
CLASSIC PAPER

Asthma in the British Army - Commentary

A McD Johnston

Major Charles Evander Vass Sutherland MB MRCP FRACP RAMC qualified in Melbourne in 1920 and by 1925 had started the first asthma clinic in Melbourne, Australia. In the late 1920s and early 1930s he published numerous articles on asthma, allergy and desensitisation therapy in the Medical Journal of Australia. He worked with physicians at Queens University Belfast, and in London, and carried out research on soldiers with asthma which showed that a high proportion of them reacted strongly to house dust antigens, and that a significant proportion responded to desensitisation therapy. In his letter to the BMJ reporting the promising results of desensitisation in 100 soldiers he wrote: "Exigencies of war have prevented further work on...(desensitisation)... at present".(1)

This paper by Sutherland(2) was published in May 1942, a few months before his BMJ paper, and opens with a paragraph outlining the effects of asthma on servicemen, then goes on to give a description of the treatments then in favour. It was written about 30 years before the widespread availability of inhaled beta-agonists.(3) To a greater or lesser degree all of the treatments he described were soon to be superseded, replaced by the synthetic chemicals that followed the postwar renaissance in pharmacology.

Sutherland's description of the types of Asthma harks back to the medicine of the late 19th century(3). His description of the pathophysiology and the distinction between intrinsic and extrinsic causes have not changed a great deal since the paper was written.

Earlier authors had recommended remedies including ipecacuanha, apomorphia, ethereal tincture of lobelia, amyl nitrite, chloroform, and several proprietary brands of herbal "Asthma cigarettes".(4) Adrenaline was known to be effective in asthma in 1903, though first pass metabolism prevented oral formulations from working well. Intranasal adrenaline use was described in the BMJ in 1909 by Dr Craufurd Matthews(5) Strong coffee was proposed as a treatment on an anecdotal basis followed in the 1920s by the synthetic methylxanthines, though just how well they really work is still debated! Isoproterenol was used from 1949, but its side effects were unpleasant, and it was only over the next 20 years that more tolerable agents became available.

The treatments Sutherland described may be found in textbooks of the period.(6) The Iodide referred to is Potassium Iodide, given at doses of 10 grains or 0.6 grammes as a mucolytic. Other treatments included epinephrine given as ½ to 1cc 1:1000 subcutaneously. Atropine and ephedrine were also used as were various patent medicines such as an inhalation of the anticholinergic rich leaves of Datura stramonium (Thornapple or Jimson Weed) mixed with saltpeter.(7) Sutherland recognised that ephedrine was ineffective, and probably also had little faith in the "Asthma Cigarettes" as he did not mention them. He describes in detail subcutaneous injections of the various offending proteins and vaccines used as desensitisation treatment. Despite his enthusiasm for desensitisation this treatment was not without its problems, and vaccination in particular caused fatalities when serum prepared in horses was given to those sensitive to horse antigens.(3) Even today the role of desensitisation is still unclear.(8,9)

In the following years change was rapid. In 1963 Dr ER Boland, Civilian Consulting Physician to the Army stressed the psychological component of asthma, and the relation between asthma and atopy was clearly described. Treatment had changed, and the synthetic derivatives of adrenaline, Isupren and Aleudrin (both isoprenaline), were available as handheld inhalers. Steroid therapy was recognised to be effective but to risk making the patient "a Cushingoid zombie". Boland had been involved in more rigorous controlled trials of desensitisation at Guy's Hospital and although the trials had been curtailed by the outbreak of WWII he clearly felt desensitisation did not work.(10)

Sutherland's article was written at a point where pharmacologic therapy for asthma and indeed medicine as a whole was about to undergo a paradigm shift. It provides a snapshot of the evolution of treatment at a time where adrenaline had proved to be an effective drug, albeit one with unpleasant side effects. Other historical treatments were being discarded, and the medical science of the day suggested desensitisation was effective.

Sutherland made several observations about the military aspects of asthma, and stressed both the potential to retain useful

Major A McD Johnston
MRCPI RAMC
Specialist Registrar in
Respiratory and
Intensive Care
Medicine
Honorary Clinical
Research Fellow
Department of
Medicine
University Hospital
Birmingham
Edgbaston
Birmingham B15 2TH
Email: amcdj@doctors.org.uk

soldiers in whom adrenalin inhalers were effective and the importance of downgrading those who did not respond. He made a strong case for collecting all of the cases together to be seen in a specialist center similar to his own in Melbourne, making him perhaps the first advocate of a Royal Centre for Defence Medicine. His prospective studies of the response to sensitivity tests are an early example of the scientific method, of which he would appear to have been a leading proponent.

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C Sutherland

During the past two years large numbers of soldiers have been discharged from the Army on account of asthma. Many of these were well trained men in responsible positions and these discharges represent a serious loss at a time when the question of man power is becoming acute. In addition there are many soldiers still in the forces whose efficiency is being reduced by more or less frequent attacks of asthma.

The outlook in asthma is regarded with pessimism by many physicians and this probably accounts for the lack of effort to deal effectively with these cases which is manifest at present. It is often held that the chance of cure is remote, that the patient will break down just when some crisis attacks and that it is better to discharge him if one or two severe attacks have occurred.

It is sometimes not realised that there are several distinct types of asthma and that a majority of those asthmatic subjects who get into the Army suffer from a kind which frequently responds well to treatment. There would seem to be no doubt, therefore, that much more could be done to render these men effective although the prognosis admittedly depends on such factors as climate, environment, associated diseases, diet and on the keenness of the patient to get well.

Another misconception is that investigation and treatment are complicated. Some obscure types do require complicated investigations and if encountered, are better discharged, but the type met with commonly in the Army can be effectively tackled with quite modest equipment and with a minimum expenditure of time. At present these cases are scattered in twos and threes throughout many hospitals so that it is not worth while for anyone to get together

the necessary equipment. If they were collected into one or two centres a large number could be handled with much less effort and greater efficiency.

Types of Asthma

Cases may be divided into (a) those in which "extrinsic" factors such as pollens, dusts and animal emanations determine the onset of attacks and (b) those in which the determining factors (chronic infection, reflex irritation from nasal polyps, etc., or more obscure causes) seem to lie inside the patient. In the "extrinsic" cases, attacks naturally vary with changes of season or environment and skin tests show reactions to pollens, dusts, etc, whereas, in the "intrinsic" cases, environment and season have little effect on the incidence of attacks, skin tests are usually quite negative and associated diseases of the nose or bronchi are much commoner. The prognosis in the former ("extrinsic") type is generally infinitely better, partly, perhaps, because the causes of the attacks are more clearly defined and it is fortunate that, among civil patients, about 70 per cent are of this type. In the Army the proportion is even higher because the intrinsic type tends to be severer and to occur among older patients so that they don't get into the Army.

The Causes of Asthma

The dyspnoea of asthma is due partly to swelling of the bronchial mucous membrane and to the secretion of rubbery sputum but mainly to bronchiolar spasm. This may be produced reflexly by irritation of a sensitive area or by the local action, in the muscles, of histamine-like substances produced by the absorption of allergens: no doubt other causes of spasm will be discovered later.

When hypersensitiveness (or allergy) is the precipitating cause, gross exposure to the specific allergen will cause attacks and complete absence of the allergen (eg in the pure air of mountains, oceans and deserts) will give complete and lasting freedom. Skin tests almost invariably give marked reactions which fit in beautifully with the history. However this is not a complete explanation because many hypersensitive individuals who are constantly exposed to moderate concentrations of their specific irritant, get periodical attacks as if some other variable factor (some biochemical "tide"?) played a part. At present the known facts can, perhaps, be expressed by saying that all asthmatics are unduly responsive to many different stimuli (chemical, thermal, mechanical, pharmacological, physical, etc) and that, in a large proportion, the most obvious stimulus is an allergic one.

The allergic hypothesis has come in for some well-merited criticism because of its over-emphasis by some enthusiasts but some of the critics have themselves been misled by the use of poor testing reagents so that they have grossly underestimated the incidence and significance of allergy. Poor therapeutic results also are often due to lack of thoroughness in dealing with environment and to the use of feeble protein extracts in attempting specific desensitization.

The question of potency of protein extracts is very important and it is regrettable that some of the commercial extracts are either feeble or inert. A good extract should be quite inert when applied to a scratch on the skin of a normal individual and should produce a large, irregular itching wheal when similarly tested on the skin of a specifically hypersensitive subject. Some liquid extracts rapidly lose activity and, until more reliable preparations are available, it is generally better to use dry, sterile, defatted powders prepared from the crude proteins (animal danders, feathers, kapok, orris root, linseed, house dust and pollens) by repeated washing in fat solvents such as toluol, carbon-tetrachloride and ether. A drop of alkaline saline is applied to each "scratch" and the powder mixed to a paste on the spot. Intradermal tests are only necessary when it is impossible to obtain potent test reagents. For example, it is sometimes difficult to prepare satisfactory extracts of feathers, sheeps wool and orris root.

Investigation

Effective treatment is possible only when the real causes of a malady are defined and then assessed at their relative importance. Much investigation can be done which, perhaps, is useful in excluding associated diseases but which does not succeed in bringing to light the really important factors

Thus asthmatic patients often undergo repeated careful clinical examinations assisted by radiology of the chest, sputum examinations, E.N.T examinations, blood sedimentation testes, etc and yet the poor results of treatment strongly suggest that the real cause has been missed. The direction which investigations take is largely determined by the theories the investigator holds and, in the present state of knowledge, there is no doubt that the allergic aspect must be investigated. Whatever its defects, the allergic approach does often give dramatically good results and there must be few physicians who have really tried it on a large scale who would disagree with this.

From a military point of view the ideal is to define the causes by simple means, to apply the best treatment thoroughly and to return the soldier to complete health in the shortest possible time. If complete cure is impossible, his future capacity must be gauged and he must be placed in the most suitable category and instructed how to maintain his health.

Investigation involves a very detailed history, a thorough examination assisted by appropriate measures to exclude associated diseases, examination of a very fresh specimen of sputum for cells, bacteria, etc., thorough examination of the nose and throat and tests for hypersensitiveness. Thorough tests might require the use of over sixty reagents, but in a majority of cases, as few as twenty tests are sufficient. Occasionally something important will be missed but the time wasted in the routine use of large numbers of extracts would seldom be justified. But it is critically important to use only extracts of known activity and to apply them skilfully. Testing should be done in a good light and, if there are many cases, it is far better to train a technician or nurse in the work so that the physician is left free to deal with other aspects.

Generally a well taken history and the routine clinical examination will distinguish between asthma and bronchitis but, when there is doubt, auscultation of the chest before and twenty minutes after an injection of adrenalin gives valuable help. Obscure cases of bronchitis should always be tested with adrenaline and a few of the important allergens as an appreciable number turn out to have an allergic cause and respond well to treatment once this is defined.

Treatment

Although the factor which precipitates attacks must be defined and dealt with, it is very necessary to take a wide view and to treat the patient rather than to attempt to treat only one aspect of the disease. Occasionally no obvious single factor can be defined and yet, when the patient's health is

improved by attention to diet, environment, psychology, exercise and general routine, the attacks cease. Unfortunately this is not often sufficient and a more concentrated attack must be made on one aspect. Poor results in treating obvious allergic cases are commonly due to (a) failure to attend properly to the patient's environment, (b) the use of poor quality protein extracts when attempting specific desensitization and (c) unskilful dosage and lack of persistence.

Even severe attacks, if due to extrinsic factors, subside promptly in a clean, dry atmosphere so that admission to hospital is indicated in severe attacks. The patient then remains free of attacks during his stay in hospital but relapses on returning to a relatively dusty billet. All cases with this sort of history so far tested have shown marked sensitiveness to house dust and, presumably, the dust in hospitals is less plentiful or less irritant than that in billets. It is in these cases that desensitization is so necessary as, under Army conditions, it is sometimes difficult to do much to reduce dust in billets.

In civil life, desensitization may require from three to six months but sometimes "rush" treatment is possible, giving the initial, small dose every few hours and the larger dose every day or so, so that the final dose is reached in two or three weeks. But there is an optimum time for the assimilation of each dose and, in some cases, days must elapse before another large dose can be given. This time factor is possibly the greatest difficulty in treating soldiers but it is far better to give as few as ten desensitizing doses spread over a fortnight rather than not to attempt treatment at all because even a few effective doses will produce striking improvement for months.

To make sure that the extracts which are to be used are really potent one drop of the strongest concentration should be applied to a scratch on the forearm; a good extract will produce a large, irregular, itching wheal within ten minutes. If it does not, it is simply a waste of time using the extract.

During treatment, effective doses will produce itching, redness and swelling at the site of injection within an hour and, during the next few days, will considerably raise the patient's tolerance so that the next dose may have to be doubled to produce the same degree of local reaction. When potent extracts are being administered to very sensitive subjects care must be taken not to give an overdose and the size of the local reaction must be the main guide in deciding on the size of the next dose.

Non-Specific Therapy

Non-specific therapy with agents such as peptone, milk, tuberculin and vaccines is sometimes very effective but there appears

to be no way of deciding beforehand whether or not it is likely to succeed. The results therefore do not compare in reliability with those of specific desensitization. However it is often worth trying when no obvious allergic factor is found. Vaccines probably act in a non-specific way and a mixture of pneumococci, streptococci, B, Influenza and staphylococci in a total concentration of about two thousand million per cubic centimetre is often most useful. It is important to use small doses, starting with one minim and increasing very slowly at intervals of five to seven days.

Drugs

Any full discussion of the use of drugs in asthma would be out of place here but one or two points should be emphasised. Some cases improve surprisingly with full doses of iodides and, subsequently, a small dose suffices to maintain that improvement. When attacks persist in spite of treatment, they can often be controlled by the inhalation of adrenalin (1:100); or the patient may be taught to inject adrenalin (1:1000). Thousands of asthma patients in civil life are able to carry on with this aid and it seems surprising that really useful men in the Army are not encouraged to do the same. It is a curious fact that more than half of the asthma soldiers examined had not even heard of adrenalin. Ephedrine, of course is used extensively but is a relatively feeble and unsatisfactory remedy.

Advantages of Special Centres for Treatment

In civil practice the advantages of special clinics for investigation, treatment, instruction and research have become very obvious and many of the same arguments apply in military practice. Attempts to deal with widely scattered cases are laborious, time consuming and not very effective. If these cases were collected into one or two centres it would become worthwhile to assemble the necessary equipment and staff and, helped by such an organization, one physician could handle, more effectively and with much less effort, large numbers of patients. In civil hospitals, such centres become of great use to dermatologists and otologists in elucidating obscure cases of contact dermatitis and chronic nasal disease and, in the Army, they should prove equally useful. Many cases of chronic, non-febrile bronchitis could also be reviewed with advantage at these centres.

A Survey of Fifty Unselected Cases

During the past few months fifty unselected cases (eight officers, five N.C.O.s and thirty-seven other ranks) have been studied. Time and facilities were limited but, in each case, at least five tests with some of the

more important allergens were made. In forty-five the history suggested that extrinsic factors might be import and, in all of these, skin tests showed some form of sensitiveness. Many, of course, reacted to several different substances. Forty-one reacted to house dust, twenty-four to feathers, four to horse dander, five to linseed, eighteen to grass pollens, one to mustard, one to kapok and one to trichomonas vaginalis. This high incidence of allergy (90 per cent) is remarkable because, in civil practice, it is rare to find more than 70 per cent hypersensitive. However the severest types of asthma seem to occur among the non-allergic cases and these, and cases complicated by other diseases, are eliminated when they attempt to enlist. This would account for the fact that in only three of the cases was there any obvious nasal disease.

In a number of cases rapid desensitization was attempted by giving injections of the appropriate extracts each day at first and then at longer intervals as the doses increased. Even after three weeks a marked increase in tolerance was produced but no useful assessment of the efficacy of treatment can be made until the cases have been observed for at least twelve months. However, in many cases, attacks have been much milder and less frequent and, in several attacks have suddenly ceased.

Conclusion

A survey of fifty cases of asthma occurring in the British Army shows that almost all suffer from a type in which treatment is generally very helpful. It is suggested that more effective steps should be taken to treat these cases and that they can best be dealt with in special centres.