CHRONIC COUGH AS THE PRESENTING MANIFESTATION OF BRONCHIAL ASTHMA

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SYNOPSIS

Bronchial asthma may present as chronic cough alone without episodic wheeze or dyspnoea. History of wheeze on coughing and rhonchi on auscultation, if present, can be helpful clue to the diagnosis. Spirometric study is usually normal. Skin prick test by reflecting respiratory allergy is important especially in smokers to differentiate from chronic bronchitis. Histamine bronchoprovocation test may be negative. Bronchodilator therapy is both diagnostic and therapeutic.

INTRODUCTION

Bronchial asthma when seen classically as a triad of dyspnoea, wheeze and cough is usually easily recognisable. Episodic wheeze is generally considered to be cardinal manifestation or even the sine qua non of bronchial asthma (1). However, there are reports of patients in whom chronic cough is the sole presenting manifestation (1, 2, 3, 4) or a prelude to acute attacks (5) of bronchial asthma.

This is a report of 15 cases of chronic cough which is the presenting manifestation of bronchial asthma. None of them had history of bronchial asthma and all of them responded to bronchodilator therapy. Diagnosis in such cases is important if repeated courses of antibiotics, antitussives and antihistamine are to be avoided.

Bronchial asthma should be included in the differential diagnosis of chronic cough.

MATERIAL AND METHODS

These 15 patients were among those referred to the Medical Outpatient Clinic, Toa Payoh Hospital for investigation of chronic cough over the period February 1983 to October 1984.

None of them had history of bronchial asthma and other causes of chronic cough were excluded. Patients with recent upper or lower respiratory tract infection were excluded but not those with history of frequent rhinitis provided there was no evidence of postnasal drip.

History taken included wheeze associated with cough, smoking habit and family history of bronchial asthma.

During clinical examination, particular attention was paid to rhonchi auscultated during normal respiration as well as during forced expiratory manoeuvre.

Forced expiratory volume in one second (FEV1) and forced vital capacity (FVC) were measured either on Vitalograph or Minato Autospiro AS-500. Predicted values were obtained from normograms from Lam et al (6).

Skin prick test was performed using Bencard solutions. The antigens used were house dust mite (D pteronyssinus), house dust, cat fur, dog hair, B2 grass pollens, B3 tree pollens and B5 flower and shrub pollens. A positive immediate (type 1) reaction was considered to be present when there was a measurable weal of 1 mm or more, surrounded by a flare, in the absence of any equivalent reaction in the control test (7).

Histamine bronchoprovocation test was done as described by Chee (8). It was considered positive if the FEV1 fell by at least 20% before or on reaching the maximum dose (dose number 9 at the cumulative dose of 7.8 umoles).

Only those whose cough responded to bronchodilator therapy were included. Smokers with negative skin prick test and negative histamine bronchoprovocation test were excluded as they were considered to have chronic bronchitis.

RESULTS

The 15 patients (Table I) consisted of 8 males and 7 females; 10 Chinese, 4 Indians and 1 Malay. Their age ranged from 18 to 57 years with a mean of 29.8 years and median of 27 years. The duration of cough varied from 1 month to 20 years with a mean of 38.8 months and median of 5 months.

None of them had history of dyspnoea or bronchial asthma though 6 (40%) had family history of bronchial asthma. 7 (47%) reported wheeze associated with cough and 9 (60%) had rhonchi during forced expiratory manoeuvre but not during quiet respiration.

Only 3 (20%) were smokers, of whom 2 had positive histamine bronchoprovocation test.

TABLE I

SUMMARY OF CLINICAL DATA AND RESULTS OF INVESTIGATIONS

No	Sex	Age (Yr)	Race	Duration of cough	History of wheeze	Rhinitis	Smoker	Family history of bronchial asthma	Expiratory rhonchi	Spirometric study	Skin prick test	Histamine broncho-provocation test
1	F	25	I	7 yr	+	+	—	—	+	N	+	—
2	F	30	C	1 mo	+	—	—	—	+	N	+	—
3	M	27	C	2 mo	—	—	+	—	+	N	+	—
4	F	37	C	4 mo	—	—	—	+	—	N	+	—
5	M	19	C	5 mo	—	—	+	—	—	N	+	+
6	F	18	I	6 yr	+	+	—	+	—	N	+	+
7	M	25	C	5 yr	+	+	+	+	+	N	+	+
8	F	57	C	20 yrs	—	—	—	—	+	Abn	+	ND
9	M	19	C	6 mo	—	—	—	+	—	N	+	—
10	M	19	C	7 yr	+	+	—	+	—	N	+	+
11	M	36	I	2 mo	—	—	—	—	+	N	+	+
12	F	32	M	2 mo	+	—	—	—	—	N	+	ND
13	F	49	C	5 mo	+	—	—	—	+	Abn	+	ND
14	M	32	I	1 yr	—	—	—	+	+	N	+	—
15	M	22	C	3 mo	—	—	—	—	+	N	+	—

M — Male
F — Female

C — Chinese
I — Indian
M — Malay

mo — months
yr — years

N — Normal
Abn — Abnormal

ND — not done

All except 2 patients (nos 8 & 13) had normal spirometric study with no significant increase (ie 20%) in FEV1 after bronchodilator (Table II). The 2 patients had severe airway obstruction. Their FEV1 was 1.0L and 0.7L with 30% and 14% rise respectively after bronchodilator. Despite their poor lung function, they never had dyspnoea or asthmatic attacks.

All of them were atopic as shown by one or more positive reactions to skin prick test (Table III).

Histamine bronchoprovocation test was not performed in 3 patients, 2 had very low FEV1 and 1 developed asthmatic attacks though her cough responded completely to bronchodilator therapy initially. Of the remaining 12, 5 (42%) had positive test.

All of them responded to bronchodilator therapy.

TABLE II
RESULTS OF SPIROMETRIC STUDY

	Before Bronchodilator			After Bronchodilator				Predicted	
No	FEV_1(L)	FVC(L)	FEV_1%	FEV_1(L)	FVC(L)	FEV_1%	% Change In FEV_1	FEV_1(L)	FVC(L)
1	2.1	2.2	95%	2.2	2.3	96%	4.8%	2.6	2.7
2	2.5	2.9	86%	2.6	3.1	84%	4.0%	2.7	3.0
3	4.4	4.5	98%	4.3	4.5	96%	−2.3%	4.0	4.5
4	2.8	3.0	93%	2.9	3.0	97%	3.6%	2.5	2.9
5	4.0	4.4	91%	4.1	4.3	95%	2.5%	4.0	4.3
6	2.2	2.5	88%	2.3	2.5	92%	4.5%	2.8	3.1
7	4.0	4.1	98%	4.3	4.4	98%	7.5%	3.8	4.1
8	1.0	1.5	67%	1.3	2.0	65%	30%	1.8	2.2
9	3.6	3.8	95%	3.3	3.7	89%	−8.3%	4.0	4.3
10	3.9	4.1	95%	4.2	4.3	98%	7.6%	4.2	4.5
11	3.1	4.0	78%	3.2	4.0	80%	3.2%	3.9	4.4
12	2.0	2.1	95%	1.9	2.2	86%	−5.0%	2.4	2.6
13	0.7	1.2	58%	0.8	1.3	61%	14%	2.1	3.1
14	3.0	3.4	88%	3.0	3.5	85%	0%	3.4	3.8
15	3.6	3.8	95%	3.6	4.0	90%	0%	4.0	4.4

L: Litres

TABLE III
RESULTS OF SKIN PRICK TEST — SIZE OF WEALS IN MM

No	Control	House Dust Mite	House Dust	Cat Fur	Dog Hair	B2 Pollens	B3 Pollens	B5 Pollens
1	0	2	5	4	4	0	0	3
2	2	3	4	4	5	2	2	+
3	0	7	5	4	3	4	3	2
4	0	3	0	0	0	0	0	0
5	0	3	4	3	4	3	0	4
6	2	6	4	4	2	0	1	0
7	2	10	7	6	4	5	5	3
8	0	0	2	3	3	0	0	0
9	0	3	3	3	3	0	3	2
10	4	14	14	4	8	5	4	3
11	2	2	3	2	3	1	1	0
12	2	4	3	3	3	2	3	0
13	1	14	10	6	5	4	3	3
14	1	3	2	2	0	+	2	0
15	0	0	2	0	4	1	+	0

0 = No weal. Erythema absent or less than 1 mm diameter
+ = Weal absent or very slight. Erythema present, not more than 3 mm diameter

DISCUSSION

Bronchial asthma presenting classically with dyspnoea, wheeze and cough is easily diagnosed. Problem arises when patients do not present with full blown manifestations. It has been recognised that chronic cough can be the sole manifestation (1, 2, 3, 4) or a prelude to acute attacks (5) of bronchial asthma. Accurate diagnosis under such circumstances is important as the treatment is specific, otherwise the patients are often repeatedly treated unsuccessfully with antibiotics, antitussives and antihistamines (2).

Although none of the patients had episodic wheeze or dyspnoea, 7 (47%) reported wheeze associated with cough and 9 (60%) had rhonchi during forced expiratory manoeuvre. Only 4 (25%) had neither. The manoeuvre is an essential part of clinical examination as the rhonchi were not audible during normal respiration. Using methacholine inhalation challenge as diagnostic standard, Pratter, Hingston and Irwin (9) found only 35% of those with history of wheeze and 43% of those with expiratory wheeze on auscultation had bronchial asthma. They concluded that these two features were not reliable in predicting bronchial asthma. However, as will be discussed later, inhalation challenge with histamine or methacholine is not always positive in bronchial asthma especially in those with minimal manifestation, these two features are more useful in providing a clue to the diagnosis than Pratter et al have suggested.

Most asthmatics are non smokers as they find tobacco smoke irritating and intolerable (10). This is not always true as Poe et al (11) found 8 (21%) of their 39 clinically asthmatic patients to be smokers and another 8 to be ex-smokers. 3 (20%) of our patients were smokers, of whom all had positive skin prick test and 2 had positive histamine bronchoprovocation test. They had no recent upper or lower respiratory tract infections which might induce transient bronchial hyperreactivity (12, 13). Moreover, their cough disappeared completely with bronchodilator therapy. The mechanism of cough in bronchial asthma is believed to be due to deformation of bronchial walls by bronchospasm chiefly in the larger airways where cough receptors are most numerous. This is supported by finding increased large airway resistance in asthmatics who present with cough only in between acute attacks (5). The cough is therefore expected to be responsive to bronchodilator therapy. On the other hand, cigarette smoke, being a bronchial irritant, provokes cough by triggering cough receptors, and by inducing inflammatory changes and large amount of secretion. The cough should not, therefore, respond to bronchodilator therapy. Hence, a smoker who has chronic cough should not be assumed to have "smoker's cough" or chronic bronchitis. Further investigations might be warranted.

Those asthmatics who present with only chronic cough supposedly represent the milder end of the spectrum of the disease. It is therefore not surprising that the majority has normal spirometric study though a few have obstructive pattern with reversibility (1, 2, 3, 4). It is interesting to note that our patient No. 8 had no complaint of dyspnoea or asthmatic attack even though she had very poor lung function and had chronic cough for 20 years.

A close relationship between allergy skin test reactivity and symptoms of respiratory allergy has been well established (14, 15). The prick method of allergy skin testing is preferred because of its ease of performance and high degree of reproducibility (14). The prick reactivity is closely related to history of respiratory allergy and total serum IgE levels by paper radioimmunosorbent test (PRIST) (16). The degree of prick reactivity is also correlated to the presence of circulating specific IgE by radioallergosorbent test (RAST) (16), and the specific IgE is, in turn, strongly correlated to the specific bronchoprovocation test by the same allergen. Indeed, prick reactions of 3 mm or more have been found to be strongly correlated to the specific bronchoprovocation test by the same allergen (17). Other study also showed a significant increased incidence of positive bronchoprovocation test to various allergens in those with prick reactions 5 mm or more (18). Skin prick test is thus valuable in the diagnosis of brochial asthma as the cause of chronic cough, especially in smokers in whom the cough might otherwise be attributed to smoking. All our patients had at least one positive reaction; and 12 (80%) had at least one reaction which is 3 mm or more than the control. This is at variance with Konig's study (2) in which 4 (36%) of his 11 patients were non-atopic.

Bronchial asthma is characterised by bronchial hyperreactivity and bronchial reactivity to methacholine has been proposed as an obligatory criterion of bronchial asthma (9, 19) including those who present with only chronic cough (1, 11). However, this proposal is not generally accepted. Kiviloog (20) found 12 (21%) methacholine non-reactors in 57 patients with clinical asthma, and of the 12, 7 were of the extrinsic reaginic type. He (21) also found a minority of asthmatic patients changed from methacholine reactors to non-reactors and vice versa in the repeat test later. Of those who remained in their original category, 46% had variation in the degree of their methacholine reactivity on repeat testing. The bronchial reactivity quantitated as respiratory threshold of acetylcholine or histamine (RT-Ach or RT-Hist) has been found to correlate significantly with scores representing asthmatic symptoms and the duration of asthma (22). And negative response to methacholine or histamine has been reported in asthmatics who had been completely free from symptoms for many years (23).

It would appear that non-specific bronchoprovocation test by methacholine or histamine is not always positive in bronchial asthma and the degree of bronchial reactivity measured varies with the severity and duration of bronchial asthma. It is thus conceivable that non-specific bronchoprovocation test is likely to be negative in those asthmatics who present with chronic cough as their only manifestation, as they are supposed to represent a milder form or early stage of bronchial asthma. 58% of our patients tested had negative histamine bronchoprovocation test. Their prompt response to bronchodilator therapy made it highly unlikely that their cough was due to causes other than bronchial asthma.

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