

RE-EXPANSION OF ARTIFICIAL PULMONARY COLLAPSE.

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The question of how long to continue successful artificial pneumothorax treatment is for the most part answered with a "two to five year" plan with few qualifications. The most radical, or should they be called conservative, say "once collapsed always collapsed." Even exhaustive treatises on the general subject of the treatment have given very little space as to when to discontinue.

While it is impossible to lay down any fixed rules, some discussion of the subject may be of value. It is probably the most difficult problem in the course of the treatment and is well-nigh insoluble.

In the early days, when less was known about the procedure and when the attempt was mostly made on the very far advanced and very active case, the question generally settled itself. The collapse was lost with the appearance of, and the mismanagement of effusion, —by spontaneous absorption of the air, because of the spreading of the adhesions, or the passing of the patient, upon leaving the sanatorium, into the hands of another, so that a "keep it up as long as possible" policy was all that was necessary to know.

With the better management of the fluid problem, the advent of pneumolysis, and the development of skilled operators in almost all parts of the country, more and more satisfactorily collapsed lungs are demanding a time limit to their imprisonment. That the patient is often fearful of the results of re-expansion only adds to the doctor's dilemma. Consequently, the easiest way is chosen and the treatment drags on. The doctor comforts himself with the feeling that he is at least playing safe, and in his heart hopes some circumstance beyond his control will settle the matter.

There are undoubtedly cases which may never be allowed to re-expand and would not do so if the attempt were made. When massive disease with extensive cavitation has been compressed, the very healing of the process, by firm fibrosis and cicatrization prevents it. This is particularly true of those cases in which a violent attack of

pleurisy with effusion has occurred early in the course of the treatment. Some of these go on to tuberculous empyema and are forced into the hands of the surgeon. Others, after five or six years of compression, and after an attempt has been made to discontinue the treatment, should be advised to apply to the same source. Exaireisis of the phrenic nerve followed by thoracoplasty may give these patients a better chance than continuance of compression with air, if offered while the physical condition is sufficiently good. While some of them might continue compression treatment indefinitely without danger, they run more risk of spread of disease to the other lung, the development of empyema, of spontaneous pneumothorax and of the distressing symptoms that may be caused by the shifting of the mediastinum. The economic value to the subject makes this more drastic treatment well worth consideration. Others will be suitable for oleothorax if judged unable to stand the strain of thoracoplasty.

The next type of case to be considered, which is also presumably in the five year or more group, is the far advanced one with moderate sized cavity formation in which a satisfactory collapse has been obtained, and a smooth course run, probably the largest group under treatment today. Disease of the chronic type with considerable fibrosis. Cavities with well-defined hardened walls will take longer to heal than more recent lesions, with softer walled cavities. They not infrequently stop coughing and expectorating and thus become bacilli free in a comparatively short time. They may or may not have gone through a mild attack of pleurisy with effusion. They have stood the test of exercise well, and may even have returned to their usual occupation. These patients are in excellent health, but one lung is collapsed. The length of time to continue the treatment is in direct proportion to the pathological change present in the lung before collapse. Experience with this type of lesion when treated by bed rest has proved that a long time is needed to bring about healing. The compressed lung will also take time to heal, but certainly not so long as without compression. Two years of bed rest and less will often heal anatomically many of these lesions, and another year see them restored to as normal a life as they can hope to lead. The compressed case may have been leading this life for some time, but he is still in an abnormal state because his lung is

compressed. The comparison shows the latter to be in better condition than the former, but does not prove the lung ready for re-expansion, though in some instances, it is. And many of them who have re-expanded for this or that reason, beyond the control of the physician, have remained well. Others, who have been allowed deliberately to re-expand, because of the development of new disease in the opposite lung, have also been found to be in a surprisingly good condition, often good enough to take up the burden while compression is applied to the other side. When necessity arises, so-called chances are taken, with the result that after all the lung is just as ready for re-expansion as it ever would be, and chance plays no part.

After two years of treatment the question of when to stop should come up. It is time to take stock and many things have to be considered (referring entirely to those patients with a satisfactory collapse and nothing to worry about on the other side). The subject should have been free of fever, cough and expectoration and, of course, tubercle bacilli for at least a year. The patient's statement that there is no expectoration should be most carefully inquired into. He should send frequent samples to the laboratory of throat clearings early in the morning, after eating, or the taking of a hot drink, maybe after smoking. For at least six months he should not have had any pleural symptom, especially the collection of small amounts of pleural fluid, or an increase of that which he may already have had in too small an amount to be withdrawn, and in particular, he should not have had even slight toxic symptoms for a year. These symptoms include general lassitude, anorexia, loss of weight, fatigue on ordinary exertion, and in women the upset that so frequently comes at the time of menstruation. This group of symptoms should be stressed, and re-expansion should not be considered while they are present. They may persist for months after all the other conditions have been fulfilled. Many cases could be quoted in which the treatment had to be continued up to the fifth or six year on account of them. Their disappearance is as good an indication of a healed process in the compressed lung as in those treated by rest only, and constantly watched by stethoscope and X-ray film. After all, symptoms require treatment, and not physical signs and skiographs, and it is only from a careful analysis of symptoms that any information

can be obtained about the collapsed lung. When the patient has reached this state of excellent health and two years of treatment have passed, re-expansion may be considered.

Refills should be given at longer and longer intervals, their spacing to be determined by the comfort of the patient. More refills are required for those who have been compressed a short time, for a pleura long accustomed to the presence of air will absorb it much more slowly. Indeed many of the older cases will give no trouble if the treatment is stopped abruptly. During this period the fluoroscope is valuable, more for the determination of the gross expansion than for the intrapulmonary condition. Again the symptoms mentioned above will be the most valuable guide and should be carefully sought for. If they reappear and are persistent, the time for re-expansion has not arrived. X-ray film is not of much value until re-expansion is almost complete, and in long standing cases, where the pleurae are apt to be thickened, may be of little help throughout. However, if it does show the cavity still open, even though no symptoms have reappeared, further treatment is necessary. The appearance of a moderate amount of fluid during the period of re-expansion is of less consequence than the smaller amounts, which were mentioned above as occurring during treatment, and should not change the plan provided everything else is satisfactory. Many patients in this group will be greatly aided by the phrenic nerve operation. This may be done at the beginning of the re-expansion period if it is believed that the disease was so great before treatment that the pleural space cannot be obliterated, or at the end of the period when it has been determined by X-ray or the tug on the mediastinum that this condition exists.

The third group to be considered for voluntary expansion is the moderately advanced case with or without small cavity formation, in which it became necessary to induce compression therapy. Again, taking a leaf out of the book of experience with bed rest treatment, it is well known that these cavities will frequently disappear in a few months, and the whole lesion practically clear up within the year. If an earlier result can be expected of artificial pneumothorax treatment, and it can, re-expansion should be considered after a year and a half. The same care should be taken, and

the same string of symptoms looked for as outlined for the far advanced group.

The phrenic nerve operation is not likely to be needed for this type, but some may require it, just as there will be others obliged to continue the treatment for four or five years. The writer has had no experience with the collapse of earlier cases than those mentioned in this third group, except for an occasional case in which a few treatments were given to control hemorrhage and discontinued abruptly.

There is no place in this discussion for the method of handling those cases of satisfactory or partial collapse which re-expand involuntarily. That many of them do well, strengthens the argument presented above. The claim is not that a shorter time limit must be set for compression therapy, but that an earlier attempt to discontinue the treatment may be made with safety, that many cases to their economic advantage can be restored sooner to normal state, and will also avoid the risks which may develop from too long compression. It is fully realized that some patients may have to continue their treatment indefinitely, and possibly throughout life, but with the help of surgery such cases are very few.

DISCUSSION.

DR. DAVID R. LYMAN: This paper of Dr. Price's is most opportune. It brings up a question that we can't answer very satisfactorily as yet, and it will probably be some time before we can. But whenever any group of sanatorium men get together, one of the first things they start quarreling about is how long you have to keep a lung compressed, and so far none of us is able to give a very accurate answer to it.

I have been interested especially in listening to Dr. Price's generalizations, and seeing how they checked off with our limited experience. I think the only way we will get the answer to this is through the accumulation of years of accurate data as to our re-expanded cases and as to what has happened to them.

Dr. Morris up there with me traced out, in 1931, about 80 completed cases whose histories ran back from 1915 when we first started, January, 1915, to January, 1931. It is a very small group of cases, but the general conclusions that we have drawn from them parallel very closely the suggestions that Dr. Price puts forward from a clinical standpoint.

There are one or two things in his paper that impressed me, and one was his insistence on paying strict attention to the symptomatology of the patient, and that symptoms that suggested the persistence of some toxemia necessitated the continuing of your compression for at least a year after those symptoms have

subsided. The other was the careful watching for the reappearance of those symptoms when you are finally letting your lung re-expand, and these symptoms are an indication that you are not ready yet to allow that lung to re-expand.

Another thing in it was his suggestion as to sputum. Positive sputum was what he referred to. In the average sanatorium you have certain days in the month or week on which you check the sputum from a certain group, and often you will find on your charts no sputum, and then you will go and ask the patients if they didn't happen to raise any, and you will get the answer that they did not raise any that day. You have to be very particular in these re-expanding cases to be sure that those patients send you in any sputum they may happen to raise.

Those limited cases of ours show the difference between sputum positive and a sputum negative. For instance, with the sputum positive cases traced, only 18½ per cent of them were living and working at the end of this period, whereas 69 per cent of the sputum negative cases were living and working. Forty-seven per cent of the sputum positive were dead as against only 21 per cent of the sputum negative.

The parallel of the length of time that we keep a patient at strict bed rest to get our results in the different types of cases in the moderate cavitation case and in the case without cavitation also corresponds very closely with our results on these cases that we permitted to expand. For example, we found with our cases that had rather extreme cavitation, those that were kept compressed under eighteen months—of course, these go back into 1915, there were a lot of cases we compressed six months then and that would be all—only 21 per cent of them that had large cavities were living and working, while of those that were kept compressed over 18 months, 50 per cent were living and working and those with slight cavitation that were compressed under 18 months, 55 per cent of them were alive and at work, whereas of those with slight cavitation, just a small cavity as shown in the X-ray, all that group that were kept compressed over 18 months were living and working.

In the group without any cavitation, those who for purely clinical reasons we have kept at strict rest, bed rest, it has taken them about a year to definitely get healing in those lesions by our old methods. He expressed the opinion that, perhaps, at the end of eighteen months these cases might be allowed to re-expand and not necessarily be kept through years of compression. On those cases with no cavitation who were kept under 18 months, 67 per cent were living and working, and of those that were kept over 18 months, 77 per cent were living and working. We were able to get a small group of these back for X-ray. We got 39 of these 80 cases to come back to the sanatorium and be X-rayed, and there again we got to a lesser extent the relationship between the length of time that we keep compression. We got what we called a perfect result, that meant there was nothing left in that lung except a slight fibrosis that would suggest no lesion, and we had 36 per cent of those cases. Those had all been collapsed over 28 months. Our good results that had a moderate fibrosis, but nothing we would interpret as any dangerous lesion at all, we had 23 per cent, and those had been

compressed on an average of 28 months. Where we had a poor result, where we still had a slight open cavity or some definite infiltration present, 21 per cent of those cases had been compressed on an average of 18 months.

So we have about reached this tentative point now; we feel that in these cases where we have had no cavitation, purely an early infiltration that has not been doing well, probably at the end of eighteen months we are justified in letting that lung re-expand and watching it like a hawk and watching the symptoms and being ready to put it down if we need it. We think that is the minimum for any cases, and we feel, where we have had a definite cavitation in the lung, we want about two and one-half to three years as a minimum before we let that lung re-expand, but we feel we have to follow our cases, and all the men have to, and get a large number of statistics in which we can get comparative results. I have thrown them all together, good, bad and indifferent, long time and short time. However, I feel we must get a large number of statistics on comparative cases before we can get an accurate answer to this question. (Applause.)

DR. EDWARD N. PACKARD: I recently reviewed 105 cases of re-expanded lungs, the shortest period being one year of re-expansion, and the longest eighteen years.

Of that whole group the average duration of pneumothorax is a little over two and one-half years, and it was very interesting to me to find that in about half the cases the pneumothorax was lost involuntarily and that the loss came in the average about two years, and that those patients did just as well as those whose pneumothorax continued and was allowed to expand.

It was also interesting that in those who had a satisfactory collapse of the cavity, and whose sputum was negative and who had returned to work, the danger of re-expanding was practically nil. Out of 70-odd patients who were working during this period of over eighteen years, 10 patients only had relapses, and that occurred in from three to eleven years after re-expansion. In other words, the process of re-expanding a lung in a satisfactory collapsed case does not reactivate the lung, but those patients must have negative sputum, consistently negative, and have a satisfactory collapse of the cavity.

This is shown by the fact that in 24 cases who did not lose their positive sputum, none were working, 10 were still living, and 14 or 15 of them died. So for a patient who goes through fire and sword with a satisfactory collapse after a period of two and one-half years, the average for the whole class of re-expansion, this is not to be feared, and a large percentage of those patients are able to return to work.

DR. JAMES B. AMBERSON, JR.: This is an extremely important subject of Dr. Price's because of so many thousands of patients in the country now with pneumothorax.

Several years ago I started studying 165 re-expanded cases from Loomis Sanatorium, and I have a yearly follow-up on those cases, that is, eight years after re-expansion. The findings are pretty much in accord with what has been

said here. One outstanding thing in our series is this: that it is not the period of pneumothorax treatment that means so much as it is the period of satisfactory collapse; that is, collapse of the lung after all cavities have been obliterated and the sputum has become negative for tubercle bacilli. We have found, as a rule, that if the lung is kept down for a year and a half to two years after the sputum is negative, those patients are likely to be living and well at the expiration of another eight years.

PRESIDENT HAMMAN: Does anyone wish to discuss this paper further? If not, will you close the discussion, Dr. Price?

DR. PRICE: I have nothing further to add.