Anthracosilico-Tuberculosis as Seen in a General Hospital

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Living and practicing in an area whose chief industry was for many years the mining of anthracite coal, the author has had opportunity to observe a large number of patients suffering from anthracosilicosis. The wards of community hospitals in Luzerne County have a constant and impressive patient population from this unfortunate group, increasing in cyclic fashion with the winter months and their accompanying incidence of upper respiratory infections. Physicians responsible for the care of these patients are only too familiar with the tendency for active tuberculosis to appear as a complication of anthracosilicosis. The purpose of this study was to analyze the tuberculous patient population in one of our hospitals over a nine-year period. As an outgrowth of this study, it was hoped that certain guides of importance in tuberculosis control peculiar to anthracosilicosis would become highlighted.

The hazard of tuberculosis in anthracosilicosis has been described by many workers, and its incidence variously reported. Fletcher\(^1\) found tubercle bacilli and histologic changes of tuberculosis at necropsy in 40 per cent of cases of progressive massive fibrosis. This author subscribed to the idea that dust gives rise to simple pneumoconiosis which does not progress after exposure has ceased, but that massive fibrosis progresses relentlessly and results from either continuation of active infection or because of vascular obliteration and replacement fibrosis. Cathcart et al.\(^2\) reviewed 1,690 miners and described cavitation in 182 of these; 69 per cent (or 126) of these showing cavities presented tubercle bacilli in their sputa. Cochrane\(^3\) noted that a little coal dust in the lungs exerted a beneficial effect so far as the development of active tuberculosis is concerned, but that large accumulations increased the attack and mortality rates from tuberculosis.

The combined occurrence of anthracosilicosis and tuberculosis creates a unique and often confusing picture, making early and precise diagnosis of tuberculosis an impossibility. Auerbach and Stemmerman\(^4\) maintain that the diffuse fibrosis of silicosis with superimposed infection produces a form of pulmonary disease indistinguishable from tuberculosis. Theodos and Gordon\(^5\) state that the diagnosis of tuberculosis can be established in 85 per cent of infected anthracosilicotics by sputum alone.

Methods

The records of all patients discharged from Wilkes-Barre General Hospital with a diagnosis of pulmonary tuberculosis were examined for the period August, 1952 to August, 1961. A total of 141 such records were reviewed. Because of the factors likely to confuse the diagnosis of tuberculosis in anthracosilicosis (see above), it was decided to accept this diagnosis only where the sputum contained acid-fast bacilli or where prior knowledge of active tuberculosis was described by the physician in charge. Where possible, the chest x-ray films of these patients were reviewed.

The study was oriented to provide information concerning coexistent anthracosilicosis, patient age, and occupational history. The admission circumstances with respect to isolation, the number of days required to establish the diagnosis of open infection and the type of hospital bed (private or ward), were also noted.

Results

A total of 82 patients with sputum positive for tubercle bacilli were identified within the hospital population in the years 1952 to 1960. The case volume for each year is represented in Table 1. Attention is invited to the fact that the annual incidence during the last four years of the study
shows a definite increase over the earlier years (Table 1).

There were 56 hard coal miners in this group of 82 patients and all 56 had anthracosilicosis in either stage II or III, as described by the roentgenologist. There was no good correlation between x-ray findings and open tuberculosis, a "suspicion of superimposed tuberculosis" being a common interpretive phrase encountered. In other words, about 68 per cent of patients with active, open tuberculosis had anthracosilicosis in this nine-year period. Two of these miners had been actively working until within a few weeks of hospitalization, both having experienced an acute upper respiratory infection. The remainder were retired, due either to ill health or to the disappearance of work demand.

As might be expected, these miners were in the upper age bracket, presenting a mean age of 59.3 years, with a range of 43 to 74 years. However, in the group with active pulmonary tuberculosis, but without anthracosilicosis, the mean age was 40 years, ranging from nine months to 76 years (Table 2). All miners were men; in the non-anthracosilicosis group, there were 16 women and 13 men. Family histories as recorded on the charts were not considered reliable, but four of these women were noted to be married to retired coal miners.

The hospital concerned in this report is a general hospital caring for both free and private patients in about a 1:3 proportion. We were concerned that a majority of the open cases of pulmonary tuberculosis were admitted to general wards without isola-
tion precautions, although 14 of the 82 were isolated on admission in each instance, reflecting the time required to obtain a positive sputum report from the laboratory (Table 3).

Contrary to our expectations, more than half of the unemployed anthracosilicotics were cared for by their private physicians (29 private, 27 free), reflecting the fact that prepaid hospital insurance plans were maintained by these frugal families. As might be expected, the proportion of private to free patients among the non-anthracosilicotics was 20:8, reflecting the fact that these patients were younger, more commonly employed or employable, and in a generally more favorable socio-economic group.

The charts of several miners revealed repeated hospital admissions, generally for cough, shortness of breath, or fever, with x-ray evidence of progressive massive fibrosis, gradually increasing.

In one instance, an indigent anthracosilicotic remained in the free ward for three months, primarily because his family was unwilling or unable to care for him and social service was unable to arrange an alternative. This 74-year-old man had had anthracosilicosis, stage III with emphysema and was hospitalized for epistaxis, cough, dyspnea and loss of appetite. His chest x-ray film showed fluid in the right lung base with superimposed infection in the same area. During his three-month hospitalization he had six sputum specimens examined, at intervals of every few weeks. At the end of two and one-half months, a specimen positive for tubercle bacilli was obtained (Gaffky III) and
subsequently confirmed by the laboratory. In this instance, we are provided with an example of anthracosilicosis, with progressive massive fibrosis and finally open tuberculosis. It seems very possible that in many such instances there is a long period when tubercle bacilli are expectorated at infrequent and irregular intervals.

We attempted to correlate the results of the tuberculin test with the development of active tuberculosis among these miners, but abandoned this review because of inadequate recording and omission of the test in many instances.

**DISCUSSION**

From the results of our review, it is apparent that there is no decrease in anthracosilico-tuberculosis in recent years among patients treated in a general hospital operating in Luzerne County. The case load has actually increased. From a community point of view, there has been a gradual contraction of hard coal mining operations in this county for several decades, but a large reservoir of retired and unemployed miners has been built up. This group is, of course, aging and during the next 15 to 20 years, it will undoubtedly be greatly reduced. Meanwhile, a significant number of anthracosilicotics will develop open active tuberculosis. Furthermore, many patients with "miners' asthma" die at home, cared for and loved by their closely knit families. It seems certain that some of these deaths represent active tuberculosis.

As has been reported by others, early diagnosis of active tuberculosis in progressive massive fibrosis is difficult, if not impossible. Several examples of this problem were encountered in our review, one of which we have described in detail. This brings up the question as to whether in the presence of a tuberculin positive patient with progressive massive fibrosis, one ought to await the development of positive sputum to initiate INH therapy.

The impression has been rather widespread, at least in this community, that retired unemployed anthracite miners are completely indigent. However, over one-half the total in this series were cared for by their private physicians; from this fact we opine that these patients do not come from poverty-stricken, crowded homes, even though more tuberculous anthracosilicotics were on the free service than under private care.

We have made no attempt in this review to analyze the incidence of tuberculosis among anthracosilicotics in the general population. Theodos and Gordon\(^*\) reported on a group of 750 hard coal miners and stated that the probable prevalence of the disease might be 12 to 15 per cent, but figures vary from 3 to 75 per cent in the literature. Kilpatrick et al.\(^*\) contended that progressive massive fibrosis is at the outset a modified form of tuberculosis, with the infection burning out in a majority of cases, leaving a scar which may increase in extent following partial vascular occlusion. In others, viable tubercle bacilli must persist within the mass, to resume multiplication after prolonged quiescence.

It would seem best to maintain a high index of suspicion that tuberculosis is present whenever one is treating a patient whose anthracosilicosis has developed into progressive massive fibrosis. Elements of special significance, as pointed out by Theodos and Gordon,\(^*\) are abrupt onset of a febrile respiratory infection, with rapid decline of the patient's strength, loss of weight, and anorexia; the presence of moist rales of localized nature; a positive tuberculin test; and x-ray evidence of asymmetry.

Our own experience in this study points up the need for a community wide attempt to register all victims of progressive massive fibrosis due to anthracosilicosis. The fact that over a ten-year period 68 per cent of our patients with active, open tuberculosis came from this group, leads us to conclude that renewed and intensive efforts must be made to seek out similar active cases in the county. In addition to a registry, we would consider tuberculin testing, sputum examinations for tubercle bacilli, and annual chest x-ray films as additional parts of a case finding program.
SUMMARY AND CONCLUSIONS

1. Sixty-eight per cent of 82 patients with active tuberculosis seen in a general hospital between 1951 and 1961 had underlying anthracosilicosis and progressive massive fibrosis.

2. There was no evidence that this incidence was tapering off during recent years—actually an increase was observed during the last four years.

3. The mean age was 59.3 years, higher than we had anticipated. Recognition of active tuberculosis depended upon the activity and awareness of the physician, as well as upon the difficulty in obtaining bacilli in the sputum. As much as three months elapsed from time of admission to the hospital to positive diagnosis.

4. We suggest a four-point community wide program to find active tuberculosis in coal miners. This means: (a) maintaining an anthracosilicosis case registry; (b) tuberculin testing all miners with progressive massive fibrosis; (c) obtaining annual sputum examinations, and (d) taking annual chest x-ray films of those on the anthracosilicosis registry.

RESUMEN

1. El 68 por ciento de 82 pacientes con tuberculosis activa vistos en un hospital general entre 1951 y 1961 tenían la antracosisilicosis como mal subyacente y fibrosis progresiva masiva.

2. No hay evidencias de que esta frecuencia tienda a disminuir en los últimos años; de hecho se ha visto aumentar en los últimos cuatro años.

3. La edad media de este grupo fue de 59.3 años, más alta de lo esperado. El poder reconocer la tuberculosis depende de la agudeza y alerta del médico así como de la dificultad para obtener el bacilo de la tuberculosis en los esputos. Hasta tres meses transcurrieron desde la entrada de los enfermos hasta que se hizo el diagnóstico positivo.

4. Sugerimos un plan de cuatro puntos para la comunidad, a fin de descubrir la tuberculosis activa entre los mineros del carbón. Esto es: (a) mantenimiento de un registro de casos de antracosisilicosis; (b) prueba tuberculínica de todos los mineros con fibrosis masiva; (c) exámenes de esputos, y (d) radiografía de tórax de todos los que están en el registro de antracosisilicosis.

RESUME

1. 68% parmi 82 malades atteints de tuberculose active, observés à l'Hôpital Général entre 1951 et 1961 avaient une anthracosilicose et une fibrose massive progressive sous-jacente.

2. Il n'y eut pas de preuve que cette fréquence ait diminué pendant ces récentes années; on a réellement observé une augmentation pendant les quatre dernières années.

3. L'âge moyen de l'atteinte fut de 59,3 ans, plus élevé qu'on ne l'avait prévu. La découverte d'une tuberculose active dépendit de l'acuité de perception et de l'expérience du médecin, ainsi que de la difficulté à obtenir des bacilles dans l'expectoration. Un délai de trois mois a été nécessaire à partir du moment de l'admission à l'Hôpital pour obtenir un diagnostic positif.

4. L'auteur suggère en quatre points un programme portant sur une large communauté, pour détecter la tuberculose évolutive chez les mineurs. Ceci signifie:
   — que l'on doit maintenir la constatation initiale d'anthracosilicose;
   — que l'on doit faire subir des tests tuberculiniques à tous les mineurs atteints de fibrose massive progressive;
   — que l'on doit faire des examens d'expectoration chaque année;
   — que l'on doit faire une radiographie annuelle à tous ceux chez qui on a constaté une anthracosilicose.

ZUSAMMENFASSUNG

1. 68% von 82 Patienten mit aktiver Tuberkulose, die im einem allgemeinen Krankenhaus in der Zeit zwischen 1951 und 1961 behandelt wurden, hatten eine ihr zugrundeliegende Kohlenstaublunge und eine fortschreitende massive Fibrose.

2. Es fand sich kein Anhalt dafür, daß dieses Vorkommen sich zutaten während der letzten Jahre-tatsächlich wurde im Verlauf der letzten 4 Jahre eine Zunahme beobachtet.


4. Wir schlagen ein 4 Punkte umfassendes Programm vor zur Ermittlung aktiver Tuberkulose bei Kohlenbergarbeitern. Dies bedeutet: (a) Führung eines Registers über Kohlenstaublungen-Fälle; (b) Tuberkulintestung aller Bergleute mit fortschreitender massiver Fibrose; (c) Durchführung jährlicher Sputumuntersuchung, und (d) Vornahme jährlicher Thoraxrönt-
genuntersuchung der im Kohlenstaub-Register ge- 
führten Fälle.

References
1 Fletcher, C. M.: "Epidemiological Studies of 
Coal Miners Pneumoconiosis in Great Brit- 
2 Cathcart, R. T., Theodos, P. A. and Fra- 
mow, W.: "Anthracosilicosis: Selected As- 
3 Cochrane, A. L.: "Tuberculosis and Coal 
Workers' Pneumoconiosis," Brit. J. Tuberc., 

SPECIAL RING CLAMP FOR APPROACH TO LARGE ATRIA

Five cases of atrial septal defect (secundum type) 
with a large right atrium have been cured by the 
circumclusion method. To overcome the difficulties 
due to a small auricle or its inadequate location in 
a high-pressure atrium, the ring-clamp of Sonder- 
gaard was applied to the atrial wall permitting a 
safe and easy approach for the introduction of a 
finger into the atrium. The postoperative course 
in each case was uneventful. No mortality.
Senn, A. and Sondergaard, T.: "Use of a Special Ring- 
clamp for the Approach to Large Atria," J. Cardiovac. Surg., 

SEMINOMATOUS TUMOR OF THE MEDIASTINUM

A 23-year-old man was admitted to the surgical 
clinic with chief complaints of cough and sputum 
of three months' duration. He had an abnormal 
shadow in his left hilum six months ago. Roent- 
genogram revealed a mass the size of a small flat 
in the anterior mediastinum. On thoracotomy, a 
mass was found to be adherent to the left upper 
lobe and infiltrating in to the pericardium. The 
tumor was removed en bloc with them. Histologic 
examination revealed seminomatous and embryonal 
carcinomatous tissue. In addition, the residual 
thyroid tissue was found in the peripheral portion 
of the tumor and calcified Hallala corpuscles were 
scattered in the tumor tissue. This kind of tumor 
should be recognized as a thymic neoplasm.
Kawaski, A. et al.: "Seminomatous Tumor of the Medi- 

CLINICAL SIGNIFICANCE OF INTRACARDIAC PHONOCARDIOGRAPHY

The experience and technic of intracardiac phono-
cardiography are described. The investigation was 
undertaken in 33 patients with congenital and ac-
quired disease of the heart and large vessels. The 
study was accomplished during venous, and in one 
case, arterial catheterization of the heart. In four 
patients, electromonometry was performed with the 
aid of two catheters, one a phonocatheter. Sim- 
ultaneously recorded pressure curves from the two 
heart cavities and Intracardiac phonocardiogram 
were obtained. The advantages of this method in-
clude the possibility of selective phonocardiography 
in various heart cavities, separate registering of the 
first and second tone components, determination of 
the source of sound phenomena. Intracardiac phono-
cardiography is considered a valuable diagnostic 
method of investigation of the cardiovascular system.
Zorin, A.B. and Silin, V.A.: "Clinical Significance of 
Intracardiac Phonocardiography," Chest Surg. (USSR), 
90:45, 1963.

CARDIOVASCULAR SURGERY

Thirteen patients with high pressure patent duc-
tus arteriosus were operated upon. There was no 
operative mortality in this group. Twelve patients 
have shown remarkable clinical improvement, and 
there was a decrease in the pulmonary arterial pres-
sure at the time of recatheterization in 11 of these 
patients resutled. One developed severe pulmonary 
hypertension and died six and one-half years after 
operation. The pulmonary arterial systolic pressure 
dropped minimally in two patients, despite pro-
ounced clinical improvement. Both patients had 
associated lesions: a large ventricular septal defect 
in one and severe congenital aortic stenosis in the 
other. Both patients are to be operated upon. All 
patients with a predominant left-to-right shunt and 
a patent ductus arteriosus should have dision of 
the patient ductus arteriosus.
Tsuji, H., Shapiro, M., Maginlin, O., Dunn, E., 
Dykstra, P. and Kay, J.H.: "Surgical Treatment of High 
Pressure Patent Ductus Arteriosus," Circulation, 27:652, 
1963.