



Case Report

Ultrasound guided stellate ganglion block for ventricular tachycardia storm

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ABSTRACT

Ventricular tachycardia storm is a life threatening emergent condition mostly unresponsive to medical management and implantable cardioverter defibrillator. Sustained arrhythmias lead to severe cardiac dysfunction, low output states and may contribute to multi organ failure. Stellate ganglion block either left sided or bilateral has been known to revert such ventricular tachycardia storm. We report 2 cases that had presented with sustained ventricular tachycardia with severe left ventricular dysfunction who failed to respond to medical management and were successfully treated with USG guided stellate ganglion block.

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1. Introduction

Ventricular tachycardia storm or Electrical Storm is defined as more than 2 episodes of sustained VT or ventricular fibrillation (VF) within the last 24-h or the occurrence of incessant VT for at least 12-h.¹⁻³ Ventricular tachycardias present with multiple episodes of ventricular arrhythmias in a short duration, affecting the cardiac function and leading unresponsive hypotension. Hemodynamic instability if not corrected promptly may result in cardiogenic shock and multiple organ failure. Most of the cases are unresponsive to standard medical therapy and shock. Stellate Ganglion block for such ventricular storm is now a well-recognized option.⁴ We report 2 cases of ventricular tachycardia storm refractory to medical management who were successfully treated with ultrasound guided Left stellate Ganglion Block.

2. Case Reports

2.1. Case I

A 56-year-old male hypertensive, diabetic patient admitted with a history of loose motions, vomiting and giddiness. Investigations revealed severe coronary artery disease

with acute coronary syndrome. He underwent coronary angiography and coronary stent to left circumflex artery. After stenting he developed ventricular arrhythmias that were unresponsive to medical treatment with Amiodarone, Xylocard. He received multiple shocks of 150 joules which temporarily terminated the ventricular tachycardia. Echocardiogram revealed an ejection fraction of 35%. Due to unstable condition and persistent hypotension he was put on mechanical ventilation support, Dobutamine, Dopamine, Noradrenaline, Amiodarone and Xylocard infusions. Biochemical parameters showed low Magnesium levels and accordingly magnesium correction was given. Patient was receiving Dytor, Ecosprin, Clopidab and Ivabrad. A left sided Stellate Ganglion block was administered under ultrasonography guidance with 12 ml of 0.25% bupivacaine in aliquots. The arrhythmias reverted back within one hour after the block was given. There were no new episodes of arrhythmias. Patient's hemodynamics started improving and he was weaned off from the ventilator, inotropes and antiarrhythmics in next 48 hours. Patient made an uneventful recovery.

2.2. Case II

A 27 year old male presented with breathlessness, palpitations and giddiness. On evaluation was diagnosed

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as Acute anterior wall Myocardial infarction with severe LV dysfunction (EF-34%). Coronary angiography revealed single vessel disease which was recannulated. Patient then developed refractory ventricular tachycardia and was unresponsive to amiodarone, DC shocks. In view of unstable hemodynamics patient was intubated, put on mechanical ventilator support and inotropes- Noradrenaline, Dobutamine. A stellate ganglion block was administered under USG guidance with 10cc 0.25% Bupivacaine. The tachycardia was reverted after an hour. Patient was weaned off from the ventilator and inotropes over next 24 hrs. Patient had an episode of ventricular tachycardia which was treated with medication. Patient made an uneventful recovery.

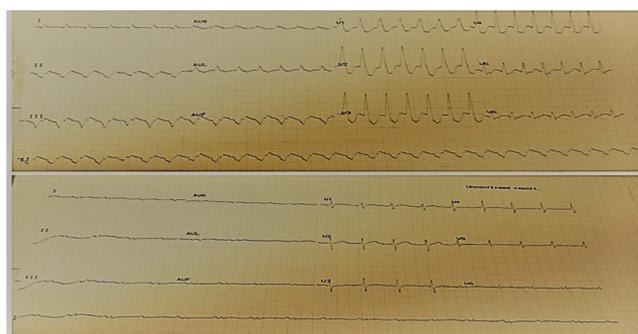


Fig. 1: Case I-Pre & Post Stellate Ganglion Block ECG

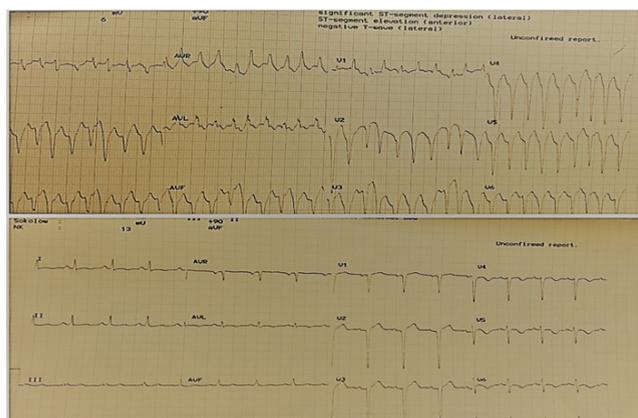


Fig. 2: Case II -ECG changes after stellate ganglion block

3. Discussion

The sympathetic innervation to the heart is derived from the left and right stellate ganglia via post-ganglionic fibers with left stellate ganglion predominant at the ventricular level. Myocardial ischemia, decompensated heart failure, electrolyte imbalance, ICD recipients, Scar-mediated reentrant phenomenon due to a previous MI are contributing factors for triggering ventricular tachycardia.⁵

Partial denervation of sympathetic fibers at the level of the myocardium in MI induces a hypersensitivity to catecholamines, making heart more vulnerable to electrical storm. Both of our patients had acute MI with low ejection fraction and had undergone recannulation of the stenosed coronaries. The treatment options for sustained ventricular arrhythmias include correction of the causative factors, beta blockers, Amiodarone, class I antiarrhythmic agents, epidural anaesthesia, stellate ganglion block. Non pharmacologic options include intra-aortic balloon pump (IABP), left ventricular assist device (LVAD), implantable cardioverter-defibrillator (ICD), and cardiac sympathetic denervation with radiofrequency ablation.⁶ Patients require an intensive care unit admission, inotropes, correction of metabolic abnormalities if any, supportive care and mechanical ventilation in critical cases. Patients with persistent hypotension requiring incremental doses of vasopressors, severe LV dysfunction, major comorbidities like chronic kidney disease and severe pulmonary disease fall in high risk groups. Intra-aortic balloon pump (IABP), left ventricular assist device (LVAD), or extracorporeal membrane oxygenation (ECMO) is reserved for patients with circulatory collapse.⁷ Attempts should be made to suppress ventricular arrhythmias and preventing further deterioration in cardiac function. By blocking the stellate ganglion, the amount of sympathetic outflow to the heart is decreased, which may in turn decrease the sensitivity of the myocardium to arrhythmias. Stellate ganglion block can be performed under Fluoroscopy, CT, MRI, or Ultrasound imaging. Lingjin Meng et al in a systemic review from previously published data analysed the efficacy of SGB. They observed that stellate ganglion block is effective in reducing the episodes and therapies for ventricular arrhythmias irrespective of the type of arrhythmias, presence of structural abnormality or degree of left ventricular dysfunction.⁸ Vaseghi M et al in a retrospective study observed the beneficial effects of both bilateral and left SGB with freedom from ICD shocks beyond the postsympathectomy period.⁹ Amarjeet Kumar et al, Rajesh MC et al, Hayase J et al have reported the benefits of Ultrasound-guided stellate ganglion blockade in ventricular storm.^{10–12} The stellate ganglion is formed by the lower cervical and first thoracic ganglia is located at the level of C7, below the subclavian artery. Ideally the needle should be placed anterolateral to the longus colli muscle, deep to the prevertebral fascia and superficial to the fascia investing the longus colli muscle. The subfascial plane facilitates the caudal spread of the injectate to reach the stellate ganglion at C7-T1 level, even if the needle is placed at C6 level.¹³ Hoarseness of voice (recurrent laryngeal nerve), Horner's syndrome, phrenic nerve involvement are known side effects. Complications such as accidental intravascular, epidural or intrathecal injection, brachial plexus and recurrent laryngeal nerve palsy, injury

to trachea, esophagus, pneumothorax can occur but are rare. Left SGB can also result in an imbalance in myocardial contractility and asynchrony of the left ventricle. An ultrasound guided block is technically easy, confers better anatomical delineation, facilitates correct needle placement and avoids injury to surrounding structures. The ability to revert ventricular arrhythmias and duration of remission is independent of the choice of local anaesthetic used.⁸ An ultrasound guided left Stellate Ganglion Block may prove to be highly beneficial, bedside treatment option for refractory ventricular tachyarrhythmias with complete or significant periods of remission.

4. Conclusion

Ultrasound guided left stellate ganglion block provides a safe alternative to treat ventricular arrhythmias in hemodynamically unstable patients that are refractory to other treatment modalities. It's usefulness as a first line of management in ventricular tachycardia storm needs to be evaluation.

5. Source of Finding

None.

6. Conflict of Interest

None.

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