

Acute Myocardial Infarction Complicated By Storming Dysrhythmia: Vt Storm

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ABSTRACT

Electrical storm refers to a state of cardiac electrical instability characterized by multiple episodes of ventricular tachycardia (vt storm) or ventricular fibrillation (vf storm) over a short period of time, typically 24 hrs. Patients with acute myocardial infarction are particularly at a higher risk. The disease has a very high mortality and hence an early recognition with prompt treatment is warranted. We report a case of a 47 year old male who had a vt storm following extensive anterolateral wall myocardial infarction. He initially had an unstable vt and was cardioverted by dc shock. However, he continued to have multiple episodes of monomorphic vt within the next 24 hours. He was initially treated with dc shock (under sedation) and amiodarone. He continued to have stable monomorphic vt for which intravenous amiodarone and metoprolol was administered. He still continued to have a dysrhythmia and intravenous lidocaine was tried which finally controlled his arrhythmia. Later, he was later put on icd for secondary prevention and had no further episodes.

Key words: Electrical storm, Vt storm, Implantable cardioverter-defibrillator, lignocaine, Amiodarone, MI.

Key Messages:

Vt storm is a disease with a very high mortality and is a cause of sudden cardiac death. Early recognition with prompt treatment is the key.

Electrical cardioversion is warranted in an unstable patient and amiodarone and beta blocker are the drug of choice for a stable patient. Lignocaine and general anaesthetics are reserved for refractory cases

These patients must be considered for an icd to maintain sinus rhythm and to prevent further episodes.

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INTRODUCTION

Electrical storm refers to a state of cardiac electrical instability characterized by multiple episodes of ventricular tachycardia (vt storm) or ventricular fibrillation (vf storm) over a short period of time, typically 24 hrs. Patients with acute myocardial infarction, those with a structural heart disease, those on implantable cardioverter-defibrillator (icd) and those with inherited arrhythmias are particularly at a higher risk. The disease has a very high mortality rate and is amongst the causes of sudden cardiac death. Early recognition and prompt treatment is the key.

Case History

A 47 year old male presented to our emergency department with chest pain of 4 hour duration. General examination was normal. Jugular venous pulse was not raised and cardiac auscultation revealed normal first and second heart sound. There was neither third heart sound nor a murmur. Electrocardiogram (ekg) showed st elevation in precordial leads v1- v6 suggesting an extensive antero-lateral wall acute myocardial infarction. He was appropriately managed medically and was immediately taken for emergency coronary angiogram which revealed 100% occlusion of proximal left anterior descending artery (Figure 1). Primary percutaneous coronary intervention was done and drug eluting stent was put to the culprit vessel restoring timi 3 flow (Figure 2). His echocardiogram revealed distal inter ventricular septum, apex and antero-lateral wall hypokinesia with mild left ventricular systolic dysfunction. On 3rd day of hospitalization he had sudden onset unresponsiveness and hypotension. Ekg was suggestive of monomorphic ventricular tachyarrhythmia (vt) (Figure 3) for which he was electrically cardioverted. Repeat ekg following cardio version, showed normal sinus rhythm with evolved

myocardial infarction changes with normal qt interval and no features of brugada. His serum calcium, magnesium and potassium were normal. He later had three such episodes and was cardioverted (under sedation). He then had a stable vt which was successfully reverted with intravenous amiodarone. However, he again had a monomorphic vt for which intravenous metoprolol was administered which even failed. He was later treated with intravenous lignocaine following which his arrhythmia got reverted and there were no further episodes. As a secondary prevention, icd was inserted after discussing with patient (Figure 4). The patient had no further episode following icd and he is under follow up.

DISCUSSION

Electrical storm refers to a state of cardiac electrical instability characterized by multiple episodes of ventricular tachycardia (vt storm) or ventricular fibrillation (vf storm) or appropriate shocks from an implantable cardioverter-defibrillator (icd) within 24 hours. The definition of vt storm is arbitrary and is a topic of ongoing debate. Two or more episodes of ventricular tachyarrhythmias in a patient without icd¹ and three or more episodes requiring pacing or shock in patient with icd² is the most accepted one. The incidence of disease varies depending on the definition used, indication for icd, left ventricular function and ranges from 2-10% per year follow-up in patients with icd.^{3,4} While electrical storm is defined by recurrent ventricular arrhythmia episodes or recurrent icd therapies, an incessant vt is a hemodynamically stable vt lasting longer than one hour.

The disease commonly occurs in patients with acute myocardial infarction, those with a structural heart disease, those on implantable cardioverter-defibrillator (icd) and those with inherited arrhythmias. Rarely this occurs in normal heart. Usually these occur

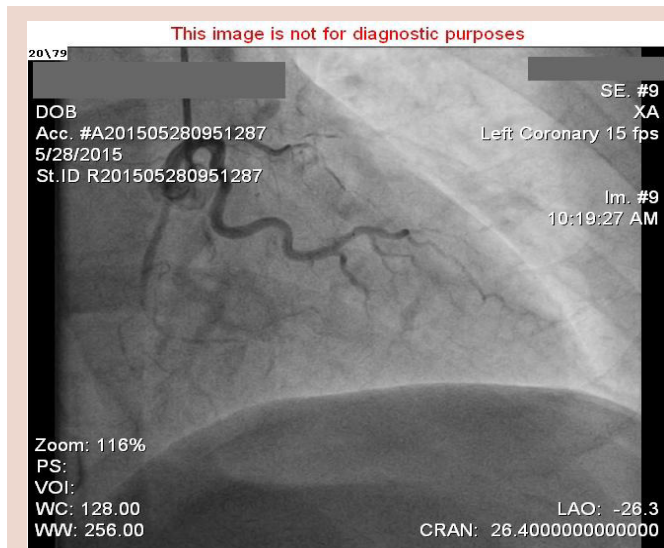


Figure 1: Angiographic image of left sinus injection showing complete occlusion of proximal left anterior descending artery.

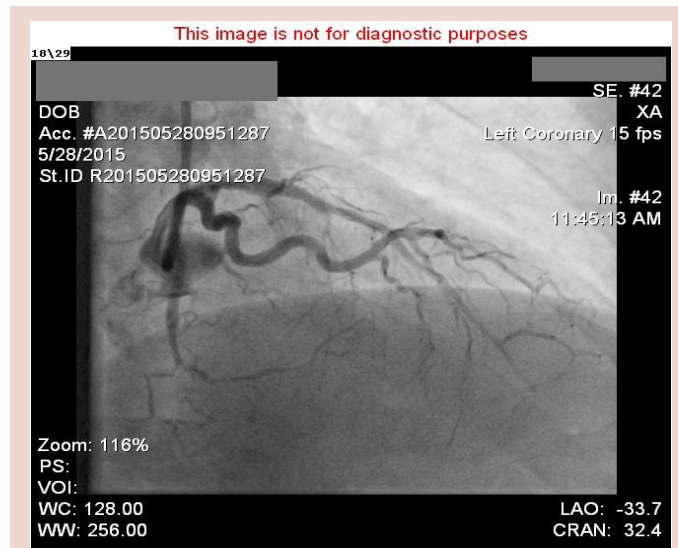


Figure 2: Post revascularization angiographic image showing TIMI 3 flow in proximal left anterior descending artery.

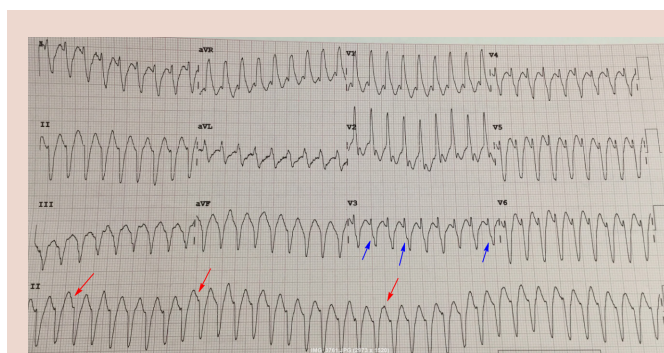


Figure 3: Electrocardiogram showing rate of around 210 with north-west axis, regular broad complexes, atrio-ventricular dissociation (red arrow) and Josephson's sign (blue arrow) suggesting monomorphic VT.

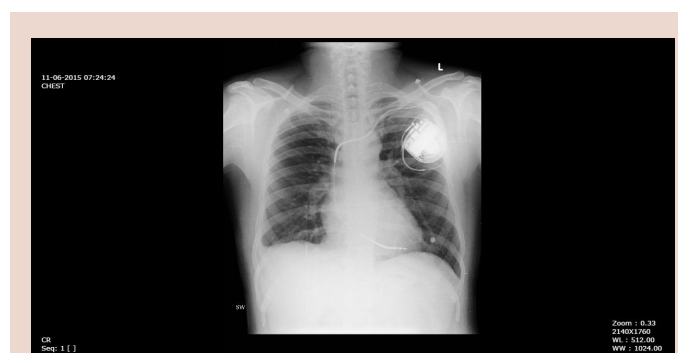


Figure 4: Chest x-ray showing ICD and lead system.

without any precipitating event and rarely are electrolyte abnormalities, drugs and new onset heart failure implicated.⁵

Clinical presentation depends on the presence and absence of icd. Presentations in those without an icd range from palpitations, pre-syncope, syncope to cardiac arrest while those with an icd in situ present with multiple icd shocks. 12 Lead ecg may sometimes miss this entity and continuous monitoring may be required for diagnosis and characterization. Monomorphic vt accounts for the majority of cases⁶ followed by vf, mixed vt/vf and polymorphic vt in that order.

Treatment of acute vt storm depends on the hemodynamic stability of the patient. In a hemodynamically unstable patient, electrical cardioversion is the treatment of choice.^{5,7} For a stable patient, amiodarone is the preferred drug and a beta blocker is added to it to combat the adrenergic surge associated with vt.^{5,8} Apart from these, other drugs commonly used include lignocaine, procainamide and general anesthetics and are reserved for patients who did not respond to or have a contraindication for the use of first line agents. For patients who had electrical storm refractory to medical measures, catheter ablation is the recommended treatment. Icd placement must be considered in these patients to maintain sinus rhythm and to prevent further episodes. Left

ventricular aneurysmectomy, left ventricular assist device, intra aortic balloon pump are amongst the treatment options for refractory cases.

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CONFLICT OF INTEREST

The author have no conflict of interest to declare.

REFERENCES

1. Kowey PR. An overview of ant arrhythmic drug management of electrical storm. *Can J Cardiol.* 1996;12(Suppl B):3B-8B
2. Israel CW, Barold SS. Electrical storm in patients with an implanted defibrillator: a matter of definition. *Ann Non Invasive Electrocardiol.* 2007;12(4):375-82. <http://dx.doi.org/10.1111/j.1542-474X.2007.00187.x> PMID:17970963.
3. Sesselberg HW, Moss AJ, McNitt S, Zareba W, Daubert JP, Andrews ML, Hall WJ, McClintic B, Huang DT; MADIT-II Research Group. Ventricular arrhythmia storms in post infarction patients with implantable defibrillators for primary prevention indications: a MADIT-II sub study. *Heart Rhythm.* 2007;4(11):1395-402. <http://dx.doi.org/10.1016/j.hrthm.2007.07.013>; PMID:17954398.
4. Exner DV, Pinski SL, Wyse DG, Renfro EG, Follmann D, Gold M, Beckman KJ, Coromilas J, Lancaster S, Hallstrom AP; AVID Investigators. Antiarrhythmics

- Versus Implantable Defibrillators. Electrical storm presages non sudden death: the antiarrhythmics versus implantable defibrillators (AVID) trial. *Circulation*. 2001 Apr 24;103(16):2066-71. <http://dx.doi.org/10.1161/01.CIR.103.16.2066>; PMID:11319196.
5. Zipes DP, Camm AJ, Borggrefe M, *et al.* ACC/AHA/ESC 2006 Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: a report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines (writing committee to develop Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death): developed in collaboration with the European Heart Rhythm Association and the Heart Rhythm Society. *Circulation* 2006; 114:e385. <http://dx.doi.org/10.1161/CIRCULATIONAHA.106.178233>; PMID:16935995.
 6. Bänsch D, Böcker D, Brunn J, Weber M, Breithardt G, Block M. Clusters of ventricular tachycardias signify impaired survival in patients with idiopathic dilated cardiomyopathy and implantable cardioverter defibrillators. *J Am Coll Cardiol*. 2000;36(2):566-73. [http://dx.doi.org/10.1016/S0735-1097\(00\)00726-9](http://dx.doi.org/10.1016/S0735-1097(00)00726-9); [http://dx.doi.org/10.1016/S0735-1097\(00\)00733-6](http://dx.doi.org/10.1016/S0735-1097(00)00733-6).
 7. Neumar RW, Otto CW, Link MS, *et al.* Part 8: adult advanced cardiovascular life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2010; 122:S729. <http://dx.doi.org/10.1161/CIRCULATIONAHA.110.970988>; PMID:20956224.
 8. Gorenek B, Blomström Lundqvist C, Brugada Terradellas J, *et al.* Cardiac arrhythmias in acute coronary syndromes: position paper from the joint EHRA, ACCA, and EAPCI task force. *Europace* 2014; 16:1655. <http://dx.doi.org/10.1093/europace/euu208>; PMID:25172845.

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