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Poorly perceived asthma

It has been recognised for some time that some patients perceive the severity of their asthma rather poorly. This may put the patient at a disadvantage because it may lead to undertreatment and be potentially dangerous because the severity of an exacerbation may be underestimated. Since the important observations made by Rubinfeld and Pain on perception of asthma[1 2] there have been relatively few studies to investigate this further. The reasons for poor perception of asthma in some patients are not obvious, but poor perception may be of particular importance in understanding fatal and near fatal asthma attacks. One of the problems has been the difficulty of measuring perception, which essentially calls for quantification of a sensation such as dyspnoea or chest tightness. This has usually been achieved by using visual analogue scales or handgrip dynamometry, which are surprisingly reproducible.[3]

Poor perception of asthma

The factors that influence perception of asthma are poorly understood. Some studies have addressed this question and have examined the relation between induced bronchoconstriction or increased resistive loads to inspiration and the sensation of dyspnoea. It is well known that patients with asthma may have impaired lung function, as measured by spirometry with a peak flow meter, without being aware of any symptoms. Asthmatic patients have a higher threshold for detecting increased resistive loads than normal subjects,[4 5] suggesting that the resting airway obstruction may be responsible for the reduced perception. Support for this suggestion comes from the finding that those asthmatic patients who perceived an increase in airway resistance after an inhaled cholinergic agonist least accurately were the patients with the greatest initial airflow obstruction.[6] This is consistent with the well described principle in sensory physiology that detection of a change in a physiological parameter depends on the magnitude of the starting value (Weber fraction). Perhaps blunted perception in patients with more severe airway obstruction is an adaptive response.

In this issue of *Thorax* (p 410) Connolly and co-workers describe reduced awareness of bronchoconstriction induced by methacholine in elderly asthmatic patients and normal individuals.[7] This impaired perception of bronchoconstriction applied equally to the asthmatic and the normal subjects, suggesting that it may be a feature of aging rather than of asthma. Among the asthmatic patients poor perception was unrelated to duration or severity of asthma.

Mechanisms of poor perception

The reason for impaired perception of bronchoconstriction in the elderly is by no means clear. Afferent information from the respiratory tract is conveyed by several types of sensory receptor.[8 9] "Irritant" receptors are myelinated nerve endings (A fibres) in the epithelium, which respond predominantly to mechanical stimuli but may be activated by inflammatory mediators such as histamine; in large airways these receptors function as "cough" receptors. Bronchial C fibres are unmyelinated and far outnumber irritant fibres; they may be activated by mediators such as prostaglandins and bradykinin. A recent neurophysiological study in which recordings were made from single fibres in guinea pig airways showed that A fibres are activated only by mechanical stimuli whereas C fibres are activated by the irritant capsaicin and by bradykinin.[10] It would be of great interest to know whether the bronchoconstrictor response to inhaled bradykinin, which is mediated via airway sensory nerves,[11] is impaired to a greater extent than the response to methacholine in elderly asthmatic patients. Whether the function of sensory fibres becomes impaired in old age is not yet certain. There is some evidence that cough responsiveness is unaltered with age, though more studies are needed.[12] The impairment in perception may be more central, and there is some evidence for impairment in central processing with age.[13] The dyspnoea of bronchoconstriction may also arise from afferents in the chest wall, which may be "reset" in asthma because of hyperinflation. Possibly perception of this hyperinflation is impaired with aging.

Effects of treatment

The effect of different anti-asthma medications on perception has not been studied in detail. β Agonists dramatically relieve the symptoms of asthma, such as chest tightness,[14] and this is believed to be due to the rapid reversal of airways obstruction due to relaxation of airway smooth muscle. β Agonists may, however, have an additional effect on perception by a direct inhibitory action on afferent nerve endings in the airway. In guinea pig airways β_2 receptors appear to inhibit the release of neuropeptides from sensory nerves, indicating that these nerve endings express β receptors.[15] This may also be true in human airways because salbutamol has an inhibitory effect on cough induced by prostaglandin $F_{2\alpha}$ and the enhancement of capsaicin induced cough by prostaglandins, which appears to be unrelated to bronchodilatation.[16] Sodium cromoglycate and nedocromil sodium may reduce perception of bronchoconstriction via an inhibitory effect on the activation of airway sensory nerves, which has been shown in animal studies.[17 18] Nedocromil sodium is very effective in inhibiting the chest tightness induced by inhaled sulphur dioxide and bradykinin in asthmatic patients.[19 20] In a series of studies on the effects of anti-asthma drugs on perception cromoglycate was found to have little effect on perception, but theophylline appeared to increase perception of symptoms and beclomethasone dipropionate reduced perception.[21] It is also possible that some drugs may alter perception of asthma symptoms without having any effects on the underlying disease; sedatives, for example, may impair perception of asthma, leading to more severe exacerbations. The effects of other centrally acting drugs on perception of asthma have not yet been explored.

Clinical implications

There are important clinical messages from these observations. Impaired perception in some patients with asthma and in the elderly may lead to underestimation of the severity of asthma, resulting in undertreatment. Reduced awareness of bronchoconstriction during exacerbations of asthma may result in delay in starting preventive treatment and in seeking medical attention. Possibly, as Connolly and colleagues point out,[7] this is a factor contributing to the high mortality from asthma in elderly patients.[22] This suggests that objective measurements of airflow obstruction should be encouraged in elderly patients and should be mandatory in any patient known to be a poor perceiver. There are also implications for trials of asthma drugs, as symptom scores are commonly used in the assessment of treatments in chronic asthma; when elderly patients are included perhaps less emphasis should be placed on symptom scores and the use of rescue bronchodilators. Some drugs, such as inhaled steroids, may reduce percep-

tion of bronchoconstriction; this could lead to undertreatment of the disease as the improvement in symptoms may be greater than the control of the underlying inflammation. More research on the effects of drugs on perception of asthma and the reasons for poor perception of asthma in some patients is now needed.

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