

Otolaryngological-Speech Therapy approach to laryngeal neuropathy in children

Abordaje otorrinolaringológico-fonoaudiológico de la neuropatía laríngea en la edad pediátrica

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What do we know about the subject matter of this study?

There is limited information on laryngeal neuropathy in the pediatric age group and therefore, on its causes, pathophysiology, and treatment. However, it is known that this pathology should be a differential diagnosis in children with chronic cough who do not respond to usual treatments.

What does this study contribute to what is already known?

This work contributes to the study of this entity and shows pediatricians and their sub-specialties, such as gastroenterology and bronchopulmonary areas, how relevant is to consider laryngeal neuropathy as a differential diagnosis of cough and the importance of teamwork with otolaryngology and speech therapy.

Abstract

Laryngeal neuropathy (LN) is characterized by hypersensitivity, hyperresponsiveness, and laryngeal hyperfunction secondary to an imbalance between the afferent and efferent components. The individual and exaggerated response to a wide variety of specific triggers can lead to diverse symptoms. Literature in children is limited. **Objective:** To report a case of laryngeal neuropathy in a 5-year-old girl, to discuss the approach from the otolaryngologist's and speech therapist's perspective and the importance of its consideration among the differential diagnoses of chronic cough in pediatrics. **Clinical Case:** 5-year-old girl referred to otorhinolaryngology due to repeated crises of emetic cough with no specific cause identified. The episodes were associated with colds, choking sensation, and short-term inspiratory stridor. She was evaluated by several specialties. X-rays (nasopharynx, paranasal sinuses, and chest) and spirometry were performed without finding a cause or treatment that resolved the cough. In the ENT evaluation, possible triggers were identified such as having a sister with a congenital syndrome, exposure to perfumes, and air fresheners. Physical examination was normal. Flexible endoscopy shows incipient vocal fold nodules. After clinical suspicion of LN, she

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was referred to speech therapy for 5 weekly sessions. The patient received vocal hygiene education, cough suppression techniques, and breathing and relaxation exercises of the extrinsic and intrinsic muscles of the larynx with favorable results at 2 years of follow-up. **Conclusions:** LN should be considered as a differential diagnosis of chronic cough in childhood when its most well-known causes and treatments do not lead to its resolution. The evaluation and speech therapy are the mainstay in the control of cough secondary to this entity in the pediatric age.

Introduction

Sensory laryngeal neuropathy, vagal neuropathy, or irritable larynx syndrome are the same entity with different clinical presentations. All these terms define a condition of laryngeal hypersensitivity, hyperreactivity, and hyperfunction where there is an overreaction to a variety of specific triggers such as irritants (perfumes, cleaning products, deodorants, cigarette smoke), previous viral infection, physical exercise, and emotional factors¹⁻⁸. The pathophysiology is controversial and poorly defined, however, literature attributes it to an individual reaction of the central nervous system where there is a balance alteration between laryngeal afferents and efferents. The intensity of response may differ from one person to another^{1,9-12}.

The clinical presentations of laryngeal neuropathy are varied, including chronic cough, laryngeal paresthesia, throat clearing, dysphonia, stridor, globus sensation, paradoxical vocal cords movement (chordal dysfunction), and laryngospasm, among others^{5,7,13-21}.

To diagnose laryngeal neuropathy, a high index of suspicion is essential. In the clinical history, patients will describe a sudden onset of symptoms and a sense of frustration at the lack of improvement despite “aggressive” medical treatment for allergy, reflux, and/or asthma. Physical examination through laryngeal endoscopy is characterized by the presence of a larynx with normal anatomical features^{2-4,9,15,22}, therefore, the diagnosis of laryngeal neuropathy is by exclusion, considering a wide range of pathologies as differential diagnoses such as respiratory and gastrointestinal diseases which can be considered as the most frequent¹.

Regarding treatment, the literature is limited. The mainstay is speech therapy associated, in selected cases, with the use of centrally acting neuromodulators, such as gabapentin or pregabalin, which have been described as adjuvant treatment in adults^{5,9}.

The objective of this work is to discuss, based on the case of a 5-year-old preschooler, the otolaryngological and speech-hearing approach to laryngeal neuropathy in the pediatric age and the importance of its consideration among the differential diagnoses of chronic cough.

Clinical Case

A 5-year-old girl was referred to otolaryngology due to repeated “crises” of emetic cough, sometimes related to upper airway infections or without an identified cause. Isolated episodes were associated with short-lasting choking sensation and stridor.

Regarding clinical history, the child was diagnosed with allergic rhinitis, gastroesophageal reflux, and moderate-severe asthma between 3 and 4 years of age, and was evaluated by pediatrics, family medicine, and pediatric bronchopulmonary and gastroenterology, who requested specific studies such as spirometry and nasopharynx, paranasal sinuses, and chest X-rays. All tests were reported as “normal” thus respiratory and gastroenterological pathologies were excluded as causal.

The patient underwent several times respiratory kinesiotherapy and treatments with oral antihistamines, systemic and intranasal corticosteroids and bronchial inhalers, antitussive syrups, bronchodilators, and antibiotics without significant improvement.

In the otolaryngologic and speech consultation, nasofibroscope was performed which showed grade II tonsils and adenoids. The larynx presented adequate cord movement and symmetrical bilateral volume increase in the middle third of both vocal cords compatible with incipient vocal nodules. Subglottis of normal characteristics. Given the clinical history and nasofibrosopic findings, speech and hearing evaluation and therapy were recommended, suspecting the probability of laryngeal neuropathy as a diagnosis.

In the speech therapy interview, we looked for probable triggering factors of cough episodes, with the birth of a younger sister with a congenital syndrome and exposure to perfume and air freshener among those suspected. During the evaluation, uncoordinated breathing, increased tension of neck muscles, and decreased maximum phonation and maximum expiration time for her age were observed, as well as weak voice intensity and slightly deep tone.

For measuring the quality of life, the “Pediatric Voice Handicap Index (pVHI)” and the “Family Impact Scale” (FIS) were used, and to assess associated symptomatology, the “Vocal tract discomfort scale”

(VTDS)²³⁻²⁵. The pVHI showed normal values (voice without alterations in quality of life) while the last two scales showed altered results. The FIS showed that the pathology affected the family sphere and the VTDS identified the symptoms of greatest discomfort and their frequency of presentation.

In the speech therapy, 5 sessions of 45 minutes were performed once a week, oriented to the management of laryngeal neuropathy and vocal nodules. The contents included were vocal education and hygiene, cough suppression techniques, breathing exercises, and relaxation of the extrinsic and intrinsic laryngeal muscles. In the reevaluation, 2 months after starting the treatment, the mother reported a significant decrease in the episodes.

Follow-up was performed 2 years after initiation of therapy, which confirmed the absence of coughing episodes that would require a new medical (se podría borrar o queda muy ambiguo?) consultation.

Discussion

Laryngeal neuropathy can present clinically in a variety of ways such as chronic cough, laryngeal paresthesia, throat clearing, dysphonia, stridor, globus sensation, paradoxical vocal cord movement, and/or laryngospasm, etc.

In this case report, cough was the cardinal symptom. According to the literature, in adults, chronic cough is defined as a persistent cough that lasts for more than 8 weeks despite medical management²⁶⁻²⁸. However, in children, it is classified as chronic, after 4 weeks of persistence²⁹. There are limited data reporting the prevalence of chronic cough in children. An investigation conducted in a tertiary pediatric center in Australia, which included 248 children, reported that 20% of them had a cough for 28 days following acute respiratory infection³⁰. In another study conducted on a population of 2,275 children aged 1 to 15 years living in rural India, chronic cough was present in 1.06% of cases³¹. Finally, in an analysis conducted in China on children living in six different urban areas, 21-28% prevalence of chronic cough was observed³².

In the pediatric population, chronic cough is a cause of great concern for parents and caregivers as it can significantly alter the quality of life, leading to social isolation and school absenteeism³³.

Patients are referred to an otolaryngologist when the cough has become a paroxysmal and continuous problem despite an extensive examination and therapeutic approach⁹.

Clinically, persistent cough due to laryngeal neuropathy, unlike chronic cough of pulmonary or gastrointestinal origin, usually presents with associated

laryngeal symptoms and is caused by involvement of the superior and/or recurrent laryngeal nerves¹.

In addition to a detailed clinical history and the identification of potential triggers, flexible laryngeal endoscopy is crucial for the diagnosis since it will allow a detailed observation of the larynx in its anatomy and functionality. It will also help to rule out organic pathologies⁴.

The efficacy of the integrated treatment between otolaryngologist and speech therapy has been reported in numerous studies^{4,34,35}. Regarding the speech therapy directed against laryngeal hypersensitivity, its objectives are to improve voluntary cough control by teaching patients to identify the sensations that precipitate coughing and to replace them with another response, for example, breathing or swallowing exercise, and to change the behaviors that contribute to laryngeal irritation¹⁵.

In relation to centrally acting neuromodulators (control of central hypersensitivity), their role lies in the increase of neural sensitization that participates in the probable pathogenesis of cough secondary to laryngeal neuropathy. In pediatrics, there are no publications that support its use in these cases. However, according to a systematic review in adults that included 8 studies, two randomized controlled studies, and 6 observational studies, treatment with neuromodulators showed improvement in quality of life in relation to cough³⁶. Despite this, adverse effects such as dizziness, drowsiness, dry mouth, and nausea, among others, should be considered¹⁵.

Conclusions

Laryngeal neuropathy constitutes an entity that should be considered within the differential diagnoses of chronic cough in the pediatric age. Its clinical suspicion is fundamental when the most known causes and treatments do not lead to its resolution. The otolaryngological and speech-hearing approach is essential and constitutes the fundamental pillar to reaching a correct diagnosis and management of these patients.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have

followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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