two years' history of nasal obstruction, ultimately developing ulcerating lesions of the nose and trachea, and died after one year's illness; at necropsy an acute necrotizing arteritis was found in many organs. We feel that these two cases are perhaps examples of nasal granuloma with periarteritis, as described here.

We have been able to examine slides of nasal lesions and post-mortem specimens of four cases of classical malignant granuloma of the nose. No evidence of periarteritis nodosa was seen, and the local lesion was a chronic non-specific inflammation. Therefore we have no evidence to enable us to decide whether the classical destructive "malignant granuloma of the nose" is another manifestation of the condition previously discussed or something entirely different.

Summary

Two cases are described in which periarteritis nodosa was preceded by an ulcerating granuloma of the nasal mucosa. Seven similar cases, and possibly two others, have been collected from the literature.

The significance of the nasal lesions is discussed and the possible connexion pointed out between this condition and the so-called "malignant granuloma of the nose."

We wish to thank Mr. L. E. Gardiner for permission to publish Case 1; Dr. I. Friedmann, Dr. A. G. Stansfield, Mr. N. R. Jory, and Dr. R. H. D. Short for allowing us to see tissues from cases of "malignant granuloma" of the nose; Mr. S. E. Andrews for the photographs; and Mr. H. Eastwood and Miss K. M. Vale for technical assistance.

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The Lebanon Hospital for Mental and Nervous Disorders at Asfuriyeh, near Beirut, was opened in 1900, and since then has passed through many excitements and upheavals, but the work has gone on unbroken. Apart from a financial crisis during 1946-7, the hospital has grown steadily, the peak number of in-patients being 501 during the summer of 1938. There are now some 23 buildings (contributed by four countries) on an estate of 38 acres beautifully situated on the foothills of Mt. Lebanon, about five miles from Beirut. The present number of beds is 450, but, with the opening this year of a large new building, there will again be room for 500 patients. The latter come from 14 or 15 countries and are of a dozen different religions. They are of all types and classes, from the rich to the destitute. The hospital also runs a neuropsychiatric clinic in Beirut, which is doing important work for early cases. Developments since 1948 include a training school for Lebanese and Near Eastern student nurses, with an Asfuriyeh certificate in psychiatric nursing. Psychiatric instruction to doctors is of longer standing, and the present medical director, Dr. W. M. Ford Robertson, is clinical professor of psychiatry at the American University of Beirut, and two senior psychiatrists also share in the work of teaching. There are also special courses at the hospital for graduate doctors and nurses of various nationalities. A copy of the annual report of the hospital can be obtained on application to the Lebanon Hospital office, Drayton House, Gordon Street, London, W.C.1.

SEGMENTAL ASPIRATION PNEUMONIA AND BRONCHIECTASIS*

BY

K. D. FORGAN MORLE, M.D., D.M.R.D.

Consultant Radiologist, Liverpool Regional Hospital Board;
 Clinical Assistant, Department of Radiology,
 University of Liverpool

AND

PHILIP W. ROBERTSON, M.D., M.R.C.P.

Squadron Leader, Medical Specialist, R.A.F.; Clinical
 Assistant, Royal Infirmary, Liverpool

[WITH SPECIAL PLATE]

In a previous publication we described the clinical features of a large series of cases of segmental aspiration pneumonia (Robertson and Morle, 1951) and suggested that the syndrome of primary atypical pneumonia could be largely explained on an aspiration basis. Reference was then made to bronchographic studies undertaken in these cases of segmental pneumonia. It was stated that a wide range of bronchial abnormality might occur within such lesions and that these changes might be serious and sometimes irreversible.

These changes are now described and their significance is discussed in relation to the natural history of bronchiectasis.

So far we have carried out bronchography about 600 times on over 300 cases of segmental pneumonia. From so large a series we feel that enough evidence is forthcoming to substantiate our view that many, if not most, of the cases of bronchiectasis originate from these segmental pneumonias occurring in association with upper respiratory infections.

Bronchograms

There are many degrees of deviation from the normal, and in a few borderline cases it has been found difficult to decide whether a bronchogram was abnormal or not. This difficulty, which appears to have worried other authors (Evans and Galinsky, 1944), is a matter of some importance, as changes of such minimal nature may represent the initial stages of disease, which may later become fully established.

We classified a bronchogram as abnormal if one or more of the following features were present. (a) Dilatation: this varied in degree from minimal changes in calibre to gross and obvious dilatation. (b) Crowding: approximation and crowding together of the bronchial shadows. (c) Failure to Fill: failure to obtain satisfactory filling of the peripheral bronchi of the region studied.

Further features noted in those bronchograms classified as abnormal on the basis of the above three criteria included distortion and angulation of the peripheral bronchi and apparent irregularity of the bronchial walls. Some elucidation of the three main abnormal features is perhaps necessary.

Calibre changes vary from loss of the normal degree of taper of the bronchus as the periphery is reached to severe and obvious dilatation. In an estimation of the significance of an apparently dilated bronchus there are several features to be taken into consideration. An illusion of dilatation may be caused by solid filling of a group of bronchi. Allowance must be made for the magnification of the

*The substance of this work formed a paper given at a meeting of the Thoracic Society in July, 1951.

image of the bronchus due to the distance of the latter from the film. In serial films care must be taken to allow for physiological change in calibre occurring at different phases of respiration.

Bronchial crowding is easily recognized, and is of course due to some degree of collapse. The coexistence of bronchial dilatation with bronchial crowding is well known and extremely common (Lander, 1946).

It is characteristic of bronchography that the appearances produced are transitory and that different stages of filling are recorded on serial films (Di Reinzo, 1949). For this reason it is unwise to be content with single films, and where necessary these should be followed by additional films after further posturing.

In general, a normal bronchial tree can be completely outlined without difficulty, and persistent failure to fill suggests bronchial abnormality. For this reason it is not possible to interpret bronchograms showing incomplete filling due to inadequate technique.

Bronchography performed in the presence of a resolving segmental aspiration pneumonia will usually show failure of filling of the peripheral bronchi within the affected segment. Further, there may be damming up of the lipiodol in the more proximal portion, indicating blockage of the peripheral bronchi by exudate. Persistent attempts to fill such a segment may lead to well-marked normal alveolar filling in surrounding normal regions—the affected region, in which neither the bronchioles nor the alveoli are filled, then being clearly demarcated. The inconstant changes referred to as rippling or beading of the outline of the bronchial wall could not be relied upon as an indication of abnormality.

The frequency with which the various bronchographic abnormalities are demonstrated in segmental aspiration pneumonia is closely related to the stage in the illness at which the bronchogram is done. Thus the incidence of abnormality is greater in the earlier stages of the illness; reversion of the bronchographic change tends to occur as resolution and re-expansion take place. The three main types of bronchographic abnormality mentioned above usually coexist, though any one may predominate over the others at different stages of the illness.

It is therefore of little value to express statistically the percentage of cases showing bronchographic abnormality. Any such figures would be wholly inaccurate and misleading. Even the incidence of persisting bronchial change is difficult to determine, for this depends upon the length of follow-up, the efficacy of treatment, and the possibility of some pre-existing disease in the affected segments. As a general impression from the investigation of over 300 cases it is felt justifiable to give a figure of about 60–70% as the incidence of bronchial abnormality in all cases of segmental aspiration pneumonia. Possibly about 5% of such pneumonic lesions have led to established bronchial abnormality despite adequate therapy and observation over a period of 18 months to two years. It is not known what the last figure would be if the cases were untreated, but it would probably be very much higher.

Natural History of Bronchiectasis

In this particular series, dealing as it does with chest infections and various stages of bronchiectasis, a history of previous significant chest illness would normally be regarded as of great importance, but in our experience it has proved unreliable. The difficulty centres on the word "significant." There can be few members of the general population who do not admit to winter coughs and colds, but these are not regarded as significant by either patient or general practitioner. Most of the present series gave a history of no more significant previous illness than such conditions, though 15% gave a history of "pneumonia." In some instances this previous history, together with a recent illness, led to the performance of bronchography on the supposedly affected side. It is interesting to note that the

percentage of abnormal bronchograms in such cases was little different from that of cases with no past history of chest disease.

One is continually faced with difficulty in interpreting the accuracy of the history: What does the patient mean by pneumonia? What does he mean by a chest cold? Doubtless in many cases either of these may have been an illness of the type described here. The patient will occasionally state that he has never had a chest illness but that he has had an illness similar to his present condition, in which there are chest pain and cough and radiological changes. There is therefore much unreliable material in the patient's history.

When one takes into account the more nebulous "chesty" colds and coughs a somewhat similar picture is evident. In approximately 13% of all cases such a history was given, and it was found that 79% of these had abnormal bronchograms. This latter group actually includes most of the more severe lesions. However, most of those with gross established and widespread bronchiectasis did not give a history which one might regard as typical of that condition and certainly no more suggestive than many who were shown to have normal bronchograms.

There are three principal points which it is wished to stress in connexion with the previous history of illness. (1) In most instances a history of a specific illness such as pneumonia is of no certain value other than indicating that there has been a chest illness. The diagnosis may well have been made on scanty evidence. The site and type of pneumonia are rarely known to the patient, and there is always the tendency for him to have received an exaggerated version of the childhood illness from his mother. (2) Although it was found that a high percentage of patients with a history of chest colds did show bronchographic evidence of disease, it must not be imagined for a moment that the history was definite enough to enable one to pick it out as "significant" as compared with the histories of a large group of general medical patients. (3) In any individual case only a survey of recent events was of help in deciding upon what investigations were necessary.

It is important to try to ascertain the age of any bronchial abnormality demonstrated in a pulmonary segment which has recently been the site of an inflammatory process. One must determine whether or not the inflammatory process was superimposed upon a pre-existing bronchial lesion. This point has been discussed from a slightly different angle by Grier (1944) and Scarlett (1946), who referred to the possibility of confusing primary atypical pneumonia with bronchiectasis which is the site of a pneumonic exacerbation; and from yet another angle by Blades and Duggan (1943), who stated that bronchograms obtained after atypical pneumonia may occasionally be misleading and give the impression that the condition was true bronchiectasis. They showed that in several instances such bronchiectases reverted to normal, and they attempted to differentiate this from true bronchiectasis on clinical criteria. They do not seem to have appreciated, as did Ogilvie (1941), that this was an early stage in the natural history of bronchiectasis.

It is our view that in most instances the bronchial condition developed during the current illness. There are several points in support of this opinion: (1) so many of the patients could give no history of chest illnesses of any kind, however trivial; (2) all cases had been passed by mass miniature radiography examination within the previous few weeks; and (3) further evidence is provided by the demonstration of reversion to normal. Failure to conform to any one of these points must cast doubt on the age of the bronchial lesion.

This statement that the bronchial condition usually developed during the current illness is of fundamental significance. It indicates that illnesses such as the so-called "primary atypical pneumonia" syndrome can give rise to serious structural abnormalities within the affected segment. The fact that such structural abnormalities are

concealed calls for great care in the handling of these cases. It provides the reason for the persistence of symptoms or signs after an apparently straightforward "virus pneumonia"; it disposes of the fallacy that such illnesses are necessarily benign; and it offers a demonstration of the actual development of bronchiectasis.

The Forerunner of Bronchiectasis

What place in the natural history of bronchiectasis does this process occupy? It is our belief that this sequence of events is the forerunner of many cases of bronchiectasis. The importance of this statement lies in the appreciation of the commonness of segmental collapse and such illnesses. It has, of course, long been recognized that there is a close relationship between bronchiectasis and such collapse (Findlay, 1935; Andrus, 1937; Lander, 1946). It has not, however, been generally recognized that such atelectatic lesions are so frequent and that most of them may arise from an aspiration mechanism, as has been suggested by us. Such aspirated material is not necessarily derived from the upper respiratory tract, for local bronchial plugging may occur from failure to clear excessive bronchial secretion, as in generalized bronchitis or in asthma. Perhaps rather too much emphasis has been placed on glandular compression, foreign bodies, carcinoma, etc., which are well known to give rise to bronchiectasis but are infinitely less common. Furthermore, we believe that this type of illness forms most of the "bronchopneumonic" illnesses of childhood, the lesions being similar to those described by Lees (1950) in association with pertussis.

In some cases we have been able to observe that where there have been recurrent inflammatory episodes increasingly severe bronchial damage follows. This is suggestive of the possible course of the development of bronchiectasis.

Where obviously established and gross bronchiectasis is found, it is sometimes possible by careful history-taking or by inspection of Service medical documents to reveal an initial illness such as we have described. This may have been four to five years previously and at that time thought to be of little significance, but recurrent chest episodes of increasing severity and frequency followed. We believe that such a history is not that of infection superimposed on previously dilated and damaged bronchi but that of the gradual development of the condition. Finally, and, we feel, most significant of all, the site incidence of segmental pneumonia is identical with that of established bronchiectasis (Robertson, 1951).

Some Problems

Many problems are raised by the detection of segmental bronchial abnormality in a healthy relatively symptomless young man. Little guidance can be obtained from the literature for the long-term management of such cases, and, so far, our own experience has been limited to a three-years study.

In the management of such cases it is often most difficult to correlate the bronchographic changes with the patient's clinical state. How is one to foretell the local anatomical prognosis? Will it remain the same, or improve, or get worse? Having attempted to answer this, one then asks how the patient will be affected clinically. It is only the experience we have gained from serial bronchography on our earlier cases which has given us guidance on the likely course of the local lesion. For example, the segmental lesion may not clear radiologically and the patient may or may not have persistent symptoms; the segment may clear radiologically but troublesome symptoms remain; then, again, there may be apparent recovery radiologically and clinically, but the whole sequence may recur.

The object in all cases in which a segmental lesion has been recently demonstrated should be to arrange for a period of at least six months' observation and treatment. Bronchography should be employed as a guide to progress.

In our own work we have usually performed bronchography a second time at the end of about six to eight weeks, and, if still abnormal, again after four to six months. Most of our patients did in fact show reversion at the time of the first or second repeat bronchogram, and these have not appeared to be particularly prone to further trouble.

One of the most difficult types of case to handle is that in which bronchial damage can be persistently demonstrated but in which symptoms are so often minimal; such a condition might, under normal conditions, and remaining uninfected, be undetected for many years.

When the question of surgical treatment is raised there are again a number of points to consider. What is the risk of recurrent "pneumonia"? Is further damage likely to occur in the same or in adjacent segments? So far as the question of spread is concerned we have been able to show that further damage in the same or neighbouring segments can, and does, occur with the passage of time, although such spread may in turn be reversible if recognized.

Would it be justifiable to interfere surgically in the hope of avoiding more widespread disease with disabling symptoms in, say, 10 years, at which time conditions might be unfavourable for operation? The only patients of ours who were finally selected for local segmental resection with this in mind refused operation on the grounds of their present excellent health.

A slightly different problem is raised by the demonstration of a local segmental lesion in the presence of recurrent attacks of generalized bronchitis or asthma. It is important to recognize that such local lesions are merely incidents in the course of a generalized disturbance and naturally would not benefit to the same extent by resection. Once again the history of "recent bronchitis" may be grossly misleading, since it may indicate, as we have previously noted, repeated infection in a region with bronchial damage or an actual recurrent acute generalized bronchitis. It may be possible to differentiate between these two groups only by a period of observation, during which actual incidents may be studied.

Treatment

The purpose of this work is to indicate a major source of bronchiectasis and to suggest that the attack on this disease be shifted to a much earlier stage in its natural history.

There are two principal factors to be considered in dealing with the pulmonary lesion. These are the infection and the mechanical aspects. The lesion may be large and yet there may be little or no clinical upset. In such cases the mechanical obstructive elements predominate. On the other hand, even small radiological lesions may be responsible for a considerable degree of general illness. Treatment must be directed against either or both of these factors.

Many of the cases when first seen with their initial illness present features so strongly resembling "pneumonia" that there may be a temptation to administer the modern antibiotics at once. However, when the laboratory findings and x-ray appearances are seen it is very often evident that the condition is not consistent with this diagnosis in its more classical sense. This is even more true if the patient be first seen a day or two after the usually short acute stage. We have found that so many have recovered rapidly without specific therapy that the value of antibiotics is often subject to doubt. We do not believe that the use of aureomycin or chloramphenicol is justifiable on the grounds of a possible virus basis for the infection (Robertson and Morle, 1951). Detailed serological investigations, while possibly of academic interest, should not be allowed to cloud the appreciation of the fundamental nature of these segmental lesions. On the whole, it has seemed reasonable to restrict the use of antibiotics to those cases in which the infective element predominates.

The basis for therapy should rest upon an attempt to reverse the sequence of events which have led to the develop-

ment of the segmental pulmonary lesion. It is essential that material which has been aspirated should be removed, thereby establishing adequate aeration of the involved segment and removing the element of collapse. In addition to this process of re-aeration, drainage will prevent stagnation within the segmental bronchi and diminish the likelihood of damage to the bronchial walls.

Properly conducted postural drainage should be instituted, having first established the exact site of the lesion. Drainage may be assisted in some cases by the use of steam inhalations or by short-wave diathermy, especially when the sputum is particularly tenacious. The actual procedure of bronchography has often been observed to increase the production of sputum, with consequent local improvement.

On the other hand, bronchoscopy is not likely to prove helpful, since the bronchial obstruction is usually peripheral and multiple. The bronchial secretions have been found to be so thick and tenacious as to block the suction tube. This suggests the need for an efficient liquefying agent which could be used endobronchially, but so far none appears to be forthcoming.

Expectorant mixtures seem to have little or no effect on these lesions, while the use of opiates is "the most frequently prescribed frustrator of the vital defence of the lungs" (Jackson, 1950).

Summary

A study of the clinical and radiological features of segmental aspiration pneumonia is presented.

There is bronchographic evidence of varying degrees of bronchial abnormality within such segmental lesions. It is shown that in some instances quite well-marked bronchiectasis can be demonstrated, and though this is usually reversible it is not always so. The possible position of this sequence of events in the natural history of bronchiectasis, together with rational preventive treatment, is discussed. It is believed that most recognized established bronchiectases originate from such segmental lesions.

Without the co-operation of the medical authorities of the Royal Air Force, and in particular Air Commodore Rumball, the consultant in medicine, this work would not have been possible. Dr. P. H. Whitaker and Dr. Robert Coope, whose clinical assistants we are, have given us every encouragement and placed the full facilities of their departments at our disposal. Our thanks are due to the radiography staff of the Liverpool Royal Infirmary and to Miss Smith for the x-ray photographs. We are also grateful for much material assistance from the University of Liverpool.

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It may surprise some that the rainfall last year over England and Wales exceeded by only 0.6 in. (1.5 cm.) the average value for the years 1881-1915. Yet such was the case, according to figures published in *The Times* this week by Dr. John Glasspoole. However, the year, in England and Wales, was drier than 1951 by 7.9 in. (20 cm.). Scotland and Northern Ireland experienced a rather drier year than average last year. The most remarkable meteorological event in 1952 was the 9 in. (22.9 cm.) of rain which fell at Longstone Barrow, four miles south of Lynmouth, during the 24 hours which began at 9 a.m. on August 15. This was the third largest daily measurement recorded in the British Isles.

INFLUENCE OF OESTRADIOL BENZOATE AND ORCHIDECTOMY ON THE RETICULO-ENDOTHELIAL SYSTEM

BY

T. NICOL, M.D., D.Sc., F.R.C.S., F.R.C.S.Ed.
F.R.S.Ed.

AND

A. ABOU-ZIKRY, Ph.D., M.B., D.G.O.
M.R.C.O.G.

(From the Department of Anatomy, King's College,
University of London)

[WITH SPECIAL PLATE]

Oestrogens are used in the treatment of prostatic carcinoma and of cancer of the breast, urinary bladder, and other organs with good results, especially in the prostate. In the case of the prostate the beneficial action is accompanied by fibrosis (Fergusson and Pagel, 1945; Fergusson, 1948). Nicol and Helmy (1951) found that oestradiol benzoate, oestrone, stilboestrol, stilboestrol dipropionate, D.B.E. ($\alpha\alpha$ -di-(*p*-ethoxyphenyl)- β -phenyl-bromo-ethylene), and dienoestrol stimulated the reticulo-endothelial system in the ovariectomized guinea-pig and suggested that the beneficial effect of oestrogenic treatment in cases of cancer of the prostate may be due to stimulation of the reticulo-endothelial system and the transformation of macrophages in the prostate into fibroblasts and fibrous tissue (Jaffé, 1938; Maximow and Bloom, 1948).

The part played by the reticulo-endothelial system in the defence against cancer has been referred to by several writers. Stern (1941) showed that the function of the system as tested by the Congo-red method was impaired in 86% of patients with malignant disease. Kavetzki and Diadjuscha (1937) showed that stimulation of the reticulo-endothelial system lowered the incidence of development of cancer metastases in rabbits inoculated intravenously with Browne-Pearce carcinoma, whereas blockade of the system raised the incidence of tumour growth. Diadjuscha (1937) has also shown that implantation of Ehrlich carcinoma into mouse liver or spleen or of Flexner-Jobling carcinoma into rat testes was invariably successful when the reticulo-endothelial system was blocked, and rarely so when it was stimulated.

Present Investigations

Our investigations were designed to study the effects of oestradiol benzoate, orchidectomy, and their combination on the activity of the reticulo-endothelial cells in the spleen, liver, lymph nodes, and prostate, and on the amount of fibrous tissue in the prostate. For this purpose 28 intact male guinea-pigs and 24 double-orchidectomized guinea-pigs were used. One month was allowed to elapse after orchidectomy to ensure complete recovery from the operation and disappearance of testicular hormone from the blood. All the animals received one daily subcutaneous injection of trypan blue at 4 p.m. for six days and were killed by chloroform the next day. The dosage of the dye was calculated on the basis of 0.8 ml. of a 1% solution in distilled water per 100 g. of body weight. Six of the intact animals and ten of the orchidectomized animals were given the dye only, and served as controls. The remainder were divided into groups in which each animal received one daily intramuscular injection of 0.5 mg. of oestradiol benzoate at 10 a.m. for one, two, three, or four weeks; these animals received the injections of dye during the last six days of the hormone treatment.

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AND BRONCHIECTASIS

FIG. 1.—Bronchial dilatation.

FIG. 2.—Bronchial crowding.

FIG. 3.—Failure to fill bronchi in affected segment. Note heavy striate markings in unfilled region.

FIG. 4.—Normal bronchogram in same case as Fig. 1 after three months' physiotherapy.

FIG. 5.—Bronchogram showing some cylindrical dilatation in all basal segments of the left lower lobe.

FIG. 6.—Bronchogram of the same patient as Fig. 5, six weeks later.

FIG. 7.—Bronchiectatic changes in right middle lobe following an acute inflammatory lesion with collapse.

FIG. 8.—Same case as Fig. 7 one year later, showing some re-expansion of right middle lobe but persistent bronchiectasis.

FIG. 9.—Widespread bronchiectasis in right lower lobe. This patient originally developed segmental pneumonia five years previously.