

Permanent Pacemaker Implantation in a Patient with Ventricular Fibrillation due to Spontaneous Coronary Artery Dissection: A Case Report

Altamirano Alvaro¹, Moukabary Talal¹, Famarzi Negar², Habibi Roshanak¹

¹Internal Medicine Department, Banner University Medical Center, Tucson, AZ, USA

²Internal Medicine Department, Brown University, Providence, RI, USA

Email: altamiranoalvaro86@yahoo.com

How to cite this paper: Alvaro, A., Talal, M., Negar, F. and Roshanak, H. (2022) Permanent Pacemaker Implantation in a Patient with Ventricular Fibrillation due to Spontaneous Coronary Artery Dissection: A Case Report. *World Journal of Cardiovascular Diseases*, 12, 414-418.

<https://doi.org/10.4236/wjcd.2022.127042>

Received: June 4, 2022

Accepted: July 25, 2022

Published: July 28, 2022

Copyright © 2022 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

We present here the case of a 43-year-old female without any known past medical history who was brought into the emergency department (ED) by the emergency medical services (EMS) after receiving cardiopulmonary resuscitation (CPR) on the field. Per EMS, on arrival patient was found to be on ventricular fibrillation and was shocked 3 times. Patient had no past medical history. In the ED, EKG showed sinus rhythm and troponin was 23 which is slightly high compared to upper limit. Patient was taken to the cath lab immediately which showed small to medium caliber septal 1 branch severe mid segment disease with distal tapering suggestive of spontaneous coronary artery dissection. No stent was placed. Electrophysiology was consulted and an Implantable Cardioverter Defibrillator was placed. Spontaneous coronary artery dissection (SCAD) is a phenomenon where an epicardial coronary artery dissection occurs that is not related to atherosclerosis, trauma or iatrogenia. Patients with SCAD presenting with ventricular arrhythmias are not very common. In a Canadian registry analyzing 1056 patients with SCAD, only 84 of them presented with ventricular fibrillation (VF) or ventricular tachycardia (VT) and only 8 underwent ICD placement. They followed up the patients for 5 years and 8 patients suffered VT/VF. 5 of those 8 patients had VT/VF on initial SCAD presentation, and only 1 of them had undergone ICD insertion. There are no specific guidelines regarding ICD placement on patients with coronary artery dissection, but the AHA/ACC/HRS guidelines can help us make decisions. Our case underscores the importance of more prospective or retrospective studies to identify those patients with SCAD who would benefit from ICD placement for secondary prevention. The current guidelines for

ventricular arrhythmias are an excellent tool for the electrophysiologist regarding the management of these arrhythmias in other specific scenarios but guidance on SCAD is still lacking.

Keywords

Ventricular, Fibrillation, Spontaneous, Coronary, Dissection, Implantable, Cardioverter, Defibrillator

1. Introduction

We present here the case of a 43-year-old female without any known past medical history who was brought into the emergency department (ED) by the emergency medical services (EMS) after receiving cardiopulmonary resuscitation (CPR) on the field. Per EMS, patient collapsed and lost consciousness the morning of the event in front of her family after which they started CPR for about 5 mins before EMS arrived. After they arrived, the cardiac monitor showed that she was on ventricular fibrillation, and she was shocked 3 times after which they achieved return of spontaneous circulation (ROSC). On arrival to the ED patient was slightly confused but conscious.

Per patient's husband, she had been having chest pain for almost 2 weeks. The day of the event, she was still having chest pain. He described that she was sitting drinking an icy drink when she suddenly collapsed and became unresponsive.

He also mentioned that about 15 years ago she fainted in Mexico and at that time she was seen by her primary care physician who diagnosed her with a heart murmur. No further information is known concerning the murmur. Regarding her family history, her father's heart stopped during a hernia repair surgery and required temporary pacing. No further workup was done at that time. Her grandmother on her mother's side died of a heart attack in her mid-60's. No other relevant history was disclosed.

In the ED, EKG showed normal sinus rhythm. Her initial and only troponin was 23 (per lab reference values, upper limit is 11). Due to the circumstances of her medical presentation, a STEMI code was called, and cardiology took the patient to the Cath lab immediately. Per report, the findings were: slow flow in epicardial vessels suggestive of microvascular/endothelial dysfunction and small to medium caliber septal 1 branch severe mid segment disease with distal tapering suggestive of spontaneous coronary artery dissection.

Her initial echo on the day of admission showed an ejection fraction of 34% and near global hypokinesis to akinesis of the inferior septum. The apex and inferolateral walls appeared spared. A cardiac magnetic resonance the next day showed that the left ventricle was normal in size and systolic function with an ejection fraction 67%. The right ventricle was also normal in size and systolic function with an ejection fraction of 59%. No regional wall motion abnormality was seen. On delayed enhancement imaging, there was no evidence of delayed

enhancement to suggest scar, and no focal wall motion abnormality, dyskinesia or aneurysm formation.

A computed tomography of the chest with contrast was also done which showed no pulmonary embolism.

Cardiac electrophysiology was consulted and the patient was started on amiodarone, but this was eventually discontinued since a single chamber implantable cardioverter defibrillator (ICD) was placed. Patient was discharged home in stable condition. Medications on discharge were aspirin, atorvastatin, metoprolol.

2. Discussion

Spontaneous coronary artery dissection (SCAD) is a phenomenon where an epicardial coronary artery dissection occurs that is not related to atherosclerosis, trauma or iatrogenia. The main mechanism of injury occurs as a result of coronary artery obstruction caused by formation of an intramural hematoma or intimal disruption [1].

SCAD has always been considered a rare entity that affects mostly females with an age of presentation ranging from 41 to 61 years although it seems that the classical patient is a female patient less than 50 years old without any previous known cardiac history [2].

The prevalence of SCAD has always thought to be very low. Some studies suggest that is less than 1% but one series using optical coherence tomography (OCT) in a Japanese population revealed that SCAD can cause up to 4% of acute coronary syndromes (ACS) in a population [3].

It was initially thought that pregnancy was the cause of a great proportion of SCAD in patients, but newer analysis have shown that pregnancy could account for less than 5% of SCAD cases [4].

Patients with SCAD presenting with ventricular arrhythmias are not very common. In a Canadian registry analyzing 1056 patients with SCAD, only 84 of them presented with ventricular fibrillation (VF) or ventricular tachycardia (VT) and only 8 underwent ICD placement. They followed up the patients for 5 years and 8 patients suffered VT/VF. 5 of those 8 patients had VT/VF on initial SCAD presentation, and only 1 of them had undergone ICD insertion [5].

Some studies found that half of the patient present with ST elevation myocardial infarction and out of the other half, about 3% - 11% developed ventricular arrhythmias or sudden cardiac death [6].

Per the 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death, in patient with idiopathic polymorphic VT/VF who are resuscitated from sudden cardiac arrest (SCA), an ICD is recommended if meaningful survival greater than 1 year is expected.

Other statements from the guidelines that relate to ischemia heart disease specify that in patients, who either survive SCA due to VT/VF or experience hemo-

dynamically unstable VT or stable sustained VT not due to reversible causes, an ICD is recommended if meaningful survival greater than 1 year is expected. For coronary vasospasm patients who were resuscitated from SCA due to coronary artery spasm in whom medical therapy is ineffective or not tolerated, an ICD is reasonable if meaningful survival of greater than 1 year is expected [7].

There are no specific guidelines regarding ICD placement on patients with coronary artery dissection, but the AHA/ACC/HRS guidelines statements discussed above can help us make decisions.

If we consider that SCAD is a time dependent healing process in the majority of patients, then maybe an ICD is not indicated since this could be considered a potentially reversible cause. An observational study showed that none of the patients had repeat SCAD on follow up but another one showed that a minority of patients did not have “angiographic” healing [8]. There are some patient’s characteristics that can help us stratify patients such as female sex and the presence of fibromuscular dysplasia. This set of patients could be more prone to have repeat SCAD but due to the lack of a large study that allow us to categorically stratify patients, the question still remains, what set of patients with SCAD benefits the most from ICD placement for secondary prevention of VF/VT.

3. Conclusions

Our case underscores the importance of more prospective or retrospective studies to identify those patients with SCAD who would benefit from ICD placement for secondary prevention.

The current guidelines for ventricular arrhythmias are an excellent tool for the electrophysiologist regarding the management of these arrhythmias in other specific scenarios but guidance on SCAD is still lacking.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Hayes, S.N., Kim, E.S.H., Saw, J., Adlam, D., Arslanian-Engoren, C., Economy, K. E., et al. (2018). Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement from the American Heart Association. *Circulation*, **137**, e523-e557. <https://doi.org/10.1161/CIR.0000000000000564>
- [2] Lettieri, C., Zavalloni, D., Rossini, R., Morici, N., Etori, F., Leonzi, O., Latib, A., Ferlini, M., Trabattoni, D., Colombo, P., Galli, M., Tarantini, G., Napodano, M., Piccaluga, E., Passamonti, E., Sganzerla, P., Ielasi, A., Coccato, M., Martinoni, A., Musumeci, G., Zanini, R. and Castiglioni, B. (2015) Management and Long-Term Prognosis of Spontaneous Coronary Artery Dissection. *American Journal of Cardiology*, **116**, 66-73. <https://doi.org/10.1016/j.amjcard.2015.03.039>
- [3] Nishiguchi, T., Tanaka, A., Ozaki, Y., Taruya, A., Fukuda, S., Taguchi, H., Iwaguro, T., Ueno, S., Okumoto, Y. and Akasaka, T. (2016) Prevalence of Spontaneous Coronary Artery Dissection in Patients with Acute Coronary Syndrome. *European*

Heart Journal, Acute Cardiovascular Care, **5**, 263-270.

<https://doi.org/10.1177/2048872613504310>

- [4] Vijayaraghavan, R., Verma, S., Gupta, N. and Saw, J. (2014) Pregnancy-Related Spontaneous Coronary Artery Dissection. *Circulation*, **130**, 1915-1920.
<https://doi.org/10.1161/CIRCULATIONAHA.114.011422>
- [5] Cheung, C.C., Starovoytov, A., Parsa, A., Andrade, J.G., Krahn, A.D., Bennett, M. and Saw, J. (2020) In-Hospital and Long-Term Outcomes among Patients with Spontaneous Coronary Artery Dissection Presenting with Ventricular Tachycardia/Fibrillation. *Heart Rhythm*, **17**, 1864-1869.
<https://doi.org/10.1016/j.hrthm.2020.06.019>
- [6] Tweet, M.S., Eleid, M.F., Best, P.J., Lennon, R.J., Lerman, A., Rihal, C.S., Holmes, D.R., Hayes, S.N. and Gulati, R. (2014) Spontaneous Coronary Artery Dissection: Revascularization versus Conservative Therapy. *Circulation: Cardiovascular Interventions*, **7**, 777-786. <https://doi.org/10.1161/CIRCINTERVENTIONS.114.001659>
- [7] (2017) AHA/ACC/HRS Guideline for Management of Patients with Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: Executive Summary. A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society.
- [8] Tweet, M.S., Hayes, S.N., Pitta, S.R., Simari, R.D., Lerman, A., Lennon, R.J., *et al.* (2012) Clinical Features, Management, and Prognosis of Spontaneous Coronary Artery Dissection. *Circulation*, **126**, 579-588.
<https://doi.org/10.1161/CIRCULATIONAHA.112.105718>