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Stellate Ganglion Block (SGB) for refractory ventricular tachycardia (VT) and ventricular fibrillation (VF)

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Introduction

Electrical storm (3 or more episodes of sustained VT/VF or appropriate ICD therapies in < 24 hours) is associated with high mortality and morbidity. Temporary sympathetic blockade through percutaneous SGB has been shown to reduce the recurrences of VT/VF in this population with low rates of complications. A SGB is a minimally invasive bedside procedure involves injecting local anesthetic (LA) superficial to the lungus colli muscle at the level of C6, aiming to have the injectate spread to the SG (Image 1). This quality improvement project addresses the need for urgent bedside procedure performed by pain specialist in critically ill patients. Over the past year, we have integrated this approach into our clinical practice, providing a promising option for patients with life-threatening arrhythmias who are unresponsive to conventional treatments.

Materials and Methods

During the academic year of 2023-2024, a multidisciplinary team, including Cardiac Electrophysiology (EP), Intensive Care physicians, and Pain specialists was established. The purpose was to define a consensus workflow on how to provide SGB procedure to inpatients with VT storm or high risk for near-term recurrent VT efficiently and safely.

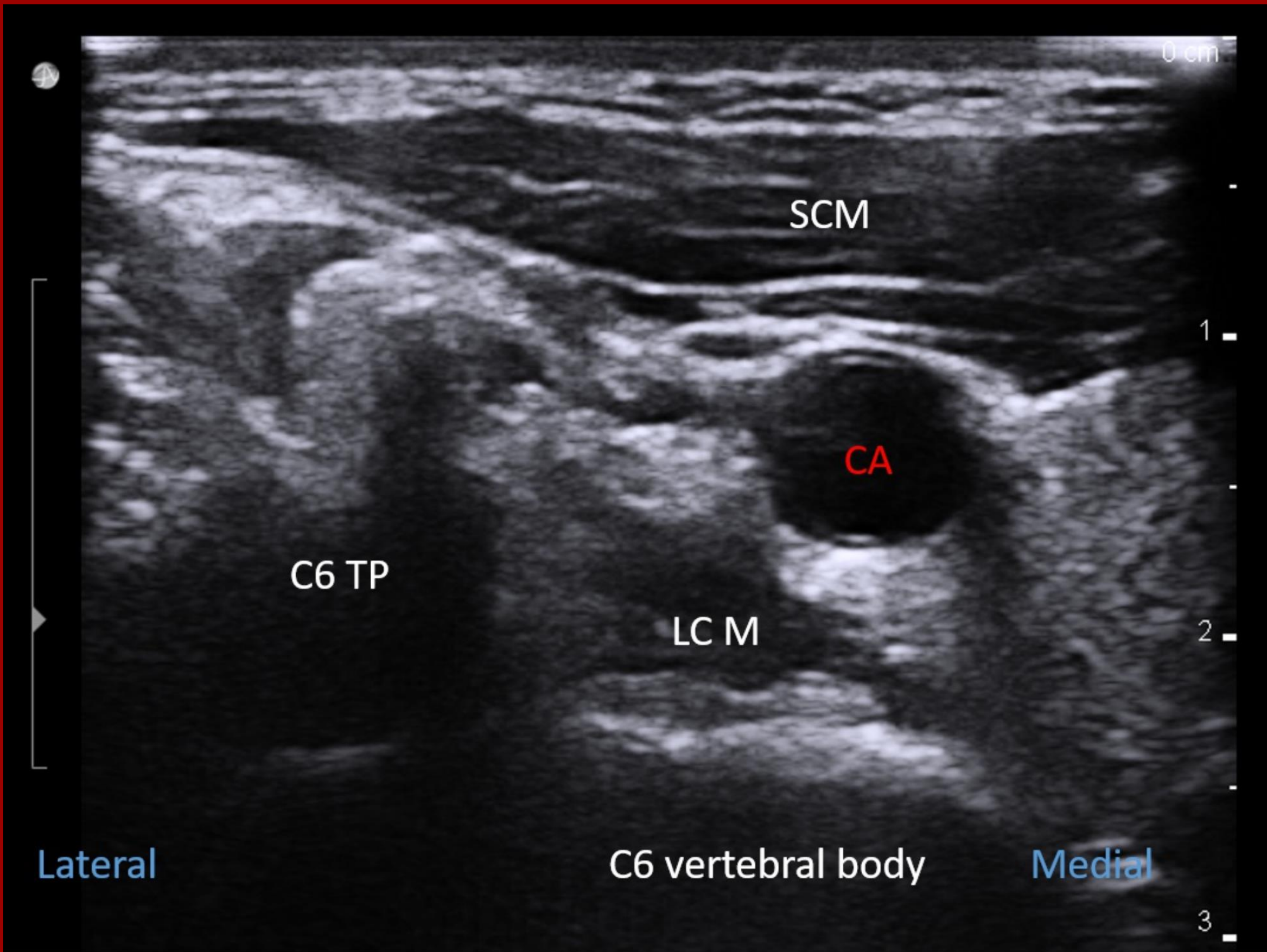


Figure 1: Stellate ganglion block under ultrasound guidance

Specifications of indications for Stellate ganglion block for refractory Ventricular Tachycardia (VT) and Ventricular Fibrillation (VF)

- To abort or prevent the recurrences of VT/VF for one of the following circumstances:
 - To stabilize a patient ahead of a planned catheter ablation
 - To bridge a patient to recovery when reversible causes of VT/VF are being addressed.
 - E.g. electrolyte disturbances, post-ischemia VT/VF or short-coupled PVCs, drug-induced long-QT syndrome or sodium channel toxicity
 - To help wean off intravenous antiarrhythmic drugs and sedation
 - To help determine the clinical response to sympatholysis which may identify patients who may be the best candidates for surgical sympathectomy

Left Stellate ganglion	Right Stellate ganglion
Predominant innervation of ipsilateral atrium	Predominant innervation of ipsilateral atrium
Less influence on sino-atrial node	Predominant innervation of sino-atrial node
Speeds up atrio-ventricular conduction	Slow down atrioventricular conduction
Innervation of posterior ventricles	Innervation of anterior ventricle, dominant in RV
Stronger iusitropic effect	Weaker iusitropic effect



Results

A working document was conducted with the following agreements. The procedure will be performed by Pain anesthesiologist. Indications were to abort/prevent recurrences of VT/VF to stabilize a patient before catheter ablation, to provide a bridging window when reversible causes of VT/VF are being addressed, to help wean off intravenous antiarrhythmic drugs and sedation, and to help identify patients who may benefit from surgical sympathectomy (Table1). Relative contraindications were defined as neck soft tissue infection, neck hematoma, neck trauma or cervical spinal injury requiring a brace, allergy to LA used, or unfavorable anatomy precluding a safe procedure. At the request of the EP service, the primary team will contact chronic pain service to request the procedure ideally within 4 hours. Technical considerations included preferred left laterality considering left side SG function (Table2) and the use of US for guidance for safety measurements. The type and volume of LA were to be decided according to attending preferences and considerations.

Discussion

Our quality improvement project developed a streamlined workflow for SGB involving a multidisciplinary team, enhancing safety and efficiency. The procedure’s indications, contraindications, and technical considerations were standardized, improving patient management in critical situations. Regarding anticoagulation status, many patients with VT/VF have structurally abnormal hearts and comorbid conditions requiring anticoagulation. Given the acuity of VT storm and the need for urgent treatment, the risks of performing US-guided stellate ganglion blockade on anticoagulation are outweighed by the benefits (avoiding cardiac arrest, unstable VT, or repeated ICD therapies), and delaying the procedure to washout oral anticoagulants may expose the patient to further risk of VT/VF episodes. Furthermore, in some patients holding anticoagulation may pose a significant risk of thromboembolism (including patients with mechanical valves, LVAD, temporary mechanical circulatory support, intracardiac thrombus, pulmonary embolism, or prior embolic stroke).

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Disclosures: none