Streptomycin in Silicotuberculosis*

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Theodos and Gordon state that the life expectancy in silicosis with complicating tuberculosis treated at home is two or three years, and that with sanatorium care life expectancy in some cases may be increased to four years.1 If the disease is clinically inactive, no particular treatment is necessary, and the patients may be encouraged to continue at work; they must in such cases work in an atmosphere which is free of dust. However, when tuberculous cavitation exists and the sputum or gastric contents are positive for tubercle bacilli, the disease usually progresses relentlessly to a fatal termination. Isolation is advisable to prevent infection of others, and rest may be of some help. Collapse therapy is usually impractical or impossible;2-3 silicosis itself reduces the vital capacity and may cause dyspnoea; extensive pleural adhesions prevent adequate collapse; and tuberculous cavities in silicotic areas of the lung are difficult to close by any collapse measures. Auerbach and Stemmerman reviewed eight cases of silicotuberculosis in which artificial pneumothorax was attempted, and four in which thoracoplasty was performed; in none of these cases was a cavity closed.4 They believe that there is little hope for success with collapse therapy in silicotuberculosis. The silicotic areas form a resistant barrier to collapse of lung tissue. In ordinary tuberculosis there is destruction of the elastic elements of the lung, and when collapse therapy is attempted it may readily be successful, as the pulmonary parenchyma has already suffered a decrease in volume. In silicosis, on the other hand, the fibrosis occurs chiefly along the septa, the silica particles stimulating the formation of new collagen fibrils to form connective tissue. The silicotic lung is more voluminous than normal and shows no tendency to collapse. Some authors even believe that in advanced cases life is actually shortened by collapse therapy.5 Because of widespread disease and lowered vital capacity, resection of major tuberculous foci is seldom feasible.

Because of the poor results obtained with other forms of treatment, streptomycin was given to every patient who came to this hospital with advanced tuberculosis complicating silicosis. For purposes of this study, no case was accepted unless there was a good history of prolonged exposure to silica dust, an x-ray film appearance typical of nodular or conglomerate silicosis and cavitation and sputum positive for acid-fast bacilli. It is admitted that this is the type of disease in which in the past treatment

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has been almost uniformly unsuccessful. Eighteen such cases were treated. The results were poor.

Symptomatic improvement—a feeling of well-being, improved appetite, weight gain, and decrease of fever—was seen in only three cases, and significant improvement was demonstrated by x-ray film inspection in only one. In several other cases there was slight and temporary improvement by x-ray film inspection. Review of these 18 cases 12 months after treatment was started, showed that six were dead, seven were worse, four were unchanged, and only one was improved. In not a single instance was there cavity closure or sputum conversion; in not a single instance did collapse or excision become feasible as a result of streptomycin therapy.

<table>
<thead>
<tr>
<th>Number of cases</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead</td>
<td>6</td>
</tr>
<tr>
<td>Worse (x-ray)</td>
<td>7</td>
</tr>
<tr>
<td>Unchanged (x-ray)</td>
<td>4</td>
</tr>
<tr>
<td>Improved (x-ray)</td>
<td>1</td>
</tr>
<tr>
<td>Improved (symptoms)</td>
<td>3</td>
</tr>
<tr>
<td>Sputum conversion</td>
<td>0</td>
</tr>
</tbody>
</table>

The only patient who showed significant improvement was a 40 year old white man who had worked for nine years in an anthracite mine in Eastern Pennsylvania. Chest x-ray film in 1947 showed a nodular pneumonoconiosis throughout, with large conglomerate nodules in both upper lobes. He was not allowed to return to the mines, but went to work as a floor layer. He remained asymptomatic except for slight dyspnoea until November 1950, when he developed some cough and expectoration. Thereafter these symptoms progressed and he lost weight. Chest x-ray film showed evidence of a new lesion at the right base, with a large cavity, and sputum was positive for acid-fast bacilli. On treatment with streptomycin his appetite improved

**FIGURE 1**

*Figure 1: Extensive Conglomerate Silicosis.*

**FIGURE 2**

*Figure 2: Tuberculous lesion with cavitation in right lower lobe, in same patient.*
and he gained 14 pounds in weight. Simultaneously serial x-ray films showed moderate improvement in the tuberculous lesion, but the cavity remained open, the sputum remained positive for acid-fast bacilli on concentration and culture, and was repeatedly heavily tinged with blood. Further improvement is not occurring on a medical regimen, and the thoracic surgeons who have seen the patient show no enthusiasm to accept the case for collapse or excision. It should be repeated that this is a report of our most successful case.

There are occasional reports in the literature which indicate that streptomycin is of value in silicotuberculosis. In most of these reports either the silicosis or the tuberculosis are not extensive. Boselli and Lusardi\textsuperscript{6} gave streptomycin to 23 cases with the combined diseases, and assert that in every case the treatment brought about benefit. Most of their patients had no pulmonary cavities. They note that on chemotherapy, in spite of clinical improvement, no cavities closed, and they say nothing about sputum conversion in cavitary cases. Most observers are agreed that in chronic fibro-cavitary silicotuberculosis streptomycin is of little value\textsuperscript{2,7} except to reduce the manifestations of toxemia\textsuperscript{1} and the results in our cases certainly support this view.

If streptomycin is of value in silicotuberculosis, its benefit is limited to acute progression of tuberculosis, post-hemorrhagic spreads, miliary disease, and extra-pulmonary tuberculosis. It is probable that before cavitation develops streptomycin may be helpful. In chronic cases with cavitation and positive sputum streptomycin does not appear to cause improvement or even halt the progression of the tuberculous disease.

**SUMMARY**

The very hopelessness of the treatment of extensive fibro-cavitary silicotuberculosis brings with it hope for the eradication of this disease. Since it is impossible to treat successfully this combination of diseases in its late stages, it must be detected earlier when treatment may be of value. This calls for periodic examinations of silicotics, alertness for early evidence of tuberculosis, and treatment at this stage. Better yet, since both silicosis and tuberculosis are preventable diseases, and since much progress has already been made in their prevention, it seems only a matter of time until silicotuberculosis will cease to exist and its treatment will be merely of academic interest.

**RESUMEN**

La falta de esperanza en el tratamiento de la tuberculo-silicosis extensiva y cavitaria, trae consigo la esperanza de que la tuberculosis sea erradicada. Puesto que es imposible tratar con éxito esta combinación de enfermedades en sus etapas tardías, debe ser descubierta más tempranamente, cuando el tratamiento puede ser de valor. Esto requiere exámen periódico de los silicosos, estar alerta para cualquier evidencia de tuberculosis y tratamiento en esa etapa. Mejor aún, puesto que tanto la silicosis como la tuberculosis pueden prevenirse, parece que es solo cuestión de tiempo el
que la silico-tuberculosis desaparezca y entonces su tratamiento sea solo algo de interés académico.

RESUME

L'insuccès complet du traitement de la silico-tuberculose extensive avec lésions fibro-ulcèreuses ne fait entrevoir d'espoir que dans la suppression de cette maladie. Puis-qu'il est impossible de traiter avec succès cette maladie à sa phase tardive, on doit la déceler plus tôt, lorsque le traitement peut avoir quelque effet. Ceci demande l'examen systématique des silicotiques, afin de mettre en évidence la tuberculose quand elle est encore latente, et de permettre son traitement. Mieux encore, puisque silicose et tuberculose sont des affections qu'on peut éviter, et que beaucoup de progrès ont été réalisés pour leur prévention, il semble que ce soit seulement une question de temps pour que la silico-tuberculose cesse d'exister et que son traitement ne soit plus que d'un intérêt purement théorique.

REFERENCES