The effect of local anesthetic injection in the treatment of notalgia paresthetica

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Abstract

Aim: Notalgia Paresthetica (NP) is a type of chronic sensory neuropathy characterized by localized itching, pain and dysesthesias including numbness, tingling, burning, coldness, hypo- and hyperesthesia. The purpose of this study was to evaluate the level of improvement in itching and burning sense and to ascertain the effectiveness of local anesthetic injection using 1% lidocaine solution in the treatment of NP.

Methods: The research comprised 63 NP patients in all, ranging in age from 18 to 70. Patient files were evaluated retrospectively. Self-Leeds Assessment of Neuropathic Symptoms & Signs Pain Score (S-LANNS) and visual analogue scale (VAS) were evaluated in patients who underwent a total of 3 local anesthesia at one-week intervals.

Results: It was determined that post-treatment VAS, VAS-itch, and S-LANSS scores significantly decreased compared to pre-treatment values. It should not be forgotten that injections with local anesthetics may be alternative options with a high chance of success in the treatment of NP patients.

Conclusions: Injections with local anesthetic may be an alternative approach that can be effectively used to treat these patients.

***Keywords**: Notalgia paresthetica; local anesthetic injection; neuropathic pain; back pain; itching*

1. Introduction

Notalgia paresthetica (NP) is a clinical condition often characterized by a hyperpigmented pruritic skin lesion, especially on the back, accompanied by burning back pain and neurologic symptoms such as hypoesthesia, hyperesthesia or paresthesia. [1,2] The symptoms of NP are often unilateral and located medially or inferior to the affected scapula region.[3,4] The lesion side may include a hyperpigmented region, which might be secondary to chronic irritation such as physical pressure developed by tight underwear, and friction movements to relieve the pruritus. [2] The symptoms often persist for many years, yet periods of remission and worsening are common in the course of the disease. [2,4–6] The majority of the patients with NP are women over 40 years of age. [1,4,7] A cross-sectional study has related the female gender to worse progress, but others failed to find a link between gender and the severity of the condition. [1,2,8] The studies indicate that the average age of patients with NP is between 50 and 60 years. On the other hand, there are reports of children diagnosed with NP, the lowest at six years of age 'Raison-Peyron at all'.[4]

NP is generally known to be a sensory neuropathy. It occurs due to the modification of the cutaneous branches of the posterior rami, in particular the upper branches of the spinal nerves from T2 to T6. [9,10] The etiology is not fully understood, but deterioration in the cervical spine is thought to be involved. [11,12]

Studies indicate that thoracal radiculopathy due to spinal nerve compression should be noted regarding the etiology of pruritus. The anatomical corner of the sensory nerve fibers entering across the multifidus muscle is considered to be an additional component linked to pruritus and pain etiology 'Maciel AA et all'. [13] The muscle spasms and strains are related to the increased pressure occurring on the nerve fibers due to the penetration through the muscle at an unusual angle.

The hyperpigmentation lesions in NP are not primarily caused by mechanisms of dermatological pathology, thought to be simply secondary to chronic mechanical irritation, including physical pressure of the underwear, scratching, and rubbing. [9,14]

The differential diagnoses for NP mainly include pigmented contact dermatitis, patchy parapsoriasis, lichen simplex chronicus, macular amyloidosis, and tinea versicolor. Pigmented contact dermatitis, also called Riehl melanosis, develops due to an allergy to perfume, cosmetics, or its ingredient, and requires patch testing for differentiation from NP.[15]

NP has many different treatment options, varying from topicals

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(steroids applied into the lesion, capsaicin, lidocaine treatments, and botulinum toxin A), intramuscular and intravenous medication, and includes methods of physiotherapy (TENS, cervical traction, exercise, and manipulation). [10,13,16]

The are reports published in reputable journals that describe lidocaine treatments for NP. Local anesthetics not only provide anesthetic effects but also trigger intracellular anti-inflammatory processes mediated by the Gq protein complex. Thus, the production and releasing inflammatory mediators are impacted when N-methyl-D-aspartic acid receptor signaling is blocked. Besides, local anesthetics generate vasodilation and decrease capillary permeability caused by pathological mechanisms. [17,18]

Local anesthetic injection (preferably 0.5-1% procaine or lidocaine solutions) aim to improve tissue function and activate natural regulation mechanisms by eliminating the factors that cause discomfort, rather than short-term pain management, which is its frequent purpose 'Egli et all'. [19] The tissue is offered the opportunity to regain its lost balance by regulating the vegetative nervous system. The aim of the treatment is to ensure that the connections between skin areas, vertebral segments, and internal organs operate in conjunction. The stimulus given by the needle and the local anesthetic is suggested to have the effect of increasing tissue perfusion through the vegetative nervous system.

The aim of this study was to investigate the effects of local anesthetic injections on pain, pruritus, and skin pigmentation in patients with NP.

2. Materials and Methods

This clinical trial was conducted from May 2022 to January 2023 at the Department of Physical Medicine and Rehabilitation (PMR) of our hospital. Ethics committee approval was obtained for the study from the Clinical Research Ethics Committee of City Training and Research Hospital Adana (Decision Number/ Date: 1888/ 07.04.2022)

The medical records of 63 patients aged between 18 and 70 years who were diagnosed with NP and presented to the Physical Therapy and Rehabilitation and Dermatology outpatient clinics of Adana City Training and Research Hospital between May 2022 and January 2023 were reviewed. Patient records were included if the diagnosis of NP had been established by the same dermatologist and if local anesthetic injections were administered to the NP lesion area using the method described below.

Patients younger than 18 years or older than 70 years, those diagnosed with inflammatory rheumatic diseases, infectious dermatological diseases, neurological, psychiatric, autoimmune, or oncological disorders, and those with a documented history of cervical or thoracic vertebral injury were excluded from the study

Patients whose records included the following local anesthetic injection protocol were enrolled in the study: The procedure was initiated by placing the patient in the prone position on the examination table, asking them to clasp their hands, rest the forehead on their hands, and relax. The spinous processes from T2 to T10, along with points located 2 cm lateral to both sides of these processes, were marked. Chlorhexidine alcohol was used for skin disinfection. A 2% lidocaine solution diluted with 0.9% saline was administered intradermally at designated points in doses of approximately 0.2–0.3 cc. Injections were applied around the hyperpigmented skin area and segmentally along the C2–T6 spinous processes at 1 cm intervals (Figure 1). Data were obtained from patient files of those who received a total of three injections at one-week intervals, recorded one week after the third injection. VAS scores for pain and pruritus, S-LANSS scores, changes in skin color, lesion size, and the frequency and severity of itching were extracted from patient records and evaluated.

Patient records were reviewed for age, sex, weight, height, comorbidities, history of allergies, family history of notalgia, cutaneous findings, symptom duration and localization, pruritus, pain, progression of hyperpigmented skin lesions, and paresthesia. Pain and pruritus severity were measured using the Visual Analog Scale (VAS) [20] and recorded on a scale from 0 (no symptoms) to 10 (maximum severity). The Self-Labyrinth Assessment of Neuropathic Symptoms & Signs (S-LANSS) was used to evaluate the severity of neuropathic pain. According to S-LANSS, developed by Michael et al.[21], a total score of 12 or above indicates a high likelihood of neuropathic pain. The patient records meeting this criterion were reviewed. (S-LANSS: This questionnaire consists of a total of seven questions aimed at characterizing the nature of pain, and a total score of 12 or higher suggests a likelihood of neuropathic pain.

As a result of the Power Analysis performed to evaluate the effectiveness of local anesthetic injection application in Notaljia Parestetica disease, it was determined that a total of 63 patient files would be sufficient in the study. G Power Statistical Program version 3.1.9.4 (Universität Düsseldorf, Germany) was used for the statistical analysis.

Figure 1

Injection Sites for Local Anesthetic

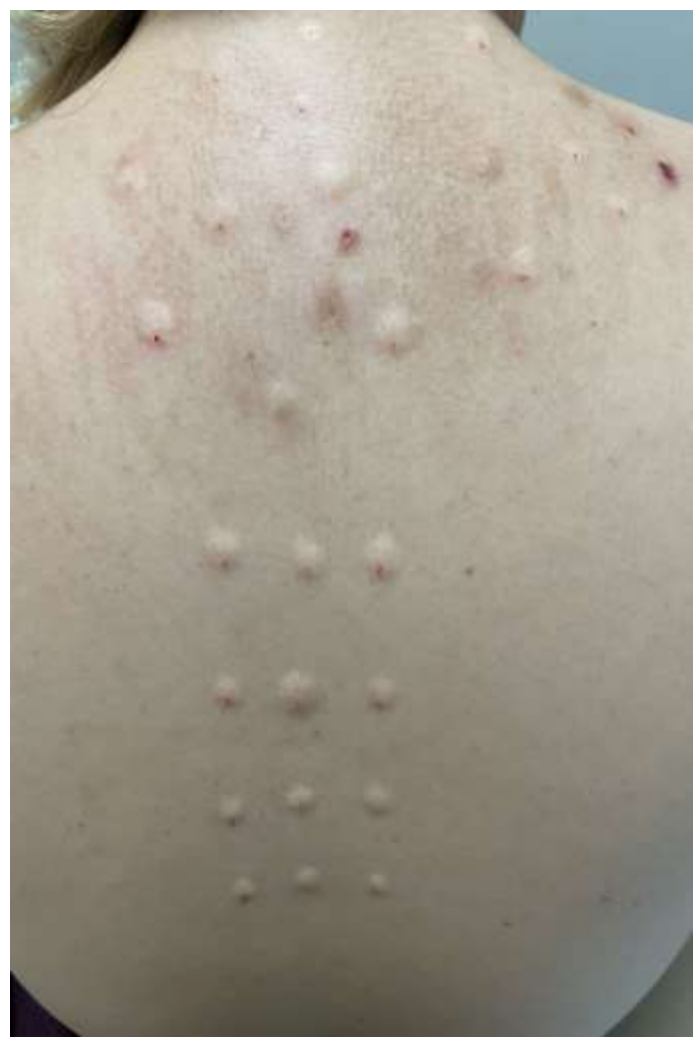

Table 1

The baseline characteristics of the study group

	Study group (n=63)
Age (years) (Mean±Std)	47.52±12,16
Gender (n,%)	
Female	51 (80.95)
Male	12 (19.05)
Accompanying Diseases (n,%)	
No	24 (38.1)
Yes	39 (61.9)
History of allergy (n,%)	
No	48 (76.2)
Yes	15 (23.9)
Family history of NP (n,%)	
No	51 (81.0)
Yes	12 (19.0)
Duration of pain (n,%)	
<1 years	9 (14.3)
1-5 years	42 (66.7)
>5 years	12 (19.0)
Duration of pruritus (n,%)	
<1 years	21 (33.3)
1 to 5 years	36 (57.1)
>5 years	6 (9.5)
Sensory impairment (n,%)	
None	21 (33.3)
Hyperesthesia	12 (19.0)
Hypoesthesia	30 (47.6)
Localization of pruritus (n,%)	
Back	57 (90.5)
Chest	6 (9.5)

Table 2

The comparison of VAS pain, VAS pruritus, S-Lanns scores and lesion area values of the patient group before and after treatment

	Pre-treatment	Post-treatment	*p*
VAS pain (Mean±Std)	7.52±1.88	3.81±2.11	<0.001*
VAS pruritus (Mean±Std)	5.48±2.33	1.95±1.56	<0.001*
S-Lanns (median (min-max))	14 (6-24)	5 (0-24)	<0.001**
Lesion area (cm^2) (median (min-max))	36 (10-325)	28 (8-455)	0.035**

** T test in dependent groups*
*** Wilcoxon Ranked Sign test*

2.1. Statistics

Continuous variables were expressed as mean ± standard deviation, and median (min-max); categorical data were expressed as numbers and percentages. Normality analysis of continuous variables was performed with the Kolmogorov-Smirnov Goodness-of-Fit Test. Pre-and post-treatment comparisons were performed with the Paired Samples T-test in the dependent groups with the normally distributed data and Wilcoxon Signed Ranks test was used for the data not normally distributed. In the comparisons of categorical data, the Chi-Square Test was used. IBM SPSS version 26.0 (IBM Corporation, Armonk, NY, USA) was used to perform the analyses. A type 1 error level of less than 5% was considered significant.

3. Results

A total of 63 patient files were analyzed, with the NP group being predominantly female (n = 51; 80.95%). Hypoesthesia was observed in 47.6% of patients, and pruritus was localized to the posterior torso in 90.5% of cases. The duration of pruritus was 1–5 years in 57.1% of patients, while pain persisted for 1–5 years in 66.7%.

Following treatment, VAS, VAS pruritus, S-LANSS scores, and lesion area were all significantly reduced compared to baseline ($p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, and $p=0.035$, respectively) (Tables 2–4). Among patients with occasional pruritus prior to treatment, no change in frequency was observed, whereas 80% of patients with daily pruritus reported reduction to occasional frequency, with one patient achieving complete resolution. Regarding symptom severity, 42.9% of patients with mild pruritus experienced complete resolution, while the remainder improved to occasional pruritus. Among patients with moderate or severe pruritus, the majority reported improvement to mild severity post-treatment. Additionally, 57.1% of patients demonstrated changes in skin coloration following therapy.

4. Discussion

NP is a common sensory neuropathy caused by entrapment of the dorsal spinal sensory nerves. The pathogenesis was due to the damage or entrapment of the spinal sensory nerves from T2 to T6 as they emerge at right angles through the multifidus spinae paraspinal muscle. [1-4]

Treatment modalities for NP are diverse and aim to alleviate symptoms. Topical therapies, such as capsaicin, lidocaine, and corticosteroids, have been utilized with varying degrees of success. Capsaicin, a substance P depleter, has demonstrated efficacy in reducing pruritus; however, its use may be limited by transient stinging sensations Lidocaine, an anesthetic, provides temporary relief and is often administered via intradermal injections. [10,13]

Our findings indicated a predominance of female patients (n = 51; 80.95%), consistent with previous epidemiological studies. [1,4,7] Although the incidence of notalgia paresthetica (NP) appears to be relatively high, many cases are likely underreported, as physicians rarely perform comprehensive physical examinations. Consequently, NP warrants a cautious diagnostic approach.

Diagnosis of NP is primarily clinical, based on patient-reported symptoms and physical findings. Pruritus is the most common symptom, typically transient, paroxysmal, and varying in intensity. Patients may also report pain, changes in temperature perception, burning or cold sensations, tingling, and numbness. [22,23] In our cohort, 90.5% of patients experienced pruritus in the dorsal region, and 47.6% presented with hypoesthesia.

Table 3

Comparison of the frequency of itching before and after treatment

Frequency of pruritus	Frequency of pruritus		Total	*p*
	Occasionally	Everyday		
None	0 (%0.0)	3 (%6.7)	3 (%4.8)	
Occasionally	18 (%100.0)	36 (%80.0)	54 (%85.7)	0.497*
Everyday	0 (%0.0)	6 (%13.3)	6 (%9.5)	
Total	18 (%100.0)	45 (%100.0)	63 (%100.0)	

** Chi-square test*

Table 4

Comparison of the frequency of itching before and after treatment

Severity of pruritus	Severity of pruritus			Total	*p*
	None	Mild	Average		
None	9 (%42.9)	3 (%9.1)	0 (%0.0)	12 (%19.0)	
Mild	12 (%57.1)	24 (%72.7)	9 (%100.0)	45 (%71.4)	0.497*
Average	0 (%0.0)	6 (%18.2)	0 (%0.0)	6 (%9.5)	
Total	21 (%100.0)	33 (%100.0)	9 (%100.0)	63 (%100.0)	

** Chi-square test*

A hallmark clinical feature of NP is the presence of a hyperpigmented macule, often resulting from chronic mechanical irritation. Repeated scratching induces the release of substance P in the epidermis and stimulates keratinocyte proliferation, leading to hyperkeratosis. [24] In our study, 57.1% of patients reported experiencing pruritus for approximately one to five years.

Currently, there is no definitive treatment that fully alleviates NP symptoms. Therapeutic options include topical agents (capsaicin, corticosteroids, tacrolimus), oral medications (gabapentin, oxcarbazepine, amitriptyline), and various interventions such as intradermal botulinum toxin A, narrowband UVB phototherapy, electrical muscle stimulation, transcutaneous electrical nerve stimulation, physical therapy, and local anesthetic injections. [25]

Physiotherapy has demonstrated sustained improvements in NP patients. [26,27] Zagarella et al. evaluated a 12-week program consisting of daily exercises and stretching for no more than 10 minutes in 12 NP patients. The intervention aimed to alleviate sensory neuropathy associated with paraspinal muscle compression and resulted in significant improvement in 11 out of 12 patients, without adverse effects. [24]

Local anesthetic injections have been shown to inhibit nociceptive activity, sympathetic excitation, circulatory disturbances, neurogenic inflammation, and muscle stiffness. The anti-inflammatory properties of local anesthetics also contribute to reducing neurogenic inflammation. Additionally, these agents modulate synaptic input to dorsal horn neurons of the spinal cord. [28,29] In our study, local segmental injections of 1% lidocaine were administered between the T2 and T10 levels to target both the affected NP region and the spinal cord dorsal horn neurons, resulting in effective relief of pruritus and pain. The maximum recommended dose for a 70-kg individual is 20 mL, emphasizing the importance of avoiding overdose. [30]

A case report by Chtompel et al. described a 50-year-old female NP patient with spinal cord injury from an epidural abscess who received intravenous lidocaine to relieve pruritus. Infusions were administered at two-week intervals (1 mg/kg bolus followed by 4 mg/kg over 1 hour, repeated three times per session), which led to a notable reduction in itching, although neuropathic pain remained unchanged. [16] In our cohort, intradermal lidocaine injections administered to 63 patients with NP resulted in significant reductions in pruritus, pain, and hyperpigmentation. Local anesthetic therapy, while not primarily intended to produce anesthesia, can modulate neural and vascular mechanisms at the injection site, interrupting the positive feedback loop of pain and inflammation, and engaging the autonomic nervous system via segmental and interference zone effects.[19]

Although several treatments demonstrate variable symptom improvement, their invasiveness, frequent administration requirements, and potential adverse effects limit practical use. Consequently, local anesthetic injections may represent a viable and effective alternative for NP management. [25]

This study has certain limitations. Its retrospective design, small sample size, lack of radiological data, and absence of a control group precluded comparative analyses and restricted the generalizability of the findings.

5. Conclusion

The study presented a significant relief in the symptoms of NP patients indicating a meaningful improvement in the quality of life. Although a gold standard treatment for NP has not been determined, with proven safety records and low cost, local anesthetic injections might be a therapeutic option for NP patients.

Statement of ethics

The study was approved by the Adana City Training and Research Hospital Ethics Committee on 07.04.2022 with meeting number 103 and decision number 1888 and was conducted in accordance with the Declaration of Helsinki.

genAI

No artificial intelligence-based tools or generative AI technologies were used in this study. The entire content of the manuscript was originally prepared, reviewed, and approved by both authors.

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Conflict of interest statement

The authors declare that they have no conflict of interest.

Availability of data and materials

This Data and materials are available to the researchers.

Author contributions

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; Nilüfer Aygün Bilecik, Tuğba Tehçi

Drafting the work or reviewing it critically for important intellectual content; Nilüfer Aygün Bilecik, Tuğba Tehçi

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