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Some Clinical Observations of Asbestosis in Mine and Mill Workers

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Instead of giving the usual clinical description of asbestosis as mentioned in the program, which description may seem to many a matter of personal impression and therefore controversial, I prefer to bring to your attention a series of remarks and comments collected during my nine years of medical supervision of some 4000 asbestos mining workers.

From 1945 to 1953 the annual medical and x-ray examination of the asbestos workers, along with the histological study of 58 autopsy cases, permitted the detection of 128 cases of asbestosis; 40 of the patients are already dead—and autopsies have been performed—and 88 are still living.

Table 1 gives the age-group distribution and the classification by degree of asbestosis in the 128 cases. You may see that there are 72 cases of minimal, 35 cases of moderate, and 21 cases of advanced asbestosis. The age distribution indicates that 16 workers are 70 years and over—one worker with far advanced asbestosis is 84 years of age and still living—and 66 workers are 60 years and over.

First, it seems indicated to explain how the diagnosis of asbestosis has been made in these 128 cases. One hundred twenty-one cases have been diagnosed by roentgenology, and 33 of these 121 cases have been confirmed by the pathological study of the lungs; so we can say that 33 cases have been diagnosed by x-ray and histological interpretation. The remaining seven cases have been diagnosed by pathological study only, having been missed on the reading of the standard chest films; but it is important to add that these seven cases are cases of minimal asbestosis. Without going into a too long discussion of the effectiveness or the superiority of roentgenology over histopathology or vice versa for making a diagnosis of asbestosis, I should like to add the following remarks.

We have to admit that the roentgenological interpretation might fail to detect cases of minimal asbestosis, but from personal experience and from repeated contacts with Gardner, Sampson, Robert, Bristol, Vorwald, and Pratt, I can say that no cases of asbestosis of clinical importance have been diagnosed by the pathologist without having been detected anteriorly by the roentgenologist. I do not know whether a similar statement is true for employees of the asbestos textile industry, where apparently the x-ray pattern of asbestosis is fainter than the one found in the asbestos mining industry.

A second comment is about the wide discrepancy in the appreciation of the degree of asbestosis by different pathologists. In a few instances, cases which looked like minimal asbestosis to one pathologist have been classified as advanced asbestosis by another pathologist. With the increasing number of autopsies for old employees and with the recent use of the lung biopsy and the lung resection in asbestos workers, we may assume

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TABLE 1.—*Thetford Mines Survey, 1945-1953*
Distribution of 123 Cases of Asbestosis by Age Groups and by Intensity

	Age Groups, Yr.					
	35-39	40-49	50-64	65-79	70 and Over	Total
Minimal asbestosis	20	24	8	11	9	72
Moderate asbestosis	2	11	13	5	4	35
Advanced asbestosis	0	5	10	3	3	21
Total	22	40	31	19	16	128

that there will be more instances in which pathologists will differ in opinion among themselves and will not agree with the roentgenologist in the estimation of the amount of asbestotic fibrosis present. This lack of agreement is very confusing in any medical study, but it is still more confusing before a compensation board.

For practical purposes, it is of great importance that a solid roentgenological classification of the cases of asbestosis, correlated with the histopathological findings, be recognized and accepted by all those concerned with this problem of asbestosis, because the chest film must be considered as an essential criterion in making a diagnosis of asbestosis and, notwithstanding the limitations of the chest films in some exceptional minimal cases, this tool remains more objective and more adequate than any other presumptive criteria.

Table 2 shows the seven main causes of death in the 40 cases of asbestosis that have been autopsied; 12 patients have died from evolutive tuberculosis, 5 from coronary thrombosis, 10 from cardiovascular diseases, 4 from cor pulmonale, 6 from bronchogenic carcinoma, 2 from bronchopneumonia and bronchiectasis, and the last one from cancer of the brain.

In reading this Table, the first question which comes to mind is: To what extent is this enumeration of causes of death different from a similar enumeration for a comparable group of employees from another industry? Unfortunately, I do not know whether there is a marked difference, and I did not have the opportunity to discuss this Table with other physicians or to compare it with a similar one which may exist in the medical literature. Nevertheless, briefly, I want to review these causes of death, trying to investigate the part played by asbestosis in the death.

It is true that 12 cases, or 30% of the deaths, were caused by an evolutive tuberculosis; this incidence may seem too high, but knowing that a more complete statistical analysis of all the employees in the asbestos industry made in 1950 did not reveal a higher incidence of tuberculosis than in a control group or a severer evolution of the tuberculosis, this rate of 30% is not in itself sufficient to establish a causal relationship between asbestos-dust inhalation and tuberculosis.

Considering the second cause of death, coronary thrombosis, it is difficult to explain how a minimal or a moderate asbestosis could contribute to the formation of a thrombus in the coronary circulation, and, consequently, I am inclined to estimate these five deaths as not related to the factor asbestosis.

The third cause was cardiovascular diseases. It is not so simple to say how many of those employees have died from their cardiovascular disease and how many have died from their asbestosis.

The fact that most of the employees who have died from cardiovascular diseases were 60 and over and the fact that statistics mention that 65 to 70% of the population of the same age are also dying from cardiovascular diseases should be taken into consideration before arriving at a conclusion.

TABLE 2.—*Thetford Mines Survey, 1945-1953*
Causes of Death in a Series of Forty Cases of Asbestosis

	Minimal Asbestosis	Moderate Asbestosis	Advanced Asbestosis	Total
Evolutive tuberculosis	5	7	0	12
Coronary thrombosis	1	4	0	5
Cardiovascular diseases	3	4	3	10
Cor pulmonale	0	1	3	4
Bronchogenic carcinoma	3	1	2	6
Bronchopneumonia and bronchiectasis	2	0	0	2
Other cause	1	0	0	1
Total	15	17	8	40

In a few borderline cases in which it was difficult to appreciate clearly the role played by the asbestosis and the role played by the cardiovascular pathology, the different cardiologists consulted were of the opinion that, unless the asbestotic fibrosis is extensive enough to produce pathological or clinical signs of right heart failure, it is impossible to tell with some certainty that the fibrosis has contributed appreciably to the death, especially if there are evident signs of advanced degenerative diseases.

In practice, this group of employees with cardiovascular diseases and a minimal or a moderate degree of asbestosis is becoming a serious problem as far as the compensation aspect is concerned. Without too much imagination and from the findings of an increasing number of autopsies on old employees, we can assume that there is a large unknown number of employees who have a minimal amount of asbestosis and who, most likely, will later on also present a cardiovascular disease. Then, unless definite criteria are developed to estimate objectively the harm produced by the asbestosis and the harm produced by the cardiovascular process, obviously those cases will remain embarrassing to appreciate correctly both by the clinician and by the compensation boards.

I have purposely separated from the cardiovascular group the four cases of cor pulmonale, because these four deaths seem quite evidently related to the presence of asbestosis. There are also the cases of two other workers who although they died from bronchogenic carcinoma and asbestosis showed evident signs of right heart failure. Therefore, we can say that in six cases of asbestosis cor pulmonale developed and the patients died from their asbestosis.

The following group of six cases of bronchogenic carcinoma present a special interest. Without going into any discussion of this problem of possible relationship between asbestosis and pulmonary carcinoma, I just want to say that there are also seven other patients with bronchogenic carcinoma among the employees who did not have asbestosis. Moreover, a general statistical survey of all employees in the industry does not seem to indicate any statistical evidence of a causal relationship. Therefore, the part played by the asbestotic fibrosis in Group 5 remains questionable.

The two patients who died from bronchopneumonia and bronchiectasis most likely died from this pathological process rather than from their minimal asbestosis. The last patient died from cancer of the brain.

In summary, in my personal opinion, six patients quite obviously died from asbestosis, and the other 34 developed a lesion which could very well be considered as the cause of death, although we do not know the role played by the asbestotic fibrosis.

TABLE 3.—*Thetford Mines Survey, 1945-1953*
Clinical Status of Eighty-Eight Living Patients with Asbestosis

	Minimal Asbestosis	Moderate Asbestosis	Advanced Asbestosis
Good	35	4	3
Mild symptoms	11	3	2
Moderate symptoms	5	9	3
Severe symptoms	2	2	3
Total	53	18	13

Table 3 gives the clinical status of the 88 living patients with asbestosis. In analyzing this Table, I have to admit that we cannot be too certain of the classification of the cases of asbestosis into minimal, moderate, and advanced, because there is a significant discrepancy between the roentgenological and the pathological classification. Here the classification is based on a roentgenological appreciation, and likely the histopathological classification would be different.

A second important reason why this Table may look highly questionable is that it is quite impossible to evaluate clinically the respiratory function of a group of employees when a large proportion of those employees are 60 years of age and over and when they present at the same time other diseases that may impair the respiratory function to the same extent that asbestosis might do.

Obviously at that age there are many factors other than asbestosis which could

embrace the cardiorespiratory function, and these factors could explain very well why 10 patients with minimal asbestosis are presenting moderate and severe symptoms while 3 with advanced asbestosis have no clinical symptoms.

With all its limitations, this Table seems to prove at least one thing, that the clinical status of 36 minimal, 4 moderate, and 3 advanced cases is good and that a total of 83 asbestotic employees are able to work without any discomfort—I mean those in the first two groups.

For the remaining 29 cases, no good correlation between the degree of asbestosis and the clinical status has been found. There is a better correlation between the age of the employees and the clinical status, showing the role played by the age.

This Table may also demonstrate indirectly that too many similar tables giving clinical data, such as cough, expectoration, and weight, cannot prove too much.

To summarize, I believe that asbestosis is a serious disease in some instances, but more frequently it remains a disease which can be tolerated quite well for many years, even without appreciable symptoms, as long as another serious disease does not supervene to cause death.

On the other hand, in practice, this disease may look more serious and cause important medicolegal problems if a too scientific medical concept or a too liberal social interpretation is accepted by the medicolegal professions, labor and compensation bodies. As a matter of fact, if the least amount or a minimal amount of asbestotic fibrosis is interpreted as asbestosis, "occupational disease," and, more so, if the compensation boards decide to apply the aggravating factor clause, notwithstanding any effective dust-control program, the problem will remain unnecessarily serious for many years to come.

The combined effort of pathologists, physiopathologists, roentgenologists, cardiologists, and clinicians is needed to orientate any research program and to bring answers to the many unknown aspects of asbestosis.