

which aspect varies as a rule with length of service. This finding is consistent with the character of a generalized fibrosis, which is a common characteristic of silicosis.

Tactile and vocal fremitus were not changed appreciably in the earlier stages, but as the generalized fibrosis of silicosis increased these were decreased in intensity.

Fibrosis of tuberculosis causes an increase in both tactile and vocal fremitus. The condition is, however, localized, whereas the fibrosis of silicosis is general throughout the lungs.

In my cases of granite cutters there was no marked change to any particular variety of breath sounds in uncomplicated cases, but rather a softening (or "soft pedal" effect) on all the breath sounds, which naturally brought out the vesicular type of breathing.

Rales were absent in the uncomplicated cases. No toxemia was present, which is accounted for by the absence of infection.

Tuberculosis as a Complication of Silicosis

It is not surprising that workers who have latent tuberculosis infections become disabled earlier than the average individual. It was our experience that these cases developed silicosis more rapidly, and that when they developed the clinical tuberculosis, they were still young people and the disease ran a more prolonged course. This was not true of the cases which developed silicosis first. The South African investigators, too, have observed that the cases which they classify as "pithinoid" break down with tuberculosis early in their mining careers.

Physical examination of silicotic patients who are breaking down with a tuberculous complication provides information which is not always available with the x-ray. Dr. Pancoast stated in a talk on pneumoconiosis at the local (Washington) medical society recently that during this transitional stage the differential diagnosis is often impossible. When the tuberculous complication has advanced, diagnosis is, of course, easy.

Inquiry into the patient's condition will usually reveal symptoms which are common to uncomplicated tuberculosis. It was our experience that early complaints were fatigue, night sweats, increase in dyspnoea, pains in the chest, and an afternoon rise in temperature. There was frequently complaint of a cough, which was productive. Many patients had hemoptysis and later in the disease, frank hemorrhages from the lungs. Loss of weight did not seem to occur so early as in uncomplicated cases, but when this symptom became manifest, it was marked. Tubercle bacilli were usually found in the sputum early in the disease.

The later stages presented no great differences from those fulminating types of uncomplicated tuberculosis.

The physical signs presented variations from those in uncomplicated cases, inasmuch as there existed already a general pulmonary fibrosis. The latent or post-tubercular rate was constant and not unlike the same valuable pathognomonic sign in uncomplicated cases of tuberculosis.

The x-rays of cases in this stage usually revealed areas of conglomeration, or fusing, of fibrotic markings. They were less distinct in character than in uncomplicated silicosis. This fact will be demonstrated in the slides.

The diagnosis of silicosis is not an easy task. The patient's history, careful analysis of his occupational life, a study of his physical condition and reliable x-rays are necessary to determine the presence of silicosis and to attempt to evaluate the extent of disability present. It is obvious that it is difficult for physicians to do this and a greater task for a lay jury. It seems to me that it would be better to have the suspected case examined at a reliable clinic or general hospital by a group of unbiased physicians and to abide by their findings rather than to have these cases fought out in courts. In most every manufacturing city large general hospitals and tuberculosis clinics are available and the use of these institutions will, it seems, insure better decisions both to the patient and to the industry.

Course of Silicosis Among Workers no Longer Exposed to Silica Dust

In the study of silicosis one of the most important questions which has arisen is the health history of those individuals who have worked in the granite industry for a number of years and then left, to find occupations in other trades where there was no further dust exposure. It was possible during the course of the study at Barre to observe 24 such cases.

The latency of silicosis has been referred to by other investigators. The South African workers found that "a steady fall over a period of years in dust concentration is not associated with the corresponding fall in the silicosis incidence." Dr. Watkins-Pitchford also records cases of miners who had been exposed to dust for a long period of time, apparently sufficient to develop silicosis, but who went into the war apparently not silicotic. He asserted that such cases were liable to develop tuberculosis. Doctor Pancoast presents a case of advanced pneumoconiosis in a quartz miner who had been exposed to dust for eight years. He had been out of the mining industry for ten years, yet the x-ray showed extensive pneumoconiosis with irregularities of diaphragm, and by fluoroscope he found the diaphragm restricted on each side. There was, perhaps, a tuberculous infection intervening at the time.

British reports two cases of workers who had been exposed to dust between seven and eight years. They changed occupations and had been away from siliceous dust for eight and nine years. They developed pulmonary symptoms and were found to be suffering from silicosis and tuberculosis. Tattersall also observed cases of latent silicosis in his studies: "Some of the men (rock drillers), moreover, had changed their occupation for various reasons quite apart from health, but in due course the inevitable dyspnoea came on. One man, for instance, worked eight years regularly with rock drills, from 1906 to 1914, then joined the Army, was passed as A-1; but in spite of his open-air life, dyspnoea came on in 1918, and from then until his death six years later his illness was a typical case of silicosis."

The influence of dust in mortality from tuberculosis is clearly indicated in the following table. New methods of manufacturing stone which created excessive dust by the use of pneumatic tools, were introduced in the granite industry about the beginning of the present century, and the tuberculosis rate has increased rapidly with their use. The rate has risen in direct proportion to the length of time during which they have been employed as follows:

1.5 per 1000.....	1890-1894
10.8 per 1000.....	1910-1914
19.5 per 1000.....	1924-1926*

(*during period of our observations.)

A consideration of the mortality statistics of Barre, Vermont, shows that there has been an excessive death rate from pneumonia and other respiratory diseases (tuberculosis excluded) during this period.

Methods for the Control of Dust in Industry and for the Protection of the Worker

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The speaker said in part: The health hazard associated with exposure to industrial dusts varies with the industry and depends upon a number of factors, chief of which are the physical characteristics of those exposed, the chemical and physical properties of the dust, and its concentration in the atmosphere of the work places.