

# Surgical Technique: The “Paddle-Under-Bridge” Technique for Safe Thoracic Spinal Cord Simulator (SCS) Paddle Lead Placement in Patients with Thoracic Stenosis

## Paddle Lead Placement in Patients with Thoracic Stenosis

Ahmed M. Raslan, MD<sup>1</sup>, Matthew McGehee, MD<sup>2</sup>, Tressa Riedman, BS<sup>2</sup>, Brian T. Ragel, MD<sup>2</sup>

<sup>1</sup>Department of Neurological Surgery, Oregon Health and Science University, Portland, Oregon, <sup>2</sup>Divisions of Psychiatry and Neurosurgery, Rebound Orthopedics and Neurosurgery, Portland, Oregon

### Introduction

Thoracic placement of spinal cord stimulator (SCS) paddle lead can be difficult in patients with thoracic stenosis. Neurologic deficit is a rare complication that can be caused by spinal cord injury, spinal cord compression, and/or epidural hematoma. The authors propose the “paddle-under-bridge” surgical technique to ensure adequate spinal canal diameter for safe paddle lead placement.

### Methods

Patients undergoing thoracic laminectomy for new SCS paddle lead were identified from January 2018 to July 2021. Surgical techniques used were: 1. A single-level ligamentum flavum removal with SCS paddle lead passed superiorly (“Standard”); 2. Aggressive under-cutting of lamina (“Aggressive laminectomy”); or, 3. “Paddle-Under-Bridge,” which entails a two-level ligamentum flavum removal at and below the level of final SCS lead placement, leaving a bony bridge for the paddle lead to pass under (Figure 1).

### Results

A total of 102 patients were identified; a standard technique was used in 88 (86%) patients, aggressive laminectomy in 4 (4%), and Paddle-Under-Bridge in 10 (10%) (Table 1, Figure 1). There were two cases (2%) of transient neurologic deficit in the standard laminectomy group, but none in the aggressive laminectomy or Paddle-Under-Bridge groups.

### Results

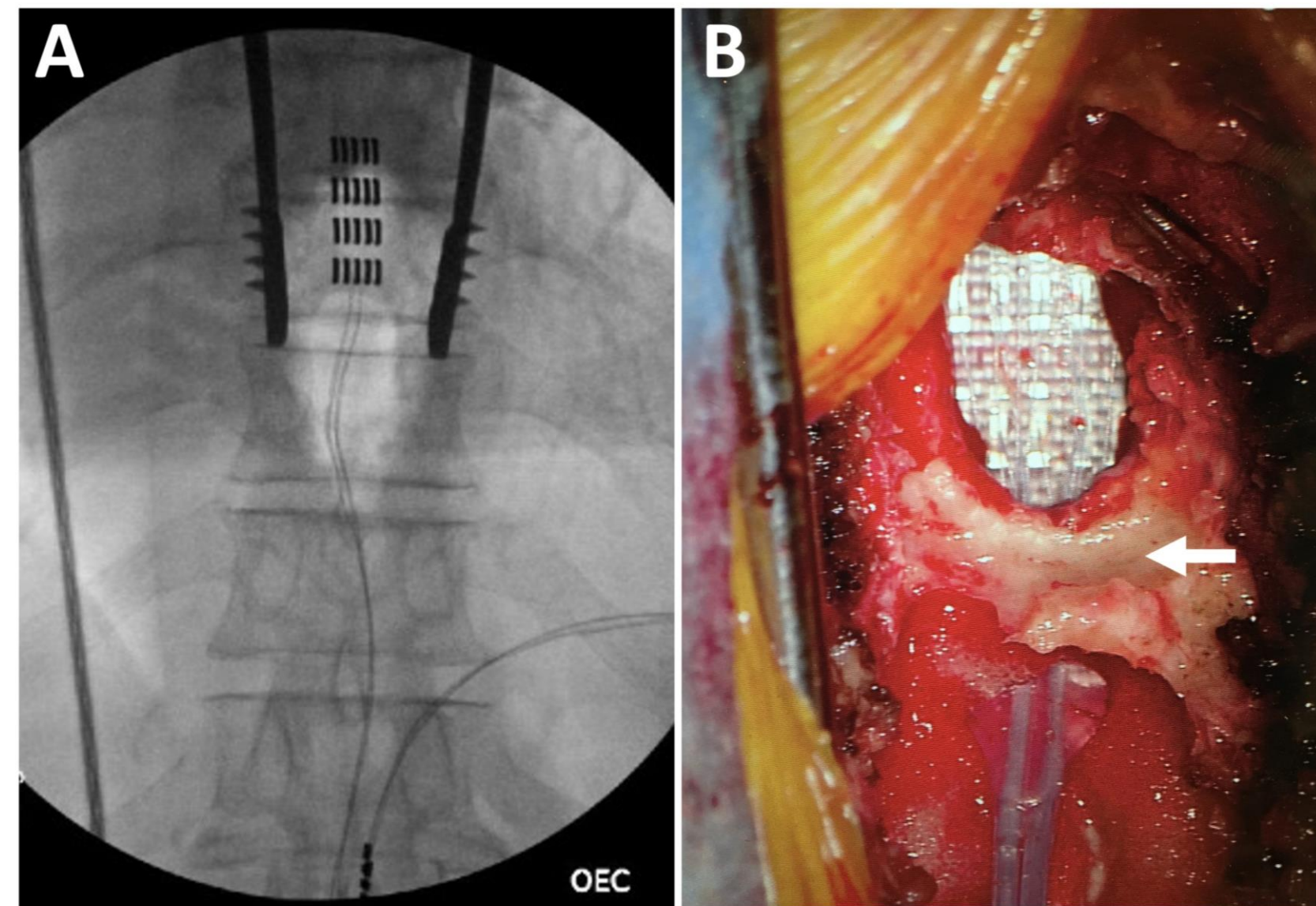


Figure 1: Case example of “Paddle-Under-Bridge” technique. A. Intraoperative X-ray, AP view, showing SCS paddle lead centered over T8/9 - disc interspace. Note the hypodensity from T8 to T10 indicating the extent of the surgical field. B. Intraoperative photograph depicting paddle lead positioned under the residual T9 bone “bridge” (arrow). Note the two-level ligamentum flavum removal at and below the level of SCS paddle lead placement.

### Results

Table 1. Demographics of 102 patients undergoing thoracic laminectomy for new paddle lead spinal cord stimulator placement from January 2019 to July 2021

Variable	Total. (%)	Neurologic deficit	
		Yes	No
No. patients	102	2 (2%)	100 (98%)
Female	48 (47%)	1 (1%)	47 (46%)
Male	54 (53%)	1 (1%)	53 (52%)
BMI			
< 30	37 (36%)		37 (36%)
30 - 40	49 (48%)	2 (2%)	47 (46%)
> 40	16 (16%)		16 (16%)
Level SCS paddle lead			
T7/8	10 (10%)		10 (10%)
T8/9	81 (79%)	2 (2%)	79 (77%)
T9/10	7 (7%)		7 (7%)
Other	4 (4%)		4 (4%)
Surgical technique			
Standard laminectomy	88 (86%)	2 (2%)	86 (84%)
Aggressive laminectomy	4 (4%)		4 (4%)
“Paddle-Under-Bridge”	10 (10%)		10 (10%)

### Discussion

The authors describe the “Paddle-Under-Bridge” technique for use in patients in whom thoracic SCS lead paddles are difficult to pass because of epidural adhesions or thoracic stenosis (Figure 1). This technique offers the advantage of providing a bony bridge to keep the paddle lead positioned midline and opposed to the spinal cord for optimum stimulation.

### Conclusion

The “Paddle-Under-Bridge” surgical technique can allow for safe SCS paddle lead placement in cases of epidural adhesions or thoracic stenosis.



**NANS 25TH ANNUAL MEETING**

**NEUROMODULATION: The Next Generation**