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Erector spinae plane block in the management of post-herpetic thoracic neuralgia: a retrospective observational study

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Abstract

Post-herpetic neuralgia (PHN) is a debilitating neuropathic pain condition that often persists despite optimized pharmacologic therapy and markedly impairs quality of life. The erector spinae plane (ESP) block has emerged as a minimally invasive interfascial technique for thoracic neuropathic pain, but evidence in established PHN remains limited. This retrospective observational study evaluated the effectiveness of thoracic ESP block combined with pregabalin compared with pregabalin alone in patients with severe thoracic PHN. Forty-six patients treated between 2018 and 2022 were included: 22 received pregabalin alone, and 24 received pregabalin plus two ultrasound-guided ESP blocks performed 7 days apart. Pain intensity (Numeric Rating Scale [NRS]), sleep disturbance (Insomnia Severity Index [ISI]), and pregabalin dosage were assessed at baseline and at 2 weeks, 1 month, 3 months, and 6 months. Baseline characteristics were comparable between groups ($p>0.05$). Although both groups demonstrated progressive improvement over time, the ESP group showed significantly greater reductions in NRS at 2 weeks ($p<0.001$), 1 month ($p=0.0001$), 3 months ($p=0.016$), and 6 months ($p=0.004$), with pain decreasing from moderate-severe to mild intensity within 2 weeks. Sleep quality improved significantly more in the ESP group at 2 weeks, 1 month, and 3 months (all $p<0.05$). At 6 months, pregabalin reduction was significantly greater in the ESP group ($p=0.004$). Thoracic ESP block appears to provide clinically meaningful and sustained analgesia, improve sleep quality, and reduce pharmacologic burden in severe thoracic PHN, supporting its role as an effective adjunct within multimodal pain management strategies. These findings support its role as an effective adjunct in multimodal pain management and warrant confirmation in prospective randomized trials.

Key words: post-herpetic neuralgia; erector spinae plane block; ultrasound-guided regional anesthesia; multimodal analgesia; chronic neuropathic pain.

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Introduction

Herpes zoster results from the reactivation of the varicella zoster virus latent in the sensory ganglia when cell-mediated immunity is altered. Once reactivated, the virus travels along the affected sensory nerve, causing painful skin lesions and neuronal damage in a unilateral dermatomal pattern.[1] Although the vesicular rash disappears after a few weeks, the pain may persist, resulting in post-herpetic neuralgia (PHN).[2]

PHN is the most common complication of herpes zoster reactivation, and it affects about 50% of the over 60 population.[2] PHN is defined as neuropathic pain that persists for more than 3 months, is difficult to treat, and is associated with a worsening of the patient's quality of life. Typical symptoms of PHN include burning, stabbing pain, dysesthesia, and allodynia in the affected area. In most cases, PHN follows the dermatomal distribution of the previous herpes zoster skin rash, along the innervation of one or more spinal nerves, resulting in radiculopathy. Intercostal radiculopathy is the most frequent form of PHN, along with trigeminal nerve involvement, whereas the lumbosacral form is less frequent.[3] Successful management requires early recognition and multimodal analgesia that includes the use of specific drugs and locoregional analgesia techniques involving both the central and peripheral nervous systems.[4,5]

Although epidural block remains the most widespread approach in such cases,[5] the most recent literature has demonstrated the effectiveness of peripheral nerve blocks and interfascial blocks as alternative or synergistic techniques, especially when epidural block is contraindicated.[6]

The therapeutic efficacy of peripheral nerve blocks and interfascial blocks lies in their potential to disrupt the transmission of nociceptive signals along neural pathways, successfully attenuating pain perception. By selectively blocking sensory nerves or

modulating neurogenic pathways, these interventions interrupt the pathological pain cycle underlying persistent pain syndromes.[7]

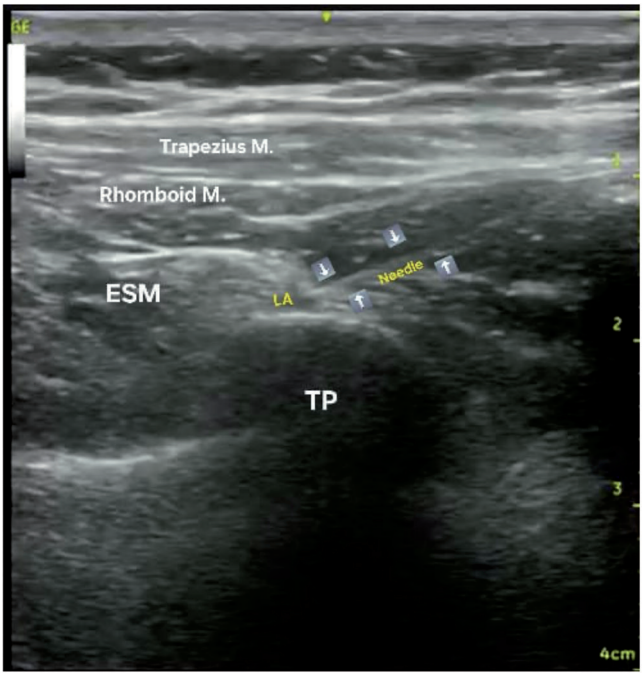
Regarding thoracic PHN, the use of the erector spinae plane (ESP) block has proven to be very effective. The erector spinae muscle fascial block was first described by Forero *et al.* in 2016 for the treatment of severe neuropathic thoracic pain, demonstrating efficacy comparable to that of the epidural block, acting on both visceral and somatic pain.[8]

Materials and Methods

Study design

To carry out this retrospective observational study, data from patients treated for thoracic PHN between January 2018 and December 2022 at the Pain Therapy Clinic of Città di Castello Hospital (Healthcare Company Umbria 1, Italy) were used.

This retrospective study was conducted in accordance with the Declaration of Helsinki. According to institutional policy, formal ethics committee approval was not required for retrospective analysis of anonymized data. All patients had provided consent for the use of their clinical data for research purposes. Medical records of consecutive adult patients diagnosed with thoracic PHN were reviewed. Patients were managed according to routine clinical practice and allocated to either pregabalin monotherapy (Group 0) or pregabalin combined with ultrasound-guided thoracic ESP block (Group 1). Treatment allocation was based on clinical judgment and patient preference. No randomization was performed.



ESM, erector spinae muscle; Rhomboid M., rhomboid muscle; Trapezius M., trapezius muscle. LA, local anesthetic.

Figure 1. Thoracic ESP block. Ultrasound scan obtained using a linear probe showing the transverse processes of T4. Arrows indicate the needle through which the local anesthetic is deposited at the target point.

Inclusion criteria were: i) severe pain with Numeric Rating Scale (NRS) ≥7; ii) moderate-to-severe sleep disturbance with Insomnia Severity Index (ISI) ≥15; iii) on pregabalin therapy for more than one month at a dosage greater than 100 mg/day; iv) consent to the execution of the ESP block; v) consent to the processing of personal data.

Exclusion criteria comprised: i) allergy to local anesthetic; ii) NRS <7; ISI <15; pregabalin therapy at a dosage of less than 100 mg/day.

Main objective

The objective of this study was to evaluate the analgesic efficacy of a thoracic ESP block in combination with oral pregabalin compared with oral pregabalin alone in patients with thoracic PHN.

Pain was assessed using the NRS at 2 weeks, 1 month, 3 months, and 6 months after ESP block administration.

Secondary objectives

Sleep quality was assessed using the score obtained from the ISI. The evaluation of sleep quality was performed at 2 weeks, 1 month, 3 months, and 6 months after the administration of the ESP block.

Furthermore, the reduction in pregabalin dosage in both groups over time was also evaluated.

ESP block technique

ESP block (Figure 1) was performed under ultrasound guidance using an in-plane technique. After sterile preparation and local infiltration, a 22-gauge needle was advanced to the deep fascia of the erector spinae muscle at two thoracic levels corresponding to the painful dermatomes. Levobupivacaine 0.25% (12 mL per level; maximum dose 2 mg/kg) combined with dexamethasone 8 mg was administered following negative aspiration. Proper interfascial spread was confirmed sonographically. The technique was consistent with previously described anatomical principles.[5,6] Two blocks were performed 7 days apart.

Outcome measures

Pain intensity was assessed using the validated 11-point NRS.

Sleep disturbance was evaluated using the ISI, a validated instrument for insomnia assessment.

Statistical analysis

A repeated measures analysis of variance (ANOVA) was performed to evaluate the effects of treatment, time and their interaction. Statistical significance was defined as $p<0.05$.

Results

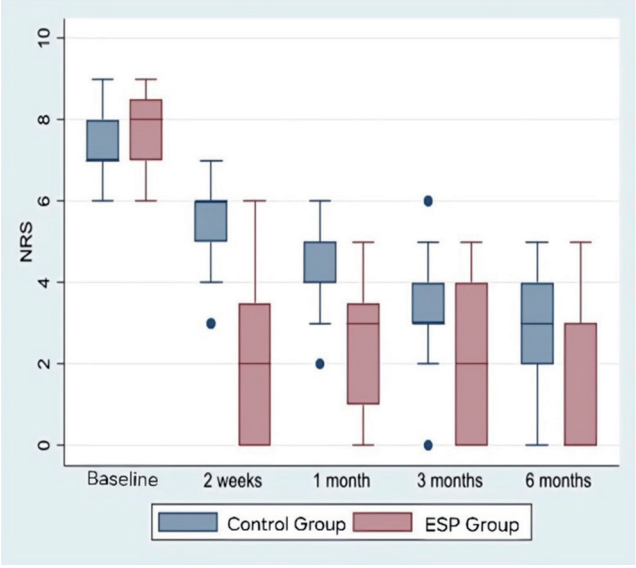
A total of 46 patients were included in the analysis: 24 in the ESP group and 22 in the control group.

Baseline demographic and clinical characteristics did not differ significantly between groups, confirming group homogeneity (Table 1). Although no statistically significant differences were observed, a higher prevalence of hypertension was noted in the control group.

Table 1. Baseline demographic and clinical characteristics of the study population. Data are presented as mean ± standard deviation or number (%).

	ESP Group (n=24)	Control group (n=22)	p-value
Age (years)	64.75±14.51	69.82±12.87	0.218
BMI (kg/m²)	27.60±3.1	27.89±3.44	0.7623
Female sex	14 (58.3)	13 (59.1)	0.804
Pain duration (months)	7.14±2.68	7.21±2.00	0.9177
Thoracic dermatomes involved	2.045±0.375	2.13±0.45	0.5195
Neurologic disease	4 (16.7)	8 (36.4)	0.2366
Hypertension	9 (37.5)	15 (68.2)	0.0742
Heart diseases	4 (16.7)	7 (31.8)	0.3912
Diabetes	9 (37.5)	8 (36.4)	0.8212
Oncological diseases	4 (16.7)	1 (4.5)	0.3980
NRS	7.32±0.89	7.63±1.10	0.3064

ESP, erector spinae plane; BMI, body mass index; NRS, Numeric Rating Scale.



ESP, erector spinae plane; NRS, Numeric Rating Scale.

Pain intensity

Both groups demonstrated progressive reductions in pain intensity over time; however, reductions were significantly greater in the ESP group at all post-baseline time points (Table 2). The distribution of NRS scores over time is illustrated in Figure 2.

Sleep quality

Sleep disturbance improved in both groups, with significantly greater improvement in the ESP group at 2 weeks, 1 month, and 3 months (Table 3). The distribution of ISI scores over time is illustrated in Figure 3.

Figure 2. Distribution of NRS scores over time in the ESP and control groups. Box plots display the median, interquartile range, and range at each time point.

Table 2. NRS pain scores at baseline and during follow-up in the ESP and control groups. Data are presented as mean ± standard deviation.

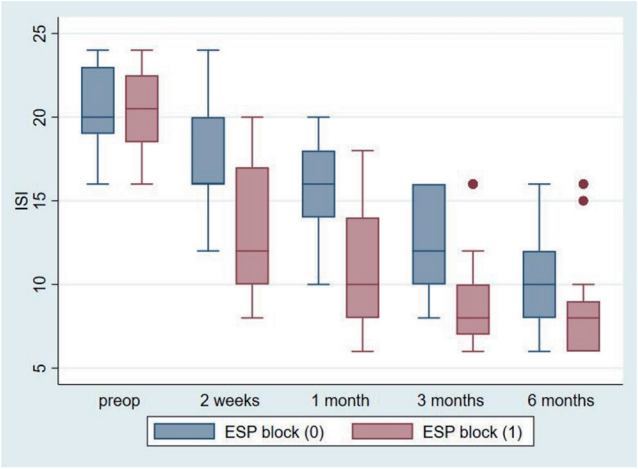
	Baseline	2 weeks	1 month	3 months	6 months
ESP group (n=24)	7.62±1.20	2.12±2.03	2.37±1.64	2.16±1.86	1.37±1.81
Control group (n=22)	7.31±0.89	5.59±1.14	4.22±0.97	3.45±1.26	2.86±1.35
p-value	0.962	<0.001	0.001	0.016	0.003

ESP, erector spinae plane.

Table 3. ISI scores at baseline and during follow-up in the ESP and control groups. Data are presented as mean ± standard deviation.

	Baseline	2 weeks	1 month	3 months	6 months
ESP group (n=24)	20.4±2.4	12.8±4.1	11.1±3.8	9.2±3.4	8.7±3.8
Control group (n=22)	20.5±2.7	17.2±3.4	15.5±3.1	12.1±2.7	10.3±3.2
p-value	1.000	0.001	<0.001	0.019	0.437

ESP, erector spinae plane.



ESP, erector spinae plane; ISI, Insomnia Severity Index.

Figure 3. Distribution of ISI scores over time in the ESP and control groups. Box plots display the median, interquartile range, and range at each time point.

Pregabalin dosage

Baseline pregabalin dosage was comparable between groups. During follow-up, a greater reduction in pregabalin dosage was observed in the ESP group, reaching statistical significance at 6 months (Table 4).

Discussion

Post-herpetic neuralgia is a neuropathic pain condition that is very often severe and frequently persists for more than 6 months, significantly affecting quality of life. Multiple mechanisms of action contribute to the persistence of this type of pain; therefore, its management involves a multimodal analgesic approach tailored to the patient based on clinical conditions and comorbidities.[9]

In addition to pharmacological management, various interventional procedures may be used to manage post-herpetic neuralgia, such as epidural block, paravertebral block (PVB), or spinal cord stimulation. However, these procedures may be associated with serious complications and contraindications.[10,11]

The ESP plane block, first described by Forero *et al.* for the treatment of thoracic neuropathic pain, has also demonstrated efficacy for several other indications.[8,12] Cadaver studies have demonstrated that ESP block has a cranio-caudal spread of local anaesthetic, extending towards the ventral branches, lateral branches, and the paravertebral and epidural spaces, thus explaining its analgesic efficacy on the anterior and posterior thoracic walls.[13]

Cao *et al.*, in 2019, published a randomized study in which 60 elderly patients enrolled from January 2018 to January 2019 were treated for thoracic post-herpetic neuralgia; the 60 patients were divided equally into one group treated with pregabalin and thoracic ESP block and another group treated only with pregabalin; pain on the NRS scale, sleep quality assessed with the Sleep Quality Score, and total pregabalin dosage were evaluated at 1, 2, 3, 4, 6, and 8 weeks from the start of treatment; at all these time intervals and for all the variables measured, it was demonstrated that the group in which the ESP block was performed had better results than the group treated with oral therapy alone. Therefore, it could be concluded that the ESP block can effectively relieve pain in elderly patients suffering from thoracic post-herpetic neuralgia, significantly reduce the dosage of oral therapy, and improve sleep quality.[1]

In 2020, Gülçin Hacıbeyoğlu *et al.* conducted a retrospective observational study in which 39 patients with post-herpetic neuralgia were divided into two groups: one treated with an ESP block and the other with an intercostal block. At 24 hours, 4 weeks, and 12 weeks, both groups showed a clear reduction in pain on the NRS, improvement in typical symptoms of neuropathic pain as measured by the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) scale, and a reduction in sleep disturbance as assessed by the ISI. However, these parameters were better in the group treated with the ESP block than in the group treated with the intercostal nerve block.[14]

In 2023, Peksöz *et al.* published a study in which an ESP block containing methylprednisolone and bupivacaine was administered to 5 patients who had developed PHN after a case of thoracic herpes zoster, and who had not responded to 3 months of medical treatment. Pain severity was assessed using the NRS. After the application of the ESP block, patients were evaluated at 1 hour, 1 month, and 3 months, and their NRS scores were recorded. Post-procedure pain scores for all patients were significantly lower than pain scores before the procedure.[15]

The results of our retrospective observational study demonstrate greater efficacy of ESP block associated with oral pregabalin therapy compared to oral therapy alone in the treatment of severe thoracic post-herpetic neuralgia in terms of pain reduction and sleep disturbance, and therefore in terms of improvement in quality of life; furthermore, especially at 6 months, a clear and greater reduction in pregabalin dosage was observed in the group in which the ESP block was performed, thus also reducing the possibility or persistence of side effects of the drug itself.

Table 4. Longitudinal pregabalin dosage (mg/day) at baseline and during follow-up in the ESP and control groups. Data are presented as mean ± standard deviation.

	Baseline	3 months	6 months
ESP group (n=24)	168.8±50.7	118.7±24.7	87.5±42.3
Control group (n=22)	161.4±46.1	140.9±19.7	122.7±33.5
p-value	0.511	0.050	0.003

ESP, erector spinae plane.

Our results are consistent with the existing literature and support the use of the ESP block, within a multimodal approach, as a promising alternative for the management of severe post-herpetic neuralgia refractory to oral therapy alone. The technique was associated with significant reductions in pain intensity and sleep disturbance, leading to an overall improvement in quality of life. Moreover, particularly at the 6-month follow-up, patients showed a marked reduction in pregabalin use and in the need for oral pharmacological therapy overall.

In one study, the ESP block was compared to the PVB in acute herpetic neuralgia. After 3 months, the incidence of persistent herpetic pain was not significantly different between the study groups. After 6 months, the incidence of persistent herpetic pain was statistically significantly lower in both the ESP and PVB groups, with no significant difference between the two groups, thereby demonstrating the non-inferiority of ESP compared with PVB.[11]

In recent years, pulsed radiofrequency (PRF) has also gained increasing attention and represents a valid and effective non-pharmacological alternative in the management of PHN. Growing evidence supports its role in pain control, prevention of progression to PHN, and improvement of related symptoms.[16-18] Overall, PRF – particularly when applied to the dorsal root ganglion – appears to be a promising neuromodulatory strategy, offering clinically meaningful pain relief and functional improvement, and constituting a valuable therapeutic option within the multimodal management of PHN.[16-18]

This study has some limitations: it is retrospective, the sample size is small, it is a single-center study, and the follow-up period is short.

Conclusions

The management of PHN is challenging and pain control is often not adequately achieved. Studies on the treatment of PHN demonstrate the efficacy of ESP block and other fascial and perineural blocks in the context of multimodal analgesia. The main advantages of the ESP block are the rapid reduction of pain in PHN, the ability to maintain this effect over time, minimal invasiveness, applicability in outpatient clinical settings, and the absence of systemic side effects.

As studies on the treatment of PHN using peripheral locoregional analgesia techniques are limited, further randomized controlled trials are required to confirm their effectiveness and justify recommendations for their use.

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