Stellate Ganglion Block In A Patient With Refractory Ventricular Fibrillation

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INTRODUCTION

Electrical storm is often refractory to standard therapies and has an acute mortality greater than 20%. Antiarrhythmic medications and catheter-based ablation procedures are the standard of care in patients with ventricular arrythmias yet are often unsuccessful at suppressing resistant ventricular tachycardia.[1]

The stellate ganglion block (SGB) is an integral treatment for electrical storm and resistant ventricular tachycardias in the intensive care population. The block can be performed at the patient's bedside on therapeutic anticoagulation. The patient described in this case report was treated successfully with a stellate ganglion block, which supports its use and effectiveness in hemodynamically unstable patients.

CASE REPORT

A 46 y/o female with past medical history of cardiopulmonary sarcoidosis, paroxysmal atrial flutter, non-ischemic cardiomyopathy with an AICD, pulmonary hypertension, obstructive sleep apnea, and right ventricular (RV) dysfunction on home milrinone of 0.25 mcg/kg/min was admitted for cardiogenic shock.

She received an orthotopic heart transplant day 5 of her admission and was initiated on immunosuppressive medications postoperatively to prevent rejection. POD 5 she developed ectopy and R on T phenomenon and VF arrest thought to be secondary to acute rejection. She received 2 minutes of chest compressions and defibrillation X 1 with ROSC. She was electively intubated for airway protection and to decrease catecholamine surge. In consultation with electrophysiology amiodarone and magnesium infusions were started. She suffered two additional VF arrests in less than 24 hours requiring cannulation of VA-ECMO.

Anesthesia pain service was consulted for a stellate ganglion nerve block for refractory ventricular arrhythmias in the setting of electrical storm. A left sided SGB was performed under ultrasound guidance at the patient's bedside. A linear ultrasound probe was placed at the level of the cricoid cartilage, identifying the carotid artery, Chassaignac's tubercle, and longus coli muscle, with the stellate ganglion located anterolaterally (Figure 1).

The procedure was performed successfully with no complications. Horner syndrome was not confirmed as the patient was intubated and sedated; however, the patient had a temperature increase of 2° Celsius of her ipsilateral upper extremity. The patient's ventricular arrythmia resolved within 15 minutes of block placement returning to normal sinus rhythm. She did not have a reoccurrence of ventricular tachycardia allowing decannulation from ECMO and extubation.

Figure 1. Ultrasound Image Of SGB[1]
SCM=Sternocleidomastoid, AS=anterior scalene, IJV=Internal jugular vein
CA=carotid artery, LC=longus colli, *=SG, AT=anterior tubercle C6

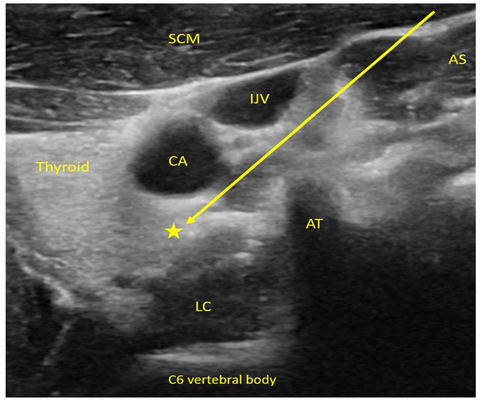
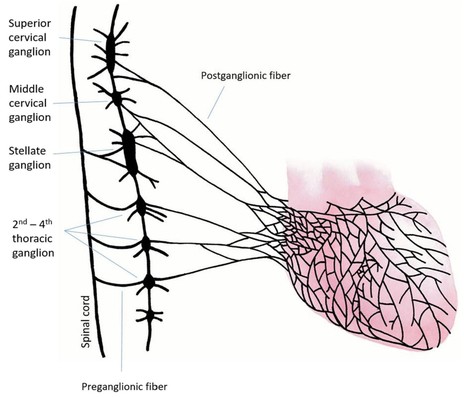


Figure 2. Sympathetic innervation to the heart[1]



DISCUSSION

Electrical storm is defined as 3 or more episodes of sustained or hemodynamically significant ventricular arrythmias in a 24-hour period. This condition is often refractory to standard therapies and has an acute mortality greater than 20%.[1] Antiarrhythmic medications and catheter-based ablation procedures are the standard of care in patients with ventricular arrythmias; however, are often unsuccessful at suppressing resistant ventricular tachycardia.[1]

The sympathetic nervous system's role of initiating and driving electrical storm is well established.[2] Neuromodulation techniques, which decrease myocardial sympathetic tone, include thoracic epidural anesthesia, spinal cord stimulation, and SGB are effective in suppressing ventricular arrhythmias. Specifically, the SGB is advantageous in the critical care setting as it can be performed bedside with ultrasound guidance in a patient on therapeutic anticoagulation.[2]

The stellate ganglion is a collection of neuron cell bodies formed by the fusion of the inferior cervical and first thoracic sympathetic ganglia.[3] The stellate ganglion measures 2.5cm long, 1 cm wide, and 0.5 cm thick located anterior to the C7 vertebral body bilaterally.[1] Thoracic preganglionic sympathetic nerves synapse with post-ganglionic sympathetic nerves, which supply efferent output to the upper extremity, neck, and myocardium (Figure 2).

A SGB results in vasodilation of the upper extremity and face, Horner's syndrome, and reduced inotropy and chronotropy. Horner's syndrome, is a nonspecific finding resulting from blockade of the middle or superior cervical ganglion, therefore not confirmatory of a successful block. The gold standard for confirmation of a successful sympathectomy is a temperature increase of the ipsilateral upper extremity.[1]

The SGB is an invaluable treatment for electrical storm and resistant ventricular tachycardias in the intensive care population. The block can be performed at the patient's bedside on therapeutic anticoagulation. The patient described in this case report was treated successfully with a stellate SGB supporting its use and effectiveness in hemodynamically unstable patients.

REFERENCES

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