Chronic cough
An approach to proper diagnosis and management for the otolaryngologist

protocol
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Abstract

Key words: Chronic – Cough – Causes - Diagnosis.

Objectives: To review relevant literature and present evidence-based guidelines to assist otolaryngologists and pulmonologists in the evaluation and management of chronic cough whether in children or adults by bringing ENT causes of chronic cough to attention.

Methods: A review of published data was performed using PubMed, MEDLINE, EMBASE databases. The search terms used included chronic cough, post nasal drip syndrome, asthma, GERD, occupational cough, habit cough, anatomy of cough, physiology of cough, management of cough and pediatric cough. Selected articles were chosen when meeting the objectives, reviewed by the researcher and put together into one single study.

Results/conclusions: Chronic cough is a common diagnostic and therapeutic problem. The exact prevalence has proved difficult to estimate and recurrent cough is reported frequently. Cough remains the most common reason for which patients seek medical attention. Duration is important in determining the possible aetiology of cough. Over recent years there has been a tendency to define adult chronic cough as cough lasting more than 8 weeks, pediatric chronic cough is cough lasting more than 4 weeks. Among the most common causes of chronic cough comes post nasal drip syndrome, GERD, asthma. Less common causes of chronic cough include bronchiectasis, interstitial pulmonary diseases, lung cancer and infections such as TB. The main reason for treatment failure is a lack of understanding of the aetiology of cough, particularly when it arises from sites outside the respiratory tract. The investigation and treatment of chronic cough is a rewarding and generally fruitful undertaking. By adopting an approach based on a careful history, simple investigations and therapeutic trials, dramatic improvements in quality of life can be achieved at little costs.

Introduction

A cough is a primitive, protective reflex in healthy individuals. It serves to expectorate unwanted substances from the upper respiratory tract. However, a persistent cough can be debilitating, socially distressing and adversely impairs the quality of life. One of the most common presentations to a medical practitioner is a chronic cough ***(Morice et al., 2006).***

Debate exists regarding the most appropriate clinical definition of a cough event. The following definition was found sufficient: "Cough is a forced expulsive manoeuvre usually against a closed glottis and which is associated with a characteristic sound" ***(Morice et al., 2006).***

Coughing is not an innocuous phenomenon. The forces generated during forceful coughing can lead to multiple complications. Chronic coughers suffer from a decreased sense of well-being, anxiety related to uncertainty about the etiology and other complications ***(Irwin et al., 1998).***

Chronic cough has frequently been considered to be an intractable problem. The main reason behind that is failure to consider the potential origin of cough as being outside the lower respiratory tract. Because cough may arise from anywhere in the distribution of the vagus, the full assessment of the patient with chronic cough relies on a multidisciplinary approach and close cooperation between gastroenterology, ENT and chest departments. If this approach is adopted; only a small number of patients with idiopathic cough remain in whom no diagnosis is determined ***(Birring et al., 2004).***

The impact of cough is reflected in the tremendous amount of money spent on over-the-counter (OTC), anti-tussives each year all over the world.

Most coughs are acute, self-limiting and secondary to respiratory tract infections, but when cough becomes chronic it can account for up to one third of all referrals to chest physicians ***(Morice et al., 2006).***

The treatment of cough is usually successful when the correct etiology is diagnosed and the intervention is appropriate and of adequate intensity ***(Irwin et al., 1998).***

Aim of the study:

In this humble study, we are about to clarify and underline the different extra-pulmonary causes of chronic cough that are of great interest to an otolaryngologist as for how to diagnose, investigate and proceed to proper treatment. This should serve towards saving the patient's time, money and suffering.

Epidemiology of chronic cough

In a European survey of young patients which presumably investigated both acute and chronic cough, about 20% reported a non-productive or productive cough during the winter months ***(Morice et al., 1994).***

In epidemiological surveys of the general population, persistent cough is reported in 18% of the US population, in up to 16% of the population in south-east England and in 11% of the Swedish population ***(Barbee et al., 1991).***

The only study to grade cough severity found that 7% of the general population had cough severe enough to interfere with normal daily activities on at least a weekly basis ***(Ford et al., 2006).***

Nocturnal cough in relation to indoor exposure to cat allergens was observed not only in sensitized but also in non-sensitized subjects ***(Gehring et al., 2001).***

A higher prevalence of nocturnal and non-productive cough was reported in women than in men ***(Ludviksdottir et al., 1996).*** Most studies show a preponderance of females. This may be related to the increased sensitivity of cough reflex in women ***(Fujimura et al., 1996).*** In the Italian Po Valley district, the increase in air pollution has been associated with an increase in cough incidence among females but not males ***(Viegi et al., 1999).***

Cough is associated with a diagnosis of post nasal drip syndrome, asthma, tobacco smoking in a dose related fashion, symptoms of reflux, irritable bowel syndrome and obesity ***(Turner et al., 2003).***

In a survey carried out in south-east England, up to 16% of 9077 responders had cough every day on half the days of the year and up to 13.2% had sputum every day on half the days of the year; 54% of this cohort were current cigarette smokers ***(Cullinan, 1992).***

Exposure to pollutants or environmental irritants is an important aggravating factor. In adults and school children, productive cough or chronic nocturnal dry cough has been associated with high levels of particulates ***(Zemp et al., 1999).*** Increases in the levels of particulates are related to increased reporting of cough, sputum production and sore throat in children with or without asthma ***(Vedal et al., 1998).***

Living close to heavy traffic may be associated with asthma symptoms and long standing cough compared with those not living close to heavy traffic ***(Montnemery et al., 2001).***

Facts about chronic cough

Cough serves to clear the airways when there are:

(1)Large amounts of inhaled materials.

(2)Large amounts of mucus due to excessive secretions or impaired mucociliary clearance.

(3)Large amounts of abnormal substances such as oedematous fluid or pus.

So, the impact of cough on health is substantial. It can be:

- An important defense mechanism that helps clear excessive secretions and foreign materials from the air ways.
- An important factor in the spread of infection.
- One of the most common symptoms for which patients seek medical attention and spend health-care money.

Cough can be defined based on time frame (ie, duration of cough), quality (eg, dry or wet, brassy or staccato), or suggested etiology (eg, specific and nonspecific) ***(Chang & Asher, 2001).***

Irwin and Madison (2000), subdivided cough in terms of duration into:

(1) Acute cough, lasting less than three weeks time.

(2) Subacute cough, lasting from three to eight weeks.

(3) Chronic cough, lasting more than eight weeks.

Causes of chronic cough

Chronic cough can present a diagnostic dilemma because the patient may have multiple etiologies. The medical history often offers few clues as to the initiating event and the characteristics of the cough have been shown to lack both diagnostic sensitivity and specificity. Studies have shown that multiple causes were present in 18 to 62% of cases and that the cough may be due to three illnesses in up to 42% of the time ***(Irwin & Madison, 2000).***

In immunocompetent patients; post-nasal drip, asthma and GERD are the three most common causes of chronic cough in all age groups and by considering smoking and other irritant induced chronic bronchitis, bronchiectasis, eosinophilic bronchitis and angiotensin-converting enzyme inhibitors (ACEI's), 95% of all the causes of chronic cough would be covered ***(Culver & Ka, 2002).***

In 2004, Birring et al., brought another rare cause of chronic cough to attention. That was chronic tonsillar enlargement. This is a condition that might potentially be associated with upper airway inflammation and cough.

Chronic tonsillar enlargement is not widely accepted as a cause of chronic cough although there is one case report of improvement in cough following lingual tonsillectomy in a child ***(Lewis et al., 2000).***

Patients with compromised immune systems and chronic cough usually have the same disorders causing cough as in the general population. They may also have a variety of infections not usually encountered in immunocompetent hosts depending on the nature and severity of the immune defect. So, in immunocompromised patients presenting with cough, the initial diagnostic evaluation should be the same as that for healthy hosts.

Opportunistic infections should only be considered when these diagnoses have been excluded ***(Rosen, 2006).***

Occupational and environmental factors may be a cause of cough or may exacerbate cough that has been initially caused by other mechanisms. Therefore, occupation and environment should be considered as possible factors when evaluating every patient with cough ***(Tarlo, 2006).***

Unsurprisingly, cigarette smoking had a dose related influence on the prevalence of productive cough. In clinical practice however; smokers readily ascribe their cough to tobacco and rarely seek medical advice specifically to combat this. As a consequence, the incidence of smoking related cough presenting as an isolated symptom in secondary care is low ***(Jankovic, 2001).***

On the basis of expert opinion, the diagnoses of habit cough or psychogenic cough can be made only after an extensive evaluation is performed that includes ruling out tic disorders and uncommon causes of chronic cough and when cough improves with behavior modification or psychiatric therapy. In adult patients with chronic cough that remains persistently troublesome despite an extensive and thorough evidence-based evaluation and after behavior modification and/or psychiatric therapy have failed, unexplained cough should be diagnosed rather than habit cough or psychogenic cough ***(Irwin et al., 2006).***

So, in up to 20% of the patients; cough remains unexplained even after extensive diagnostic investigations and therapeutic trials. In this group of patients in whom the cough gets labeled as idiopathic chronic cough, the

challenge is to find the precise mechanism responsible for the troublesome symptom so that appropriate therapeutic measures can be initiated to relieve cough. It is worth saying that making the distinction between psychogenic or habit cough and unexplained cough can be very challenging ***(Prakash, 2006).***

Mechanisms of cough

Cough receptors are located in the larynx and other upper airway structures as well as in the lower airways. All conditions associated with upper airway inflammation are commonly implicated in causing chronic cough ***(Fuller & Jackson, 1990).***

The available theories suggest that mechanical stimulation of the pharynx by mucous is not adequate for the production of cough. Inflammatory mediators in the lower airways are raised in upper airway cough syndrome (UACS), cough variant asthma and GERD. The theory that an inflammatory process is affecting one airway is a plausible one. Nasal disease is more likely to result in cough from the co-existing involvement of the lower airways through an undefined pathway and eosinophil and mast cells mediation appear a likely mechanism ***(Ohara & Jones, 2005).***

Tics are sudden, brief, intermittent, involuntary movements (ie, motor tics), or sounds (ie, phonic or vocal tics). Phonic tics can consist of coughing, throat clearing, sniffing, grunting, squeaking, screaming, barking, blowing, and making sucking sounds. Transient tic disorders, chronic vocal tic disorders and Tourette syndrome are a part of a much larger list of conditions in which patients can present with cough tics. All of these

conditions must also be ruled out before diagnosing habit cough or psychogenic cough in a patient ***(Jankovic, 2001).***

Chronic cough in pediatrics

Pediatric chronic cough (ie, cough in children aged less than 15 years) is defined as a daily cough lasting for more than 4 weeks ***(Hay et al., 2003).***

This time frame was chosen based on the natural history of upper respiratory tract infections (URTIs), in children and differs from the definition of chronic cough in adults. Chronic cough in pediatrics is subdivided into specific cough (ie, cough associated with other symptoms and signs suggestive of an associated or underlying problem) and nonspecific cough (ie, dry cough in the absence of an identifiable respiratory disease of known etiology). Hereby, we are concerned with nonspecific cough as specific cough encompasses the entire spectrum of pediatric pulmonology ***(Chang & Glomb, 2006).***

Unlike adult data; the relationship between cough and upper airways disorders, asthma, gastroesophageal reflux disease (GERD) is less convincing in children. Other considerations for the etiology of nonspecific cough include the inhalation of a foreign body, airway lesions, environmental pulmonary toxicants, nonasthmatic eosinophilic bronchitis (poorly described in the pediatric literature), respiratory infections and postinfectious cough, the side effects of medications and otogenic causes ***(Wubbel & Faro, 2003).***

Pediatric patients with chronic cough should be managed according to child-specific guidelines which differ from those for adults as the etiologic

factors and treatments for children are sometimes different from those for adults. Cough in children should be treated based on aetiology, there is no evidence for using medications for the symptomatic relief of cough. If medications are to be used, it is imperative that the children are followed up and therapy with these medications stopped if there is no effect on the cough within an expected time frame. An evaluation of the time to response is important. Irrespective of the diagnosis, environmental influences and parental expectations should be discussed and managed accordingly. Cough often impacts the quality of life of both children and parents, and exploring parental expectations and fears is often valuable in the management of cough in children ***(Chang & Glomb, 2006).***

Approaching a case of chronic cough

It has been suggested that some patients with chronic cough should not be treated symptomatically, but first should be evaluated for the causes of cough. It has been widely accepted for over 20 years that the causes of chronic cough can be proven in 88 to 100% of patients with a diagnostic algorithm regarding the causes of chronic cough. The common causes of chronic cough are postnasal drip (PND), cough-variant asthma and gastroesophageal reflux disease (GERD) ***(Kastelik et al., 2005).***

Recently, questions have arisen over the cost effectiveness of diagnostic protocols which involve an elaborate series of laboratory investigations. A number of recent studies have suggested that trials of empirical treatment for chronic cough offered a more cost beneficial option than laboratory testing. It is therefore timely to review the investigations

currently available to highlight those which are most useful and to consider the future role of new tools in the evaluation of cough ***(Lin et al., 2001).***

In the last 30 years there have been considerable advances in our understanding of the mechanisms and management of cough. Basic science has combined closely with clinical practice and the pharmaceutical industry to develop new diagnostic and therapeutic strategies. Currently, self-medication with over the counter (OTC), antitussives probably remains the best approach for cough associated with upper respiratory tract infections, despite doubts as to their efficacy. However; the management of chronic cough remains a challenge for the clinician ***(Schroeder & Fahey, 2002).***

Anatomy and physiology of cough

Anatomy of the respiratory system

The respiratory system extends from the mouth and nose down to the tiny sacs in the lungs (called alveoli) where oxygen is transferred into the blood stream. The respiratory system is one continuous tract designed to bring in air from the atmosphere and deliver fresh oxygen to the blood. It