

Continuous Stellate Ganglion Block as a Bridge to Heart Transplantation

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INTRODUCTION

Ventricular arrhythmias (VA) are a leading cause of sudden cardiac death and are associated with many pathological conditions. Mainstays for management have long been antiarrhythmic medications, placement of an implantable cardioverter-defibrillator (ICD), cardiac resynchronization therapy (CRT), and electrophysiology studies with catheter ablations. While there are multiple etiologies for these arrhythmias, excessive sympathetic stimulation from the autonomic nervous system can lead to increased myocardial excitability and subsequent VA. The stellate ganglion, a cervicothoracic source of autonomic innervation to the heart, has been well studied for its role in VA. Both surgical interventions and regional anesthetic techniques have been well documented as permanent or temporary treatments for VA. Here, we present a patient awaiting a heart transplant who presented with unstable persistent ventricular tachycardia (VT) who ultimately had a continuous stellate ganglion block placed, which successfully treated his arrhythmia, and allowed him to receive a heart transplant 35 days after catheter placement.

METHODS

An extensive literature review search was performed with the PubMed database. Articles applicable to our case were reviewed and cited. IRB approval was deferred as all patient identifiable information was omitted, in accordance with rules and regulations of Loyola University Medical Center. Informed consent was obtained from the patient for this case report to be used solely for research and educational purposes.

RESULTS/CASE REPORT

A 64 year-old male patient with NICM (ambulatory class IV) was transferred to our institution for management of recurrent VT in the setting of advancing heart failure. He had an extensive history of VA, including a VT arrest 17 years prior for which an ICD was placed followed by subsequent CRT-D placement several years later, and a VT storm refractory to defibrillation 5 years prior for which a multifocal epicardial ablation was performed.

He presented to Loyola from an outside hospital after being intubated and sedated for VT refractory to multiple defibrillations from his CRT-D even with initiation of amiodarone and lidocaine infusions. Further evaluation revealed that the arrhythmia was multifocal in origin, making him a poor candidate for an ablation in the setting of prior failed ablations. Additionally, he had developed severe right ventricular failure, precluding him from VAD therapy. An intra-aortic balloon pump (IABP) was placed to support cardiac function while workup for heart transplant was initiated.

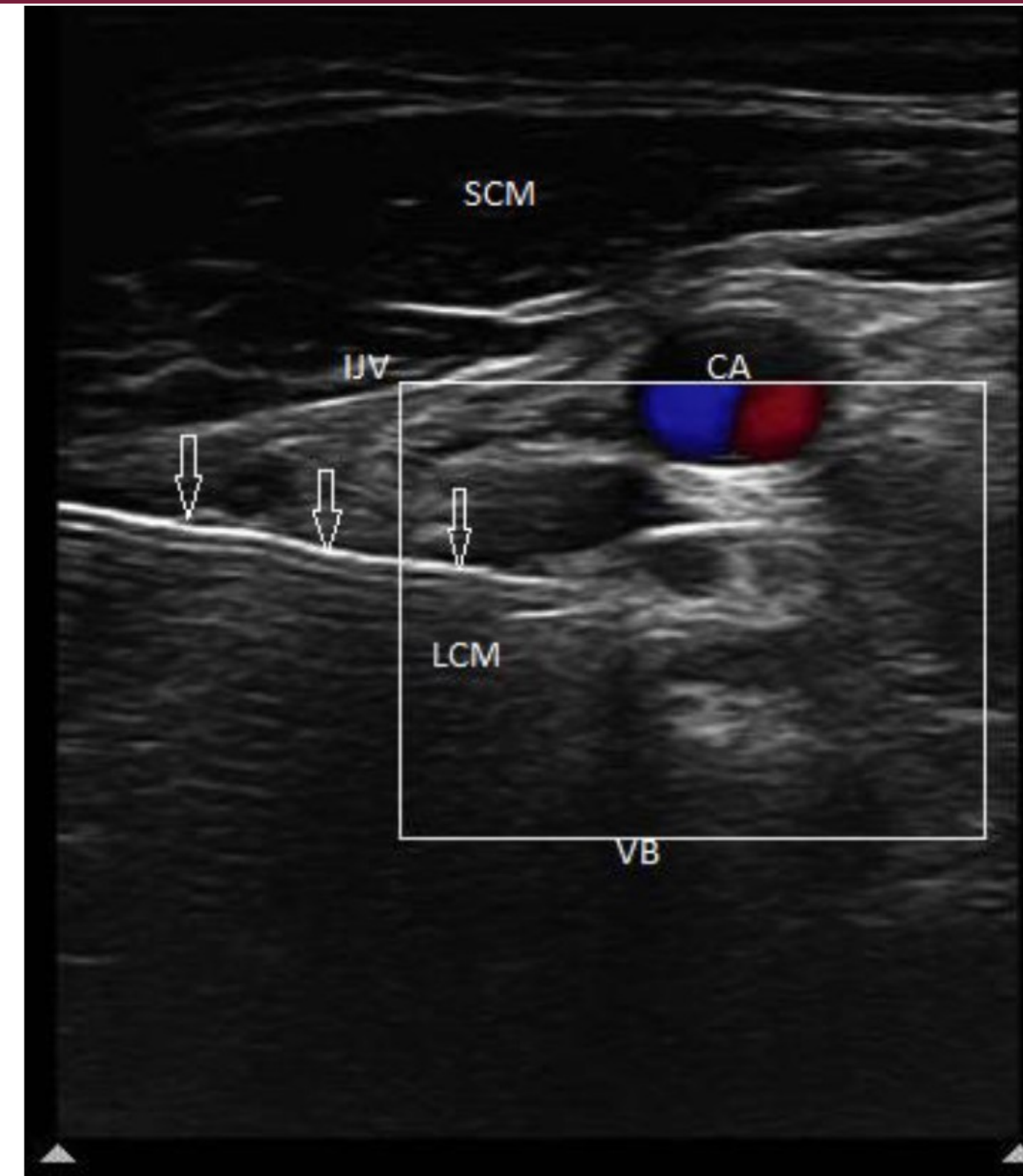


Figure 1: Block needle (arrowheads). VB, C6 vertebral body; LCM, longus colli muscle; IJV, internal Jugular vein; CA, carotid artery; SCM, sternocleidomastoid muscle.

Unfortunately, his cardiogenic shock and respiratory failure precluded him from being listed. At this time the Acute Pain Service was consulted to place a stellate ganglion block in hopes of terminating his VA and allowing him to get extubated. Using an ultrasound-guided approach, a 17g Touhy needle was used to administer 10 mL of 0.5% bupivacaine at the left stellate ganglion followed by placement of a Perifix FX catheter to allow for continuous infusion of 4 mL/hr. The patient's VA terminated after the procedure, and on post catheter placement day (PCD) 3 he was extubated. Multiple attempts to subsequently wean the continuous infusion were unsuccessful, each time resulting in the return of VT, requiring the bupivacaine infusion to be restarted. The patient did need to be reintubated on PCD 23, however this was suspected to be sepsis-related secondary to a urinary tract infection he developed. Once treated, the patient was again extubated, then relisted for a heart transplant. On PCD 32 the patient right heart failure had progressed to where he was reintubated and placed on VA ECMO. On PCD day 35 a donor heart was identified, and he underwent a successful heart transplant, at which time the stellate ganglion catheter was removed.

DISCUSSION

Stellate ganglion blocks have been demonstrated as an effective tool in mitigating the sympathetic surge that contributes sustained VA. It can be used as a diagnostic or therapeutic modality prior to more definitive therapies. Patients with recurrent or persistent VA are often too unstable to undergo surgery. Performing a stellate ganglion block can help temporarily treat this condition, but the procedure can come with a high degree of risk, as seen in this medically complex patient. Patients that have mechanical support devices in place, like an IABP or ECMO, are on continuous anticoagulation. This is often considered a contraindication to many regional anesthesia techniques given the inherent risk of vascular puncture or hematoma formation. Indwelling catheters pose another risk, as they are easily colonized, which can lead to local or systemic infections if left in for long periods of time. Furthermore, the local anesthetics commonly used in these blocks can cause cardiac and neurotoxicity in the form of local anesthetic systemic toxicity (LAST). The risks of bleeding, infection, and toxicity were all of very high concern in this patient. Using a US-guided technique by specialists trained in regional anesthesia help mitigate bleeding concerns during placement in an anticoagulated patient. Daily examination by the Acute Pain Service allowed for observation of any signs of catheter infection. And finally, continuous monitoring in a critical care setting was essential to monitor for signs of LAST. In this case, after extensive discussions amongst the patient's family and the multidisciplinary team managing his care, the benefits of performing a continuous stellate ganglion block ultimately outweighed the risks, and allowed the patient to receive a heart transplant.

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