

CASE STUDY:

THE ROLE OF ELECTRICAL STIMULATION IN REDUCING CHEMOTHERAPY INDUCED PERIPHERAL NEUROPATHY (CIPN) PAIN

BACKGROUND:

While more Americans than ever are surviving cancer thanks to the effectiveness of treatments, many also suffer from short- and long-term side effects. Chemotherapy induced peripheral neuropathy (CIPN) is a dose-limiting effect of certain chemotherapy agents, such as Taxanes, Vinca Alkaloids and Platinum compounds. CIPN causes patients to have significant limitations in their activities of daily living (ADLs) and recreational activities.

PATIENT HISTORY:

The patient is an active and otherwise healthy 58-year-old female with an unremarkable past medical history. She was referred to outpatient physical therapy for CIPN. She was diagnosed in March 2013 with grade IV metastatic papillary serous carcinoma of gynecological origin. She underwent a debulking surgical procedure for a hysterectomy with salpingo-oophorectomy, an appendectomy and a partial sigmoidectomy. Tumor size was 7.5 cm at its greatest dimension and poorly differentiated. Her tumor staging was a T3NXM1 (distant metastases including presence of malignant cells in the pleural fluid). She then received 17 treatments of chemotherapy through two ports (an upper and a lower port) of Cisplatin and Taxol alternations. This patient reported that as of the first treatment, she noted tingling in her lower extremities.

REHABILITATION:

Electrical stimulation was used to decrease the patient's CIPN pain and increase her activity level (with either the same use of pain medication or with a reduction in the use of these medications). Therefore, at Day 1, the patient began to add the use of electrical stimulation at home with the use of a sock and glove set. The patient was instructed to begin the use of this at home for 20 minutes for 2 to 3 times daily on her greatest involved side (right foot and right hand). The parameters for this unit were set at 200 microseconds phase duration and 50Hz for frequency. Dosage/intensity was set to patient's moderate intensity level (enough to tolerate).

RESULTS:

The patient reduced 30% of the time by 1 point on the NPR within sessions. However, while this is not a minimally clinically significant difference, over 2 weeks, she had a reduction of 2 points on the NPR, which is shown to be above MCID for those with chronic pain (Farrar et al, 2001). She also had discharged her narcotic pain medications and utilized OTC pain medication only once in the 2-week period.

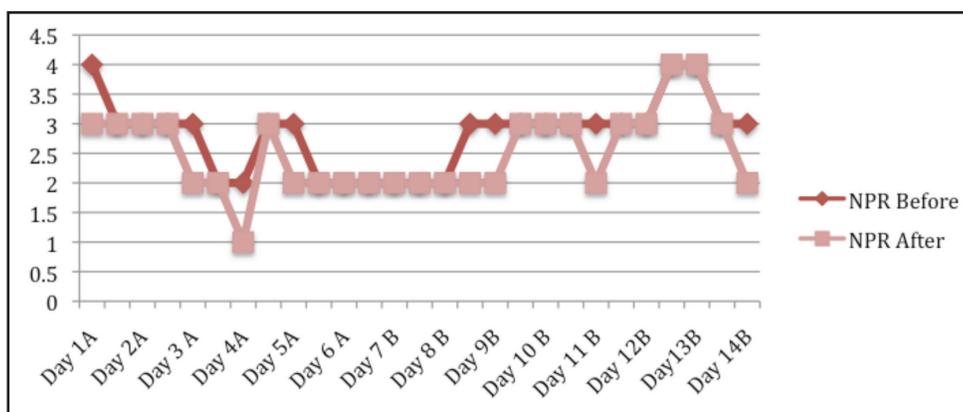


Figure 1.1: This chart displays the numeric pain scale report before doing the intervention and then after the intervention. Most notable is that she had reportedly increased her activity levels at the following times: in between sessions during day 4, in between days 8 and 9, after session A during day 10, and at day 13.

RESULTS CONTINUED:

The total neuropathy score reduced (m-TNSr), and her NPS-CIN also showed a decrease in the two weeks of intervention (Figure 1.2). On the m-TNSr Items, she scored at 14/20 (with 20 being the worst impairment) before the intervention had begun. After the intervention, she had a 7/20. This would be considered that she has moved from having a moderate level of neuropathy to a minimal level of neuropathy (Vasquez et al). Additionally, on the NPS-CIN prior to intervention, she was reported at a 12/24, and after intervention she scored at a 6/24. Most notably on the NPS-CIN items was that the intensity, unpleasantness and sharpness decreased, but the deep, numb and tingly pain descriptions increased one level. The results are below.

	m-TNSr	NPS-CIN
Day 1	14	12
Day 14	7	6

❁ Table 1 • Modified 5-Item TNSr and NPS-CIN Item Scoring					
	0	1	2	3	4
TNSr Items					
Symptom extension ^a (tingling, numbness, neuropathic pain)	None	Symptoms limited to fingers or toes	Symptoms extend to ankle or wrist	Symptoms extend to knee or elbow	Symptoms above knees or elbows or functionally disabling
Pin sensibility	Normal	Reduced in fingers/toes	Reduced up to wrist/ankle	Reduced up to elbow/knee	Reduced to above elbow/knee
Vibration sensibility	Normal	Reduced in fingers/toes	Reduced up to wrist/ankle	Reduced up to elbow/knee	Reduced to above elbow/knee
Strength ^b	Normal	Mild weakness	Moderate weakness	Severe Weakness	Paralysis
Tendon reflexes	Normal	Ankle reflex reduced	Ankle reflex absent	Ankle reflex absent/ others reduced	All reflexes absent
NPS-CIN items					
How intense is your neuropathy pain?	Not at all	Mild	Moderate	Severe	Excruciating
How unpleasant is your neuropathy pain?	Not at all	Mild	Moderate	Severe	Excruciating
How sharp does your neuropathy pain feel?	Not at all	Mild	Moderate	Severe	Excruciating
How deep does your neuropathy pain feel?	Not at all	Mild	Moderate	Severe	Excruciating
How numb does your neuropathy pain feel?	Not at all	Mild	Moderate	Severe	Excruciating
How tingly does your neuropathy pain feel?	Not at all	Mild	Moderate	Severe	Excruciating

Abbreviations: NPS-CIN, chemotherapy-induced neuropathy-specific Neuropathic Pain Scale; TNSr, total neuropathy score-reduced.
^aThe worse score of the 3 subcomponents (tingling/paresthesia, numbness, and neuropathic pain proximal extension) was used as the subjective symptom extension score.
^bThe muscle with the worse score is used as the strength score (toe, ankle, wrist and finger extensors and flexors, quadriceps, hamstrings, biceps, and triceps).
 TNSr and pain items were adapted with permission.^{11,12,14,15}
Cancer Nurs. 2010 Mar 30. [in print]. The Reliability and Validity of a Modified Total Neuropathy Score-Reduced and Neuropathic Pain Severity Items When Used to Measure Chemotherapy-Induced Peripheral Neuropathy in Patients Receiving Taxanes and Platinums. Lavoie Smith EM et al

NOTES INCLUDING CLINICAL RELEVANCE:

This case study has limitations in that the patient also participated in physical therapy treatments, which included myofascial techniques, as well as participated in increased ADLs when she had noted decreases in pain, which then elevated her pain levels. This patient also had intermittent difficulties with the issued ES unit and switched frequencies over the two-week period, which does not give significant consistencies.

However, this does provide a promising look into the use of ES units to mediate pain and decrease dependence on pain medications, as the patient was noting decreases in NPR of 1 within sessions 30% of the time and with consistent activity and consistent use of ES unit, would note decreases in 2 levels on the NPR scale over a longer period of time. This case study further introduces the necessity for further research regarding the topic of identifying treatments to assist in decreasing pain in this population.

For more information, contact Kathleen Fortier, DPT, MBA of Good Shepherd Physical Therapy – Souderton at kfortier@gshr.org or 215-721-1871.

Now entering patients into further study. If you or your patient is interested in participating, please contact Kathleen Fortier at 215-721-1871.

