



Successful Use of a Stellate Ganglion Catheter for Suppression of Refractory VT Storm

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Introduction

- Sympathetic cardiac input can precipitate cardiac arrhythmias and is supplied in part via the stellate ganglion (SG). Inhibition of this pathway by a stellate ganglion block (SGB) can decrease sympathetic overactivity.
- Stellate ganglion blocks are infrequently utilized as a rescue therapy for promoting cessation of ventricular tachycardia (VT) storm.
- Relative to SGB, stellate ganglion catheters (SGCs) offer the benefit of extended duration of SG sympatholysis and decreased risk associated with repetitive blocks.

Patient Presentation

- A 43-year-old male with PMH of HFrEF (20%), ischemic cardiomyopathy d/t Kawasaki disease, chronic total LAD occlusion, and MI who sustained VT and underwent VT ablation 4 years prior with ICD placement then presented with recurrent persistent VT despite ICD shocks.

Hospital Course

- Intubation, sedation, and ICU admission were required.
- VT was refractory to VT ablation, three cardioversions, and infusions and boluses of amiodarone, procainamide, and lidocaine.
- Support with ECMO was considered if patient continued to experience VT storm.
- Regional anesthesiology service was consulted to attempt a SGB.
- A left-sided SGB was associated with temporary cessation of his refractory VT during the duration of the block.
- The following day, after return of VT, a left SGC was placed.

Intervention

- Using a high-frequency linear US probe, the left stellate ganglion was visualized at the C6 level. Other structures were analyzed under color (Doppler) mode to find a safe area for needle insertion.
- An 18-ga Tuohy needle was inserted under in-plane US guidance posterolaterally to anteromedially as shown in Image 1.
- After negative aspiration, a bupivacaine-epinephrine mixture was injected under US visualization around the SG to confirm appropriate spread below the carotid artery and above the longus colli muscle and then a nerve catheter was threaded (see Image 2) and programmed for intermittent hourly boluses.

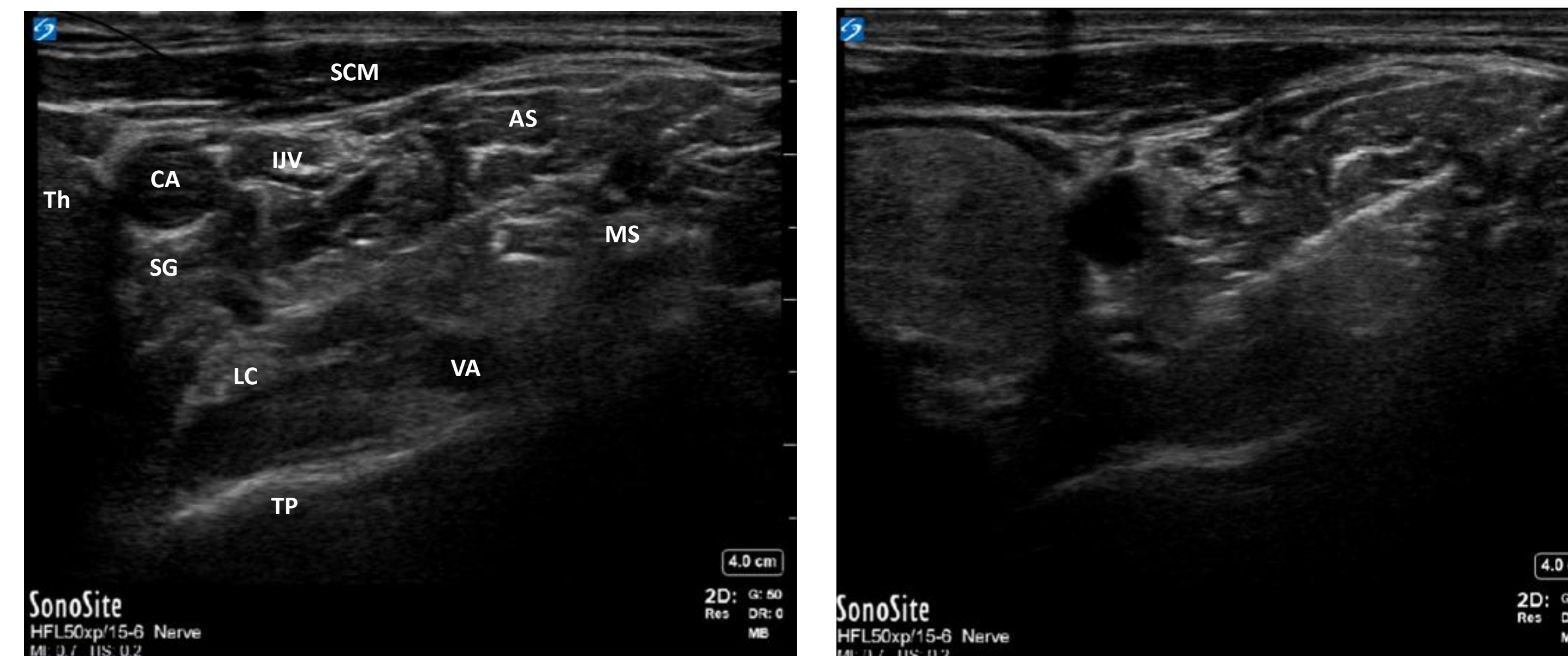


Image 1 : In-Plane Visualization of SGC Placement

At the level of the C6 transverse process. SG = stellate ganglion; CA = carotid artery; IJV = internal jugular vein; VA = vertebral artery; Th = thyroid; SCM = sternocleidomastoid muscle; AS = anterior scalene muscle; MS = middle scalene muscle; LC = longus colli muscle; TP = transverse process of C6

Image 2 – In-Plane Visualization of SGC Placement

Results

- Following SGC placement and ensuing hourly intermittent boluses of ropivacaine as well as continuation of his sedation, intubation, and anti-arrhythmic medical therapies, no further VT episodes occurred in the following seven days which bridged the patient to a successful heart transplant.

Learning Points

- The stellate ganglion regulates cardiovascular sympathetic activity. Increased sympathetic tone can promote arrhythmogenesis. Therefore, SG blockade could decrease arrhythmogenesis.
- Stellate ganglion catheters may be a useful emerging tool for provisional suppression of medically refractory VT storm until more definitive treatment can be pursued.
- A stellate ganglion catheter offers an extended duration of sympathetic outflow attenuation versus a stellate ganglion block. Goals for therapy and time until definitive management of VT storm should be considered to limit additional risk of repeating SGBs.

References

1. Patel RA, Condrey JM, George RM, Wolf BJ, Wilson SH. Stellate ganglion block catheters for refractory electrical storm: a retrospective cohort and care pathway. Reg Anesth Pain Med. 2023;48(5):224-228. doi:10.1136/rapm-2022-104172
2. Tian Y, Wittwer ED, Kapa S, et al. Effective Use of Percutaneous Stellate Ganglion Blockade in Patients With Electrical Storm. Circulation: Arrhythmia and Electrophysiology. 2019;12(9):e007118. doi:10.1161/CIRCEP.118.007118