

# Evaluation of the Effectiveness of Physiotherapy Techniques in Improving Postoperative Recovery for Disc Herniation Patients

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## Introduction

Intervertebral disc herniation (IVDH) is one of the most common neurological disorders in dogs, particularly affecting the thoracolumbar spine.

It results from disc degeneration leading to spinal cord compression and neurological dysfunction.

- Diagnosis is based on neurological examination and confirmed using advanced imaging techniques such as MRI or CT, which help define the location, severity, and extent of the lesion.
- Treatment depends on clinical severity and includes conservative management or surgical decompression, with hemilaminectomy being the preferred technique in thoracolumbar cases.

While surgery is often successful, many dogs experience residual neurological deficits such as paraparesis, ataxia, or incontinence.

Therefore, postoperative rehabilitation may enhance neuroplasticity, reduce muscle atrophy, and accelerate functional recovery to improve quality of life.

## Objectives

- To implement a multimodal physiotherapy protocol in a group of dogs operated for disc herniation.
- To use standardized assessment scales to objectively record patient progress.
- To evaluate the effectiveness of a multimodal rehabilitation protocol focusing on its impact in reducing neurological residual deficits and accelerating functional recovery.

## Methods

This study was conducted in collaboration with the Centre de Rehabilitació Animal de Referència (CRAR) and evaluated the efficacy of a multimodal physiotherapy protocol in 7 dogs.

The multimodal rehabilitation program consisted of:

• Hansen Type I TL disc herniation  
• Prior hemilaminectomy  
• Paraparesis (ambulatory/non-ambulatory)

**Laser Therapy:** Perilesional zone, 2 minutes.

**Electrical Muscle Stimulation:** Quadriceps/sciatic nerve, 15 Hz, 10 minutes.

**Active Locomotor Training:** Progressive adjustment of speed and duration.

The 16-week protocol included 18 sessions, with neurological assessments every 3 sessions using standardized scales:

**Modified Frankel Score (0-5):** Neurological status

**Open Field Score (0-14):** Gait analysis

**Neurological Examination Score (5-15):** Postural reactions, reflexes, nociception, etc.

Statistical Analysis:

Pre- and post-intervention scores were compared using Wilcoxon signed-rank tests to evaluate treatment efficacy.

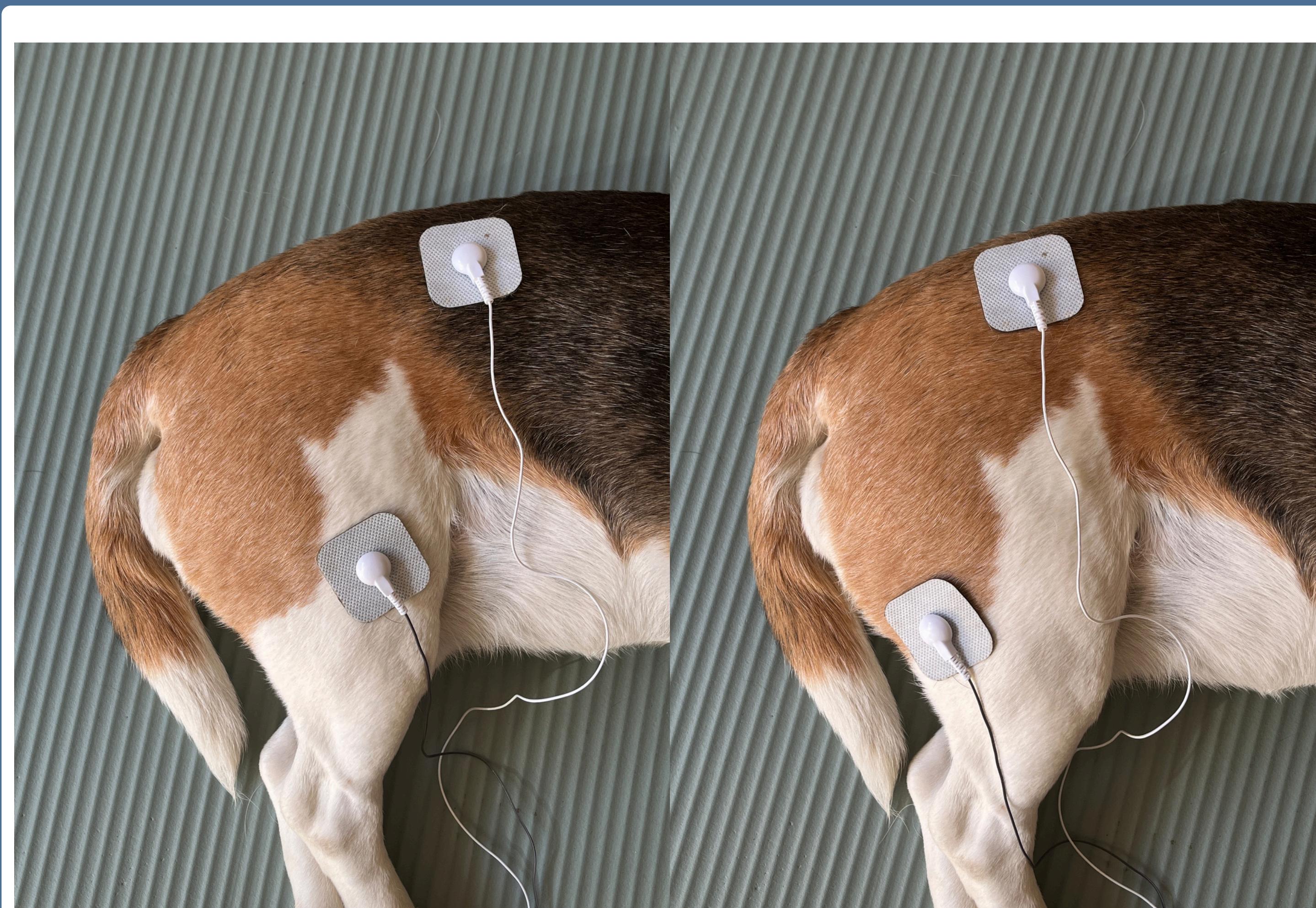
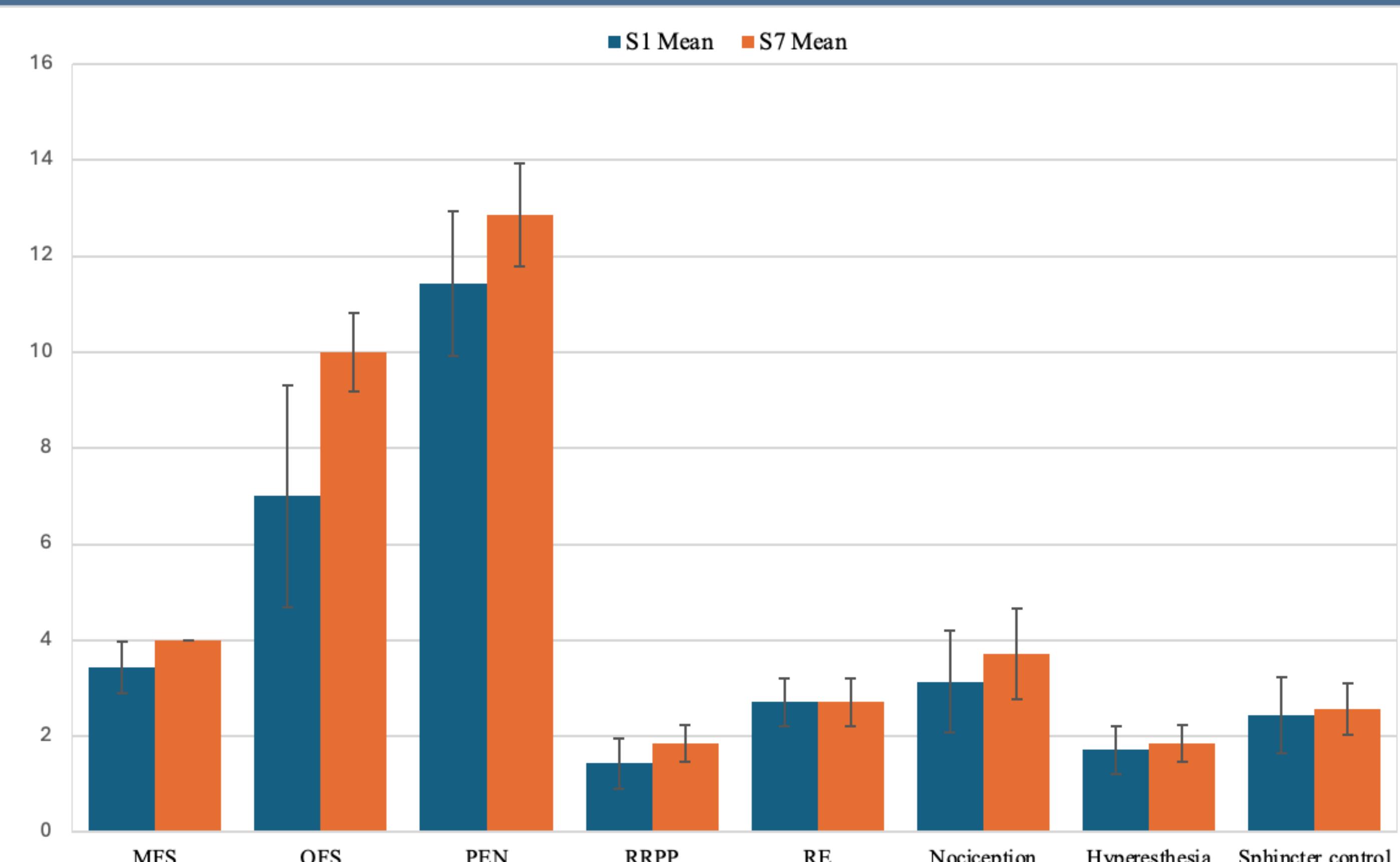


Figure 1. Representation of electrode placement for functional electrical stimulation of the quadriceps femoris muscle (left) and sciatic nerve (right).

## Results and Discussion

**Table 1.** Clinical improvement and statistical significance of evaluated parameters following the rehabilitation protocol. Mean baseline (S1) and post-intervention (S7) scores are shown, including absolute improvement, relative improvement (%), and p-values from Wilcoxon tests. MFS: Modified Frankel Score. OFS: Open Field Score. PEN: Neurological Examination Score. RRPP: Postural Reactions. RE: Spinal Reflexes. SD: Standard Deviation.

Parameters	S1 ± SD	S7 ± SD	Absolute Improvement	Relative Improvement	p-value
MFS (0-5)	3.43 ± 0.53	4.00 ± 0.00	+ 0,57	36,31%	0,028*
OFS (0-14)	7.00 ± 2.31	10.00 ± 0.82	+ 3	42,86%	0,018*
PEN (5-15)	11.43 ± 1.51	12.86 ± 1.07	+ 1,43	40,06%	0,043*
RRPP (1-3)	1.43 ± 0.53	1.86 ± 0.38	+ 0,43	27,39%	0,068
RE (1-3)	2.71 ± 0.49	2.71 ± 0.49	0	0,00%	1,000
Nociception (1-4)	3.14 ± 1.07	3.71 ± 0.95	+ 0,57	66,28%	0,046*
Hyperesthesia (1-2)	1.71 ± 0.49	1.86 ± 0.38	+ 0,14	51,72%	0,317
Sphincter Control (1-3)	2.43 ± 0.79	2.57 ± 0.53	+ 0,14	24,56%	0,414



**Figure 2.** Comparison of mean neurological parameter scores before and after rehabilitation protocol implementation. MFS: Modified Frankel Score, OFS: Open Field Score, PEN: Neurological Examination Score, RRPP: Postural Reactions, RE: Spinal Reflexes, S1: Baseline assessment, S7: Final assessment

All seven paraparetic dogs (100%) achieved ambulation by study completion, including four initially non-ambulatory cases that required a mean of 12.6 weeks to regain walking capacity.

## Conclusions

This study provides evidence that postoperative rehabilitation in dogs with thoracolumbar disc herniation significantly improves motor function, nociception, and global neurological scores. While some neurological functions did not show statistically significant changes, the results support the clinical utility of standardized rehabilitation protocols in these patients.