

# “Post-Nasal Drip Syndrome”: most patients with purulent nasal secretions do not complain of chronic cough\*

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## SUMMARY

**Introduction:** Post-nasal drip syndrome (PNDS) is quoted as a common cause of chronic cough. However, there is little evidence to explain the mechanism by which PNDS may stimulate the cough reflex. This cohort study looks at patients with purulent nasal secretions, who may best represent any potential candidate for PNDS, and observes the frequency of symptomatic coughing.

**Methods:** One-hundred and eight consecutive patients referred to a rhinology clinic with symptoms of chronic infective rhinosinusitis, all with purulent nasal secretions identified on nasendoscopy, were observed through investigation and treatment. Patients were initially treated with broad-spectrum antibiotics and nasal douching. The frequency of coughing was recorded pre- and post- treatment.

**Results:** Eighty-nine percent of patients complained of post-nasal secretions. Twenty-three (21%) patients complained of cough. Eight had co-existing asthma, 3 had bronchiectasis, 1 had sarcoid and 2 had had a recent respiratory tract infection. Therefore 9 patients (8%) had purulent nasal secretions and a cough with no other discernable pathology. Cough improved in 8 of the 9 patients following treatment. Cough improved in 9 of the 14 patients with other possible co-existing causes for cough.

**Conclusions:** Only a small proportion of patients with purulent rhinosinusitis without coexisting chest disease complain of cough. Although nasal disease may be a genuine cause for chronic cough it is unlikely to be as common a cause as has been reported. Postnasal secretions do not appear to be an adequate cause for cough and the term ‘PNDS’ should be replaced by rhinosinusitis when nasal disease is the cause of chronic cough.

*Key words:* chronic rhinosinusitis, infection, endoscope, post-nasal drip syndrome

## INTRODUCTION

Post-nasal drip syndrome (PNDS) has been cited as the cause of chronic cough in up to 87% of patients<sup>(1)</sup> and is named as one of the “pathogenic triad of chronic cough” along with asthma and gastroesophageal reflux disease (GORD)<sup>(2)</sup>. This may help explain why referrals are often made to otolaryngologists to investigate for ‘PNDS’ as a cause for chronic cough. In spite of the proposed influence of ‘PNDS’ on the prevalence of cough, there is very little in the literature to explain the association, or the mechanism by which PNDS causes stimulation of the cough reflex.

How PNDS causes chronic cough is a contentious issue. It has been suggested that it is due to mechanical stimulation in the upper airway and specifically due to secretions dripping into

the hypopharynx<sup>(3)</sup>. Having no clear definition and lacking a physiological reason why secretions should ‘drip’, in that nasal mucus is normally tenacious and cannot drip<sup>(4)</sup>, PNDS appears to have become more of a label than a useful term to describe underlying nasal pathology. Indeed, a recent review on the subject describes PNDS as a ‘dustbin’ label<sup>(5)</sup>.

This study aims to investigate whether coughing is a prominent symptom in patients with documented purulent nasal secretions at nasal endoscopy. If we assume that PNDS is a label to denote symptomatic nasal disease and if this were a genuine cause for chronic cough, then we would expect to observe coughing as a symptom in this series of patients. To complement this work a study would need to be done to look at the incidence of purulent nasal secretions at endoscopy in a

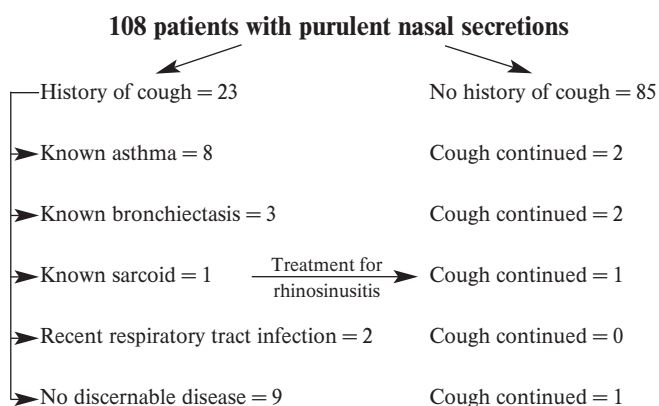


Figure 1. Diagrammatic representation of the outcome of patients with purulent rhinosinusitis.

population undergoing full investigation for unexplained cough. To the best of our knowledge, nasal endoscopy has never been incorporated into such a clinical evaluation of the causes of chronic coughing. We accept that this study investigates a ‘rhinological’ group of patients rather than patients whose main complaint is of chronic cough. However, the senior author has found that in his experience the subgroup of patients with non-explained cough rarely have purulent secretions at endoscopy.

**METHODS**

Prospective data was analysed for 108 consecutive patients with documented purulent nasal secretions identified at rigid nasal endoscopy, seen between January 1999 and January 2003 at a specialist rhinology clinic. A history was taken with particular reference to nasal symptoms including nasal obstruction, rhinorrhoea, sneezing, a sensation of post-nasal secretions, sense of smell (objectively measured by the Zurich smell test (6)), cough and co-morbidities, including asthma and GORD. Rigid nasal endoscopy was performed in all patients. As this group of patients’ primary complaint was rhinological, laryngoscopy was not routinely performed for signs of co-existing pathology. All patients with chronic infective rhinosinusitis (meeting the definition set by the European Position Paper on Rhinosinusitis and Nasal Polyps (7), as detailed above) were initially treated with a broad-spectrum oral antibiotic for 14 days (co-amoxiclav as first-line or cefuroxime axetil and metronidazole as second-line) and nasal douching. Purulent secretions were presumed infective in all cases due to their green colouration. Yellow or clear secretions have not been included, these being more associated with eosinophilia rather than infection. Secretions were not cultured for this study. Topical nasal steroids (Betamethasone) nose drops, 2 drops to each nostril in the nostril-up position, were also prescribed for 6 weeks if there was a history of allergic rhinitis or any signs of mucosal oedema. Endoscopic sinus surgery was performed for those patients who failed to respond to maximal medical therapy

**RESULTS**

Of the 108 patients, 50 were female and 58 male and their mean age was 51 years (15 – 92). The mean follow-up was 5 months (2 -27 months). In addition to the findings of infective mucopus, polyposis was noted in 21 (19%) patients (13 without cough and 8 with cough). Four patients without cough had had previous sinus surgery. One patient with cough had had previous endoscopic sinus surgery.

On questioning 96 (89%) patients were aware of their post-nasal secretions. Twenty-three (21%) of the 108 patients with documented purulent nasal secretions complained of cough. Of those patients who complained of coughing, 12 had other significant co-morbidities: 8 had asthma, 3 had bronchiectasis and 1 had sarcoid. A further 2 patients had a history of a recent respiratory tract infection. Nine patients (8%) therefore had purulent nasal secretions and a cough with no other discernable pathology, which might have contributed to their cough (Figure 1). No patients complained of coughing with a history or symptoms suggestive of co-existing GORD. Of the 108 patients, 21 (19%) had known asthma.

Figure 2 summarises the prevalence of nasal symptoms in the series. Nasal obstruction was a complaint in 61% (52/85) of patients without a cough and in 57% (13/23) of patients with a cough. Smell was objectively recorded for all patients with a cough and in 76/85 patients without a cough. Anosmia or hyposmia were observed in 74% (56/76) of those patients tested without a cough and in 91% (21/23) of patients with purulent nasal secretions and coughing. Sneezing was a complaint in 20% (17/85) of patients without a cough and 9% (2/23) in those with a cough. Rhinorrhoea was a complaint in 67% (57/85) and 57% (13/23) of patients without and with coughing, respectively.

Twenty-one patients with cough responded to medical treatment whilst 2 patients required endoscopic sinus surgery in conjunction with medical treatment. In spite of these patient’s infective rhinosinusitis resolving some patients cough persisted and these included 2 of the 8 asthmatics, 2 of the 3 patients with bronchiectasis, 1 patient with sarcoid and 1 of the 9 patients with no other recognisable co-morbidities. Therefore

Nasal Symptom	Percentage (no.) of patients with the symptom, with no history of coughing (n=85)	Percentage (no.) of patients with the symptom, with a history of coughing (n=23)
Post-nasal secretions	87% (74)	96% (22)
Nasal obstruction	61% (52)	57% (13)
Anosmia or Hyposmia	74% (56)	91% (21)
Sneezing	20% (17)	9% (2)
Rhinorrhoea	67% (57)	57% (13)

Figure 2. Summary of nasal symptoms recorded for patients with purulent nasal secretions.

cough improved in 17 of 23 (74%) patients with chronic infective rhinosinusitis when their purulent secretions resolved.

## DISCUSSION

Some general practitioners and chest physicians refer patients with chronic cough to ENT surgeons, with the aim to confirm or refute the presence of underlying nasal pathology, or as is often written in the referral "post-nasal drip", as a cause for the cough. Examining the literature implies that PNDS is attributed as a common cause of chronic cough as protocols for the treatment of chronic cough often commence with empirical treatment for 'PNDS' <sup>(8)</sup>. Using an 'anatomical' approach <sup>(9)</sup> a number of case series have attributed chronic cough to PNDS in 8-87% of patients <sup>(1,2,9-18)</sup>. It has been suggested that this wide variation in the reported prevalence of this patient group represents differing definitions of PNDS rather than different patient characteristics <sup>(5)</sup>. Most recently the American College of Chest Physicians has recommended that PNDS-induced cough be replaced by the 'more accurate' term 'Upper Airway Cough Syndrome' (UACS) <sup>(19)</sup>. We believe that the present study is the first to have investigated whether patients with purulent nasal secretions also complain of cough as a symptom. We swallow or expectorate around 20-40 mls of nasal mucus <sup>(20)</sup> and around 1000 mls of saliva each day. Otolaryngology clinics are well frequented by patients with habitual 'throat clearing', 'catarrh', 'something dripping down the throat' or a sore throat. The vast majority of these patients have no demonstrable nasal disease. Any of these symptoms could imply the presence of an underlying PNDS to the non-specialist. It is for this reason that we would strongly recommend very focused history taking, directed at specific nasal symptoms for the elucidation of a cause that may be related to chronic cough. The symptoms to inquire about include nasal obstruction, purulent secretions when blowing the nose and a decrease in taste or smell, which may suggest rhinosinusitis. Symptoms of sneezing, itchy eyes and clear rhinorrhoea are suggestive of allergic rhinitis. The relevance of specifically asking about nasal symptoms in chronic cough is supported by this study's results. In those patients with purulent secretions and chronic cough, smell was reduced in 91% (21/23), nasal obstruction was a complaint in 57% (13/25), rhinorrhoea a complaint in 57% (13/25) with sneezing less commonly cited in 9% of patients. We do feel that there is enough evidence to support nasal disease as a coexisting disorder with chronic cough <sup>(8)</sup>, but we also believe that we would have observed more complaints of coughing in this series if a mechanical 'drip' of mucus were a valid mechanism for the stimulation of the cough reflex. The term 'drip' is a misnomer and implies that mucus can drip from the soft palate or nasopharynx into the larynx or hypopharynx. This does not happen because of the rheological properties of mucus; namely its cohesive forces, spinnability and adhesiveness <sup>(4)</sup>. Nasal mucus is cleared through the mucociliary apparatus and adheres to the walls of the naso- and oropharynx to be swallowed along with saliva

when the swallowing reflex is initiated. If mucus becomes infected its viscosity increases and its viscoelastic properties would make it even less liable to drip <sup>(21)</sup>.

We have objective evidence of purulent nasal secretions in all patients in this series, 89% of whom had an awareness of post-nasal secretions. We therefore suggest that this group of patients might be expected to be representative of any such 'Post-nasal Drip Syndrome'. However, only 8% of these patients complained of cough as a troublesome symptom, in the absence of any other co-existing respiratory pathology. In a further 13% of patients, cough was a complaint but in the presence of co-existing asthma, bronchiectasis, sarcoidosis or a recent upper respiratory tract infection. We accept that we are limited in drawing clear-cut conclusions from these 13% of patients. In these patients cough could be caused by nasal disease, co-existing pathologies, or with the two acting in combination. We also accept that reflux disease has not been investigated for in this group of patients. Being a primarily 'rhinological' group, patients did not routinely have laryngoscopy performed and laryngeal signs of reflux have therefore not been recorded.

It is interesting to note that asthmatic symptoms have been shown to improve following treatment for co-existing rhinosinusitis <sup>(22)</sup>. In this series coughing improved in 6 out of the 8 asthmatics following resolution of their purulent rhinosinusitis. The concept of a 'united airway' is one current theory to explain how nasal disease may cause chronic cough <sup>(8)</sup>. There is evidence to show that inflammatory mediators are raised in the lower airways of patients with nasal disease <sup>(23)</sup>. The association of nasal disease and asthma is well known. It is believed that rhinitis and asthma are often manifestations of the same disease with either the upper and lower airway being affected more as a predominant site of inflammation in some patients. We feel that nasal disease is more likely to result in cough through co-existing involvement of the lower airways through an as yet undefined pathway, with eosinophil- and mast cell-mediation as the markers of this inflammatory process.

## CONCLUSIONS

The mechanical 'drip' of mucus from the nasopharynx into the larynx or hypopharynx <sup>(3)</sup> does not appear to be an adequate mechanism for the production of cough as a result of nasal disease. This is illustrated by the fact that only a minority of patients in this series with purulent secretions complained of cough, in the absence of co-existing respiratory pathology (8%), whilst a majority had a subjective sensation of post-nasal mucus. Consequently, the labels of 'Post-Nasal Drip Syndrome' and 'Upper Airway Cough Syndrome' should be replaced by the more accurate diagnoses of rhinosinusitis in the small subgroup when this is a cause for chronic cough. We do believe that underlying nasal disease has a role in the production of chronic cough, but more through an interaction

with the lower airways with a continuum or 'united' inflammation of the whole respiratory airway. This is supported by the fact that 8 of 9 patients had cough resolution following treatment for infective chronic rhinosinusitis. When enquiring about nasal disease as a cause for cough, the history taking should be directed at specific nasal symptoms. Non-specific pharyngeal symptoms, on their own, that have previously been attributed to 'PNDS' are usually not an indication of intranasal disease.

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