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## Chronic cough as a symptom of laryngopharyngeal reflux — two case reports

The authors declare no financial disclosure.

### Abstract

Laryngopharyngeal reflux (LPR) is a complex of symptoms caused by the backflow of gastric contents into the larynx, pharynx, nasopharynx, sinuses and even to the middle ear space. The symptomatology of LPR includes: chronic cough, hoarseness, throat clearing, laryngitis, „globus pharyngeus”, swallowing disturbances, postnasal drip, „fotor ex ore”. In the article, the authors present two boys with chronic cough, in one of them the asthma was suspected and antiasthmatic treatment was administered; in our patients according to the 24-hour pharyngeal pH-metry LPR was diagnosed. The aim of this study was to emphasise that pediatricians should be able to recognise symptoms of LPR. The appropriate diagnosis and treatment leads the symptoms to subside.

**Key words:** chronic cough, laryngopharyngeal reflux, children

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### Introduction

Laryngopharyngeal reflux (LPR) is a set of symptoms that appear as a result of the backflow of gastric contents into the larynx, pharynx, oral cavity and the middle ear and nasal sinuses [1–3]. The occurrence of LPR is encouraged by impaired functioning of the upper and lower esophageal sphincters and the impairment of a safety barrier of the pharynx and larynx. The signs and symptoms of reflux include: chronic cough, hoarseness, throat clearing, laryngitis, globus pharyngeus, pharyngolaryngeal dysphagia, expectoration and postnasal drip — ‘fotor ex ore’ [1, 3, 4]. LPR should be differentiated between infectious diseases, allergies, neoplasms and alimentary system diseases. Diagnostics of LPR uses the Restech Dx System based on 24 or 48 hour pharyngeal pHmetry using an antimony probe [2]. It is the appliance that measures pHmetry of the pharynx and enables diagnosis and monitoring of extraesophageal manifestations of gastro-eso-

phageal reflux disease (GERD). The mentioned probe measures pH every 0.5 second in the real time, thus enabling detection of incidents of reflux in the pharynx both in liquid and gaseous environment.

The present paper reports two cases of laryngopharyngeal reflux diagnosed in children with chronic cough.

### Case 1

A 10-year-old boy with suspicion of bronchial asthma was admitted to the Ward of Paediatrics, Internal Medicine and Allergology due to persisting for about three years cough, throat clearing, intermittent sensation of backflow of gastric contents and stomachache irrespective of the food consumed. Perinatal history was not clinically significant, there were symptoms of protein intolerance in early childhood. Since his second year of life, the boy has suffered from frequent infections of the airways, including

pneumonia (on average 4–5 times per year), obstructive bronchitis (on average 4–5 times per year) and otitis (2 times per year). The patient was repeatedly treated with antibiotics and hospitalised. Due to suspicion of bronchial asthma, the boy underwent a several-year-long therapy with inhaled glucocorticosteroids (GKS) and long-acting beta2-mimetics without expected clinical response. On admission to the ward, general condition of the child was good, the boy presented with cough and throat clearing. His body mass was below 75 percentile, whereas height below 50 percentile. In order to diagnose the symptoms presented, the boy underwent the following tests: blood cell count and blood smear, the serum IgA, IgG, IgM and IgE levels, total IgE, specific IgE for inhaled and food allergens (skin prick tests could not be done due to the patient's treatment with antihistaminic drugs), antibodies to *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Bordetella pertussis*, *Toxocara canis*, *Helicobacter pylori*, HBs, scatoscopy for *Giardia intestinalis* antigen, parasites, stool culture for fungus, general and bacteriological urine analysis, ultrasonography of the abdominal cavity and lung function tests (spirometry, airway resistance, FeNO), chest X-ray. The test results showed abundant growth of *Candida albicans* in the stool, the remaining results were normal. Laryngological examination showed drying of the nasal mucosa, widened vessels of Kiesselbach plexus at the right side with tendency for bleeding, the curvature of the nasal septum and the overgrowth of the pharyngeal tonsil for potential adenoidectomy. Laryngopharyngeal reflux was suspected. Reflux Syndrome Index (RSI) was calculated [5], giving the outcome of 20 points ( $N < 13$ ). A 24 hour pHmetry of the larynx was performed; in a vertical position the following parameters were found: Ryan Score — 26.47 ( $N < 9.41$ ), % of time below pH 5.5 — 0.38 ( $N < 0.13$ ), the number of episodes of pH decline  $< 5.5$  — 11 ( $N < 1.2$ ), duration of the longest episode of pH decline  $< 5.5$  (min) 0.41 ( $N < 0.71$ ), the outcomes in a horizontal position were as follows: Ryan Score — 20.08 ( $N < 6.8$ ), % of time below pH 5.0 — 1.36 ( $N < 5.15$ ), the number of episodes of pH decline  $< 5.0$  — 24 ( $N < 4.0$ ), duration of the longest episode of pH decline  $< 5.0$  (min) 2.61 ( $N < 18.97$ ). Laryngopharyngeal reflux was diagnosed.

Proton pump inhibitor (IPP) therapy (omeprazole) at a dose of 1mg/kg body mass for 8 weeks was recommended, as well as Fluconazole at a dose of 5mg/kg body mass for 14 days and anti-reflux diet. After 8 weeks, clinical symptoms

disappeared. Symptoms in the patient were evaluated again with the RSI, giving 2 points. The boy remains under constant control of a Gastrological and Laryngological Outpatient Clinic.

## Case 2

A 16-year-old boy was admitted to the Ward of Paediatrics, Internal Medicine and Allergy due to persisting for several years non-productive cough, more intensive between March and June. Additionally, the patient complained about itchy throat and sensation of a lump in a throat. Physical examination did not show deviations from the norm. Due to chronic cough, differential diagnosis was made that excluded allergic background (skin prick tests, total IgE, specific IgE), bronchial asthma (lung function tests), active infection with atypical bacteria (*Chlamydia pneumoniae*, *Mycoplasma pneumoniae* and *Bordetella pertussis*) and chest X-ray irregularities. Tests for infections with parasites such as *Toxocara canis* and *Ascaris lumbricoides* were done, giving the outcomes within the reference ranges. The remaining results of laboratory tests — blood cell count, alpha-1 antitrypsin and antibodies to *Helicobacter pylori* levels — were also within normal limits. Due to suspicion of laryngopharyngeal reflux, the symptoms in the boy were evaluated with the RSI scale, giving 17 points. The patient was qualified for a 24 hour laryngopharyngeal pHmetry with the help of the ResTech Dx-pH Measurement System, obtaining in a vertical position the following results : Ryan Score 336.05 ( $N < 9.41$ ), % of time below pH 5.5 — 13.01 ( $N < 0.13$ ), the number of episodes of pH decline  $< 5.5$  — 10 ( $N < 1.2$ ), duration of the longest episode of pH decline  $< 5.5$  (min) 25.58 ( $N < 0.71$ ), and in a horizontal position Ryan Score 2.92 ( $N < 6.79$ ), % of time below pH 5.0 — 0.02 ( $N < 5.15$ ), the number of episodes of pH decline  $< 5.0$  — 1, ( $N < 4.0$ ), duration of the longest episode of pH decline  $< 5.0$  (min) 0.15 ( $N < 18.97$ ).

Basing on clinical observation, the boy was diagnosed with laryngopharyngeal reflux. Pantoprazole at a dose of  $2 \times 20$  mg for 2 months was included in the therapy together with dietary modifications. After treatment, cough disappeared and the patient was again assessed with the RSI, obtaining 3 points.

## Discussion

The cause of clinical symptoms was diagnosed in both boys. Differential diagnosis did not

confirm bronchial asthma or allergic reaction to food or to other environmental factors. The following conditions were excluded: chronic infection of the airways, active infection with atypical bacteria, parasitic infestations, infection with *Helicobacter pylori*, alpha 1-antitrypsin deficiency.

It is assumed that LPR occurs less frequently than gastroesophageal reflux disease (GERD), which affects 8% of children and adults. Block et al. performed a retrospective analysis including 295 children aged  $7.2 \pm 4.3$  years with hoarseness persisting for more than 3 years. In 36% of them, LPR symptoms occurred during laryngological examination [6]. Although the precise prevalence of reflux in children is not known, it is estimated that 1 in 5 children may present with the symptoms of reflux [7]. About 4–10% of patients who complain about laryngeal diseases are diagnosed with LPR [8]. Patients with reflux have the impaired physiological barriers that protect from acid gastric contents (upper and lower sphincter of the oesophagus, oesophageal mucosa, peristalsis, as well as saliva and gravity), acid gastric contents damage epithelium of the larynx and pharynx [9]. It was found that approximately half of patients with recurring laryngitis or voice disorders suffer from LPR. The disease is a frequent cause of infections of the upper airways.

A crucial examination in diagnostics of laryngopharyngeal reflux is also laryngoscopy, which shows changes in the larynx such as reddening, oedema or inflammation [7, 9]. When the symptoms are intensive and persist for a long time, laryngoscopy is necessary to exclude other laryngeal diseases, including neoplasm [9].

The symptoms presented by the mentioned patients (cough, hoarseness, throat clearing) are typical of laryngopharyngeal reflux. In the first patient, bronchial asthma was suspected and the boy was receiving anti-asthmatic treatment for a few years. Diagnosis of LPR and the use of proton pump inhibitor therapy led to disappearance of clinical symptoms. Laryngopharyngeal reflux was diagnosed basing on a 24 hour pharyngeal pHmetry with the use of the Restech Dx-pH Measurement System [10]. The mesopharynx is the most proximate point in which laryngopharyngeal reflux incidents may be confirmed. The positive result of pHmetry in a vertical and horizontal position in the first patient and the RSI limit — 20 points ( $N < 13$  points) imply coexistence of GERD. The patient was referred for gastroenterological consultation with the possibility of further qualification for endoscopy of the upper part of the alimentary tract [1].

In spite of high sensitivity, pHmetry is an invasive, expensive and time-consuming examination, therefore, in the opinion of some authors, it is reserved only for patients with ambiguous clinical symptoms or after unsuccessful IPP therapy [9, 11, 12]. Some scientists believe that diagnosis is possible after taking medical history, the assessment of the patient's symptoms with the RSI scale and when the response to treatment is observed [9].

Pharmacological treatment of LPR is based on proton pump inhibitors. Omeprazole is the best examined IPP in respect of safety in children up to 2 years of age. The doses of omeprazole recommended for children amount to 0.5–2 mg/kg/body mass/day in two divided doses. The treatment should last at least 2–3 months. If after the therapy the symptoms do not disappear, it is necessary to verify diagnosis [9, 13].

A vital element of the therapy is modification of lifestyle. General recommendations include diet excluding fatty, stodgy, spicy and causing stomach distension food, the avoidance of chocolate, mint, alcohol, tobacco smoking, the reduction of the amount of food eaten, not eating directly before sleep, raising a headboard and the reduction of body mass (in the case of obese patients). All these modifications may significantly suppress the disease symptoms [7].

The alteration of lifestyle importantly improves LPR treatment (decline in RSI), but it is necessary to follow the above mentioned recommendations for at least 6 months after the IPP therapy [14].

## Conclusions

We reported the cases of two boys at the age of 10 and 16 years with chronic cough, hoarseness and throat clearing. After exclusion of other causes of the symptoms presented, i.e. bronchial asthma, infection of the airways, allergy, infections with atypical bacteria, parasite infestation, infection with *Helicobacter pylori*, alpha 1-antitrypsin deficiency, laryngopharyngeal reflux was diagnosed.

To sum up, it should be emphasised how vital is that the paediatrician, allergist and pulmonologist, basing on detailed history of the patient, suspect reflux and order the appropriate diagnostics. Diagnostics of chronic, dry cough and recurrent infections of the airways, after exclusion of numerous medical conditions, should always consider the presence of LPR. Both patients presented with symptoms typical of the disease. The boys were

treated with proton pump inhibitor, achieving a substantial reduction in ailments.

### Conflict of interest

The author declares no conflict of interest.

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