Did it feel the same?-Predominant Stimulation Mode and One-Year Outcomes with Spinal Cord Stimulation for Upper- versus Lower-Limb Neuropathic pain

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INTRODUCTION

- SCS offers paresthesia-based and paresthesia-free modalities.
- Evidence directly comparing upper- and lower-limb neuropathic pain remains limited.
- Multidimensional outcomes may reveal effects not captured by pain intensity alone.

OBJECTIVES

- Compare predominant stimulation mode at one year between upper- and lower-limb cohorts.
- Compare one-year changes in pain, neuropathic symptoms, catastrophizing, mood, and health status.

RATIONALE AND HYPOTHESIS

Why might upper-limb patients prefer paresthesia-free SCS?

- Cervical movement may cause greater variation in perceived stimulation.
- Hand paresthesia may be less tolerable because of greater sensory sensitivity and interference with fine motor tasks.
- Paresthesia-free SCS may restore analgesia when paresthesia-based SCS fails in upper-limb neuropathic pain.
- Our initial clinical experience suggested greater use of paresthesia-free stimulation in upper-limb patients.

Hypothesis: Patients with upper-limb neuropathic pain would preferentially use paresthesia-free SCS.

METHODS

Design and participants

- Retrospective cohort study; institutional REB #24-5864.
- Included SCS recipients with upper- or lower-extremity neuropathic pain.
- Excluded persistent spinal pain syndrome with predominant axial cervical or lumbar pain.

Exposure and outcomes

- Predominant mode: documented mode used for >50% of stimulation time at one year.
- NRS, NPSI, PCS, PHQ-9, GAD-7, and EQ-5D VAS were measured before implantation and at one year.
- Questionnaires used complete baseline–one-year pairs.

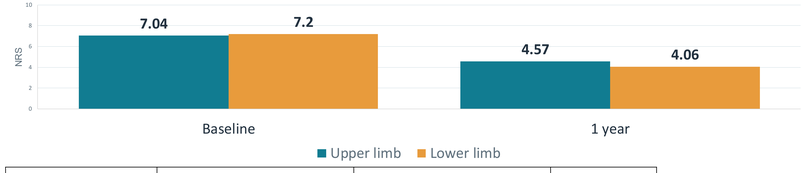
Statistical analysis

- Within-group change: paired t-test.
- Between-group continuous outcomes/change scores: Welch's t-test.
- Mode distribution: exact binomial tests within groups; Fisher's exact test between groups.
- Two-sided $p<0.05$ was statistically significant.

COHORT AND PREDOMINANT MODE

Characteristic	Upper	Lower	*p*-value
Patients	28	32	—
Age, years	51.50 ± 15.50	49.81 ± 12.81	0.650
Female, n (%)	12 (42.9%)	18 (56.3%)	0.438
Paresthesia-based	15 (53.6%)	14 (43.8%)	0.605
Paresthesia-free	13 (46.4%)	18 (56.3%)	—
Within-group mode p	0.851	0.597	—

PAIN INTENSITY



NRS	Upper	Lower	*p*-value
Baseline	7.04 ± 1.75	7.20 ± 1.55	0.699
1 year	4.57 ± 1.73	4.06 ± 2.40	0.346
Reduction	2.46 ± 1.86	3.14 ± 2.38	0.222
Within p	<0.001	<0.001	—

CLINICALLY MEANINGFUL PAIN RESPONSE AT 1 YEAR

NRS reduction	Upper	Lower	*p*-value	
> 30 %	64.3 % (18/28)	65.6% (21/32)	1.00	
> 50 %	28.6 % (8/28)	43.8 % (14/32)	0.287	

NEUROPATHIC SYMPTOMS AND MENTAL HEALTH OUTCOMES

- No difference in NPSI scores at 1 year after implant between cohorts
  - Decreased by 22-33% in both cohorts
- No difference in PCS, GAD-7, and PHQ-9 scores at 1 year after implant between cohorts
  - Decreased by 16-40% in both cohorts

Outcome	Upper	Lower	Between -group
NPSI	↓22.5 %	↓33 %	NS
PCS	↓23 %	↓40 %	NS
PHQ-9	↓16 %	↓27 %	NS
GAD-7	↓28 %	↓32 %	NS

HEALTH STATUS

EQ-5D VAS	Upper (n=21)	Lower (n=23)	*p*-value
Baseline	55.00 ± 23.18	38.70 ± 26.81	0.036
1 year	59.76 ± 20.83	63.26 ± 21.88	0.590
Change	+4.76 ± 32.88	+24.57 ± 24.21	0.030
Within p	0.514	<0.001	—

Lower-limb improvement was greater, but baseline health status was significantly lower.

DISCUSSION AND CONCLUSION

- Mode utilization did not differ by limb location.
- Both cohorts improved in pain and multidimensional outcomes.
- EQ-5D VAS findings require caution because of baseline imbalance and the retrospective sample.

References

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