

Impact of psychological and physiological variables on efficacy of perineural steroid injections in post-traumatic peripheral neuropathic pain.

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Introduction

Perineural steroid injections can provide analgesia in refractory post-traumatic neuropathic pain. These procedures can be associated with procedural complications, hyperglycemia, osteoporosis, reduced immunity, and myopathy. Prediction of likelihood of benefit can help optimize use of healthcare resources and avoid interventions in subjects unlikely to respond. Objective hemodynamic and psychological parameters can be used to predict treatment outcomes.

Methods

This was a retrospective case series of patients who received steroid injections around injured nerves that innervate the foot and the ankle. Systolic, diastolic blood pressure (BP), and heart rate (HR) were recorded before and after the intervention. Baseline pain catastrophizing scale (PCS) score, patient health questionnaire-9 (PHQ-9) score, and lower extremity functional scale (LEFS) score, pain numerical rating scores (NRS) before the procedure and at 6 weeks following the procedures were included in data analysis. "Responders" were defined as patients with at least 30% reduction in pain NRS at follow-up. The primary hypothesis was that analgesic response is associated with reduction in HR and BP immediately after the procedure. The secondary hypothesis was that probability of analgesic response increases with lower baseline PCS scores.

Results

133 patients received perineural steroid injection for refractory neuropathic pain. 84 patients had data available for analysis and 34 patients were responders. Baseline variables were similar in responders and non-responders except for PCS that was lower in responders (Table 1). Mean pain NRS at follow-up was significantly lower in responders but changes in hemodynamic variables were similar in both groups (Table 2).

Table 1. Baseline data for responders and non-responders.

Characteristics	Responders (n = 34)	Non-responders (n = 50)	p-values
Age (years) mean $\pm$ SD	47.15 $\pm$ 11.29	43.66 $\pm$ 12.94	0.206
Gender Males / Females	21 (38%) / 13 (45%)	34 (62%) / 16 (55%)	0.556
Baseline pain NRS mean $\pm$ SD	6.87 $\pm$ 1.63	6.75 $\pm$ 1.37	0.722
Function (LEFS) mean $\pm$ SD	27.64 $\pm$ 15.85	24.17 $\pm$ 13.81	0.302
Catastrophizing (PCS) mean $\pm$ SD	21.85 $\pm$ 13.64	27.94 $\pm$ 12.45	0.03*
Depression (PHQ-9) mean $\pm$ SD	11.35 $\pm$ 8.24	11.62 $\pm$ 6.66	0.870
Smoking status Non-smoker / Smoker	17 (40%) / 14 (38%)	26 (60%) / 23 (62%)	0.877
Duration of pain (months) Median (IQR)	17.0 (11.0, 23.0)	14.0 (9.0, 22.0)	0.181
Work status Not working/ working	17 (37%) / 17 (45%)	29 (63%) / 21 (55%)	0.408

Table 2. Hemodynamic changes and sedation parameters.

Characteristics	Responders (n = 34)	Non-responders (n = 50)	p-values
Post-procedure pain NRS mean $\pm$ SD	3.18 $\pm$ 1.54	6.39 $\pm$ 1.43	<0.001*
Change in HR (/min) median (IQR)	6.0 (0.0, 9.0)	7.0 (2.0, 11.0)	0.296
Change in SBP (mmHg) mean $\pm$ SD	10.56 $\pm$ 13.43	7.86 $\pm$ 13.54	0.371
Change in DBP (mm Hg) mean $\pm$ SD	5.53 $\pm$ 12.11	7.84 $\pm$ 11.74	0.385
Propofol used for sedation No / Yes	18 (42%) / 16 (39%)	25 (58%) / 25 (61%)	0.791
Sedation None or Low High	21 (49%) 13 (32%)	22 (51%) 28 (68%)	0.109

Discussion

Forty percent of the patients with refractory post-traumatic neuropathic pain experienced analgesic benefit from perineural steroid injections. Baseline PCS was significantly lower in responders. We propose that PCS has the potential to predict treatment outcomes for pain interventions in this population. We did not observe a correlation between HR and BP changes and analgesic outcomes. Further research should focus on exploring association of intra-procedure peak hemodynamic values or values at 6 weeks or later following interventions with analgesic outcomes.