

2-2021

Clinical Outcomes Following Lumbar Fusion in Patients With and Without a History of Spinal Cord Stimulation Therapy

Jake Budlow

Ellina Hattar

Heli Patel

Thiago S. Montenegro

Glenn A. Gonzalez

See next page for additional authors

Follow this and additional works at: https://jdc.jefferson.edu/si_ctr_2023_phase1



Part of the [Translational Medical Research Commons](#)

[Let us know how access to this document benefits you](#)

This Article is brought to you for free and open access by the Jefferson Digital Commons. The Jefferson Digital Commons is a service of Thomas Jefferson University's [Center for Teaching and Learning \(CTL\)](#). The Commons is a showcase for Jefferson books and journals, peer-reviewed scholarly publications, unique historical collections from the University archives, and teaching tools. The Jefferson Digital Commons allows researchers and interested readers anywhere in the world to learn about and keep up to date with Jefferson scholarship. This article has been accepted for inclusion in Phase 1 by an authorized administrator of the Jefferson Digital Commons. For more information, please contact: JeffersonDigitalCommons@jefferson.edu.

Authors

Jake Budlow, Ellina Hattar, Heli Patel, Thiago S. Montenegro, Glenn A. Gonzalez, Garrett Largoza, Christopher Elia, Caio M. Matias, Chengyuan Wu, Ashwini D. Sharan, and James S. Harrop



**Sidney Kimmel
Medical College™**
at Thomas Jefferson University

Clinical Outcomes Following Lumbar Fusion of Patients With and Without a History of Spinal Cord Stimulation Therapy

Jake Budlow, Ellina Hattar , Heli Patel, Thiago Montenegro, Glenn Gonzalez, Ashwini
D. Sharan, James S. Harrop*

Disclosures

- None

Background

- In the US, 15-40% of the population has chronic lower back pain^[1]
 - Disabling up to 50% of those afflicted^[2]
- Opioid epidemic is responsible for more than 30,000 deaths per year ^[3]
- Lumbar fusion surgical treatments have annual expenses over \$34 billion ^[4]
- Spinal Cord Stimulators (SCS) are used in patients with intractable pain
 - Failed back surgery syndrome, complex regional pain syndrome, painful peripheral vasculature disease



Spivack J, (2010)

Introduction & Objective

In Current Research

- For patients with a prior history of thoracic SCS, there is a lack of evidence on clinical outcomes following lumbar fusion

Objective:

- To study the association between a history of a permanent thoracic SCS and the effect of lumbar fusion surgery on the patient
- To create better evidence-based algorithms for the management of chronic back pain secondary to lumbar disease



Commonwealth Spine and Pain Specialists (2021)

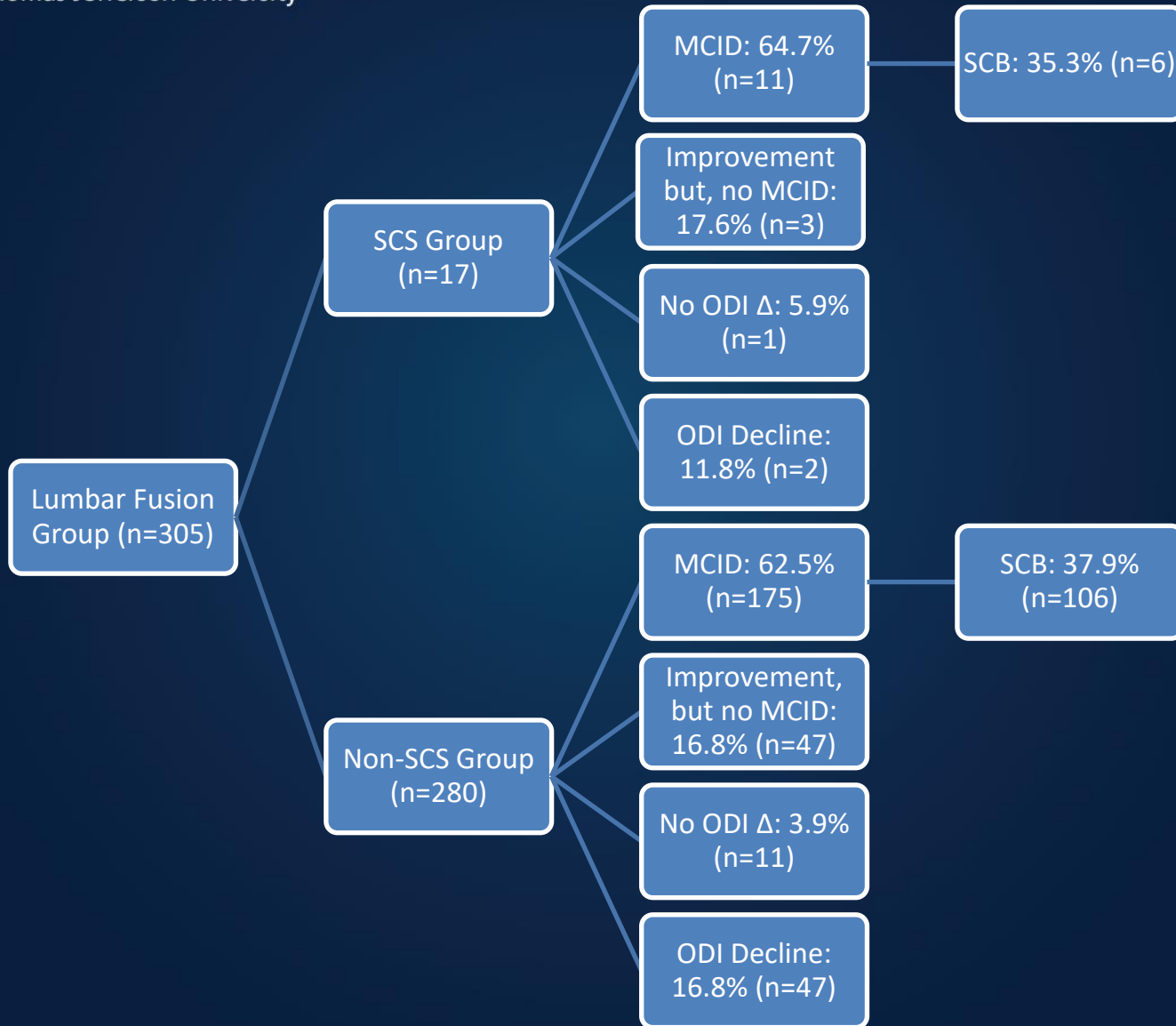
Research Question and Hypothesis

- Research Question
 - How do outcomes of lumbar fusion surgeries compare in patients with a prior history of SCS to those without?
- Hypothesis
 - Patients with a prior history of SCS will have a lower Δ ODI after 6 months compared to those without a history of SCS

Approach and Analysis

- Retrospective Medical Chart Review
- Population: Patients who underwent lumbar fusion surgery between January 2018 and December 2019
- Intervention: Prior history of a permanent thoracic SCS
- Comparison group: Patients naïve to SCS treatment
- Outcome: Change in the patients' Oswestry Disability Index (ODI) preop to 6 months postop
 - Minimal Clinically Important Difference (MCID) defined as $\Delta\text{ODI} \geq 5$
 - Substantial clinical benefit (SCB) defined as $\Delta\text{ODI} \geq 10$ points
 - No MCID which was defined for patients whose ODI improved but did not reach 5 points (ΔODI 1-4 points)
 - No change in ODI
 - Worsening ODI
- Analysis
 - The chi square test and the fisher exact test for categorical variables
 - The student t test was used for continuous variables
 - Computed at the 95 % level of confidence

Distribution of Outcomes



Outcomes in ODI scores based on History of SCS

	SCS Group	Non-SCS Group	P Value
	n=17	n=280	
Percentage of Total Studied Population	5.7% (17/297)	94.3% (280/297)	
Pre-Operative ODI	29.9 ± 7.2	24.5 ± 8.7	0.0065
Post-Operative ODI	23.2 ± 9.2	16.9 ± 9.2	0.0073
ODI Δ at 6 months	6.7 ± 8.5	7.5 ± 8.1	0.68
Percentage of patients with ODI Improvement	82.4% (14/17)	79.3% (222/280)	0.52
MCID	64.7% (11/17)	62.5% (175/280)	0.92

Outcomes in ODI scores based on Concordance with North American Spine Society (NASS) Criteria

	SCS Group		Non-SCS Group		P value
ODI Change	MCID achieved	MCID not achieved	MCID achieved	MCID not achieved	
Total Population	64.70%	35.30%	62.50%	37.50%	0.92
NASS Concordant	94.1% (16/17)		93.5% (262/280)		1
NASS Concordant	64.7% (11/17)	29.4% (5/17)	60.0% (168/280)	33.6% (94/280)	0.79
NASS Discordant	0% (0/17)	5.9% (1/17)	2.5% (7/280)	3.9% (11/280)	1

Discussion and Conclusions

- Our initial assumptions were the SCS population may
 - have a higher level of functional disability compared to the non-SCS cohort making it more difficult to treat
 - or the SCS group had benefited to some degree from their SCS, reducing their likelihood of benefitting from a lumbar fusion
- We conclude:
 - Patients with a prior history of SCS are more likely to have a higher functional disability before and after surgery
 - We reject our hypothesis that patients with a prior history of SCS will have a lower Δ ODI after 6 months compared to those without a history of SCS
 - Patients with a prior history of SCS are equally as likely to benefit from lumbar fusions as those who did not have a history of SCS
 - **The presence of a SCS should not impact surgical decision making**

Future Directions

- Increase the sample size of our SCS group
- Look into other factors that may affect lumbar surgery efficacy
 - SCS efficacy

Acknowledgements

- A big thank you to
 - Ellina Hattar (PGY5)
 - James Harrop (PI)
 - Ashwini Sharan



References

1. Deyo RA, Mirza SK, Martin BI: Back Pain Prevalence and Visit Rates: Estimates From U.S. National Surveys, 2002. **Spine** 31:2724-2727, 2006
2. Bell GK, Kidd D, North RB: Cost-effectiveness analysis of spinal cord stimulation in treatment of failed back surgery syndrome. **Journal of pain and symptom management** 13:286-295, 1997
3. Gleber R, Vilke GM, Castillo EM, Brennan J, Oyama L, Coyne CJ: Trends in emergency physician opioid prescribing practices during the United States opioid crisis. **The American journal of emergency medicine** 38:735-740, 2020
4. Reid PC, MorrS, Kaiser MG: State of the union: a review of lumbar fusion indications and techniques for degenerative spine disease. **Journal of Neurosurgery: Spine** 31:1-14, 2019

Supplementary: Descriptive Statistics of ODI Change

	SCS Group	Non-SCS Group
	n=17	n=280
Mean ODI Δ	6.7 (p=0.02)	7.5 (p<0.0001)
Std. Deviation	8.5	8.1
Std. Error of Mean	2.05	0.49
95% CI of Estimated Mean	6.7 \pm 4.4	7.54 \pm 0.97
Minimum	-14	-8
25th Percentile	3	1
Median	8	7
75th Percentile	14	13
Maximum	17	35
Range	31	43