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Original Research Article

The diagnostic workup of patients with a primary complaint of post-nasal drip

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ABSTRACT

Background: Post-nasal drip (PND) is likely multifactorial in etiology which may be attributed to excessive sinonasal secretions or an increase in mucous viscosity from chronic sinusitis or allergic rhinitis. Increased throat sensitivity due to inflammatory changes have been postulated as a possible cause, which may be secondary to laryngopharyngeal reflux (LPR).
Methods: Patients presenting with a primary complaint of post-nasal drip were prospectively enrolled into the cohort study. All patients underwent nasal endoscopy, flexible laryngoscopy, in-vitro allergy testing, and computed tomography (CT) imaging. Patients were also asked to fill out a SNOT-22 questionnaire and a reflux severity index (RSI) form.
Results: 33 patients were enrolled in the study of which 22 completed all necessary procedures. In our cohort of patients the average SNOT score was 43±22, and the average RSI was 22±7. Twenty-one of the 22 patients had RSIs consistent with LPR. Reflux finding scores (RFS) as evaluated and averaged between two laryngologists found that all patients in the cohort met criteria for LPR with an average RFS of 12.6±2.1. Fourteen of the 22 patients had a positive RAST. Seventeen of the patients in the cohort had CT scans that were normal. The average Lund Kennedy score was 0.9±1.4 with 14 of the 22 patients having unremarkable nasal endoscopies.
Conclusions: Patients with PND benefit from consideration of empiric treatment with PPIs, dietary modification given the high rates of LPR. Consideration should also be given to allergy testing prior to any consideration for CT imaging.

Keywords: Rhinorrhea, Post-nasal drip, Laryngopharyngeal reflux, Allergy

INTRODUCTION

Postnasal drip (PND) remains a prominent patient complaint that the otolaryngologist must manage on a frequent basis. Diagnosing PND remains vague and is dependent on the patient's history and symptomatology of rhinorrhea, throat clearing, and a sensation of "dripping down the throat". PND has been grouped under postnasal drip syndrome (PNDS) and under upper airway cough syndrome (UACS) as its presence has been associated with a persistent chronic cough.[1] This categorization contrasts with the symptom of PND as a unique process with a multifactorial etiology which may include excessive sinonasal mucous secretions, increase in viscosity of sinonasal secretions, abnormal mucociliary function, and sensory dysfunction of the upper airway because of mucosal inflammation.[2,3] The change in the nasal mucosa and the mucous characteristics may develop after chronic exposure of the upper airway respiratory tract to allergens, irritants, and pathogens.[4] Damage to the nasal mucosa can be seen in chronic rhinosinusitis (CRS), a pattern of

inflammation of the nasal and paranasal sinus mucosa for a period of greater than 12 weeks.[5,6]

Laryngopharyngeal reflux (LPR) is the reflux of gastric contents into the larynx and hypopharynx resulting in primary symptoms of hoarseness, dysphagia, throat clearing and globus sensation.[7] The inflammatory changes to the upper airway mucosa may result in a heightened cough or increased throat sensitivity.[8,9] Associations between LPR and PND symptoms have been postulated and demonstrated by previous authors with pH probe testing or with improvement in symptoms with treatment with proton-pump inhibitors (PPIs).[2,10]

The otolaryngologist is tasked to manage and counsel patients who have likely not had success to initial medical treatment from the referring provider. In this study, the investigators aim to provide the clinician managing PND with a reference to expected diagnostic results from patients with primary complaint of persistent PND. Specifically, the investigators aim to determine the diagnostic value of nasal endoscopy, allergy testing, CT imaging, and laryngoscopy to better determine what clinical interventions are useful to assist in diagnosis.

METHODS

Study population

We conducted a prospective cohort study to include all adult patients with a chief complaint of PND who were referred to the Loma Linda University Sinus and Allergy Center for additional care. Participants were enrolled to be included as part of the study from November 2015 to September 2016. Patients with previous history of endoscopic sinus surgery were excluded from the study. All participants signed written informed consent. The study was approved by Loma Linda University's Institutional Review Board.

Participants underwent a full otolaryngologic history and physical examination with one of three rhinologists, at which time they were identified for participation. The patient's demographic data, past medical history and medication list were obtained during the visit. Participants were asked to fill a sinonasal outcome test-22 (SNOT-22) and a reflux severity index questionnaire. The initial examination included rigid nasal endoscopy with documentation of findings reported under the modified Lund-Kennedy scoring system and CT Maxillofacial imaging with the in office mini-cat scanner.[11] The scans were scored under the Lund-Mackay scoring system. Participants were then scheduled for allergy testing. For this patient were sent for radioallergosorbent test (RAST) as the study of choice to detect possible allergic sensitivity.

Participants were seen by laryngology to undergo flexible laryngoscopy with one of two laryngologists. All laryngoscopies were recorded and saved for video review. All recordings were scored using the reflux findings score (RFS) on a separate date by the two laryngologists in a blinded fashion.[12] Prior to assigning an RFS to the participant's flexible laryngoscopy findings, two videos were reviewed from anonymous clinic patients to perform anchoring and ensure agreement with the scoring system and findings. During the anchoring phase, each laryngologist scored the studies independently prior to discussing their scores. The RFS for the anchoring flexible laryngoscope studies were within 2 points and 1 point of each other and considered to be acceptable for initiating review of the participant's recordings. Each laryngologist reviewed the studies and assigned an RFS independently. The RFS established by each reviewer were then averaged together.

At the conclusion of the review, an additional two recordings from the pool of participant's videos were scored again to ensure consistency. These repeated scores differed by one point on average from the assigned RFS on initial review and accepted as a marker of reliable results. No sample size calculation or statistical analysis was performed as a part of this cross sectional presentation of data.

RESULTS

Of the 33 patients that were originally enrolled as part of the cohort, 22 of the patients were able to complete all required aspects of the study. One patient did not complete both allergy testing and CT imaging, four patients did not complete allergy testing, five patients did not undergo flexible laryngoscopy, and one patient did not complete CT imaging. These patients were excluded from the final data collection. Demographic data including age, sex, smoking history and prior use of PPIs and nasal sprays were collected (Table 1).

Participants filled out the SNOT-22 and RSI. The average SNOT-22 score was 43±22. The average score for "post-nasal discharge" was 3.9±1.2. The average score for the RSI was 22±7. 95% of patients had RSIs consistent with LPR, indicated by a score greater than 13.

Rigid nasal endoscopies were scored using the modified Lund-Kennedy scoring system with a score of 0.9±1.4, with 64% of patients having unremarkable nasal endoscopies. No patients were noted to have nasal polyps.

The participants underwent allergy testing via RAST with 64% having positive antibodies to at least one of the 29 allergens that were tested. Patients who tested positive on average were sensitive to 10.2±8.7. The study population underwent CT imaging and scoring of severity of their sinus disease burden with Lund-Mackay scoring. The mean Lund-Mackay score was 1.7±5.2. 17 of the 22 patients had no signs of sinus opacification on imaging.

The study population's RFS mean was 12.6±2.1. All patients in the cohort had evidence of LPR as evidence as indicated by a score greater than 7 on RFS.

Table 1: Cohort characteristics.

Demographic data	
Sex	
Male	10 (45%)
Female	12 (55%)
Age (years)	63.1±11.6
Active	
Smoking status	0
Former	7 (32%)
Never	15 (68%)
Medication use	
Prior PPI use	12 (55%)
Prior nasal spray use	14 (64%)
Prior PPI and nasal spray use	8 (36%)
SNOT and RSI scores	
SNOT-22	43.4±21.2
SNOT-22 PND	3.9±1.2
RSI	21.9±6.7
RSI PND	4.5±0.8
RSI consistent with LPR	21 (95)
Allergy testing	
Positive results	14 (64%)
Allergens detected	10.2±8.7
Lund Mackay scoring	
Lund Mackay score	1.7 5.2
0	17 (77%)
1-23	4 (18%)
24	1 (5%)
Lund Kennedy scoring,	0.8±1.4
Flexible laryngoscopy scoring	
RFS	12.6±2.1
RFS consistent with LPR	22 (100%)

DISCUSSION

Patients referred to the otolaryngologists for PND may be frustrated and looking for answers regarding causes and symptom resolution of their discomfort. PND may be associated with cough which may be disruptive to a patient's daily activities.[13] PND is thought to have a multifactorial etiology that may be attributed to change to the amount and viscosity of sinonasal mucous throat hypersensitivity secondary to prolonged inflammatory mediated changes to the larynx and hypopharynx. In this study, the investigators demonstrate a typical result pattern for patients with a primary complaint of postnasal drip. A notable finding from this study includes the high prevalence of acid-reflux related symptoms on RSI as well as findings of LPR that were noted on flexible laryngoscopy based on RFS.

Given the prevalence of LPR findings in this cohort, the question remains as to how best to approach treatment plans for the referred PND patient. This study did not include pH probe testing as part of the protocol for all patients and thus relies on flexible laryngoscopy and RSI for diagnosis and as a guide for PPI treatment. Prior studies have been conducted correlating pH probe findings with PND symptoms. Wise et al had 68 participants undergoing 24 hour pH testing with pH probe placement, noting that patients with reflux events with pH <5 had more PND symptoms on separate questionnaires than non-reflux patients.[10] A study by Loerhl et al also reported increased pharyngeal acid exposure events in patients with PND and a higher rate of positive pH probe studies than control group.[14] The populations in these studies however have a decreased rate of LPR as it compares to our cohort.

Treatment of LPR with PPIs continues to be a widely debated topic. A recently published systematic review summarizes that the majority of studies do not show benefit of PPIs over placebo, while more recent systematic reviews and meta-analyses from 2016 demonstrate an improvement in LPR symptoms with no change in laryngoscopic findings.[15] As PND is a potential symptom stemming from LPR, PPIs may be considered as a potential treatment option. Pawar et al demonstrated a statistically significant benefit in reduction of PND frequency, hoarseness, and cough in patients using PPI when compared to a placebo controlled group.[2] However, there was a benefit noted as well in symptoms for the placebo group from baseline scores. PND has also been attributed as a cause of chronic cough in the absence of overt GERD symptoms as a part of the PNDS.[16] One study recruited patients with unexplained cough and randomized patients into PPI versus placebo treatment.[17] The therapy group demonstrated improvement in the Leicester cough questionnaire supporting empirical use of PPIs for patients with an unknown source of cough.

CRS and allergic rhinitis should be considered as part of the differential diagnosis of patients with persistent PND. In this cohort, only one patient had evidence of severe sinus disease on imaging, while 64% of patients had positive results on allergy testing. While treatment with nasal antihistamines and nasal steroid sprays can improve the symptom burden a CRS patient experiences, studies monitoring for improvement in PND scores alone are limited. Macedo et al noted that the use of fluticasone drops, ipratropium bromide and azelastine sprays in patients with PND and cough demonstrated a statistically significant improvement in cough and nasal discharge, but no statistically significant improvement in PND scores.[18] This raises the concern that the treatment of CRS alone may not be sufficient to treat patient's subjective PND.[19] With regards to CT imaging, the cost and burden of cumulative radiation must be considered carefully in patients with primary complaint of PND given the low diagnostic yield in this cohort and potential for harm.

Our study is limited by being a cross-sectional study that intends to present to the clinician managing PND an example of expected results of a workup when considering the various etiologies for PND. Shortcomings of our study are inherent in the study design as there was no intervention that was standardized and studied in our

population. Patients may have benefited from pH probe placement to detect any reflux events given the subjective nature of the RFS. Additionally, our original cohort study size experienced a high attrition rate with 33% of originally enrolled patients not being able to complete all aspects of the study. Future prospective studies assessing response of patient to different nasal spray and medications based on findings on nasal endoscopy, SNOT-22, and flexible laryngoscopy may be helpful in the future to improve our treatment of PND.

CONCLUSION

LPR has a high prevalence among patients with a primary complaint of PND. These patients would likely benefit from empiric therapy for LPR in the absence of findings on physical examination and nasal endoscopy that would support a different pathology. CT imaging should be reserved for patients who have exhausted therapeutic options given the low yield in this population.

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