Rest Therapy in Pulmonary Tuberculosis

Galen, who was born 130 years after Christ, employed rest therapy for the treatment of his tuberculous patients, and it remains the time-proved method of treatment upon which we still depend.

With the addition of pneumothorax and other surgical aids to make rest of the diseased area more effective, an era of increased interest in the treatment of pulmonary tuberculosis began. When the surgeon became actively allied with the internist in the care of these patients, a more aggressive treatment was instituted. Over enthusiasm resulted, however, in many operations that proved to be ill advised; not only were they not helpful, but some were distinctly harmful. A few years ago a large municipal hospital reported that phrenicectomies were being done on practically all patients entering the hospital.

At present there are those advocating pneumothorax for minimal cases with a view to permitting the patient to continue at work. There are to be found in our medical journals reports of the treatment of bilateral cavity tuberculosis by means of bilateral pneumothorax in ambulatory patients. Other writers vigorously condemn the use of surgical treatment until serial films show that progress cannot be expected by strict bed rest.

With a disregard of the importance of segregation as a means of checking the spread of the disease, much has been written to encourage the family physician to carry on "home treatment," which usually must be done without the facilities considered necessary for good work by the internist who specializes in the care and treatment of the tuberculous.

These divergent opinions serve to confuse both the patient and his physician, and make advisable a review of our various therapeutic procedures, about the indications and the limitations of which we are gradually learning more. The axiom that "the repair of the diseased tissue is best furthered by complete rest of the diseased part" is just as true today as it was when surgeons first called our attention to its application in the treatment of pulmonary tuberculosis by their success in the treatment of bone and joint manifestations of the disease.

The question that now confronts us is: Have we arrived at a period in the treatment of pulmonary tuberculosis when by means of surgical procedures we can safely immobilize the affected lung, and obtain a satisfactory cure, while the patient remains mobile and carries on his usual activities?

Before conclusions are drawn we should review the results obtained by strict bed rest, both with and without the surgical adjuncts which I regard as additions to rest therapy.

The physiological reasons for bed rest and the serious effects that result in the patient who disregards the need for rest should also be considered.

If, by resorting directly to surgery, the results are as good as those obtained through rest and its surgical adjuncts, then by all means we should resort to surgery and relieve this vast army of sufferers of much expense and loss of time. But, if surgery and ambulatory or partially ambulatory treatment fails to meet the requirements for the majority of patients, then great care should be exercised in the type of treatment selected for the individual case.

The tuberculous patient is ill only in proportion to the amount of tubercle toxins that finds its way into the blood stream. If a tuberculous patient is given tuberculin subcutaneously, in sufficient amounts, both systemic and focal symp
Diseases of the Chest

Tons will result. Headache, fever, general aching over the body, nausea and vomiting are complained of, and an examination of the chest will show congestion, rales, and other signs of increased activity in the affected area.

The tuberculous patient can duplicate these signs and symptoms any time that he indulges in a sufficient amount of exercise. Just as there are different degrees of reaction to various-sized doses of tuberculin; so there are moderate or severe symptoms that follow different amounts of physical exercise.

Some years ago only the toxic fever case was considered a subject for bed rest. Following the loss of fever the patient was allowed up and more or less mobile. Now, however, we have learned that progress continues most rapidly if rest is uninterrupted; that mobility of the patient interferes with repair work and all too frequently leads to advancement of the disease.

We have learned that all clinical cases, however mild, should be placed at strict bed rest because the same mechanism is required for the healing of the minimal as is required for the more advanced case. Occasionally we see recoveries with a less strict regime, and we know that some patients recover without any treatment just as some do in other infections, but no patient can afford to experiment for the purpose of learning whether or not he be in that class.

Pottenger, in a paper on The Physiological Basis of Rest as a Therapeutic Measure in Pulmonary Tuberculosis says:

"Twenty per cent more effort is required to sit quietly in a chair than to lie in bed; one hundred per cent more is required to walk about and three to four hundred per cent more for strenuous exercise.

"Two hundred fifty to three hundred c.c. of air is required per minute while at rest, and for moderate exercise six hundred to sixteen hundred c.c.

"The healthy pulse rate, while resting, is from seventy to eighty; under moderate exercise from one hundred to one hundred twenty, and for strenuous exercise a rate of one hundred fifty to two hundred is necessary.

"The heart output is four or five liters per minute while the body is at rest and twenty liters when at work. The blood pressure must rise fifty to sixty mm to maintain sufficient oxygen for exercise.

"Under normal conditions the increased output of the heart is accomplished by greater ventricular activity with a relative increase in rate while in the tuberculous patient response is mainly by increased heart rate and is deficient in ventricular response."

Even when the patient lies quietly in bed the respiratory rate is more than 1000 per hour, and when he stands on his feet the respiratory and circulatory load is markedly increased; there is more movement of the diseased area; lymph flow is stimulated, and a greater volume of pulmonary blood carries into the general circulation increasing amounts of tuberculotoxins. On the other hand, slowing of the pulmonary circulation and increasing stasis of the lymph lessen the amount of toxins carried in the blood stream and favor healing.

Serial films show that absorption of exudates and debris takes place when the affected area is sufficiently immobile. Absorption is hindered, or prevented, if the patient is tuberculized by the frequent flooding of the circulation by toxins. Cough and sputum are reduced as immobilization becomes effective, but aggravated by increase of respiratory and circulatory effort.

Strict bed rest gives splendid results for the early involvement, and no other form of treatment should be considered for the exudative type unless the allergic response has been so severe that necrosis of tissue and cavitation has taken place.

With bed rest alone many moderately advanced cases do well and small cavities may disappear, but, if the cavity is more than two centimeters in diameter, or has
thickened walls, bed-rest will prove insufficient.

If the lung is not adherent to the chest wall a collapse by pneumothorax closes cavities, immobilizes the diseased area, and favors healing by fibrosis.

Rarely do we find a case that is free from adhesions, but, by maintaining an even pressure through frequent refills of 250 to 350 c.c. of air, we may gradually produce an effective collapse.

Pleural effusion is not so frequent a complication where small refills are repeated at intervals that keep the pressure as uniform as possible. If an effusion occurs, the fluid should be removed and replaced by air. Often we again get a dry pleural cavity, but, if the fluid is allowed to remain, we frequently lose the pneumothorax.

Adhesions that prevent collapse may be severed by pneumolysis, if they be accessible, or we may consider reducing the tension of an adhesion by phrenicectomy.

Certain thick-walled cavities in the first interspace area are recognized by the experienced observer as being unsuitable for closure by pneumothorax. He recognizes the fact that such areas tightly adhere to the pleural dome, and, although the remainder of the lung may be nicely collapsed by gas, the cavity will remain open. He may choose to do a partial thoracoplasty with or without the collapse of the remainder of the lung by pneumothorax, depending on the amount of pathology present. With an extensive involvement through a greater portion of the lung the complete thoracoplasty would be indicated.

In 1916, Webb\textsuperscript{2} first pointed out the advantages of postural rest, and the use of shot-bags. For a cavity in the upper part of the chest a shot-bag of about three pounds may be placed over the affected area so that movement of that part will be reduced to the minimum. Air in that portion of the lung is reduced, atelectasis of some degree takes place, and a collapse of the cavity tends to follow. For involvements lower in the lung the patient is placed on a firm pillow on the affected side, a similar effect occurring when the weight of the body restricts movement of the affected area. Placing the patient on the affected side has been of value to me in some cases and the use of the shot-bag in the upper lobe has closed cavities for me, but the treatment must be continued over a long period of time if the cavity is to remain closed.

The use of either posture or shot-bags is justified when a pneumothorax is impossible and the patient's general condition forbids the use of thoracoplasty as too hazardous, but pneumothorax and thoracoplasty are the operations upon which we must place our reliance for effective results.

Phrenicectomy, formerly tried for numerous types of lesions, has been disappointing. Corrylos\textsuperscript{3} reports that in selected basal lesions phrenicectomy is successful in but 16 per cent of the cases and that he is convinced that the reported successes of enthusiastic supporters of the operation are due to their use of it in benign, acute, exudative tuberculous, and that the patients recovered, not because of, but in spite of phrenicectomies.

Good serial stereoscopic films are of the utmost importance, not only for diagnosis, but for following the progress of the case, and to determine the need for surgical intervention.

In a large percentage of cases suitable for pneumothorax, an active lesion is found in the opposite lung. In such case we have no choice but to maintain strict bed-rest and at the same time carry on the pneumothorax.

Only infrequently do we get a perfect collapse by pneumothorax, but, if the cavity is closed, and the sputum remains continuously negative, it is effective. \textsuperscript{1}Positive sputum means an unsatisfactory pneumothorax.

The location of the cavity and the size of the bronchus into which it drains determines the effectiveness with which it may collapse the cavity.

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Bed-rest frequently makes effective a partial pneumothorax which is ineffective if the patient is mobile.

Pneumolysis will allow a more complete collapse, but frequently the adhesion that holds the cavity open is so located that it cannot be reached.

Thorocoplasty should be done if the pneumothorax is not effective, but no thorocoplasty accomplishes as complete a lung collapse as a good pneumothorax.

The post-operative treatment, consisting of strict bed-rest, is necessary until fibrosis permanently closes the cavitated area; otherwise a splendid thorocoplasty may be rendered useless by the respiratory movements pumping in sufficient air to reopen the cavity.

In certain unilateral cases that have been successfully closed by pneumothorax the patient may not only be mobile, but may even continue at work if his general condition is good.

Active, aggressive treatment of the tuberculous has shortened the term of disability and made recovery more certain. Surgical adjuncts have made recovery possible for many who could not have survived by bed-rest unaided. However, tuberculosis cannot be regarded as merely a mechanical problem; a cavity must be closed or an affected area of lung shut off; but rather a disease which has produced for long periods of time systemic alterations that require both time and rest of the body as a whole, as well as rest of the affected area, for the restoration of normal functions.

References

1. Pottenger—Annals of Clinical Medicine, September, 1924.
2. Gerald B. Webb—Colorado Medicine, May, 1933.
3. Coryllos—The Quarterly Bulletin of Sea View Hospital, October, 1935.

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