at various ages the actual fraction is remarkably constant. Fig. 3 is that of similar cyrtometer tracings of individuals with abnormal conditions; whilst Fig. 4 shows drawings of what may be called "freak" chests. I merely include

FIG. 4.—Very abnormal chests. (a) Aged 13. A.P. dia. 8 in.; C. dull. 4½ in.; circum. 25½ in.; C.T.I. 1/6. (b) Aged 15. A.P. dia. 7 in.; C. dull. 5 in.; circum. 29 in.; C.T.I. 1/5.8. (c) Aged 11. A.P. dia. 6 in.; C. dull. 6 in.; circum. 24½ in.; C.T.I. 1/4.1. (d) Aged 46. A.P. dia. 9 in.; circum. 35 in.

these last by way of interest, and as examples of the one or two conditions in which it is clinically impossible to determine the factor I have called the cardio-thoracic index which is emphasized in Fig. 5, which is an illustration of a

FIG. 5.—The condition in extreme emphysema.

chest with extreme emphysema. In such cases, or with chests which are very abnormally shaped, the most careful percussion of which I am capable has failed to map out the deep cardiac dullness. But such cases are comparatively rare, and in them every other clinical method is equally fallacious, so they do not materially invalidate the suggestion I have made above—namely, that the size of the heart can be expressed as a constant for any age, the deep cardiac dullness being one-sixth of the circumference of the chest at the level of the cardiac impulse.

ARTIFICIAL PNEUMOTHORAX IN ADVANCED PULMONARY TUBERCULOSIS.

BY

DENNISON PICKERING, M.D.CANTAB.,

SENIOR PHYSICIAN, PENDYFFRYN HALL SANATORIUM, PENMAENMAWR.

In the BRITISH MEDICAL JOURNAL for February 19th, 1927 (p. 323), a case of pulmonary tuberculosis is described by Dr. Bernard Hudson in which, in spite of a history of old-standing disease with a recent severe "flare-up," an artificial pneumothorax was induced and resulted in considerable and continued improvement. The two following cases are of interest in this connexion.

CASE I.

An ex-officer, aged 26, was admitted to this sanatorium on August 30th, 1922, with a history of persistent cough and cold since the previous winter. Both upper lobes and the upper parts of both lower lobes were involved. The patient improved at first, increasing 28 lb. in weight. For the next year he held his own, but then lost ground slowly.

On August 27th, 1925, intermittent haemoptyses began, and on August 29th an artificial pneumothorax was induced. Intermittent bleeding continued for twelve hours, after which there was another haemorrhage of 10 ounces. A refill was given, and the bleeding gradually stopped.

The records of the first operations are as follows:

August, 29th, 1925, 1 a.m.	...	-4, -2	...	1,000 c.cm.	...	-2, +3
" " " 2.15 p.m.	...	-3, +1	...	1,000 c.cm.	...	0, +5
September 1st, 1925	...	-2, +4	...	500 c.cm.	...	+1, +7
" " " 5th, "	...	-2, +5	...	400 c.cm.	...	+2, +6

The patient gradually recovered from the effects of the haemorrhage and improved in general condition. Fairly high pressures were kept up throughout, and at the beginning of August, 1926, when I took charge of the sanatorium, the last records had been:

July 13th, 1926	...	-8, +2	...	800 c.cm.	...	-3, +5
July 27th, 1926	...	-10, +2	...	800 c.cm.	...	+2, +7

X-ray records had not been kept.

When I first saw him the patient had been in bed for four days because his temperature had risen to 102° for a couple of days after the last refill (June 27th), and he had had vague pains in the left side of the chest. On August 13th I attempted a refill, but found the pressure -1, +2. After introducing 150 c.cm. of air the pressure was +2, +3. On introducing the needle in a different place the pressure was again +2, +3, so the attempt was abandoned. After this the temperature rose to 99.4°, and there were again vague pains in the left side of the chest. About ten days later fluid appeared at the left base, and increased slowly until November 22nd, when it had reached the level of the third intercostal space. This was confirmed by x-ray examination. Fluid replacement was considered, but in the absence of marked dyspnoea or other signs of cardiac embarrassment, and in view of the pleurisy in August, it was decided to wait. The fluid gradually decreased and finally disappeared, leaving signs of much-thickened pleura. The weight, which for a long time had remained about 10 st., is now over 10 st. 5 lb., temperature and pulse are normal, and the patient is walking from three to four miles a day. The sputum is slight, and tubercle bacilli have been found only once since December 30th, 1926. The adventitious signs in the chest have remained about the same, except in so far as they have been modified by the presence of fluid and air respectively.

It is clear that in this case the ultimate prognosis is poor and the immediate risks not inconsiderable. At the same time the pneumothorax, which but for the haemorrhage would never have been attempted, has undoubtedly improved both the chances and the comfort of life. The fluid, by keeping up partial collapse for some months after the refills were stopped, doubtless contributed towards the result.

CASE II.

A girl, aged 20, was admitted in March, 1925, with a history of slight haemoptysis three and a half years previously and a recurrence in 1923. On admission, the right upper lobe and the upper half of the lower lobe were involved, and there was some suspicion about the left mid-scapular region. After an x-ray examination, Dr. A. E. Barclay of Manchester reported: "... evidence of extensive disease on the right side, which is almost all definitely of old standing. The apex is largely consolidated and fibroid, the trachea being dragged across fully three-quarters of an inch to this side. ... From the interlobar septum downwards there are extensive changes of fibroid type. ... On the left side ... some increase in root shadows with nodules, which are sharply defined, and do not give the impression of active disease."

In October an unsuccessful attempt to induce an artificial pneumothorax was made. The patient's condition meanwhile remained very much the same.

When I first saw her, in August, 1926, the symptoms were: troublesome cough frequently leading to vomiting, copious sputum swarming with tubercle bacilli, dyspnoea on exertion, and lack of energy. There were signs of definite activity at the left apex, as well as on the right side. The x-ray appearances were much the same as in February, 1925.

The patient asked me if nothing further could be done. The case did not appear to be particularly suitable for the use of sanocrysin, and so, before considering such a line of treatment, or further surgical measures, I felt that another attempt to induce an artificial pneumothorax should be made. The initial operation was performed on September 2nd, 1926, and I was fortunate enough to get into the pleural cavity without difficulty. The earliest records are as follows:

September 2nd, 1926	...	-3, -2	...	250 c.cm.	...	-2, -1
" 3rd, "	...	-4, -2	...	350 c.cm.	...	-2, 0
" 4th, "	...	-3, -1	...	400 c.cm.	...	-3, 0
" 8th, "	...	-2, -1	...	400 c.cm.	...	0, +1

At first only partial collapse was obtained. Almost the whole of the apex was adherent, and there were a number of adhesions near the base. Soon, however, the latter adhesions began to give way gradually, and at the beginning of January collapse was almost complete; the inner parts of the apex and upper lobe, however, remained adherent.

At the beginning of October no râles could be heard on the left side. X rays showed the trachea in normal position. On November 17th no tubercle bacilli were found, and none have been found since; soon after that date the cough disappeared and the sputum ceased.

There is still some dyspnoea, and a very quiet régime is being followed, with one short walk daily. It has not been possible to increase the intervals between refills beyond a fortnight, or even less, as re-expansion usually takes place rather rapidly.

In this case, owing to the length of history and the probability of adhesions, the chances of inducing an artificial pneumothorax appeared small. The operation was undertaken rather as a forlorn hope before going on to more serious surgical measures. Yet not only did the operation succeed, but, although the ultimate outlook is doubtful, the chances of life are certainly improved, and in the meantime the absence of severe cough with copious, offensive sputum, and the knowledge that she is no longer a source of danger to others, are in themselves a great boon to the patient.