(1937) gave daily doses of ergotamine tartrate, which they found diminished suicidal, homicidal, and destructive activity (Linderman observed the converse with adrenaline injections—namely, that patients became more subjective and introspective). Such treatments offer great individual and economic hopefulness, provided sufficient further scientific study of their relation to cerebral capillary function is made to render them scientific instead of empirical: in this direction the work of the Harvard Medical School, Boston, is to be highly commended.

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It is announced that one of the main subjects for discussion at the International Congress on Rheumatism now being organized to take place in Oxford in March is juvenile rheumatism. The views of experts from other lands on this serious malady will be of great interest, and meanwhile there is available Professor H. B. Cushing's recent Blackader Lecture (*Canad. med. Ass. J.*, 1937, **37**, 311) on this disease as it occurs among Canadian children. He places acute rheumatism and cardiac disease in childhood as taking "first place as a threatened danger to normal childhood and adolescence in this country," basing this upon figures which indicate that about 25,000 school children in Canada are afflicted with rheumatic cardiac disease. Professor Cushing reviews the possible means of attack upon this malady and describes the interesting results obtained at the Children's Memorial Hospital, Montreal, where for the past three years children with rheumatic cardiac disease have been treated in a special pavilion very much on the same lines as patients with tuberculosis are treated. It is too soon in the experiment for any definite conclusions to be drawn, but the entire staff of the hospital is convinced that the results obtained are measurably an improvement on those seen before this step was taken. Professor Cushing pleads for organized co-operative effort to secure recognition, supervision, and after-care of all cases of rheumatic fever. He sees the need for the improvement of social conditions, particularly as regards general hygiene and housing conditions. Thirdly, he makes the point that since relapses of rheumatic fever follow regularly on infections of the respiratory tract and of the throat efforts should be made to lessen such infections and improve the hygiene of the mouth and the throat of the community.

THE HEALING OF EMPYEMA CAVITIES WITH SPECIAL REFERENCE TO ASPIRATION AND AIR REPLACEMENT AS AN AID TO OPERATION

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(WITH SPECIAL PLATE)

Since the healing of empyema cavities has been investigated by repeated radiographs with lipiodol injection, it has been apparent on many occasions that the original drainage opening, though adequate at first, has during the course of re-expansion of the lung become unsatisfactory. Healing might often have been accelerated by better planning of the drainage opening. It seems that the exact shape and position of the cavity, and the way in which the lung will expand—things upon which the position of the opening must depend—are more difficult to assess than has been supposed. Ideally the drainage tube should pass perpendicularly through the chest into the empyema at a point in the wall which would normally be the last to heal. Although the attainment of this end—a matter of the greatest importance to successful treatment—might appear to be simple, it has in fact been found to present considerable difficulty. In order to place a drainage opening accurately it is necessary to understand the way in which the obliteration of a cavity normally takes place, the factors which govern this, and how they apply to the particular case under consideration.

Factors governing Healing

Healing of an empyema cavity must be distinguished from mere diminution in capacity. When pus is first removed there is in the acute case an immediate and notable diminution in the capacity of the empyema due to the return of the displaced mediastinum, re-expansion of the compressed lung, and elevation of the depressed diaphragm; but true healing is a comparatively slow

FIG. A.—Diagram showing mediastinal displacement, compression of left lung, and depression of diaphragm by a large empyema.

FIG. B.—The results of simple aspiration.

process, which depends upon the gradual and steady adhesion of the visceral and parietal walls of the empyema. The latter results from granulation-tissue formation and fibrosis all along the line of approximation of the two walls. If the pus removed from an empyema at operation is measured and the cavity immediately refilled with an antiseptic solution it is found that the amount of fluid required to fill the cavity is usually only a small fraction of the volume of pus originally present. It would be absurd, however, to suppose that to that extent healing had taken place. Figs. A and B

illustrate these immediate post-operative changes as they occur in one plane. Fig. 1 (Special Plate) is reproduced from a radiograph which was taken immediately after the aspiration of six pints of pus from the left side of the chest and the injection of a little air in order to demonstrate the level of the fluid.

Choice of Drainage Point

The line of inflammation at the union of the visceral and parietal walls of the cavity may be called the healing edge. If this line be considered as a circle, then, it might be supposed that healing would occur centripetally at an equal rate at all points of the circumference and that the ideal position of the drainage opening would be at the centre. In practice the line of union is usually irregular, but an accurate appreciation of the shape of the cavity before operation is nevertheless a guide to the choice of the point for drainage, which is most nearly equidistant from all the parts of the healing edge. The simple conception of an empyema of circular shape healing centripetally is a useful one in so far as it emphasizes the difference between the healing of an empyema and that of a simple abscess in the cellular tissues. It is, however, inaccurate in detail for a number of reasons. First, as stated above, the outline of an empyema is seldom circular; secondly, healing does not take place in a flat plane as on a sheet of paper but along the curved plane of the chest wall; and, thirdly, because inequalities in the elasticity of the walls make the rate of healing vary at different points. The second and third of these reasons require further elaboration. If the chest wall were quite rigid and the lung perfectly expansile, healing would occur along the curved plane of the chest and there would be complete re-expansion of the lung without any collapse of the chest. This end can be attained in the treatment of acute empyema if the chest wall is prevented from collapsing by the proper exercise of muscular control. All the walls of a chronic empyema may be equally rigid owing to the dense lining of fibrous tissue, and if such a cavity can be made to heal by simple drainage it may happen that the chest wall will collapse to meet the lung as much as the lung expands to meet the chest. In these circumstances healing may occur in a flat plane. If the walls of a chronic cavity are so rigid that obliteration is impossible after simple drainage, then the chest wall must be mobilized, and healing occurs along the plane of the rigid collapsed lung.

The third consideration is closely bound up in the principle of the second. Inequalities in the rate of healing at different points depend mainly on differences of elasticity, and these may be in either the parietal or the visceral wall. In the parietal wall the ribs and intercostal structures, the diaphragm, spine, and mediastinum may all be involved, and the rate of healing along these walls varies with their relative extensibility. Thus healing between lung and mediastinum is rapid compared with that between lung and chest wall. Differences also occur in the extensibility of the lung in different parts, and this is particularly well demonstrated in empyemata secondary to streptococcal pneumonia. In this disease the inflammation is primarily in the interstitial tissue of the lung, resolution is often incomplete, and scar tissue is formed. This may vary in extent in different parts of the lung, and therefore the ability of the lung to expand varies accordingly. It is sometimes seen that the most extensive scarring has occurred in the interlobar septum, and this

layer of fibrous tissue acts as a rigid band between the hilum and the periphery of the lung, preventing expansion. Fig. 2 (Special Plate) is a radiograph of such a case, in which a streptococcal empyema occurred as a result of post-operative inflammation of the right lung. It was drained through an opening about an inch above the lower part of the cavity and half-way between its anterior and posterior extremities. Healing was delayed in the region of the interlobar septum, so that the drainage track ultimately became almost vertical, leading from the original opening below to the end of the thickened, scarred interlobar septum above. The illustration shows the track injected with lipiodol. It also shows the dense interlobar septum extending from the hilum out to the small residual empyema space at the periphery.

Classification of Acute Empyemata

The classification of acute empyemata into the syn-pneumonic and the post-pneumonic, and the general recognition of the significance of these types from the point of view of treatment, have done very much to reduce the immediate mortality from operation, but now that this lesson has been learnt a classification should be considered which would help to reduce the incidence of chronic empyema with its associated morbidity and mortality. To this end two groups, simple and complicated, are suggested. The simple empyema is one in which no permanent structural alteration has taken place within the lung tissue, and where, with adequate drainage, the lung expands completely to fill the chest with no deformity of the parietes. Such an empyema should always heal without difficulty, and if it becomes chronic this can only be as a result of inefficient drainage. The complicated empyema is one in which structural damage has occurred in the lung to such an extent that complete re-expansion is impossible, and in those circumstances not only will there be delay in healing but this will occur partly at the expense of the parietes. The factor that interferes with expansion may be an acute process such as a streptococcal pneumonia or, rarely, a more chronic one such as an underlying carcinoma. Strangely enough, the existence of bronchiectasis, though undoubtedly a cause of slow healing, is not so inimical to complete cure as might be supposed, and the reason for this is not far to seek. When an empyema develops in a patient with bronchiectasis the accumulation of pus in the pleura takes place at the expense of the healthy easily compressible lung tissue rather than the hard fibrosed part. The latter remains more or less stationary during healing, and obliteration of the cavity occurs as the result of re-expansion of the compressed healthy tissue. The healing of a simple basal empyema is usually associated with slight elevation of the diaphragm and obliteration of the costo-phrenic sinus. This is strictly a change in the parietal wall, and would be of no clinical significance if it were not for the fact that drainage tubes are sometimes inserted into the costo-phrenic sinus and that inefficient drainage almost invariably results.

The placing of a particular empyema into one or other of the two classes depends on the detailed clinical history of the case and the bacteriological examination of the pleural fluid. The most significant point in the history is the relation of the febrile attack to the pleuritic pain. In general it may be said that if the pleuritic pain occurs at the beginning of the illness the empyema is likely to be a simple one. The commonest inflammatory disease which does not cause permanent structural damage to the

lung is pneumococcal pneumonia, and this is most often the cause of simple empyema. If, however, a febrile attack is the initial disturbance, followed after some interval by pleuritic pain, the empyema is likely to be a complicated one. Streptococcal pneumonia, and pneumonitis secondary to lung abscess and bronchial block, start in the depths of the lung tissue and spread outwards to the pleura by the interstitial lymphatics, so that pleurisy occurs at a later stage of the illness.

Treatment

With regard to the treatment of the two varieties of empyema, it may be said that in no case does preliminary

radiographs of the chest are taken in the upright position, in antero-posterior and lateral planes, sometimes one or other oblique plane, and occasionally in the prone position. From these films the best point for drainage is chosen according to the principles advanced above. The method of drainage, open or closed, is not considered to be of any importance so long as the tube is large enough and in the right place. A portion of rib is always resected. The above procedure has no influence whatever on the ultimate choice of treatment in a particular case; some are still treated by aspiration alone and some by aspiration followed by drainage, and the rules for the choice of the appropriate method are sufficiently well established to be omitted here.

FIG. C.—Diagrams showing immediate expansion of lung, rendering drainage tube ineffective.

aspiration do harm, and that in every case this simple operation relieves the patient and at the same time gives valuable information to the operator. It must be admitted that where a cavity is filled with large masses of fibrinous clot aspiration is not always possible, but the routine attempt at the above procedure has been found to diminish the number of cases requiring secondary drainage operations.

It has already been mentioned that relief of pressure in an empyema is associated with immediate anatomical adjustments within the chest, and it is obvious that these changes must result in an alteration of the shape of the empyema cavity. When empyemata have been drained without previous aspiration it has sometimes been found that these adjustments result in the lung coming up flat against the end of the tube and so interfering with the drainage of a relatively deep space. This is depicted in Fig. C. Before the point of drainage is decided, therefore, it is an advantage to allow these immediate adjustments to be made by the aspiration of as much of the pus as possible, followed by radiological examination in two or more planes.

From every point of view it is desirable, before operation, to know these details: the shape, position, and size of a cavity after the relief of pressure within it; the composition of the parietal wall; and such information about the way in which the empyema will heal as may be deduced from consideration of its nature and the elasticity of its walls. To this end it has become the practice in the treatment of these cases to aspirate through a wide-bore cannula, where possible, as much of the pus as can be removed, and then, by leaving the cannula in position while detaching it from the suction apparatus, to allow a little air to be drawn into the cavity by the patient's own respiratory effort. The presence of air in an empyema cavity is not harmful in any way, but by creating a fluid level it makes accurate radiological examination of the cavity possible. Following aspiration,

Summary

1. The way in which an empyema heals is discussed and the factors governing this are indicated.
2. The best position for the drainage tube is shown to depend on the immediate anatomical adjustments following the relief of pressure in the empyema, and on the factors influencing the way in which gradual obliteration of the cavity takes place.
3. Knowledge of these things may be gained by the routine pre-operative aspiration of pus and partial air replacement followed by radiological examination in various planes.
4. The position of the drainage opening is of the greatest importance if chronic cavities and secondary drainage operations are to be avoided.

The Cicely Northcote Trust was bequeathed to St. Thomas's Hospital twenty-eight years ago with the object of extending almoners' work into the wards, and making a comprehensive medico-social service for in-patients and their families before admission, while in hospital, after discharge, and in certain cases until death. The report of work done between October, 1936, and October, 1937, has recently been issued, and as in previous years contains numerous examples of the great value of the undertaking alike to patients and medical practitioners. The "follow-up" activities sometimes secure adequate nursing for in-patients who could not otherwise obtain it after discharge. Latterly, it is mentioned, there has been a closer linking in cases of malignant disease between the social and the medical follow-up work, especially for patients who have been treated with radium. Records of each case are kept, and prove to have statistical as well as clinical value. The scope of the work seems likely to extend, and further financial help is desirable. The Trust almoners are required to interview all patients admitted to the wards to discuss whether any contribution can be made towards the cost of treatment, or whether assistance is actually necessary to ease home difficulties.

P. R. ALLISON: HEALING OF EMPYEMA CAVITIES, WITH SPECIAL REFERENCE TO ASPIRATION AND AIR REPLACEMENT AS AN AID TO OPERATION

FIG. 1.—Radiograph of chest after aspiration of six pints of pus, showing mediastinal replacement and partial expansion of lung

FIG. 2.—Radiograph of chest in another case following injection of lipiodol into sinus, showing thickened interlobar septum.

DOROTHY PRICE: TUBERCULOSIS IN INFANTS

FIG. 1.—Aged 5 months. Ribbon shadow caused by tuberculous paratracheal glands. Child recovering.

FIG. 2.—Aged 10 months. Infiltration of right lung, accompanied by spina ventosa and multiple subcutaneous tuberculous abscesses. Cured two and a half years later, with radiograph clear except for a small calcified hilar gland.