in it, as well as its inapplicability to some cases, should not put it out of court for all.

The technique employed throughout for the injection of these cases has been substantially that taught me by Dr. Lillingston, to whom I am indebted for kindly undertaking the first two operations, as well as for many subsequent suggestions. It is possible that after the initial difficulties with technique encountered in the injection of Case 3 one might have proceeded to a more satisfactory issue by the method of open incision advocated by some writers.

To Sir Almroth Wright I am indebted for permission to publish these cases, and for continuous counsel during their treatment.

My thanks are also due to Dr. G. H. Orton for much help in connexion with the frequent X ray examinations of these cases.

St. Mary's Hospital, W.

A CASE OF ARTIFICIAL PNEUMOTHORAX,

PRODUCED IN TREATING CHRONIC PULMONARY TUBERCULOSIS.

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THE account of the following case of pneumothorax, artificially produced and kept up by injections of nitrogen gas for the treatment of chronic pulmonary tuberculosis, should be of interest as being one of the first cases, if not the first case, produced in England with such an object. The success of the treatment has been striking, although the pneumothorax produced is, on account of adhesions, only a partial one. A brief account of a second case in which this method of treatment was attempted without success is added, and contains points of interest.

CASE 1.—Male, aged 34. Previous history: The patient originally suffered from subacute pulmonary tuberculosis affecting the upper half of the right lung in February, 1902. He devoted the greater part of the subsequent two years to his health, spending part of the time at a sanatorium in Wales, and at the end of this period he got his health well restored. He lived in South Africa for several years. In 1907 he married. He was at work regularly in the City for a year up to the autumn of 1908. Then a recrudescence of the lung trouble broke out, apparently partly due to worry connected with the illness of his wife. At the end of October, 1908, he was admitted to the Mundesley Sanatorium.

Condition in November, 1908.—Old fibrosis in the right upper lobe; recent, extending, and decidedly active infiltration and partial consolidation in the right lower lobe; recent infiltration in the left upper lobe and apex of the left lower lobe. Temperature, 99.4° A.M. and 100.6° F. P.M. rectally. Morning pulse, 90 to 100. Cough troublesome; expectoration heavy, greenish muco-pus, about 30 c.c. daily. Tubercle bacilli plentiful. Dyspeptic; well-covered, but very flabby and anæmic.

History between November, 1908, and August, 1910.—Progress was chequered, periods of improvement alternating with exacerbations of symptoms. A bad relapse with hæmoptysis started in May, 1909, just when he seemed about to be well enough to return home. His temperament was against him, for he has always been too readily depressed, too apprehensive of ill, and nervously worried. Anticipation of departure from the sanatorium contributed largely, in our estimation, to the relapse in May. After this the disease became severe in the right lower lobe, but by degrees this extension quieted down and the patient went home in December, having had a morning pulse of 78 and rectal temperatures of 96.5° A.M. and 98.4° P.M. for many weeks previously. He kept fairly well until June, 1910, when he was readmitted to the sanatorium. During June, July, and early August very slow progress was made. Pulse was always over 94, and evening temperature at 9 o'clock averaged 100.4°. The slight disease which had existed on the left side had at this time cleared up, and no adventitious sounds were audible there; in the right lower lobe softening had occurred and was occurring.

Artificial pneumothorax decided upon.—The patient was in the depths of despair, and could not contemplate months of rest in bed and endurance of feeling so ill as he did. The prospect of accomplishing marked improvement by the ordinary régime seemed very slight. He was getting towards the end of his tether, though not actually in an imminently grave state. At this juncture one of us (Dr. Claude Lillingston) extolled to the others the merits under certain circumstances of the production of artificial pneumothorax. This procedure was decided upon, and the first puncture was made on August 11th, 1910, in the sixth space just posterior to the mid-axillary line. It was successful in reaching the pleura. 300 c.c. of nitrogen were given on this and the following days, the highest positive pressure reaching 4 cm. of water on the manometer scale. The following injections were given at the same site each time, finishing with the highest positive pressure represented by the figure in the third column:—

Date.	Cubic centimetres of N.	Plus centimetres of water	Date.	Cubic centimetres of N.	Plus centimetres of water.
Aug. 13th ...	450 ...	8	Aug. 30th ...	320 ...	7
„ 15th ...	260 ...	6	Sept. 4th ...	300 ...	6
„ 17th ...	400 ...	6	„ 7th ...	500 ...	10
„ 19th ...	175 ...	6	„ 12th ...	600 ...	14
„ 22nd ...	600 ...	11			

Between Sept. 20th, 1910, and March 6th, 1911, 18 further injections have been given by one or other of us or by Dr. W. Wynne, his home medical adviser. The amount given has varied from 175 c.c. to 600 c.c. and the pressure was gradually raised to 32 cm., and on one or two occasions to 34 cm. At the time of writing injections of about 450 c.c. are given about every fifteenth day, and the pressure is raised at each injection from about *plus* 6 to *plus* 30 or 32 cm.

Results of treatment.—The temperature dropped almost at once, the average temperature readings, August 11th to 18th, being: A.M., 97.3° F. (36.3° C.), and P.M. (highest), 99.3° F. (37.4° C.) rectally. On August 19th, 20th, 21st, and 22nd the temperature was never above 98.6° F. (37° C.). From August 24th to 29th there was a bout of high fever with a sharp pain in the right side, but without any sign of pleurisy or fluid. From the end of August, 1910, up to May, 1911, the rest temperature has on no occasion been above 98.6° F. (37° C.) rectally. The pulse became a little more frequent at first after August 11th, and then at the beginning of September gradually showed slight improvement in rate and considerable improvement in quality. Four months later it was still rather too frequent, but gradually improving.

The clearing up of the general symptoms was rapid and steady. On August 23rd the patient said, "I feel a different man." Early in September he was beginning to get up and about. By the end of the month he was walking about 1½ miles daily and by the beginning of November about 3 miles daily, which amount, or a little more, he continues to do comfortably. On Sept. 8th he remarked that it was the first morning on which he had not coughed before breakfast for many months, and the cough had almost gone altogether. By three months after the induction of the pneumothorax the cough became rare, but occasionally, about once every two or three days, generally a few days before an injection, a blob of mucoid or muco-purulent expectoration was coughed up. The expectoration used to teem with bacilli, and was green and heavy. Now bacilli are not usually found, and the sputum, when it does occur, is light in colour and consistence.

The ordinary signs of pneumothorax remain fairly constantly present over the greater part of the right chest, except that there are no definite bell note and no tinklings. Ordinary examination and that by X rays show the pneumothorax to be incomplete superiorly and posteriorly towards the vertebral column. On Jan. 2nd, 1911, the patient wrote to us saying he was "feeling very fit and well." Again, on July 7th, 1911, he writes, "I feel very well indeed all round."

CASE 2.—Male, aged 38. Years of ill-health, due to phthisis with some periods of temporary recovery, had resulted in severe chronic invalidism. From November, 1908, to October, 1910, he had been confined to bed almost constantly with slight and varying but obstinate fever—average rectal readings being about 36.9° C. (98.4° F.) A.M., to 38.0° C. (100.4° F.) P.M. Cough frequent, loose, but not

actually distressing. Expectoration plentiful (one to two medium-sized cupfuls per 24 hours), purulent, and always teeming with tubercle bacilli. The disease was bilateral, but always much more severe on the left side, where signs indicated the probable existence of extensive excavations and fibrosis with much thickening, especially basally.

Although pleural adhesions were suspected, the state was one which we thought suitable for attempting to produce a left-sided artificial pneumothorax. We all felt sure that the fever was kept up by the left-sided disease, and that the expectoration came from this side practically entirely. The lesions on the right side were comparatively slight, and this lung alone was quite capable, we thought, of supporting the patient comfortably in a quiet life, and with every likelihood of a capacity for more activity than he had enjoyed for years. Ordinary treatment had not availed to better the patient's condition materially, although it was entirely successful in maintaining a fairly good general, digestive, and circulatory condition, as well as a moderate degree of personal comfort, and in reducing the activity of the disease. He had seen the remarkable results produced by artificial pneumothorax on the patient first quoted. Although we told him that success was not assured, or even likely, he anxiously desired that the attempt should be made. Six punctures were made on two separate occasions with a Saugman needle made for us by Messrs. Allen and Hanburys. On these two occasions each of us attempted to reach the pleural cavity at different sites but without success. The punctures demonstrated that the surmise as to the pleura being thickened was correct. At one or two places it felt very thick and tough. The patient's condition eight months after the second effort at producing pneumothorax is *in statu quo ante*.

A CASE OF TORSION OF THE PEDICLE OF A UTERINE FIBROID.

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TWISTING of the pedicle is a fairly common complication of ovarian tumour, but it is by no means so frequent in uterine myomata. In 1908 Dr. Stephen Tracey of Philadelphia published a paper¹ on a Study of Degeneration, Complications, and Associated Conditions in 3561 Cases of Fibroid of the Uterus. In only seven cases was the complication of twisting of a pedicle present. The total of 3561 was obtained from the records of 16 authors who had each contributed to surgical literature a series of 100 or more cases. When torsion of the pedicle of a fibroid does occur, it is said² that it may cause hæmorrhage into it, and œdema, or even gangrene, and this may lead to a fatal peritonitis. In small fibroids the tumour, it is stated,³ may even be twisted right off the pedicle, as happens also with some ovarian cysts. Of course, the fibroid must have a fairly long pedicle to allow of this twisting. It is said⁴ that at the time of twisting severe pain may be caused. It is also stated⁵ that if the obstruction to the circulation is incomplete "a subacute inflammatory reaction may ensue, leading to the formation of extensive adhesions with adjacent structures, particularly the great omentum, by which the nutrition of the tumour is maintained." In my own case the fibroid was congested and hæmorrhagic, and the great omentum was loosely adherent to it. The changes were those often found in an ovarian cyst with a twisted pedicle—congestion, hæmorrhage, and dry adhesive peritonitis.

In some cases not only is the tumour rotated, but the uterus itself is twisted. A case in which this occurred is recorded⁶ by Dr. S. J. M. Cameron of Glasgow. In his case the uterus was twisted so that the right tube and ovary lay

to the left of the middle line. The tumour was in the same condition as in my own case—very congested and hæmorrhagic. In a case recorded⁷ by Mr. A. M. Connell of Sheffield, in which the tumour itself had not undergone torsion, the uterus and appendages had become greatly twisted. The twisting of the genital organs was associated with severe pain and frequent vomiting. The abdomen was opened after symptoms had existed for 60 hours. The twisted uterus and appendages were chocolate-coloured, swollen, and œdematous, with patches here and there of a greenish-yellow lymph on their surfaces. The patient recovered.

The patient, a married woman, aged 39, was seen in consultation with Dr. W. H. Stevens on the afternoon of Tuesday, Feb. 8th, 1910. She had then had pain across the lower abdomen for nearly 48 hours. It began on the evening of the 6th and was not very severe at the commencement, so that she was able to go out after it started, but some hours later it became severe, and was so bad in the night that she could not lie in bed. There was no vomiting. The bowels had acted during the period in which the pain had been present. She had noticed a lump in her abdomen for two years; sometimes she found it in one part of her abdomen, sometimes in another, but most frequently in the right lower abdomen. Menstruation was regular but scanty. It had ceased two days before the onset of symptoms. There was no history of leucorrhœa. The highest temperature during the time Dr. Stevens had been attending her—i.e., since the onset of the pain—was 100°.

There was a mass in the left lower abdomen which caused a visible prominence there. It reached to just above the umbilicus, and as far inwards as the middle line, and outwards and downwards to the anterior superior spine and Poupart's ligament. It was too tender to handle much, but it felt hard and regular in outline. It did not move readily with light palpation. There was no tenderness at all on vaginal examination, although the abdominal tumour was so tender. The cervix was displaced much to the left—i.e., to the same side as the abdominal tumour—and to the right of it was a flat, hard mass, with a round, hard nodule projecting from it. This certainly felt like a fibroid. Nothing further was made out on rectal examination. The complete absence of the tenderness, which was so marked on abdominal examination, suggested that the mass felt per vaginam on the right of the uterus was a separate tumour. The abdominal tumour was too tender to make firm pressure on it to see if it moved independently of the pelvic one. The onset of the symptoms I have mentioned, associated with the history of some swelling in the abdomen preceding it, suggested the twisting of the pedicle of an ovarian cyst, and it seemed to me quite possible this might be the condition with which we had to deal. On the other hand, the pelvic tumour certainly felt like a fibroid, and this raised the question whether the abdominal tumour might not also be a fibroid, associated with some local peritonitis, perhaps from tubal infection on that side. The possibility of it being a fibroid with a twisted pedicle did not occur to me, for such a condition is quite rare. The hardness of the abdominal tumour might very well have been caused by tension in an ovarian cyst, due to hæmorrhage into it, from twisting of its pedicle. The fact that the patient had noticed the tumour in various parts of the lower abdomen suggested that it might be an ovarian cyst with a long pedicle, but two years was certainly a very long history for a small ovarian cyst. On the other hand, the pedicles of fibroids are seldom long enough to allow of any very extended range of movement. But patients' observations are often very inaccurate, and when we came to examine the tumour it was evident that it could never have moved very far to one side or the other.

I advised immediate operation, as the presence of an ovarian cyst with a twisted pedicle seemed quite possible, but the patient preferred to see if she got better without, as she was not then in severe pain. I did not see her again until Friday, the 11th, when she came into hospital. The pain by then had much decreased. The temperature had been between 99° and 100° each afternoon. Menstruation had come on again. The tumour was much less tender, and felt very hard, but there was a considerable amount of tympanitic distension. The condition on vaginal examination was unaltered. She had a great deal of colicky pain about

¹ Journal of Surgery, Gynecology, and Obstetrics, 1908, vol. vi., p. 246.

² Hart and Barbour: Text-book of Gynecology.

³ Sutton and Giles: Text-book of Gynecology.

⁴ Ibid.

⁵ Roger Williams: Uterine Tumours.

⁶ Brit. Med. Jour., 1905, vol. ii., p. 712.

⁷ Journal of Obstetrics and Gynecology of the British Empire.