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CASE REPORT

Belching, regurgitation, chest tightness and dyspnea: Not gastroesophageal reflux disease but asthma

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Abstract

Belching is a common symptom of gastroesophageal reflux disease. If the symptoms are not relieved after anti-reflux treatment, another etiology should be considered. Here, we report a case of a 43-year-old man who presented with belching, regurgitation, chest tightness and dyspnea for 18 mo, which became gradually more severe. Gastroscopic examination suggested superficial gastritis. Twenty-four-hour esophageal pH monitoring showed that the Demeester score was 11.4, in the normal range. High-resolution manometry showed that integrated relaxation pressure and intrabolus pressure were higher than normal (20 mmHg and 22.4 mmHg, respectively), indicating gastroesophageal junction outflow tract obstruction. Pulmonary function test showed severe obstructive ventilation dysfunction [forced expiratory volume in 1 second (FEV1)/forced vital capacity 32%, FEV1 was 1.21 L, occupying 35% predicted value after salbuterol inhalation], and positive bronchial dilation test (Δ FEV1 260 mL, ΔFEV1% 27%). Skin prick test showed *Dermatophagoides farinae* (++), house dust mite (++++), and shrimp protein (++). Fractional exhaled nitric oxide measurement was 76 ppb. All the symptoms were alleviated completely and pulmonary function increased after combination therapy with corticosteroids and long-acting β2-agonist. Bronchial asthma was eventually diagnosed by laboratory tests and the effect of anti-asthmatic treatment, therefore, physicians, especially the Gastrointestinal physicians, should pay attention to the belching symptoms of asthma.

Key words: Asthma; Gastroesophageal reflux disease

Core tip: Belching is a common symptom of gastroesophageal reflux disease. If the symptoms are not relieved after anti-reflux treatment, bronchial asthma needs to be considered when the patient is accompanied by respiratory symptoms. Combination of multiple tests including pulmonary function, fractional exhaled nitric oxide, and allergen skin prick test, except for specific gastroenterological examinations, is helpful to make a correct diagnosis. Corticosteroids are the most effective medication for asthma-induced belching. This case suggests that physicians, especially the gastrointestinal physicians, should pay attention to the belching symptoms of asthma.

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INTRODUCTION

Gastroesophageal reflux disease (GERD) commonly produces symptoms in subjects of all ages. The dominant complaints are usually related to the upper gastrointestinal tract and include heartburn, regurgitation, and occasionally dysphasia. Patients with reflux are also liable to respiratory complications leading to severe, progressive, and disabling pulmonary damage. More recently, attention has been drawn to an association between reflux and exacerbations of bronchial asthma. There is still controversy about the causation of these two types of symptoms.

In this report, we describe a case with digestive complaints accompanied by respiratory symptoms, which was not controlled by antacid or gastric prokinetic agents but by antiasthmatic treatment. We tried to establish the related pathophysiological mechanisms that would indicate that asthma was the cause of the GERD-like symptoms.

CASE REPORT

A 43-year-old non-smoking man complained of belching, abdominal distention, and regurgitation for 18 mo, which became gradually more severe in the past 2 mo, accompanied by chest tightness and dyspnea, especially at night. No hemoptysis, heartburn, cough or sputum was reported. He had allergic rhinitis and no family history of asthma. The patient had no history of smoking. In previous hospital visits the patient was treated for GERD for more than 2 mo but obtained no symptom relief. There was no positive sign in the physical examination. The patient gave written informed consent to report his case.

In the Gastroenterology Department, gastroscopic examination suggested superficial gastritis. Twenty-four-hour esophageal pH monitoring showed a Demeester score of 11.4 (normal range < 14.7), 49 total reflux episodes (normal range < 73), including 28 episodes of acid reflux, 14 of weak acid reflux, two of acid gas reflux, and five of weak acid gas reflux. There was no basic gas reflux. The belching was associated with reflux. High-resolution manometry showed that integrated relaxation pressure (IRP) and intrabolus pressure (IBP) were higher than normal (20 mmHg and 22.4 mmHg, respectively), indicating gastroesophageal junction outflow tract obstruction. Other laboratory results were as follows: routine blood testing showing white blood cell count 3500/mm^3, 9% eosinophil percentage (normal range 0.5%-5%), absolute eosinophil count 310/mm^3 (normal range 20-510/mm^3), hemoglobin 165 g/dL, and platelet count 195000/mm^3. Liver function, renal function, and electrolyte balance were normal. Serum total IgE was 272 IU/mL (normal range < 165 IU/mL). Parasitological examination and detection of parasite eggs in stool showed negative results. The patient had taken three drugs: ilaprazole enteric-coated tablets (10 mg q.d), domperidone (10 mg t.i.d), and L-glutamine and sodium gualenate granules (0.67 g t.i.d) orally for 10 wk without effect.

In the Respiratory Medicine Department, chest computed tomography showed no abnormal findings. Pulmonary function test showed severe obstructive ventilation dysfunction [forced expiratory volume in 1 second (FEV1)/forced vital capacity (FVC)] 32%, FEV1 was 1.21 L, occupied 35% predicted value after salbuterol inhalation, and positive bronchial dilation test (ΔFEV1 260 mL, ΔFEV1% 27%). Residual volume/total lung capacity (RV/TLC) 23%, the diffusion capacity decreased slightly (Diffusion lung capacity for carbon monoxide (DLCO) 73%). The viscous resistance or total airway resistance (R5) and central airway resistance (R20) increased clearly (263% and 184% predicted value), X5 (peripheral elastic resistance) increase slightly, and resonance frequency increased to 289% predicted value. Skin pick test showed *Dermatophagoides farinae* (++), house dust mite (++++), and shrimp protein (++). Fractional exhaled nitric oxide (FENO) measurement was 76 ppb (NIOX, Solna, Sweden).

The patient received 40 mg methylprednisolone intravenous infusion for 3 d, followed by budesonide/formoterol 160/4.5 μg inhalation (twice daily) combined with leukotriene receptor montelukast (10 mg po, q.n) for 3 mo. The patient started sublingual mite desensitization treatment. The patient felt better and his symptoms resolved completely after 2 wk treatment. After 3 mo treatment, FEV1 and FEV1/FVC increased to 1.9 L (67% predicted value) and 64% predicted value, and FENO decreased to 25 ppb. According to the above results and drug effects, the patient was diagnosed with bronchial asthma and is still undergoing follow-up.

DISCUSSION

Belching is a common symptom of digestive system diseases, such as GERD, chronic gastritis, digestive ulcer, or functional dyspepsia. The most common cause is GERD[1]. However, in this case, the symptoms did not resolve after antireflux treatment. Treatment failure questions whether the diagnosis was correct or the treatment was appropriate. Referring to respiratory symptoms and lung function test results, bronchial asthma was considered and the patient was controlled by antiasthmatic therapy. Therefore,

a diagnosis of asthma and not GERD was eventually determined.

Asthma is an inflammatory disease of the airways characterized by increased airway reactivity with airflow obstruction. A long duration of airway inflammation can result in severe destruction of lung function, like the severe obstructive ventilation in the present middle-aged patient. Recurrent cough, wheezing, and dyspnea are the typical symptoms of this common respiratory disease. Recently, a few atypical symptoms such as chest pain, pure chest tightness, and cardiac palpation have been reported in asthma[2-4]. Most of these patients with atypical symptoms did not visit respiratory physicians and many of them were misdiagnosed with other diseases for several months to years, which suggests that it is necessary for internal physicians to consider a diagnosis of asthma in patients with non-respiratory symptoms. In this case, this patient complained with the presentation of digestive disease and received various tests and therapy focused on GERD, however, the etiology about respiratory disorder is definitely made by adding special test such as FENO, SPT *etc.,* at last. Therefore asthma patients also can be appeared firstly in gastroenterology department except for non-pulmonary department such as cardiovascular, psychology, ear-nose-throat department. It would be helpful for internal physicians, including gastroenterologists, to make a correct diagnosis by continuously improving their differential diagnosis capability.

The prevalence of GERD in patients with asthma is estimated at 34%-80%[5,6]. In China, Chen *et al*[7] reported that the prevalence of GERD was 67% in patients with asthma. The mechanism of the phenomenon is related to the increase in intrathoracic pressure due to greater respiratory effort, which makes the transdiaphragmatic pressure increase and lower esophageal pressure decrease, thus causing gastric gas or acid reflux. In the present case, the DeMeester score was not high enough to diagnose GERD. However, the increases in IRP and IBP were indicative of abnormal gastroesophageal motility. It is possible that the increased transdiaphragmatic pressure resulted in gastroesophageal junction outflow tract obstruction.

How to differentiate asthma and GERD is important for correct diagnosis. Medical history should be carefully taken, including atopy, especially allergic rhinitis. Epidemiological studies have shown consistently that asthma and allergic rhinitis are frequent comorbid conditions. Most patients with asthma (> 80%) have allergic rhinitis and many patients with allergic rhinitis (⩽ 50%) have asthma and/or increased nonspecific bronchial hyper-reactivity[8]. The abnormal laboratory results should be noted and analyzed as far as possible. This patient had eosinophilia and a high level of IgE. Although patients with eosinophilia have digestive symptoms, parasitic disease should be excluded by negative stool test and parasite antibody test. Eosinophilic gastroenteritis can present as eosinophilia, normal upper gastrointestinal endoscopy and asthmatic wheezing[9], however, the patients show no ascites or other gastrointestinal symptoms such as abdominal pain, vomiting, and loss of appetite. Both eosinophilia and higher IgE level are useful indicators of atopy. Focusing on these two important features, other specific laboratory tests should be conducted. Apart for lung function tests, skin prick test and FENO analysis should be performed in a timely manner. FENO is a useful noninvasive biomarker to reflect eosinophilic airway inflammation with high specificity. FENO > 50 ppb supports a diagnosis of asthma[10]. The skin prick test could help us to determine the coexistence of allergic conditions. So, it is valuable to combine various methods to make a definite diagnosis.

In conclusion, some gastrointestinal symptoms such as belching and regurgitation may be the first and main complaint of bronchial asthma. Comprehensive differentiation and combination of auxiliary tests are the key to making a correct diagnosis for asthma.

COMMENTS

Case characteristics

A 43-year-old man presented with a combination of belching, regurgitation, chest tightness, and dyspnea.

Clinical diagnosis

The patient was initially admitted to the Gastroenterology Department and treated with anti-reflux therapy.

Laboratory diagnosis

Twenty-four-hour esophageal pH monitoring showed a Demeester score in the normal range of 11.4. High-resolution manometry showed that integrated relaxation pressure and intrabolus pressure were higher than normal (20 mmHg and 22.4 mmHg, respectively), indicating gastroesophageal junction outflow tract obstruction. Pulmonary function test showed severe obstructive ventilation dysfunction [forced expiratory volume in 1 second (FEV1)/forced vital capacity (FVC)] was 32%, FEV1 was 1.21 L, and occupied 35% predicted value after salbuterol inhalation, and positive bronchial dilation test (ΔFEV1 260 mL, Δ FEV1% 27%). Skin pick test showed *Dermatophagoides farinae* (++), house dust mite (++++), and shrimp protein (++). Fractional exhaled NO measurement was 76 ppb.

Treatment

The patient received 40 mg methylprednisolone intravenous infusion for 3 d, followed by budesonide/formeterol 160/4.5 μg inhalation (twice daily) combined with leukotriene receptor montelukast (10 mg po, q.n.) continuously for 6 mo. The symptoms resolved completely and his pulmonary function improved significantly.

Related reports

Many studies have reported that reflux can induce airway hyper-reactivity and result in an asthma-like presentation, and that asthmatic symptoms are resolved only by antireflux therapy, suggesting that gastroesophageal reflux disease (GERD) was the cause of asthmatic manifestation. However, in this case, we found that reflux symptoms were released completely by only using antiasthmatic therapy, which indicates that asthma may be eventually the cause of reflux symptoms.

Experiences and lessons

Belching is a common symptom of GERD. If the symptom is not resolved after anti-reflux treatment, bronchial asthma needs to be considered when the

patient has accompanying respiratory symptoms. There is controversy about the causative relationship between GERD and exacerbations of bronchial asthma. Combination of multiple tests including pulmonary function, FENO, allergen skin prick test, as well as gastroenterological examinations, and effect of antiasthmatic treatment may be helpful in making the correct diagnosis. Corticosteroids are the most effective medication for asthma-induced belching.

Peer-review

This case will shed light on the diagnosis and differential diagnosis between asthma and GEED for the physicians. It is a good paper of interest for gastrointestinal physician.

REFERENCES

1 **Kessing BF**, Bredenoord AJ, Smout AJ. The pathophysiology, diagnosis and treatment of excessive belching symptoms. *Am J Gastroenterol* 2014; **109**: 1196-2003; (Quiz) 1204 [PMID: 25001253 DOI: 10.1038/ajg.2014.165]

2 **Shen H**, Hua W, Wang P, Li W. A new phenotype of asthma: chest tightness as the sole presenting manifestation. *Ann Allergy Asthma Immunol* 2013; **111**: 226-227 [PMID: 23987204 DOI: 10.1016/j.anai.2013.06.016]

3 **Wu YH**, Liu CT. Atypical asthma characteristic of chest pain. *Zhongguo Huxi Yuweizhong Jianhu Zazhi* 2007; **6**: 12-14

4 **Zhang JX**, Han YP, Bai C, Li Q. Atypianl asthma with chief complant of palpitations: Twelve cases analysis. *Zhongguo Huxi Yuweizhong Jianhu Zazhi* 2014; 13: 112-115

5 **Davis MV**. Relationship between pulmonary disease, hiatal hernia, and gastroesophageal reflux. *N Y State J Med* 1972; **72**: 935-938 [PMID: 4502329]

6 **Sontag SJ**, O'Connell S, Khandelwal S, Miller T, Nemchausky B, Schnell TG, Serlovsky R. Most asthmatics have gastroesophageal reflux with or without bronchodilator therapy. *Gastroenterology* 1990; **99**: 613-620 [PMID: 2379769]

7 **Chen BY**, Liu WT, Cao J, Du WB. Investigation of the prevalence of GER in asthmatic patients. *Zhongguo Jiehe He Huxi Zazhi* 2000; **23**: 383

8 **Bousquet J**, Van Cauwenberge P, Khaltaev N. Allergic rhinitis and its impact on asthma. *J Allergy Clin Immunol* 2001; **108**: S147-S334 [PMID: 11707753]

9 **Leal R**, Fayad L, Vieira D, Figueiredo T, Lopes A, Carvalho R, Dantas-Corrêa E, Schiavon L, Narciso-Schiavon J. Unusual presentations of eosinophilic gastroenteritis: two case reports. *Turk J Gastroenterol* 2014; **25**: 323-329 [PMID: 25141324 DOI: 10.5152/tjg.2014.6735]

10 **Bjermer L**, Alving K, Diamant Z, Magnussen H, Pavord I, Piacentini G, Price D, Roche N, Sastre J, Thomas M, Usmani O. Current evidence and future research needs for FeNO measurement in respiratory diseases. *Respir Med* 2014; **108**: 830-841 [PMID: 24636813 DOI: 10.1016/j.rmed.2014.02.005.]

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