Some Clinical Problems in Patients with Airways Obstruction*

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The physiologic approach to the clinical problem of airway obstruction is too often limited to laboratory measurements made on one or a few occasions, on an individual patient or upon a group of patients. The observations are then summarized by the unwary physician by labels, which have the implication of well recognized lung pathology, but for which in the individual in whom they are applied there is in fact little or no evidence. Thus, on the basis of apparent irreversible airway obstruction, the term chronic bronchitis may be applied when there is no history of cough or sputum and no longitudinal records of airway resistance measurements; on the basis of large lung volumes, emphysema is applied when the radiograph is incompatible; and on the basis of wheeziness and airflow obstruction, the term asthma is applied when, on the measurements available, there is no evidence of reversibility. In attempts to avoid these well-known pitfalls, the intellectually elite have sometimes used the term, chronic obstructive airway disease. This term has the virtue of avoiding one set of disadvantages, but promptly presents equally great ones, in that it fails to make important practical distinctions so necessary for good management. As it bears no relation to any recognized pathology, it thus, by including all, means virtually nothing.

If the clinician is to predict pathology, and thus apply treatment rationally, we have to do better; but to be practical, we have to be simple. There still remains a considerable gulf between the physiologist, with his increasingly sophisticated laboratory tests, and the clinician, caring for large numbers of patients suffering from these exceedingly common conditions. The clinicians often fail to make the most of what the physiologist has to offer, but the physiologists have all too often failed to reach out and recognize the subtleties of the clinical problems.

Even to a group of international experts, it is appropriate to illustrate some of the real clinical problems, to consider the diagnostic errors which frequently arise, and to consider how far our research is focusing upon the questions to which the clinicians require answers. I recognize that much of what I shall say is very familiar and is routine in clinical practice, but so long as the standard clinical management of patients with chronic airways obstruction remains generally poor, the onus for the latter must remain firmly with us for having failed as teachers.

Terminology

There is no point in attempting to seek agreement on definitions for the clinical use of the word asthma, chronic bronchitis and emphysema. However, a widely accepted (if not universal) definition for asthma is in terms of reversible airway obstruction. There is also widespread use of the MRC-proposed definition for chronic bronchitis in terms of chronic cough and sputum, and there is widespread acceptance of the term, destructive emphysema, as an increased size of the airspaces distal to the terminal bronchioles with disruption of alveolar walls.

Having summarized these three sets of characteristics (which is a practical exercise having therapeutic implications), it is often assumed that the conditions thus defined are, in individual patients, necessarily mutually exclusive. Physicians overlook the fact that if asthma is defined in terms of function, bronchitis in terms of symptoms, and emphysema in terms of pathology, then clearly they will not necessarily exist in exclusion from each other. As illustration of this fact, 98 (25 percent) of 385 consecutive asthmatic patients (as defined in terms of reversibility) also fulfilled the MRC criteria for chronic bronchitis, while 75 percent did not.

On the other hand, there are very good clinical reasons for the splitting rather than the lumping approach to the analysis of disorders having demonstrable airway obstruction because the therapeutic opportunities are distinctive. For example, if a patient with MRC-designated chronic bronchitis has in addition an important component of reversible airways obstruction, it matters less about the academic argument regarding nomenclature and far more that the

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patient receives appropriate palliative treatment.

Leaving aside the problems of semantics, let us consider some practical clinical issues where our knowledge of pathogenesis is deficient and where the approach to therapeutic assessment can often be improved.

**Sympathomimetic Responsiveness with Persisting Instability**

One of the major problems in the management of clinical asthma is that of easily demonstrable sympatomimetic responsiveness associated with persisting instability of the airways, in spite of all attempts to achieve stabilization using slow release bronchodilator compounds and full doses of prophylactic drugs (steroids, cromoglycates, theophylline or indeed the regular administration of atropine in maximally tolerated doses, Fig 1). The problem is compounded by the demonstration of at least two distinct patterns of instability—the *morning dipper*, with fluctuating asthma following a diurnal pattern and showing very little airway obstruction during the day-time, and the *chaotic or brittle* asthmatic patient with an unstable pattern throughout the day and night. The cause of this drug-resistant instability, or indeed of the distinctive patterns, is unknown. The problem is an important one, not only in terms of therapeutics, but also because there is evidence that these unstable cases may be at high risk in terms of sudden death.

**Irreversible Airway Obstruction with a Reversible Component**

This problem has many aspects. While the explanation for the irreversible component in some asthmatic patients is fairly easy to understand, such as those with very longstanding asthma, those with associated fea-

![Graph](image)

**Figure 1.** A record of peak flow readings taken every two hours over one week in an asthmatic showing continuing reversibility with an aerosol bronchodilator (---) but total lack of airways stability even with intensive maintenance therapy. (Note: the absence of effect with cromoglycate had been demonstrated previously but is not shown on this record.)

tures of chronic bronchitis and those who smoke, less attention has been given to those without these obvious explanations who develop an irreversible component at a very young age. These cases contrast with the majority who, while having a history of equally severe asthma, remain completely reversible on appropriate treatment. In a recent study of a consecutive series of patients with asthma of at least 30 years’ duration, 40 percent of 30 cases were still able to achieve a peak flow reading within the normal range at some time during twice daily observations over a two-month period. Incidentally, this study also emphasized that the asthmatic patients developing the most severe irreversible component were those with complicating bronchopulmonary aspergillosis.

Quite a distinct clinical problem is the important group of patients with severe primary emphysema with clear radiographic and physiologic evidence of destructive emphysema who, in addition to the very severe irreversible airway obstruction, also have a reversible component. Even minor improvements in this may result in major relief of symptoms, probably due to the accompanying (and demonstrable) deflation. Where there is obvious evidence of gross emphysema, it is easy to overlook a minor but treatable aspect.

**Apparent Irreversible Airflow Obstruction**

There are several reasons for physicians concluding incorrectly that a patient has irreversible airways obstruction. It is common knowledge that an asthmatic subject may be refractory to bronchodilator drugs on one particular occasion, but have totally reversible airway obstruction on appropriate treatment. Many clinical trials, however, are often based on selection of patients in whom assessment of reversibility is made on a single occasion only; such a selection must result in biased sampling.

Much too frequently, drugs are tried in individual patients (both as out-patients and on the wards) without any attempt at objective records of airflow obstruction being obtained. When patients have severe and persisting disability and when simple recording devices are available, it could be regarded as negligent to propose that drug responsiveness can be assessed on the basis of subjective reports from the patient alone. Systematic documentation of therapeutic attempts (in individual patients quite as much as scientific and formal drug trials) is essential for economic and effective management. The responsiveness to corticosteroids in particular demands objective assessment. A case history will illustrate the complexity of the clinical problem.

**Case Report**

The patient complained of slowly developing exertional dyspnea...
over several months, was diagnosed as having chronic bronchitis and emphysema, and not treated. She did not have episodes of breathlessness and there was no audible wheeze; she had no cough or sputum production and was a non-smoker. Her peak flow was reduced to 180 L/min and her FEV₁ was reduced disproportionately to the FVC (0.8/2.4 L). A longitudinal record of peak flow measurements over two weeks showed little variability and no response to bronchodilators. The chest radiograph did not show hyperinflation (Fig 2) and the peripheral vessel pattern was normal. The domes of the diaphragm were not flattened. Her carbon monoxide transfer factor was normal. There was no blood or sputum eosinophilia and her skin tests were negative. Thus, she did not have clinical chronic bronchitis or typical radiographic and physiologic features of destructive emphysema. Obliterative bronchiolitis-bronchitis was a possibility and she gave a prior history of her symptoms dating from an attack of influenza. However, treatment with corticosteroids demonstrated that her refractory airway obstruction was in fact totally reversible (Fig 4).

**Discussion**

It is probable that there are a great many such patients who have been inappropriately labelled and where objective measurements over short periods of time may have actually been misleading. If such problems exist which are reversible by therapy with corticosteroids, others also certainly exist which are reversible with administration of atropine. It is our routine to measure atropine responses in patients refractory to bronchodilator drugs (sympathomimetics and theophylline derivatives) and steroids, particularly those without cough and sputum and particularly those with hyperinflation, but with a normal KCO.

The peak flow meter, although invaluably simple and ideally suited for measurements at home and at frequent intervals, has limitations, particularly in those cases where therapy causes major improvements in the FVC (forced vital capacity) without change of FEV₁ or peak flow. The lungs deflate, the patient reports great improvement, and if the drug happens to be a corticosteroid, then the effect may be attributed to euphoria and the true physiologic changes fail to be recorded.

These few examples show the value of longitudinal measurements of airflow obstruction in the assessment of drug responsiveness, yet Cochrane and Clark¹ found that even in asthmatic patients with acute and severe attacks admitted to major teaching hospitals in the United Kingdom, objective measurements were totally inadequate. There is reason to believe that the U.K. is not alone in this omission.

**Asthma Without Wheeze**

Patients may appear with breathlessness, but without wheeze. This may occur in exceedingly severe cases of asthma, but the history of previous asthma and the relatively short history of severe breathlessness,
the presence of pulsus paradoxus, and tachycardia usually suggest the correct situation.

Occasionally, patients are not so acutely ill, have no wheeze but show gross hyperinflation on the chest radiograph. Under these circumstances, destructive emphysema is often diagnosed in spite of many distinguishing clinical features (Fig 5). In asthma, the radiographic feature of a unified attenuation of peripheral vessels, the low but curved domes of the diaphragm, the uniformity of breath sounds, and the normal KCO in spite of an increased TLC are characteristic. By contrast, in emphysema, the vessel attenuation is irregular with the best perfused parts of the lung identified by marker vessels, the domes of the diaphragms are flat as well as low, the breath sounds are diminished irregularly throughout the chest corresponding to the x-ray film findings. The raised TLC is associated with a low KCO. When the overall clinical features are observed, diagnostic difficulties should rarely arise, but in practice, a distinction between reversible hyperinflation and destructive emphysema is very often confused, with disastrous ensuing therapeutic errors.

THE VARIED PATHOLOGY OF IRREVERSIBLE AIRWAYS OBSTRUCTION

Irreversible airway obstruction is of several well-defined clinical types:

(1) Without intrinsic airway narrowing but with marked airflow obstruction on expiration due to airways collapse. In these cases, slow vital capacity measurements may be much better than forced maneuvers. This pattern is often seen in patients with other clinical characteristics typical of destructive emphysema.

(2) Evidence of intrinsic narrowing with, in addition, a clear history of intermittent asthma, but not of MRC chronic bronchitis or clinical features of emphysema.

(3) Intrinsic airway narrowing with a history of MRC bronchitis, ie, typical chronic bronchitis.

(4) Intrinsic airways narrowing without MRC-designated bronchitis or a history of asthma. These cases are almost invariably not distinguished from bronchitis and emphysema. In some of them, the pathology has been shown to be distinctive, and in fact to have the features of obliterator bronchiolitis. While well recognized in infants, the frequency of this in adults is unknown. Reference to the disorder in current textbooks is minimal; the etiology, although occasionally identified when the condition follows severe viral pneumonia, is, in most cases, unidentified. The natural history has not been described.

We have recently identified obliterator bronchiolitis in a group of previously misdiagnosed patients with rheumatoid arthritis. The pathology was confirmed and was distinctive from that of chronic bronchitis and asthma, and there was no evidence of destructive emphysema. The natural history was also distinctive in that many patients succumbed with
severe irreversible airways obstruction in less than two years from their first symptom of breathlessness.

The importance of this example is that in every instance these patients had been previously misdiagnosed and, in consequence, the syndrome occurring in association with rheumatoid arthritis had, we believe, not been described in detail before. Now that the clinically distinctive features ofobliterative bronchiolitis in adults can be recognized, it is likely that many more cases (with and without arthritis) will be identified in the future.

CONCLUSION

Advances in the better management of patients presenting with various forms of chronic airway obstruction can only be made when the elegant measurements made in the physiology laboratory are translated into practical simple procedures for the clinician to use repeatedly to monitor airflow obstruction over long periods, and are integrated with all other clinical data, particularly the history, the chest radiograph, and the clinical signs.

REFERENCES

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