2. The therapeutic benefit obtained with injections of autogenous urinary proteose in cases of asthma is about the same as that obtained with peptone. Any specificity which may be claimed for the former method does not outweigh the many advantages of a simpler and more general form of desensitization such as can be obtained with peptone.

3. The therapeutic results obtained in cases of urticaria are encouraging, and of sufficient interest in our opinion to warrant further investigation.

In conclusion, we wish to record our sincere thanks to Dr. W. Howel Evans for preparing the proteose in each case, and to Dr. R. Kemp for his help in supervising the peptone injections.

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THE VALUE OF OLEOTHORAX IN OBLITERATIVE PLEURISY

BY

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The ingenious idea of Bernou of employing large quantities of oil in the pleural cavity was, unfortunately, overdone and exploited in certain quarters with an uncritical enthusiasm, with the result that opinion veered the other way until the method appears to have become almost entirely discounted. This is to be regretted, for though a minor procedure, it occupies a position of great importance, used strictly within its proper indications and limitations. If oblitative pleurisy is taking place with dangerous prematurity in the course of artificial pneumothorax, oil in the pleural cavity is the only thing that will keep the pleural layers apart, and so save the patient from a thoracoplasty. As the obliteration of the pleura proceeds so will the oil be driven to the upper zone of the chest, where collapse is most commonly wanted. It will be held there under considerable pressure, and, contrary to what Mr. Morriston Davies wrote in an excellent contribution to the *American Journal of Thoracic Surgery* in December, 1935, I believe that it is the high-pressure oleothorax that is of the greatest value.

The division of adhesions in cases of incomplete pneumothorax may itself start the process of oblitative pleurisy. Then, although the intervention may have given

complete rest to the lung, closed all cavities, abolished all symptoms, and led to the complete disappearance of tubercle bacilli, the inexorable and irresistible march of the pleural symphysis may, as it reaches the higher zones of the thorax, reopen the cavities, tear apart quiescent and healing areas, and so start the disease process all over again.

If it is evident that the pleural obliteration is progressive, or if it is possible that the premature re-expansion of the lung will reactivate the disease, something must be done to prevent it. There are only two possible courses: one is thoracoplasty, and the other is to establish an oleothorax. Of the two oleothorax is obviously to be preferred.

Oil is incompressible and practically unabsorbable, or absorbed only over a very long period. It is driven to the upper part of the thorax, where it is most usually wanted, and there it will remain unchanged and unnoticed by the patient for many years.

The objection raised is that it may rupture into the lung. I believe that this is putting the point the wrong way round. The lung, if the seat of active tuberculosis, may rupture into the oil, just as a spontaneous pneumothorax may occur with or without an artificial pneumothorax, with or without pleural fluid, and with or without an oleothorax. At the same time it cannot be denied that oil under considerable pressure over a softened area of diseased lung could burst through. If this happens it is an unpleasant and sometimes a grave event. With a thickened pleura, however, which usually exists under the conditions for which I advocate oleothorax, I believe this accident to be rare; moreover, it is a risk most patients would be prepared to take if they understood the alternative. At the very first suspicion of oil in the expectoration the oil in the pleura must, of course, be immediately replaced by air.

Conditions Necessary for the Establishment of a Successful Oleothorax

There are two essentials in my opinion: a rigid mediastinum, and a pleural cavity of strictly limited capacity. The first is obvious; the second perhaps not.

In the early days I tried therapeutic oleothorax as a substitute for pneumothorax, and I found that three pints of oil would not half fill the hemithorax. To maintain an adequate lung collapse by oil with a non-rigid mediastinum and a completely free pleura would take, in an average case, probably six to eight pints, and this would seem highly undesirable. With a mobile mediastinum no amount of oil would be effective without producing, simultaneously, gross mediastinal displacement. Hence it can be seen that commencing or, better, partially developed oblitative pleurisy provides the ideal conditions for oleothorax. The mediastinum is fixed, the pleura is probably thickened and unyielding; the capacity of the pleura is limited and progressively becoming smaller.

Nevertheless I have cases where an oleothorax was performed as a substitute for pneumothorax. One patient was a child, aged 7, whose case I published in the *British Medical Journal* (June 18th, 1932). There was acute phthisis and extensive cavity formation. Artificial pneumothorax treatment was given, and a huge central cavity would not close because of adhesions. These were divided and the cavity closed. The child so dreaded the refills of air that I decided to perform an oleothorax. This was done in 1931, and the child to-day is perfectly well, living the normal life of a schoolgirl, with the oil still present. It has apparently become encysted from apex to base. She has never had any recurrence of symptoms.

Technique

Pure sterile olive oil is used. There is no need for the addition of gomenol, which serves no useful purpose, and merely acts in many cases as an irritant. Even olive oil may produce a pleural reaction. It is necessary, therefore, to use pilot doses, at first 5 c.cm., then, if no reaction, say, 50 c.cm., then 100 c.cm., then 500 c.cm. If there is still no reaction the total requisite amount can be given. It can be introduced gradually as each refill is due, or it can be given at one time if a hypodermic needle is inserted in the first or second intercostal space anteriorly, with the patient lying on his back, and the oil injected, say, in the mid or anterior axillary line, and continued until it runs out of the hypodermic needle above.

Illustrative Cases

CASE I

In July, 1925, a man aged 25 came under my observation with diabetes and pulmonary tuberculosis. The diabetes was so severe that dieting and 60 units of insulin hardly con-

FIG. 1.—Acute pulmonary tuberculosis with extensive excavation, October 4th, 1934.

FIG. 2.—Artificial pneumothorax. Cavity held open by numerous adhesions before division by single puncture thoracoscope, November 22nd, 1934.

FIG. 3.—The lung freed, but oblitative pleurisy and some fluid, July 17th, 1935.

trolled it. There was extensive tuberculosis in the left lung of a rapidly spreading bronchopneumonic type. Tubercle bacilli were present in the sputum in large numbers. The temperature was high and the patient was emaciated. Artificial pneumothorax was induced by Dr. F. H. Young. The temperature gradually fell to normal, and the general condition rapidly improved: the cough, expectoration, and tubercle bacilli disappeared. The insulin was reduced from 60 to 15 units.

After a time a large effusion appeared on the left side. This was replaced twice, once by air and once by oxygen, but again recurred. Fearing the progress of oblitative pleurisy, which was already beginning, I decided to replace the fluid by oil in March, 1926; 600 c.cm. of 5 per cent. gomenolized olive oil were injected into the pleural cavity. At first refills of air were given above the oil. In March, 1927, 250 c.cm. of oil were injected; on February 7th, 1928, 360 c.cm., and on July 21st, 390 c.cm. The air of the pneumothorax was gradually absorbed; the oil was pushed by the pressure of the contracting pleural space to the upper zones of the chest. The last two fills had to be given under great pressure, the piston of the syringe being driven forcibly back.

The patient remained in good health, doing full work, and gained 2 st. in weight. In October, 1928, he was very well, and weighed 11 st.; there was no sugar in the urine, and the blood-sugar figure was 166. In March, 1929, he had pneumonia. In April, 1929, his general condition was

very good; there were no symptoms and no tubercle bacilli were present, and his weight was 11 st. 8 lb. In May, 1931, he had a sudden acute diabetic coma, and died.

The post-mortem examination showed a well-compressed lung, over which the oil had remained perfectly clear. The tuberculous process was completely healed, leaving a calcareous area in the left lower lobe. The specimen is in the Victoria Park Hospital Museum.

CASE II

A married woman aged 24 first came under my care in September, 1934, with active pulmonary tuberculosis. She was wasted, and had high fever; there were night sweats, haemoptysis, tubercle bacilli in large numbers, much sputum, and a hectic flush. Nearly the whole of the left upper lobe was excavated by a huge cavity.

An artificial pneumothorax was induced on October 5th, 1934. There were numerous adhesions holding the cavity open; these were all divided in three operations, by the single cannula thoracoscope, each operation taking about an hour and a half. The lung was completely freed and the cavity closed; the patient made a remarkable recovery, gaining 4 st. in weight. Fluid, however, appeared after the last

FIG. 4.—Oleothorax, July 15th, 1936.

thoracoscopy, and very soon oblitative pleurisy commenced. It rapidly advanced until the lung became adherent about a third of the way up the chest wall. Refills were given in progressively lesser quantities and higher pressures, but, even so, this did not serve to prevent the progress of the pleural obliteration, and in a short time tubercle bacilli reappeared in the sputum.

Oleothorax was therefore decided upon. On December 9th, 1935, the patient was given 5 c.cm. of sterile olive oil; there was no reaction. On December 12th she was given 140 c.cm., and on the 16th 420 c.cm. without any reaction. On December 31st she was given 40 c.cm., not under undue pressure, but oil just slightly oozed out of the needle at the end of the injection. On January 21st, 1936, she received 20 c.cm.; on March 3rd 50 c.cm. and some air; and on May 13th a small injection of air, the final pressures being +14 and +23. On June 10th 100 c.cm. of oil and on August 13th 80 c.cm. of oil were given, making a total of 855 c.cm.

The patient is now in perfect health, with no symptoms and no tubercle bacilli. Various stages of this case are illustrated in the diagrams.

Conclusion

The true indication for oleothorax is oblitative pleurisy occurring with dangerous prematurity in the course of artificial pneumothorax treatment.