

STELLATE GANGLION BLOCK AS A BRIDGE TO CARDIAC SYMPATHECTOMY FOR TREATING RECURRENT VENTRICULAR TACHYCARDIA IN A HIGH-RISK PATIENT: CASE REPORT

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- Background:** Stellate ganglion block is a salvage therapy used for refractory or incessant ventricular tachycardia when conservative measures have failed.
- Case Report:** This case involves a man in his 60s with a history of hypertension, glaucoma, heart failure with a reduced ejection fraction of 28%, and 2 stents at the mid left anterior descending artery and proximal right coronary artery following a recent myocardial infarction. After his initial presentation, he was found to be in sustained ventricular tachycardia, in addition to having a right brachial vein deep vein thrombosis for which he was started on rivaroxaban. He had several major risk factors, including triple anticoagulant therapy, glaucoma, recent myocardial infarction, and cardiac conduction block. Since he was a poor candidate for heart transplantation and after weighing risks vs benefits, he underwent a stellate ganglion block. No immediate postprocedure complications occurred. He had terminal cardiac sympathectomy afterwards.
- Conclusion:** While stellate ganglion block is not a novel technique, this case demonstrated the feasibility for performing it for refractory ventricular tachycardia in select high-risk patients.
- Key words:** Recurrent tachycardia, stellate ganglion, anticoagulation, conduction block, high-risk, glaucoma, regional, myocardial infarction, ropivacaine, hematoma
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BACKGROUND

The stellate ganglion block (SGB) was first described in 1925 for treating chronic pain. In the 1940s and the following decades, the procedure gained additional attention for treating depression and psychiatric symptoms; peripheral vascular disease; hyperhidrosis; and various other indications (1). Using an SGB for abolishing ventricular tachycardia (VT) storm started in the 1970s and has grown as a reliable salvage therapy and bridge to terminal cardiac sympathectomy (2).

The benefit seen with an SGB is thought to occur via abolishing abnormal accelerated discharges from the

cardiac accelerator fibers that exit the thoracic spinal cord at the T1–T4 vertebral levels. Sympathovagal imbalance of these fibers contribute to various ventricular arrhythmias including electrical storm, which is defined as 3 or more episodes of VT or ventricular fibrillation within a short period of time (2). In hemodynamically stable patients for whom conventional therapies including anti-arrhythmic treatment and radiofrequency catheter ablation have been ineffective, an SGB can provide both a therapeutic and diagnostic benefit by reducing postprocedure VT episodes that would be terminal following cardiac sympathectomy (3). Recently, large

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multicenter studies and meta-analyses have shown the SGB's efficacy for reducing recurrent VT episodes. The STAR multicenter registry of 131 cases found a > 50% reduction of arrhythmic episodes in 92% of patients, with a median reduction of 100% in the first 12 hours following an SGB (4).

The case described in this report adds to the existing literature by reporting a successful SGB performed in a patient with multiple risk factors, including anticoagulation, a recent myocardial infarction, and cardiac conduction block. In doing so, we showed that even for select high-risk patients, an SGB can still be performed as a bridge to cardiac sympathectomy by adhering to appropriate procedural and postprocedural safety and monitoring parameters.

CASE PRESENTATION

Our patient is a 65-year-old man with a history of hypertension, glaucoma, reduced ejection fraction heart failure with an ejection fraction of 28% on goal-directed medical therapy, coronary artery disease with recent mid-left anterior descending artery, and proximal right coronary artery stents that were placed because of ST-elevation myocardial ischemia less than one month prior to consulting with us.

He presented to the emergency department with syncope, chest pain, dizziness, and palpitations a week after his stents placements; he was in sustained VT > 200 beats/min for several minutes.

His electrocardiogram showed a right bundle branch block. After we treated him with lidocaine and amiodarone drips, he continued to have recurrent VT episodes. He was taken for emergent left heart catheterization, which showed patent stents and normal left ventricle filling pressures, prompting an electrophysiology consultation.

Our patient's treatment was complicated by VT arrest the next day while being weaned from the drips; return of spontaneous circulation occurred after one round of cardiopulmonary resuscitation and a single defibrillator shock. He had VT ablation several days later that revealed injured Purkinje fibers within the midapical left ventricular septum due to his prior ST-elevation myocardial ischemia; the injured Purkinje fibers were believed to be responsible for the ventricular events. At postprocedure he had no further bouts of VT, although he was found to have a right brachial vein deep vein thrombosis and so was started on rivaroxaban prior to his ablation. While transitioning from intravenous

to oral anti-arrhythmic medications, he had recurrent 30-second episodes of monomorphic VT. At this time, the pain service was consulted for an SGB for his recurrent VT that was refractory to medical therapy and cardiac ablation.

Given our patient was undergoing triple therapy—anticoagulation therapy for his deep vein thrombosis and dual antiplatelet therapy for his prior coronary stents, glaucoma, recent myocardial infarction, and cardiac conduction block—he had several risk factors for performing an SGB. However, since he was a poor candidate for a heart transplant (due to a lack of social support); had failed more conservative measures including oral amiodarone 400 mg twice per day and mexiletine 300 mg 3 times per day; had failed to wean from intravenous medications including lidocaine at one mg/min, and esmolol infusion at 175 mg/min; and after our thorough discussion with him regarding the risks and benefits of the procedure, the decision was made to proceed with an SGB.

Because our patient had multiple risk factors for complications from an SGB—specifically, vascular puncture of the carotid artery, internal jugular vein, inferior thyroid artery, or vertebral artery, as well as hematoma leading to airway compromise or compression of other vital structures—a high degree of safety and preparation was undertaken prior to performing the procedure.

The patient was placed supine on a fluoroscopy bed with standard vital monitors. His left neck, upper chest, and lower face were prepped with chlorhexidine and draped in a sterile fashion. Anteroposterior fluoroscopy was used to identify the C6, C7, and T1 vertebrae and transverse processes, which were then marked on the skin. A 13-6 MHz ultrasound probe with sterile cover was used to identify the Chassaignac (carotid) tubercle at the C6 level. The vertebral artery and longus coli muscle were identified at the C7 level. Relevant soft tissue, glandular, and vascular anatomy were identified, and color doppler was used to identify critical vascular structures.

The stellate ganglion was identified to lie anterior and with the body of the longissimus coli muscle. A 20G 2-inch blunt tip echogenic needle was advanced toward the stellate ganglion using an in-plane technique. Negative aspiration was confirmed, and one mL of contrast medium was injected, which was then confirmed visually by appropriate spread on fluoroscopy (Fig. 1). Fluoroscopy additionally helped confirm that no vascular spread of contrast medium occurred postinjection. After confirming appropriate spread, 8

mL of 0.2% ropivacaine were then injected slowly 2-3 milliliters at a time while confirming negative aspiration each time. The needle was then removed with a flush, the patient's neck was cleaned and bandaged over the needle insertion site, and the patient was then seated up. No paresthesia was noted, though ptosis and miosis of the left eye, and slightly increased skin temperature of the left face—which were expected following a successful block—were transiently present at postinjection.

No complications were noted immediately following the procedure. In future wound checks, our patient never developed any concerning signs for hematoma around the needle insertion site. In the subsequent days, attempts were made to wean him off lidocaine and esmolol drips. He was weaned off esmolol completely and converted to propranolol 100 mg 3 times per day, while lidocaine remained at a rate of 1 mg/min. He remained quiescent on telemetry until the next day when lidocaine was attempted to wean to 0.5 mg/min, at which point he had a 70 second episode of hemodynamically

stable VT. He was then placed on a lidocaine drip at a rate of one mg/min for the remainder of his course.

He was transferred to another hospital to undergo cardiac sympathectomy since the SGB allowed him to wean off at least one of his drips, indicating a favorable response to sympathetic blockade. At discharge, he maintained a heart rate of approximately 50-60 beats/min on the lidocaine drip. He underwent bilateral thoracic sympathectomy 2 weeks later, followed by subsequent dual-chamber implantable cardioverter-defibrillator implantation one week after that.

In a phone call follow-up one month following discharge from our institution, he reported doing well with no specific complaints and was off all infusions.

DISCUSSION

SGB is one of several salvage therapies used for refractory or incessant VT when medical therapy or catheter ablation attempts have failed. Given the proximity of the ganglion to several vascular structures, special

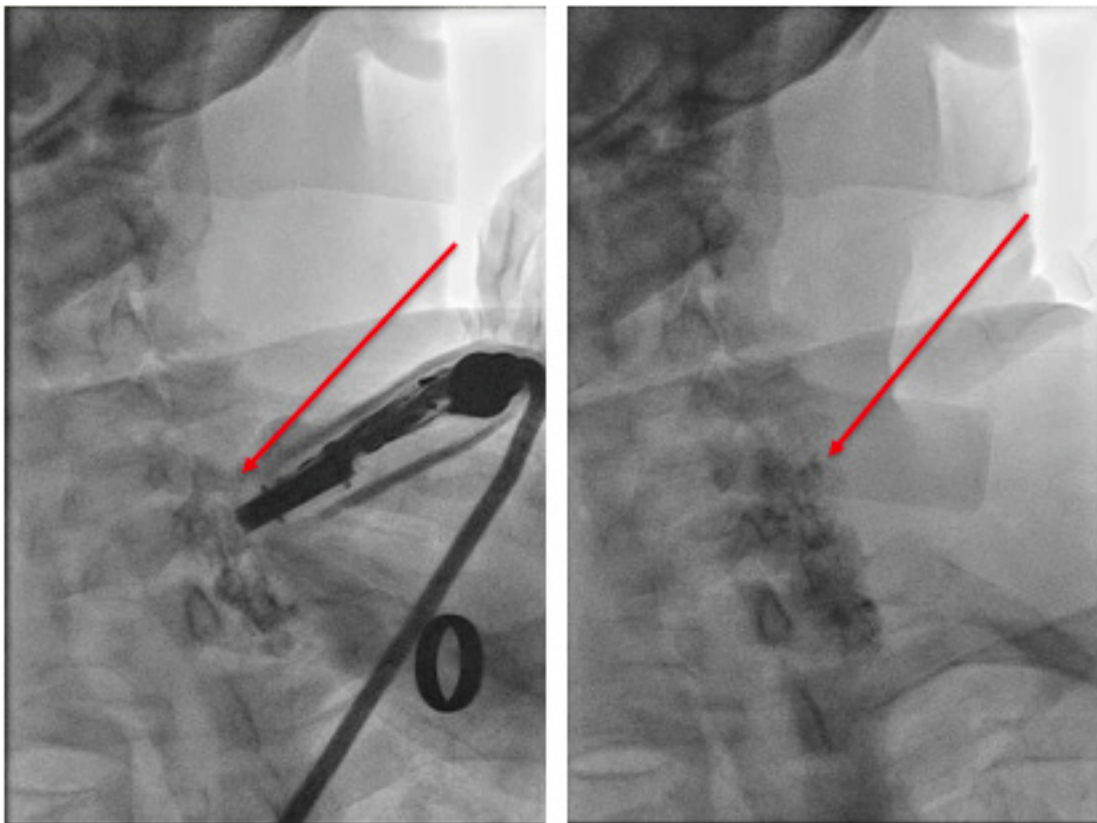


Fig. 1. Stellate ganglion block under ultrasound guidance at C6 with simultaneous fluoroscopic guidance. Contrast deposit seen moving caudad over the anatomic location of the stellate ganglion on both images.

expertise is needed when performing the block, as well as attention to the various contraindications. Some contraindications, like glaucoma, are more relative than others. While early reports have described both exacerbation of the condition (5), other more recent reports have shown relief for patients with painful blind eyes related to glaucoma after performing the block (6). Contraindications to an SGB when the patient has cardiac conduction block are described as being due to unopposed parasympathetic activity that arises when sympathetic input to the heart is decreased via an SGB. While this would be the intended goal of the block in patients with VT, these patients should still be carefully evaluated for underlying conduction abnormalities (7,8).

Contraindication to an SGB when the patient is on anticoagulation therapy is due to the increased risk of a hematoma forming during or following the block. Since the ganglion's proximity to the airway and the needle's path to the airway and other critical vascular structures, such as the vertebral artery and other cervical vessels, the risk for airway compromise or other potentially catastrophic sequelae must be heavily weighed against the benefits of performing an SGB (9). These contraindications constitute the majority of risks associated with performing an SGB in patients similar to our patient. Even though SGBs for rapid suppression of VT have been used for many decades, our case report

gives details on how it can also be used for treating a very high-risk patient.

CONCLUSION

This case report shows that while performing an SGB can safely be done even in high-risk patients, the risks associated with the procedure should not be taken lightly. We carefully weighed SGB's risks against its benefits for this patient, specifically that without the procedure he would have likely been subject to palliative care involving lifelong reliance on intravenous anti-arrhythmic medications to control recurrent VT storms. Careful planning and discussion were done with the patient and the multidisciplinary care teams involved, detailing how emergent complications would be approached if they occurred. Fortunately, our patient's course went as favorably as could be expected, with no complications from the procedure, resulting in a successful block that validated performing terminal sympathectomy. For those attempting to perform this procedure on similar patients, alternative options, such as whether their patients would be a good candidate for heart transplantation, should also be considered in formulating their care plan. While an SGB is not a novel therapy for VT, this case report shows its feasibility and safety as a bridge to sympathectomy in a high-risk patient. Such cases may inform future guideline refinement in patient selection and procedural planning.

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