

# TREATMENT MODALITIES FOR NOTALGIA PARESTHETICA INCLUDING OMT

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## ABSTRACT:

**Background:** Notalgia paresthetica (NP) is a type of neuropathy associated with pruritus, dysesthesias and sometimes pain. Most etiologies stem from trauma and entrapment of cutaneous branches of the upper thoracic nerves.

**Objectives:** We report a case of NP treated with osteopathic manipulative therapy (OMT) along with a review of previous treatment modalities performed per the literature.

**Methods:** A comprehensive literature search using PubMed was performed on NP and its treatment. Keywords used include notalgia paresthetica, treatment, osteopathic manipulation, neuropathy and pruritus.

**Results:** Our patient reported a 30% reduction in severity of pruritus after receiving OMT, with full intention of following up in office for additional treatment.

**Conclusion:** OMT monotherapy or combination treatments may prove to be efficacious with little to no added risk.

## INTRODUCTION

Notalgia Paresthetica (NP) is a rarely reported condition that presents with chronic neuropathic pruritus, commonly localized to the interscapular borders and paravertebral regions with episodic exacerbations and remissions. Associated symptoms include, but are not limited to, hyperesthesia, dysesthesia and pain. The pruritus is commonly unilateral although it may be bilateral. These symptoms are often seen in conjunction with hyperpigmentation at the site of irritation without any triggering factors.<sup>1</sup> NP is often a disease of adulthood with women more commonly affected than men. Some pediatric cases with underlying multiple endocrine neoplasia 2A have been reported.<sup>2-4</sup>

## Pathophysiology & Pathology

Pruritus, the chief complaint in patients with NP, stems from a division of c-fiber neurons, a subset also responsible for the sensation of nociception.<sup>5</sup> The release of Substance P from c-fiber nerve terminals leads to release of histamine, which can induce mast cell degranulation and cause consequent pruritus.<sup>6,7</sup>

The ensuing chronic rubbing and itching produces a localized inflammatory infiltrate with subsequent post-inflammatory melanosis.<sup>8</sup> Substance P may also be the primary mediator of hyperpigmentation seen in NP as it stimulates the growth of keratinocytes, arterial smooth muscle cells and fibroblasts.<sup>9</sup>

While the etiology of NP is not entirely clear, it is generally accepted that NP is a sensory neuropathy stemming from irritation to the cutaneous branches of the posterior division of the upper six thoracic nerves, most frequently T2 through T6. The T2-T6 posterior division fibers are particularly predisposed to injury and entrapment as they penetrate and cross through the transverse spinal musculature at a 90-degree angle prior to providing sensory innervation to the epidermis.<sup>10</sup> Furthermore, compression from degenerative pathologies in the spine or hypertonicity of paraspinal musculature may be responsible for damage to the posterior rami of the involved thoracic nerves.<sup>1,8</sup> Wang *et al.*, reported significant symptomatic relief in patients with NP by providing electromagnetic stimulation to the serratus anterior muscle. This further suggests that NP may occur secondary to underlying neuromusculoskeletal disease.<sup>11</sup>

As underlying neuromusculoskeletal disease may play a significant role in the development of NP, osteopathic manipulative treatment (OMT) merits consideration as a treatment modality. To date, the literature on the utility of OMT for patients with NP is limited.<sup>12</sup> In this manuscript, we describe the case of a 70-year-old male who presented with episodes of a suprascapular itch in a bilateral dermatomal distribution that started six months prior.

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He was diagnosed with NP, was treated with OMT and efficacy of treatment was measured via the Visual Analog Scale (VAS). A review of treatment options for patients with NP is also discussed.

## CASE PRESENTATION

### History And Examination

A 70-year-old male with a diagnosis of NP was referred to our clinic by dermatology. The patient presented with episodes of a suprascapular itch in a bilateral dermatomal distribution (C6/C7) that started six months prior. The episodes gradually increased in frequency over time until they became intolerable. Nothing made the pruritus better or worse. Patient reported no pain associated with the episodes: no upper back pain, neck pain or radicular symptoms. He stated that the daily pattern of episodes was unpredictable. Prior to treatment, he reported the severity of the pruritus to be an 8/10 on VAS. Of note, the patient had a history of bilateral neuropathy in the lower extremities, with no associated numbness and minimal tingling. He also had history of malignant melanoma (amelanotic) and associated phosphatase and tensin homolog (PTEN) abnormality on genetic testing. He underwent neck dissection in 2004 to ascertain whether his cancer had metastasized.

Additionally, the patient's history was remarkable for obstructive sleep apnea, tobacco abuse, hypertension, coronary artery disease, hypercholesterolemia, obesity, peripheral neuropathy, abnormal gait, bilateral hearing loss, benign prostatic hyperplasia, erectile dysfunction, gastroesophageal reflux disease, colonic polyps, diverticulosis, melanoma, umbilical hernia and bilateral cataracts.

His surgical history was remarkable for hemorrhoidectomy, cardiac catheterization, laparoscopic cholecystectomy, bilateral inguinal hernia repair, excision of giant cell tumor on the left index finger, excision and neck dissection associated with malignant melanoma at the left mastoid process.

On physical exam, the patient was well developed and in no acute distress. His vitals were stable. He had decreased range of motion of the head and tenderness to palpation of the cervical and thoracic paraspinal musculature. His neurological exam was unremarkable for focal neurologic deficits. Cranial nerves II–XII were grossly intact. The patient had intact sensation to light touch in C5–T1 dermatomes, 2/4 deep tendon reflexes, and 5/5 strength in the upper extremities bilaterally. Skin was intact without lesions or rashes, particularly in the bilateral suprascapular area.

### Intervention

OMT was performed to the cervical, thoracic and lumbar vertebrae, as well as the sacrum, innominates and pelvis. Cervical somatic dysfunctions at C2–C4 and C6 were treated with balanced ligamentous tension (BLT) and direct release (DIR). Thoracic somatic dysfunctions at T2–T6 were treated with BLT and DIR. Lumbar somatic dysfunctions at L2–L4 were treated with BLT and DIR. Right on right (RoR) sacral torsion was treated with BLT and DIR. Right anterior innominate was treated with DIR and muscle energy (ME).

## FOLLOW-UP

On his two-week follow-up, the patient reported severity of pruritus to be 5/10 the night of treatment, indicating a 30% reduction in severity from baseline. He reported that in the week following treatment, the severity of pruritus returned to an 8/10. The patient reports that he plans to follow up in the office for additional treatment, in hopes that he will experience more long-lasting and sustained relief.

## DISCUSSION

As NP does not consistently respond to conventional treatments such as anti-inflammatory or antipruritic drugs, unconventional methods for relieving symptoms may be considered. The suspected etiology of NP—that it stems from some extent of muscle impingement or spinal nerve pathology—has led clinicians to consider a variety of different treatment modalities. These range from topical capsaicin, tacrolimus, gabapentin, botulinum toxin, strengthening exercises, stretches and physical therapy. While literature on the use of osteopathic manipulation to treat NP is limited,<sup>12</sup> we believe that there should be a role for it in the algorithmic approach to treatment of these patients.<sup>13</sup>

### Stretching and Strengthening Exercises

One group discusses the efficacy of exercise as either a first line or adjunct in the treatment of NP. They report a case series demonstrating symptomatic improvement in patients that participated in range of motion exercises, as well as strengthening of the scapular and pectoral muscles. Initially, they describe a case of a patient experiencing episodes of subscapular itch typical for NP. One month prior to the start of the episodes, the patient ended her weight-lifting regimen. Additionally, the team noticed that this patient normally kept her shoulders rounded, leading to protraction and elevation of her bilateral scapulae. The patient's posture, in combination with the fact that the spinal nerves initially pierce the rhomboid and trapezius muscles prior to becoming cutaneous nerves, led the team to conclude that the cutaneous spinal nerves were under persistent tension; this could have been a potential source for the symptoms. The patient was instructed to strengthen her rhomboids in hopes of reducing the protraction and elevation of the bilateral scapulae and restoring the musculature of the back to a neutral position. After a week of performing these exercises, the symptoms subsided.<sup>14</sup>

This team had a second patient with reduced bilateral shoulder range of motion, status post right mastectomy and axillary node dissection. This patient began to experience pruritus consistent with NP localized medial to the scapula. She was encouraged to perform rhomboid, pectoral and latissimus dorsi strengthening exercises and stretches. After a week of performing the exercises, her pruritus resolved.<sup>14</sup> These cases suggest a role for upper body strengthening as an option for patients with NP.

Another team reported a patient with refractory NP and cervical neural foraminal stenosis. She was prescribed a course of mechanical cervical traction, trapezius exercises and posture education, during which her symptoms resolved. This further

supports the notion that some cases of NP may be due to nerve impingement and associated musculoskeletal issues.<sup>15</sup>

## Pharmacological Therapies

NP's classification as an isolated peripheral sensory neuropathy has led to the use of pharmacotherapies such as tricyclic antidepressants (TCAs) and gabapentin for relief of symptoms. In an isolated case by Yeo and Tey, 300 mg of gabapentin worsened the patient's symptoms. A 10 mg dose of amitriptyline once per day for nine months blunted pruritic symptoms to a manageable level. After nine months, the patient stopped taking amitriptyline and the symptoms' severity remained stable.<sup>16</sup> This case demonstrates that although these medications may not work for all cases, NP may require personalized treatment with various drug classes/non-pharmacological treatments to optimize therapy.

One team discusses a patient with an itch medial to the scapula and on the extensor surfaces of both arms. He was diagnosed with NP and bilateral brachioradial pruritus (BRP). Of note, the itch began after corrective surgery for spinal stenosis. After experiencing limited relief with hydrocortisone/pramoxine (2.5%) ointment, he was given gabapentin 300 mg at bedtime. After one month of taking gabapentin, his itch resolved. Furthermore, the itch returned after he ran out of medication, and was specifically localized to the scapular area. Interestingly, this suggests two distinct pathologies between NP and BRP. Also, this suggests a role for the use of gabapentin in patients experiencing NP.<sup>17</sup>

## Botulinum Toxin

One team assessed the effect of botulinum toxin A (BTX-A) in the treatment of NP, with a proposed mechanism being that the toxin mitigates the production of substance P. The group performed a double-blind, randomized control study, where 10 patients were delivered placebo treatment and 10 were given BTX-A. The impact of treatment was evaluated using the VAS. It was found that the difference in pruritus VAS in patients given BTX-A ( $-0.72 \pm 2.97$ ) versus placebo ( $-0.91 \pm 3.8$ ) at eight weeks was not statistically significant ( $p=.902$ ).<sup>18</sup> The major limitation of this study was the small sample size.

## Capsaicin

The use of capsaicin in the treatment of NP is contingent on the idea that the condition results from a local release of tachykinins, neurokinin A, substance P and calcitonin gene-related peptide from unmyelinated C-fibers in the epidermis. Capsaicin, like BTX-A, is thought to decrease these C-fiber neuropeptide levels and mitigate the burning and itching sensation. One group conducted a vehicle-controlled double-blind crossover study that assessed the effect of capsaicin in the treatment of NP. The team used the VAS scale to assess treatment impact. The group treated initially with capsaicin had a reduction of itch intensity from  $60.9 \pm 4.3$  to  $34.7 \pm 6.9$  during the first period, and a reduction of  $35 \pm 5.9$  to  $30.7 \pm 8.6$  after the vehicle-controlled second period. Additionally, the group treated with the vehicle first had a reduction of  $68.3 \pm 4.5$  to  $55.2 \pm 10.1$  in the first period and from  $52.5 \pm 9.3$  to  $26.6 \pm 8.6$  after the second period (using capsaicin). The results demonstrated that 14 of 20 patients found

symptomatic improvement with capsaicin treatment, while six of 19 patients found symptomatic improvement with the vehicle. Despite the small sample size, this suggests a potential role for the use of capsaicin for symptomatic relief in NP.<sup>19</sup>

## Tacrolimus

One group evaluated the efficacy of 0.1% tacrolimus ointment in reducing pruritus from NP. The team had a sample size of seven patients, four male and three female, who had been experiencing symptoms anywhere between one and four years. Dermatomal distributions varied from T2-T8. The results indicated that after six weeks of treatment, six patients reported reduction in intensity or frequency of itch. Mean itch pre-treatment on VAS was  $6.6 \pm 1.9$  versus  $4.6 \pm 2.1$  post-treatment ( $p<0.02$ ). Frequency of itch was reduced from  $2.2 \pm 1.5$  episodes per day pre-treatment versus  $0.7 \pm 0.7$  post-treatment ( $p<0.03$ ). Of note, after treatment had ceased, symptoms recurred. Although the sample size was small, this study suggests a role for 0.1% tacrolimus in the symptomatic control of NP.<sup>20</sup>

## Surgical Decompression

In one case report of NP, the authors were able to discern the entrapment of the dorsal branches of T4 and T5 spinal nerves and surgical decompression was performed. The authors reserve this approach, following diagnosis of NP via electromyography, for when other methods of symptom relief have failed. The patient in this report had a 50% reduction of pain one week post-operatively. Four months post-operatively, the patient was symptom-free.<sup>21</sup>

## Local Anesthetic Block

While local anesthetic blocks are known to provide short-term symptomatic relief, some studies have demonstrated their potential to provide long-term symptomatic relief. In one case report, a patient with NP had a paravertebral block at D5/D6 followed by a D3/D4 block with 5ml of 0.75% bupivacaine with 40mg of methylprednisolone acetate. This regiment provided the patient relief from pruritus for 12 months.<sup>22</sup> Local anesthetic blocks are a conceivable approach in patients resistant to other treatment modalities. Furthermore, local anesthetic blocks pose less surgical risk and are less invasive than surgical decompression.

## Additional Non-Pharmacological Therapies

One novel treatment modality is narrow-band UVB phototherapy. In a report of five cases, pruritus improved significantly in all patients after full completion of UVB protocol.<sup>23</sup> Although the mechanism of action is unclear, UVB phototherapy serves as a relatively safe and economic adjunctive treatment option.

Another non-pharmacologic therapy used for neuropathy, although studies have been inconclusive, is acupuncture. One retrospective case series demonstrated that 75% of patients with NP experienced total resolution of symptoms using acupuncture when symptom severity was measured using the VAS. However, 37% of patients reported reoccurrence of their symptoms in the ensuing 1-12 months post-treatment.<sup>24</sup>

**TABLE 1:**

Treatment modalities for notalgia paresthetica

TREATMENT	REFERENCES
PHARMACOLOGICAL	
Tacrolimus	Ochi H, Tan LX, & Tey HL, 2016
Gabapentin	Loosemore MP, Bordeaux JS, & Bernhard JD, 2007
Amitriptyline	Yeo B & Tey HL, 2013
Botulinum toxin-A	Maari C, Marchessault P, & Bissonnette R, 2014
Capsaicin	Wallengren & Klinker, 1995
NON-PHARMACOLOGICAL	
Narrow-band UVB	Perez-Perez L, Allegue F, Fabeiro JM et al., 2010
Acupuncture	Stellon A, 2002
Cervical traction	Low R, Swanson LA, & Swanson DL, 2017
Exercise	Fleischer AB & Meade TJ, 2011
Osteopathic manipulative treatment	Richardson BS, Way BV, & Speece A 2009
Muscle stimulation	Wang CK, Gowda A, Barad M et al., 2009
Surgical decompression	Williams EH, Rosson G, Elsamanoudi I et al., 2010

## Osteopathic Manipulation

Prior to this manuscript, only one case of OMT for the treatment of NP had been reported. In this case, modalities including suboccipital decompression, thoracic and cervical ME, soft tissue techniques, rib ME, rib raising and scapulothoracic fascial release to the patient's pruritic left scapula were performed. A total OMT time of 20 minutes was enough to alleviate symptoms immediately and for two weeks post-treatment.<sup>12</sup> Findings from our case demonstrate a 30% reduction in severity of pruritus after treatment, with full intention of following up in the office for additional therapy. Further controlled experiments should be performed in order to more appropriately assess and isolate the impact of each osteopathic treatment modality in the treatment of NP or other neuropathies.

## Limitations

Despite the various modalities used to treat NP,<sup>25</sup> there are no randomized control trials demonstrating the most efficacious treatment. Our manuscript would have benefitted from additional follow-up data on the patient. Additionally, OMT modalities were performed at multiple sites, making it a challenge to determine which specific treatment provided benefit. Our intention is for this manuscript to raise research interest and contribute to the limited literature discussing treatment of NP with OMT.

## CONCLUSION

OMT has a place in the treatment of patients with NP. While additional data is needed to more appropriately assess the therapeutic efficacy of OMT, the results of our patient case suggest that OMT has the potential to provide immediate symptomatic relief in patients with NP. Our hope is that repeated follow up

treatments will lead to more long-term, sustained symptomatic relief and that this manuscript stimulates further research interest in this area.

## AUTHOR DISCLOSURES:

The author(s) declare no relevant financial affiliations or conflicts of interest.

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