

ELECTRICAL STORM - BEYOND CONVENTIONAL THERAPY

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Abstract

Electrical storm is a condition characterized by recurrent episodes of ventricular tachycardia or ventricular fibrillation. Ultrasound guided stellate ganglion blockade (SGB) can be used for pharmacotherapy / electrical defibrillation-refractory electrical storm.

Keywords: Refractory VT, Stellate Ganglion Block, Ultrasound.

INTRODUCTION

Electrical storm is a life threatening condition. It is defined as 3 or more sustained episodes of ventricular tachycardia (VT), ventricular fibrillation (VF), or appropriate implantable cardioverter-defibrillator (ICD) shocks during a 24-hour period [1]. Recurrent episodes of VT or VF, carries high mortality and is associated with increased risk of sudden cardiac death, data on the prognostic significance of electrical storm strongly suggest that these patients have a poor outcome and might be an independent risk factor for sudden cardiac death[2]. Mediated by sympathetic overactivity, suppressing sympathetic activity can help in controlling the storm. Electrical defibrillation and pharmacotherapy are widely used in terminating ventricular arrhythmias. Drugs like amiodarone, esmolol, magnesium sulphate are widely used in refractory ventricular arrhythmias. Stable VT can be managed with pharmacological therapy while unstable VT can be managed by synchronized cardioversion. We report a similar case where ultrasound guided stellate ganglion block was used as a last resort for terminating electrical storm.

CASE

A 32 year old male was brought to emergency department with history of shortness of breath and decreased response since 1 day. There was no history of any underlying comorbid conditions. On examination, the patient was in gasping state with weak central pulse. Immediately airway was secured and connected to ventilator. On further assessment, Heart rate of 98/ regular with blood pressure of 60 systolic. Focused Point of care ultrasound revealed bilateral confluent B lines with bilateral positive shred sign all zones, Inferior Vena Cava(IVC) assessment revealed more than 50% collapsing, cardiac contractility was good with no Right Atrial/Ventricular dilatation, no Regional wall motion abnormality. Initial intravenous fluid bolus of normal saline 1 litre was given, repeat blood pressure was 80mm Hg systolic hence patient was started on noradrenaline infusion at the rate of 10mcg/min, which was later increased to 15mcg/min. ECG revealed sinus tachycardia with no significant ST-T changes, normal

intervals. One hour later, monitor revealed wide complex tachycardia with heart rate of 190 pm. ECG was suggestive of ventricular tachycardia (Image A). The patient's blood pressure was 70 systolic. In view of unstable ventricular tachycardia, 100J synchronized cardioversion was done but rhythm persisted. Subsequently repeat synchronized cardioversion of 140J and later 200J was given.

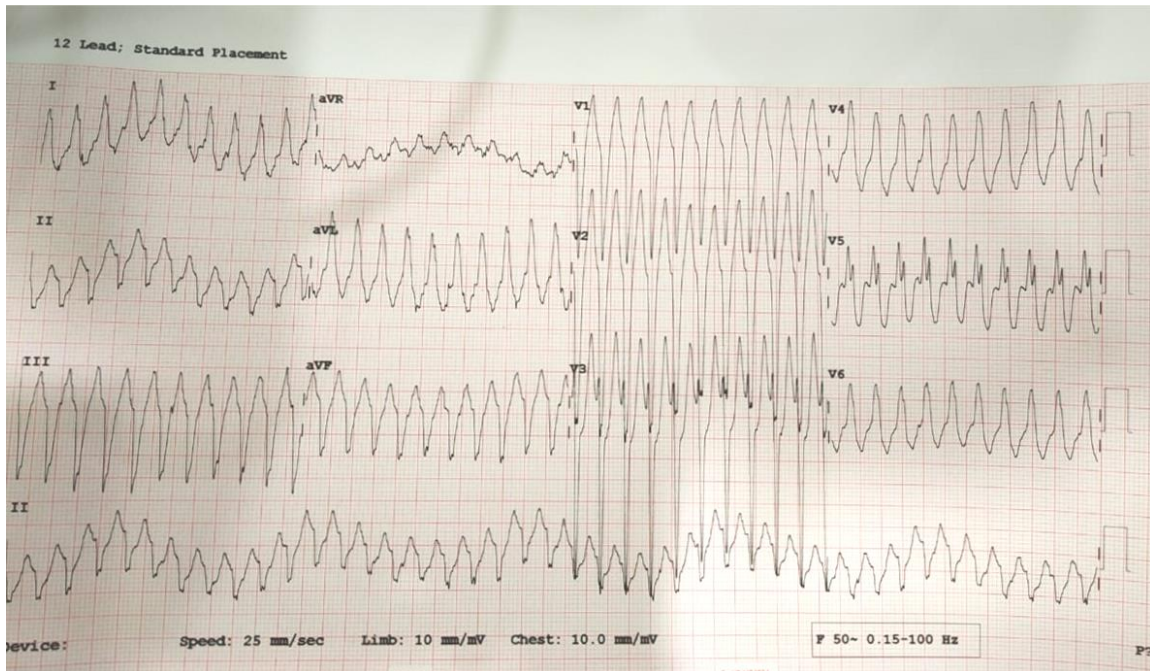


Image A: ECG suggestive of ventricular tachycardia

On reassessing, central pulse was not palpable for 10 seconds, code blue was activated and immediately resuscitation was started as per ACLS guidelines. Initial rhythm was again ventricular tachycardia; hence defibrillation was performed with 200J and chest compressions continued. Since already 4 shocks were given, injection amiodarone 300mg bolus was given and 150mg was repeated after 4 minutes in view of sustained ventricular tachycardia. Arterial blood gas did not signify any reversible cause. Despite electrical defibrillation and pharmacotherapy, patient had persistent ventricular tachycardia. In view of the “electrical storm”, esmolol 25 mg iv was given. After 12 minutes of resuscitation and persisting ventricular tachycardia, we decided to perform ultrasound guided stellate ganglion block. Stellate ganglion block was performed on the right side with 10ml 2% plain lignocaine solution. Cardio Pulmonary Resuscitation (CPR) was continued, after 2 minutes, monitor showed organized sinus rhythm and return of spontaneous circulation (ROSC) was attained. Patient was shifted to intensive care unit.

Later the patient was diagnosed of covid-19 pneumonia with acute respiratory distress syndrome. The patient had no further episodes of ventricular tachycardia. Blood gas analysis showed ph-7.2, PaCO₂-55mmHg, PaO₂-104 mmHg, HCO₃-18 mEq/L, lactate-6mmol. During the course of admission, the patient did not have further episodes of VT. Patient subsequently developed severe covid-19 acute respiratory distress syndrome and refractory septic shock, succumbed on day-3 due to respiratory failure.

DISCUSSION

Refractory ventricular arrhythmias also known as “electrical storm” is a life-threatening syndrome that involves recurrent episodes of ventricular arrhythmias. It is defined as 3 or more sustained episodes of ventricular tachycardia (VT), ventricular fibrillation (VF), or appropriate implantable cardioverter-defibrillator (ICD) shocks during a 24-hour period. Management of electrical storm is challenging to the emergency physicians. The clinical presentation can also be varying. Pharmacological therapy includes adrenergic blockers like amiodarone, beta blockers, magnesium sulphate and finally stellate ganglion block[2]. Amiodarone is widely used in the management of electrical storm[1]. Amiodarone helps in reversal of electrical storm by 60% [4]. The ARREST trial, in which amiodarone was compared to placebo, amiodarone showed improved survival-to-hospital admission rates in patients with electrical storm [4].

Other indications of SGB are peripheral occlusive vascular diseases, Raynaud’s disease, post-surgical pain, complex regional pain syndrome, intractable angina .

CONCLUSION

Refractory ventricular arrhythmias, refractory to pharmacological therapy can be treated with ultrasound guided stellate ganglion block. The technique and practice has to be actively implemented and taught in all emergency department and intensive care units.

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