

Effectiveness of Superior Laryngeal Nerve Block in Patients with Neurogenic Cough: A Prospective Cohort Study

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Abstract

Introduction:

A study was undertaken to evaluate the role of superior laryngeal nerve block in management of neurogenic cough.

Materials and Methods:

A Prospective Cohort study was conducted on 30 patients of neurogenic cough in Government Medical College, Patiala, India from Jan 2024 to May 2025. Adult patients with unexplained cough > 8wks were included in the study and superior laryngeal nerve block with long acting steroid and local anaesthetic was given. All patients were monitored every two weeks for three months post superior laryngeal nerve block. Pre and post treatment cough severity index (CSI) were compared.

Results:

In our study of thirty patients, twenty five patients showed subjective symptomatic improvement. Normality of continuous data was assessed using the Shapiro Wilk test. For Intra comparison Paired t-test was used. The mean cough severity index (CSI) score decreased significantly from 24.533 ± 2.909 to 16.167 ± 2.365 post intervention with p value 0.001 which was found to be highly significant.

Conclusion:

SLN block is an effective alternative therapeutic option for patients of neurogenic cough in terms of efficacy, minimal invasiveness and safety.

Keywords: Superior laryngeal nerve, Hypersensitivity, Neurogenic, Cough

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Introduction

Refractory chronic cough is a persistent condition encountered frequently by otolaryngologists (1). Neurogenic cough (NC) is a chronic cough (more than 8 weeks duration) diagnosed by ruling out other common conditions and by noting a lack of response to standard therapies (2).

The exact etiopathogenesis of this sensory neuropathy is unknown but is believed to be due to irritation, damage, or hypersensitivity of the internal branch of the superior laryngeal nerve (3). Neurogenic cough affects normal laryngeal functions and patients typically cough with activities like talking, positional changes, and laughing (4).

Superior laryngeal nerve enters the thyrohyoid membrane and provides sensory innervation to larynx above the vocal folds (5).

Recent studies have shown effectiveness of a superior laryngeal nerve (SLN) block with corticosteroids and local anaesthesia drugs as a novel treatment option (6).

This study was conducted to evaluate the effectiveness of superior laryngeal nerve (SLN) block in the management of neurogenic cough.

Materials and Methods

A prospective cohort study was conducted in Government Medical College, Rajindra hospital, Patiala, India on 30 patients of neurogenic cough. Inclusion criteria: Patients of both sexes of 18 to 65 years with cough > 8 weeks, refractory to medical management were included in the study.

Exclusion criteria:

Patients with co morbidities like Hypertension, chronic rhino sinusitis, allergic rhinitis, laryngopharyngeal reflux, asthma, chronic obstructive pulmonary disease that may account for cough & patients on neuromodulators were excluded.

Protocol: The study protocol was approved by institutional ethics committee (9 (310) 2024/3551). Written informed consent was taken from all patients before inclusion in the study.

In all patients a detailed history of comorbidities was taken and examination findings were noted. Chest X ray was done to rule out Tuberculosis, chronic obstructive pulmonary disease. Laryngeal endoscopic examination was performed to rule out laryngopharyngeal reflux and haematological

& biochemical investigations like Absolute Eosinophil Count were done to rule out other possible causes of chronic cough.

After detailed examination and ruling out other possible causes, patients refractory to medical management with chronic cough of more than 8 weeks were diagnosed with Neurogenic cough and selected for SLN block.

Cough Severity Index (CSI) questionnaire (Table.1) developed by Adrianna C. Shembel (7) was used to assess the severity and impact of cough.

Table 1. Cough Severity Index

My cough is worse when I lie down
My coughing problem causes me to restrict my personal and social life.
I tend to avoid places because of my cough problem.
I feel embarrassed because of my coughing problem.
People ask, "What's wrong? Because I cough a lot."
I run out of air when I cough.
My coughing problem affects my voice.
My coughing problem limits my physical activity
My coughing problem upsets me
People ask me if I am sick because I cough a lot.
Each symptom was formatted into a question that could be answered on a 5-Point Likert Scale (i.e., "I feel embarrassed because of my cough problem." 0 ¼ Never; 1 ¼ Almost never; 2 ¼ Sometimes; 3 ¼ Almost always; 4 ¼ Always).

Patients diagnosed with neurogenic cough were given SLN block with long acting steroid (1ml of 40mg/ml Triamcinolone (20mg)) along with 1 ml of 2% Lignocaine (10mg) with 26G needle in thyrohyoid membrane where internal branch of SLN enters the larynx. The block was given by palpating bony landmarks (hyoid bone and thyroid cartilage) and was given just above the superior border of thyroid cartilage and proper needle placement was confirmed by aspirating before injection (Fig 1,2).

Patients were instructed to not eat or drink for about 1 hour after injection. It was performed by a single surgeon to prevent bias. Follow up was done every 2 weeks for each patient and finally all patients were reviewed after 3 months post intervention with no patients needed or received additional treatment for their neurogenic cough. Pre and post treatment CSI were recorded and compared (Fig.3).



Fig 1. Image showing administration of SLN block on the left side in a patient of neurogenic cough



Fig 2. Image showing administration of Triamcinolone Acetonide in thyrohyoid membrane in a patient of neurogenic cough

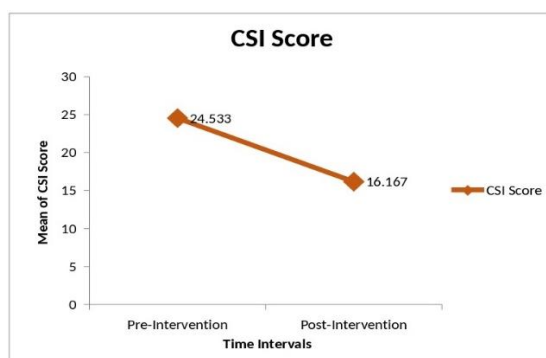


Fig 3. Mean Cough severity index (CSI) score pre & post intervention

Results

The study was conducted on 30 adult patients in the age group of 18-65years. 22 were females and 8 male patients. All patients were suffering from chronic cough for > 8 weeks to one year and all of them were non- smokers and without any co morbidities that may account for chronic cough. SLN block was given on left side to 20 patients and on right side to 10 patients. The laterality of block was determined by palpating the area along the thyrohyoid space triggering cough, the direction of which was directed to that SLN. In our study, 25 patients showed subjective symptomatic improvement while 5 patients didn't show any improvement and no adverse events were noted in any patient. Bilateral injection was given to only 5 patients on the opposite side after 2 weeks who didn't show any improvement with 1st dose. No symptomatic improvement was noted in these 5 patients even after 2nd dose.

Sample size was calculated by using the formula:

$$n = 2a^2 (x+y)^2 / z^2$$

n = Sample size; a=2.56 for 95% CI; x=1.96; y=0.84 & z=1.38

Minimum required sample size = (26.78) or 27

Statistical Analysis

The data was entered and combined with the help of MS Excel. The observations were statistically analyzed by using software IBM SPSS 22. Normality of continuous data was assessed using the Shapiro-Wilk test. Intra Comparison was done by using paired t-test. Mean, SD and Median were calculated and $P < 0.05$ were taken as statistically significant. Pre and post treatment CSI scores were obtained and compared. The mean CSI score decreased significantly from 24.533 ± 2.909 to 16.167 ± 2.365 with p value 0.001 (Table.2) which was found to be highly significant. No complications were noted following SLN block in any of the patients.

Table 2. Pre and post treatment mean cough severity index scores for patients who underwent superior laryngeal nerve block for treatment of Neurogenic cough

CSI Score	Mean±Standard deviation	Median	Std. Error Mean	95% Confidence Interval	t-test	p value
Pre-Treatment	24.533±2.909	25.00	0.531	6.958-9.776	12.144	0.001
Post-Treatment	16.167±2.365	16.00	0.431			(HS)

Discussion

Neurogenic cough is a diagnosis of exclusion. It is believed to be related to a sensory neuropathy in the hypopharynx and larynx. These patients generally requires detailed workup and exclusion of other common aetiologies that may be contributing to cough like chronic rhinosinusitis, allergic rhinitis, laryngopharyngeal reflux, asthma, chronic obstructive pulmonary disease or drug related side effects (8). The majority of the specialists avoids expensive standardized tests available which are used to measure sensory laryngeal dysfunction such as cough reflex sensitivity testing & Fibreoptic Endoscopic Evaluation with Sensory Testing (FEEST). Hence, without correct diagnosis and therapy, neurogenic cough is not treated. A multimodal escalation approach is used for management of neurogenic cough (9).

Medical therapy with neuromodulators, cough suppressants and Antidepressants has been the mainstay of treatment. Non pharmacological therapies administered by speech and language pathologists like voice hygiene training, cough suppression therapy are effectively used tools along with pharmacotherapy/procedures.

Neuromodulating agents like Amitriptyline, Gabapentin, Baclofen are somewhat effective for management of cough but are associated with highest rate of adverse effects like dry mouth, weight gain, blurred vision, dizziness and taste disturbances (11).

Among procedural therapies, bilateral thyroarytenoid BTX injection & vocal fold augmentation indirectly suppresses cough by decreasing glottic insufficiency (10,12).

SLN block with long acting steroid & local anaesthetic is another newer effective treatment option for neurogenic cough patients. It works by reducing nerve inflammation and hypersensitivity, potentially alleviating the cough. Regional nerve block of the internal branch of the SLN alters sensory feedback which disrupts the signaling pathway that initiates the aberrant cough reflex. SLN block can significantly improve the severity, intensity and frequency of neurogenic cough. It can be practiced both as a primary or an alternative treatment option along with speech therapy and neuromodulators (13). It is cost effective, in-office procedure, well tolerated by majority of patients. Adverse events for SLN block are low, non serious and temporary. No adverse events were noted in our study. The reported side effects include ecchymosis & swelling at injection site, paresthesia of throat and tongue, laryngospasm (14).

In our study, majority of patients (25 out of 30) showed significant symptomatic improvement. The CSI scores decreased significantly after treatment. The previous studies also reported a similar significant reduction in CSI scores (Table.3) in patients of neurogenic cough managed with SLN block.

Table 3. Review of literature of SLN block used for Neurogenic cough

Author	No. of Patients	Mean follow up period	Pretreatment Mean CSI	Post treatment Mean CSI with 95% CI	Weight (%)
Simpson ⁽⁶⁾ (2018)	18	85.4 days	26.8	14.60(9.19, 20.01)	12.65
Dhillon ⁽⁵⁾ (2019)	10	3.4 months	26.7	10.40 (7.42, 13.38)	17.58
Dhillon ⁽¹⁴⁾ (2021)	30	5.3 months	27.8	12.8	P<0.05
Duffy ⁽¹⁵⁾ (2021)	16	85 days	24.3	16.15	P<0.006
Gray ⁽¹³⁾ (2024)	83	85 days	25.2 +_11.2	19(3.9-8.5)	P<0.001
Present study (2025)	30	3 months	24.533±2.909	16.167±2.365 (6.958-9.776)	P 0.001

Conclusion

SLN Block is a favorable alternative therapeutic option for patients of neurogenic cough in terms of efficacy, minimal invasiveness and safety.

The limitations of our study includes a small sample size (30 patients) and a short follow-up period (three months) .It was a single centre study with subjective outcome measure, possible placebo effect and selection bias. Hence, more studies with a larger sample size

are required to establish a stronger basis whether it is really a wonder treatment for neurogenic cough or not. Although the small sample undertaken in this study points towards this possibility.

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