As far as hospital personnel is concerned, exposure to contagious tuberculosis is dangerous, whether the patient be on a tuberculous or nontuberculous service. To infect or reinfect such persons as members of personnel, other patients, and visitors, on either service is inexcusable, since we now have methods of detecting contagious tuberculosis promptly, and strict isolation technique has been developed to protect those who come in contact with contagious cases.

J. A. M.

Editorial

PNEUMOPERITONEUM TREATMENT OF PULMONARY TUBERCULOSIS

Since 1931, artificial pneumoperitoneum has been in use for the treatment of pulmonary tuberculosis. Its application for this purpose was discovered incidentally when in a case of intended artificial pneumothorax, air was injected into the peritoneal cavity. Since then, rapid strides have been made in its widespread clinical use. Subsequent research studies brought about a clear understanding of the mechanics of the therapeutic efficacy of this measure. Basically, its influence upon the lung is in no way different from that of artificial pneumothorax. It is known that the therapeutic effectiveness of the latter is conditioned upon adequate pulmonary relaxation. A perview of available investigative data indicates that the same holds true of artificial pneumoperitoneum. If this is so, pneumoperitoneum, of necessity, has definite curative potentialities in pulmonary tuberculosis.

Let us look at the available pertinent information. Accurate measurements have demonstrated that, by systematically maintained pneumoperitoneum, one is able to attain a substantial elevation of the diaphragm. Of course, no satisfactory diaphragmatic rise can be anticipated when the diaphragm is fixed by adhesions. In individuals without extensive diaphragmatic adhesions, elevation of the diaphragm by air injected intraperitoneally is followed by a shortening of the apico-basal diameter of the lung. This may amount to as much as 7.3 cm. Expressed in other terms, the distance between the apex and base of the lung, as measured on a standard roentgenogram, can be reduced by 32.8 per cent on inspiration and by 34.3 per cent on expiration. The decrease in the apico-basal diameter of the lung by artificial pneu-
moperitoneum is associated with a considerable reduction in the volume of the lung. An even greater reduction in the lung volume can be established by the combination of phrenic nerve operation and pneumoperitoneum.

Induced reduction in the lung volume signifies pulmonary relaxation. The latter initiates a number of changes in the lung which, potentially, are conducive to the healing of the tuberculous lesion. These are: 1) Relative tissue anoxemia; 2) Accumulation of carbon dioxide; 3) Lymph stasis; 4) Approximation of cavity walls; 5) Lessened bronchogenous, lymphogenous and hematogenous spread; 6) Diminished absorption of toxins.

There is ample experimental and clinical proof of the inimical effect of these changes upon tubercle bacilli, and of their beneficial influence on the resorption of pulmonary exudate and also, on the formation of fibrous tissue. In other words, artificial pneumoperitoneum offers the necessary pre-requisites of healing.

Pneumoperitoneum has a wide field of applicability in the treatment of pulmonary tuberculosis. It is well to remember in this connection that it is preferable to treat unilateral cases with the combination of phrenic nerve operation and pneumoperitoneum, although, in some instances, pneumoperitoneum alone may bring about gratifying results. When pneumoperitoneum is given as an independent therapeutic measure, it can always be supplemented by a phrenic nerve operation if circumstances so require.

It must be emphasized that pneumoperitoneum is not a competitive procedure as far as other forms of pulmonary relaxation therapy are concerned. Sound clinical practice necessitates that it should be looked upon as part and parcel of a well-conceived and well-integrated, selective therapeutic system. With this in mind, it is interesting to see that, according to the great majority of reports in the literature, this more or less new therapeutic approach is becoming a standard measure, in spite of occasional endemic therapeutic prejudice.

The subject of indications for pneumoperitoneum is too large to be discussed within the short space of this writing. For details, the reader is referred to numerous publications and texts which appeared during the past few years. However, there are certain items which deserve special attention.

Pulmonary hemorrhage may be effectively checked by pneumoperitoneum when it is impossible to induce artificial pneumothorax and in cases where one is unable to ascertain from which lung the bleeding originates. Following induced pneumoperitoneum, the consequent relaxation may seal the ruptured blood vessel. The resulting less negative intrapleural pressure reduces the intrapulmonary blood flow and thereby decreases or stops the hem-

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orrhage. Also, it is interesting to recall that similar results may be expected from the diminished inspiratory descent of the diaphragm. The latter will decrease the flow of blood through the inferior vena cava into the right auricle. This, in turn, means lessened amounts of blood driven to the lungs by the right ventricle.

In recent bronchopneumonic and pneumonic tuberculosis of the lung, artificial pneumothorax is bound to invite the development of empyema. The grave consequences of the latter should serve as a deterrent to the use of pneumothorax in these instances. Pneumoperitoneum which, naturally, is free of this complication should be looked upon as the treatment of choice in patients with these types of lesion. On the other hand, one can a priori predict failure of treatment with pneumoperitoneum when patients are selected whose lung lesion is characterized by extensive fibrosis or by rigid-walled cavities. Furthermore, one should never forget that it is a mistake to use pneumoperitoneum as a last resort.

Brock of North Carolina, pointed out at the last annual meeting of the College in 1946 the remarkable effect pneumoperitoneum has on the closure of tension cavities. His statement is worth quoting: “When a phrenemphaxis is done on one side, followed by pneumoperitoneum, two things are accomplished. First, the high rise of the diaphragm relaxes the lung and thereby facilitates drainage. Secondly, there is a marked relaxation of the lung and bronchial tree. There is little shortening of the bronchi and little narrowing of their lumina during expiration and this allows for continuous drainage through patent bronchi. This also allows for healing of the endobronchial lesion. With the introduction of pneumoperitoneum in acute bilateral advanced disease with tension-cavity formation in the Negro, drainage may be so adequate that the disease may clear entirely. In my opinion, such disease in the Negro has been looked upon as fatal, and such a result could not have been obtained by any other method of collapse therapy at our disposal.”

The more frequent use of artificial pneumoperitoneum in a large group of patients with far advanced bilateral pulmonary tuberculosis deserves a great deal of thought. These are individuals—who may be called the “forgotten men” of the institutional population—for whom no form of mechanical relaxation therapy is being offered in accordance with conventional concepts. Artificial pneumoperitoneum may bring about welcome changes in a great many of these cases. In addition to improvement in their pulmonary condition which may prove curative or may prepare the patient for major surgical intervention, one may observe the favorable effect of pneumoperitoneum on the competency of cough and on the course of intestinal tuberculosis. The incidence of the latter,
whether it is recognized or not, is high in far advanced pulmonary tuberculosis.

Some recent discussions of this subject admit the usefulness of pneumoperitoneum in controlling pulmonary tuberculosis in women when the treatment is given postpartum. This recommendation clearly recognizes the favorable therapeutic potentialities of pneumoperitoneum which result from the elevation of the diaphragm and from the consequent relaxation of the diseased lung. If this is so, it is difficult to comprehend why should not the same hold true of men and nonpregnant women who have pulmonary tuberculosis of the same kind and extent. Also, it is hard to conceive why is the value of pneumoperitoneum as a psychologic measure emphasized in particular. Over-emphasis of the psychologic effect of pneumoperitoneum by some clinicians connotes a metaphysical trend of thought which has no room in sound clinical practice.

In closing, just a few words about statistical analyses. It is a foregone conclusion that the end results of pneumoperitoneum treatment will be always unsatisfactory if unsuitable cases are selected for treatment. This generic truth applies to any form of therapy. Also, it is self-evident that when this treatment is given for too short a time or with unsuitable technique, the therapeutic result will be poor. Therefore, for the benefit of the patient as well as for the sake of scientific accuracy, a scrupulous selection of cases for this treatment and adequate technique are mandatory. Only correct and objective clinical judgment will protect the welfare of the patient and is likely to contribute to a competent evaluation of the therapeutic results.

—A.L.B.