



A National Surgical Quality Improvement Program (NSQIP) Analysis Comparing Postoperative Complications Following Spinal Cord Stimulator Implantation and Removal

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Introduction

-Spinal cord stimulators (SCS) are an effective treatment for a variety of chronic pain conditions

- National databases have not been used to establish the rate of complications following SCS implantation and removal

-Therefore, our aim was to use the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) to estimate the prevalence of 30-day postoperative complications following SCS implantation and removal

Methods

-Patients who underwent SCS implantation/replacement (CPT codes: 63650, 63655, 63663, 63664) and removal (CPT codes: 63661, 63662) were obtained from the 2005-2015 ACS-NSQIP

- The prevalence of 30-day postoperative complications were estimated

- Multivariable logistic regression was used to identify risk factors for at least one complication

Prevalence of Postoperative Complications

Variable	Spinal Cord Stimulator Insertion (n=90)	Spinal Cord Stimulator Removal (n=55)	Chi2 (df)	P-Value
Age				
< 65	69 (76.7)	34 (61.8)	3.66 (1)	0.06
> 65	21 (23.3)	21 (38.2)		
Female	59 (65.6)	36 (65.5)	0.0002 (1)	0.99
Race				
White	73 (81.1)	46 (83.6)	0.15 (1)	0.70
Other	17 (18.9)	9 (16.4)		
BMI				
Normal-Underweight	13 (14.4)	8 (14.6)		
Overweight	24 (26.7)	18 (32.7)	0.66 (2)	0.72
Obese	53 (58.9)	29 (52.7)		
Tobacco Use	33 (36.67)	12 (21.8)	3.52 (1)	0.06
Diabetes	20 (22.2)	8 (14.6)	1.29 (1)	0.26
COPD	7 (7.8)	2 (3.6)	1.01 (1)	0.32
Hypertension	44 (48.9)	31 (56.4)	0.76 (1)	0.38
ASA Class III/IV/V	44 (48.9)	38 (69.1)	5.67 (1)	0.02
Wound Class II-IV	0 (0.00)	6 (10.9)	10.24 (1)	0.001
Duration of Surgery (hrs)	1.99 ± 1.39	2.92 ± 1.71	-3.56 (143)	<0.001
At Least One Complication	5 (5.6)	10 (18.2)	5.86 (1)	0.02
Superficial incisional SSI	2 (2.2)	1 (1.8)	0.03 (1)	0.87
Wound Dehiscence	1 (1.1)	0	0.62 (1)	0.43
Urinary Tract Infection	0	1 (1.8)	1.65 (1)	0.20
Sepsis	0	1 (1.8)	1.65 (1)	0.20
Pneumonia	0	1 (1.8)	1.65 (1)	0.20
Unplanned Intubation	0	1 (1.8)	1.65 (1)	0.20
On Ventilator >48 hours	0	1 (1.8)	1.65 (1)	0.20
Transfusion within 72 hours	2 (2.2)	7 (12.7)	6.47 (1)	0.01
Return to the Operating Room	2 (2.2)	1 (1.8)	0.03 (1)	0.87

Results

- There were 145 cases of SCS surgery (90 implantation/replacement, 55 removal)

-Prevalence of any complication was significantly lower for SCS implantation/replacement compared to removal (5.56% vs. 18.18%; $p=0.02$)

- However, there was not a significant difference in the odds of complications after controlling for covariates

-Longer duration of surgery (OR: 1.69; CI: 1.19-2.40; p=0.004) was the only significant predictor

Multivariable Model

Variable	Any Complication	P-Value
Surgery Type	OR (95% CI)	
Insertion	1.00 (Reference)	
Removal	2.40 (0.56 - 10.29)	0.24
Age		
< 65	1.00 (Reference)	
> 65	1.33 (0.27 - 6.63)	0.73
Female	3.04 (0.62 - 14.90)	0.17
Race		
White	1.00 (Reference)	
Other	0.31 (0.03 - 3.03)	0.31
BMI		
Normal-Underweight	1.00 (Reference)	
Overweight	0.55 (0.08 - 3.58)	0.53
Obese	0.41 (0.06 - 2.61)	0.34
Tobacco Use	0.35 (0.06 - 2.18)	0.26
Diabetes	4.05 (0.70 - 23.36)	0.12
COPD	1.92 (0.17 - 21.32)	0.60
Hypertension	1.18 (0.26 - 5.38)	0.83
ASA Class III/IV/V	2.18 (0.43 - 11.04)	0.35
Wound Class II-IV	1.32 (0.09 - 18.92)	0.84
Duration of Surgery (hrs)	1.69 (1.19 - 2.40)	0.004
AUC	0.84	

Conclusions

- The overall prevalence of any complication within 30 days of SCS removal is higher than for implantation/replacement on univariate analysis, but not on multivariable analysis

-Longer duration of surgery was the only risk factor for higher likelihood of complications

-Further research is necessary with a larger sample to better characterize the postoperative course following SCS surgeries