9	1	89%

## Technique

1. Bilateral 2-port VATS in 45 degree supine position
2. 8 mmHg intrapleural CO2
3. Harmonic dissector
4. Inferior Hemi-stellotomy + sympathetomy down to T4
5. 2nd IC cut - Kuntz nerve
6. 45 min Surgery duration



## Discussion

- SNS regulates cardiac electrophysiology through interconnections between preganglionic axons in sympathetic paravertebral chains
- Preganglionic axons synapse on neurons within the stellate ganglion (fusion of the lower cervical C7 and T1 ganglia) and run through T4
- The left ventricle contributes to a significant catecholaminergic stimulus in the generation of refractory arrhythmias especially in long-QT syndrome.
- Norepinephrine release - Increased sympathetic tone = Arrhythmogenesis
- Bilateral (BSCD) for structural cardiomyopathies
- Left (LSCD) for Channelopathies
- Effects of Cardiac Denervation:
  1. Catecholamine antagonism - Vagotonicity
  2. Antiadrenergic effects - Interruption of Norepinephrine release
  3. Antagonism of neuronal remodeling and Neuropeptide Y 4. Correction of neuronal Nitric Oxide Synthase imbalance
- VATS cardiac denervation is an effective treatment option of patients with Refractory ventricular arrhythmias

## Results

1. 92% resolution of Arrhythmias at 3 months
2. 85% resolution of Arrhythmias at 3 years
3. 100% resolution of electrical storms
4. 0% mortality

Table 1. Patient characteristics and Results

NO.	AGE	SEX	ARRHYTHMIA	CARDIOPATHY	ICD	PACEMAKER	TRANSPLANT	SHOCKS PRIOR TO VATS	SHOCKS AFTER VATS	SHOCK-FREE POST-VATS	COMPLICATIONS	
1	75	M	VT	DILATED	YES	NO	YES	NO	0	0	NO	HEPATOHEPATITIS
2	65	M	VF	DILATED	YES	NO	YES	NO	0	0	NO	NO
3	70	M	VT	DILATED	NO	YES	YES	0	0	0	NO	NO
4	70	F	VF	ISCH	YES	NO	NO	NO	2	0	20%	NO
5	65	F	VT	ISCH	YES	NO	YES	NO	0	0	NO	NO
6	65	M	VT	ISCH	YES	YES	YES	NO	2	0	NO	NO
7	65	M	VT	ISCH	YES	YES	NO	NO	0	0	NO	NO
8	65	M	VT	ISCH	YES	YES	YES	NO	0	0	NO	NO
9	70	F	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
10	70	M	VT	ISCH	YES	NO	YES	NO	0	0	NO	NO
11	65	M	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
12	65	M	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
13	65	M	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
14	65	M	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
15	65	F	VT	ISCH	YES	YES	YES	NO	0	0	NO	NO
16	65	F	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
17	65	M	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
18	65	F	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
19	65	M	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO
20	65	M	VT	ISCH	YES	NO	NO	NO	0	0	NO	NO

Abb. VT (ventricular tachycardia) VF (ventricular fibrillation) LQTS (Long QT Syndrome) VATS (Video-assisted Thoracoscopic Surgery) ICD (Implanted Cardio-Defibrillator)



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