

cooperative agreement with the Johns Hopkins Bloomberg School of Public Health.

The authors declare no conflicts of interest.

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## Case Series of Left Stellate Ganglion Blocks for Refractory Angina Pectoris: 14 Years Later and Still Efficacious



To the Editor:

Refractory angina pectoris (RAP) is conventionally defined as a chronic pain condition characterized by chest pain (angina) resulting from diffuse coronary artery disease which cannot be treated by a combination

of optimal medical therapy or revascularization.<sup>1</sup> In Europe, the annual incidence of RAP is estimated at 30,000–50,000 new cases per year.<sup>2</sup> Revascularization (surgery or percutaneous intervention) is not option for these patients because of unfavorable coronary anatomy, unsuccessful previous coronary artery bypass graft (CABG) or percutaneous coronary intervention, lack of suitable grafting conduit material, significant comorbidities, advanced age, etc. RAP can also include patients with microvascular angina. Traditional options for this patient group are limited to anti-anginal drug therapy and secondary risk factor modification. Long-term mortality in this patient group was thought to be very high, but recent data contradict this. Recent case series of spinal cord stimulation (SCS) for RAP showed 50% survival after implantation of five years<sup>3</sup> and the mortality rate among all patients with RAP has been found out to be <4% annually; 70% survive for nine years or more. It thus becomes important to focus on symptom control and ways to achieve an improved quality of life in this growing population.<sup>4</sup>

Among the reported therapies for pain due to RAP are neuromodulation by transcutaneous electrical nerve stimulation or patient-controlled SCS and coronary sinus reducers to optimize endo-epicardial blood flow ratio.<sup>5</sup> In 2005, Moore et al. published in this journal a trial of temporary left cervical sympathectomy for pain control in RAP.<sup>5</sup> They compared this with paravertebral blockade and concluded that cervical sympathectomy is a safe and easy analgesic option. The first publication on sympathectomy to relieve chest pain was in 1933 and the potential for long-standing benefits from intermittent blockade was described in 2000.<sup>6,7</sup> We describe the use of cervical sympathectomy via repeated left stellate ganglion block (LSGB) for management of RAP.

## Case Series

A total of 120 LSGBs were performed in our institution between 2011 and May 2019. A summary of the 12 treated patients can be found in [Table 1](#). Six patients experienced significant pain relief. A summary of before-and-after pain score can be found in [Table 2](#).

### Patient 1

This patient first underwent CABG in 1997 followed by further coronary stenting for the grafts in 2007, but the interventions did not provide much symptomatic relief. He then underwent a trial of SCS in 2007, which was also unsuccessful. Despite opioid therapy, he remained house bound and used a mobility scooter. His first trial of LSGB was in 2007. He underwent blocks every three months for two years. Each block

Table 1  
Summary of All the Patients Who Received Left Stellate Ganglion Block for Refractory Angina

Patient No.	Age, yrs	Sex	Past Medical History	Interventions	Stellate Ganglion Block	Complications
1.	73	M	Housebound Uses mobility scooter IHD	CABG 1997 Trial of SCS 2007 AF ablation 2018	First trial in 2007 11 weekly basis (total of 32 LSGBs)	7/3/16 No symptom relief, repeated in 2 weeks 20/3/17 No symptom relief, repeated in 2 weeks
2.	67	M	AAA Bladder cancer Right humeral and left ankle fracture IHD	CABG 1986,1997 Coronary stenting 2018 SCS 2004 Reimplantation of SCS 2007	First trial 2009 3 monthly basis since 2011 (total of 30 LSGBs since 2011)	5/12/16 No symptom relief, repeated in 1 week 5/12/16 Neck hematoma 4/12/17 Neck hematoma
3.	56	M	AMI 2004 Previous apical thrombus	Coronary stenting 2005, 2009, 2014, 2019 Declined CABG because of young age	First trial 2010 3 monthly basis (total of 28 LSGBs since 2011)	16/1/17 No symptom relief, repeated in 1 week
4.	48	M	IHD	CABG 2015 Coronary stents 2015 Declined SCS	First trial 2017 8 weekly basis (total of 8 LSGBs since 2017)	None
5.	71	M	Bilateral TKR IHD	Coronary stents 2010 Not suitable for CABG Declined SCS	First trial 2017 3 monthly basis (total of 7 LSGBs since 2017)	None
6.	68	M	Learning disabilities OSA IHD	Coronary stents 2017, 2018	First trial 2018 (total of 7 LSGBs since 2018)	None
7.	62	M	Morbid obesity OSA, T2DM, Depression, IHD	Coronary stenting	2018 2019	Short symptom relief <1 week
8.	71	M	Conn's syndrome HTN, IHD	TENS SCS 2017—successful	2015	None
9.	63	M	Refractory angina unknown origin	Coronary stents 2013	2015	Unsuccessful
10.	67	M	Refractory angina unknown origin	Coronary stents	2017	Unsuccessful
11.	55	M	IHD	CABG 2017	2019	Unsuccessful
12.	53	M	Coronary sinus aneurysm		2012–2014 (total of 3 LSGBs)	Unsuccessful

IHD = ischemic heart disease; AF = atrial fibrillation; CABG = coronary artery bypass graft; SCS = spinal cord stimulation; LSGB = left stellate ganglion block; AAA = abdominal aorta aneurysm; AMI = acute myocardial infarction; TKR = total knee replacement; OSA = obstructive sleep apnea; T2DM = type 2 diabetes mellitus; HTN = hypertension; TENS = transcutaneous electrical nerve stimulation.

helped for only 11 weeks, and since 2011, he has traveled 36 miles to the outpatient clinic to receive an LSGB every 11 weeks. He has had 32 LSGBs. On two occasions, the blocks were not effective and needed repeating within two weeks. He has continued his clopidogrel during all this time, and during the past three years, he underwent further coronary stenting of one of the CABG grafts and atrial fibrillation ablation. He reports much improved quality of life with LSGB and halved his morphine dose to 40 mg bd.

### Patient 2

This patient first underwent CABG in 1986. This was repeated in 1997. As angina was produced by distal vessel disease, he was enrolled in the SPIRIT trial, a randomized trial of SCS.<sup>8</sup> His pain was experienced

very high in the chest and the neck, and SCS could not control it. The SCS was re-implanted at a higher level in 2007, but again failed to produce analgesic benefit. He has his first LSGB in 2009; it produced three months of analgesic benefit. He was referred to a local hospital for further LSGBs, but these could not be offered there. He continued traveling to our hospital (129 miles) every three months since then. Since 2011, he has had 29 LSGBs, and during the past five years, he has missed his LSGB appointments on only several occasions because of treatments for other medical conditions. He started warfarin three years ago. He had one failed block, which needed repeating within a week, and developed a left neck hematoma because of inadvertent carotid arterial puncture on two occasions. He maintains an active family and social life (leads the local scouts).

Table 2  
Table Showing the Duration of Block, Pain Score Before and After Block

Patient No.	Date of 1st Block	Pain Score Before Block <sup>a</sup>	Pain Score After Block <sup>a</sup>	Pain Score After Five Weeks <sup>a</sup>	Angina Attacks + Frequency	Duration of Block
1	2007	8–10	3–4	5–6	Daily. Continuous. All day	Up till 8 weeks
2	2009	9–10	7	8	5–7 times a day Lasts for 20–25 minutes	10 weeks
3	2010	6	0	2–6	Every other day Once a day	12 weeks
4	2017	8	3	0	On exertion	8 weeks
5	2017	7–8	5–6	5–6	Daily angina attacks around 20–30 minutes	12 weeks
6	2018	8	5	5–6	Sometimes twice a day	10 weeks

<sup>a</sup>Pain scores: 0–10 scale.

### Patient 3

This patient has had coronary stents inserted in 2005, 2009, 2014, and 2019. He was reluctant to consider CABG when he was diagnosed earlier on. He was also reluctant to take analgesic medication as he feared that the side effects can interfere with his active lifestyle. He received his first LSGB in 2010 and has been receiving these every three months. He has had one failed block, which needed repeating in four weeks, and at the same time he needed a further coronary stent. He travels 48 miles to the clinic. He has experienced a few short-lasting (10–15 minutes) dizzy spells after the blocks, for which he rests in the outpatient department before driving home. He has had 28 LSGBs since 2011.

### Patient 4

This patient had his first CABG in 2015. Although the grafts were patent, he suffered from distal ischemia. He is reluctant to have SCS as his father had SCS and died on the day after its implantation in 2007. He had his first LSGB in 2018 and receiving blocks every eight weeks. He reports good analgesic benefits from LSGB and has had seven blocks since, leads active lifestyle, and maintains full time employment.

### Patient 5

This patient has been diagnosed with distal coronary disease producing RAP. His coronary anatomy is not suitable for surgical intervention, and he is reluctant to have SCS. He received his first LSGB in 2017 and has been receiving repeat blocks on three monthly basis. He has had a total of six LSGBs. He reports good analgesic benefits and takes no analgesic medication. He underwent bilateral knee replacement in late 2018, which was complicated and needed systemic analgesics for few months, these are now discontinued.

### Patient 6

This patient has grossly normal coronary anatomy, but typical symptoms of RAP. Numerous imaging

investigations have failed to identify the clear reason for this pain. He has mild learning difficulties and needs a carer. Before his first LSGB in 2018, he had severe chest pain and was brought to the emergency department weekly. The only useful treatment was oral morphine 10 mg. He has been receiving LSGBs every 10 weeks since February 2018 and has so far had six. With these blocks, he reports excellent angina control and has needed only several emergency department visits.

### Unsuccessful LSGBs

Several patients have tried LSGBs without long-lasting analgesic benefit. Patient 7 had refractory angina and morbid obesity. Two LSGBs in 2018 and 2019 provided less than one week of pain relief. Patient 8 received a successful LSGB in 2015 while he was an inpatient. He has distal coronary disease and after a period during which angina was controlled with transcatheter electrical nerve stimulation, he underwent implantation of an SCS in 2017 and has had good RAP control since. Patients 9 and 10 had unsuccessful trials of LSGB in 2015 and 2017, respectively; the blocks were never repeated. Patient 11 underwent CABG in 2017, but subsequently developed chronic pain in the left chest. An LSGB in 2019 was not beneficial and was never repeated. Patient 12 had three LSGBs during 2012–2014, with variable benefit. After receiving an SCS for RAP and chronic back pain, he no longer needs LSGBs.

### Comment

Our experience suggests that some patients with RAP gain enduring benefit from repeated LSGBs, usually every two to three months. This observation is consistent with other published reports.<sup>5,8</sup> Among our patients, the duration of analgesic benefit varied between eight and 13 weeks, and toward the end of this period, angina symptoms become more frequent and more severe (intensity of pain and duration of angina attacks). The follow-up appointments for

repeat blocks were sometimes moved forward to when the blocks analgesic benefits had worn off earlier.

The complication rate from repeated LSGBs was low and limited to two neck hematomas experienced by one patient. On four occasions, a block failed and was repeated within two weeks. Patients did not stop their medication, including anticoagulation (warfarin or anti-platelet medication), to receive the LSGBs.

Our center's case series demonstrate how a scientific trial published in this journal<sup>5</sup> has triggered a useful and minimally invasive treatment for RAP and provided better analgesia for patients who suffer from this debilitating pain condition. We maintain high standards and continue offering this treatment as an outpatient procedure in a department with resuscitation facilities.

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<https://doi.org/10.1016/j.jpainsymman.2019.05.019>

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