

Abnormal Chest Roentgenogram in an Asymptomatic Georgian

Bashir A. Chaudhary, M.D., Tesneem K. Chaudhary, M.D., William A. Speir, M.D.
Augusta, Georgia

DOI: <http://dx.doi.org/10.5915/20-2-13272>

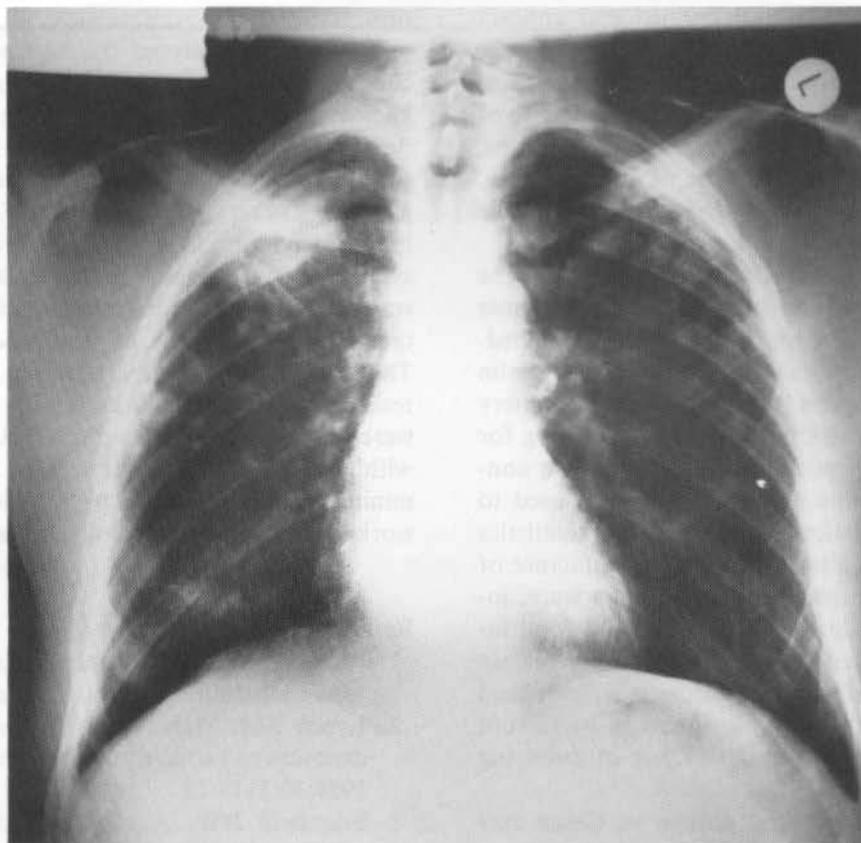


Figure 1: P.A. Chest Roentgenogram

Case History

A 38 year old black male was referred for evaluation of an abnormal chest roentgenogram obtained during a routine physical examination (Figure 1). The patient was asymptomatic. He had not had shortness of breath, cough, sputum production, chest pain, or

fever. There was no history of previous significant medical illness, except for one hospitalization 2 months previously for vomiting. A chest roentgenogram had shown the same bilateral nodular pattern. The patient had smoked 1 to 2 packages of cigarettes per day for 14 years, but had stopped 2 years ago. The patient drank a small amount of brandy each day. The physical examination was normal. Routine laboratory investigations were also normal. Pulmonary function studies revealed an FVC of 3.8L (90% predicted), an FEV₁ of 3.1L (88% predicted), and a TLC of 4.9L (74% predicted). Arterial blood gases showed a pH of 7.37, PaCO₂=38 mmHg, PaO₂=76 mmHg, and SaO₂ 95%.

*From Section of Pulmonary Diseases
The Department of Medicine
Medical College of Georgia
Augusta, Georgia 30912-3135*

*Reprint requests: Bashir A. Chaudhary, M.D.
Section of Pulmonary Diseases
Department of Medicine
Medical College of Georgia
Augusta, Georgia 30912-3135*

For the correct diagnosis and a review of the condition refer to the next page.

Diagnosis: Kaolinosis

The patient had worked in the processing area of a kaolin plant near Augusta, Georgia, for 20 years. In this area kaolin is mixed with other materials to prepare mixtures for manufacturing. Dust is generated in this process, and in the past most workers did not wear masks while working in this area. The chest roentgenogram of this patient shows a diffuse bilateral reticulo-nodular pattern and larger densities in both upper lobes. The large density in the right upper lobe is very well defined and appears mass-like, while the multiple small densities in the left upper lobe are still in the process of coalescence. The workup of the patient did not reveal evidence of infection or granulomatous or malignant processes. The patient has not had any signs of active disease, and his chest roentgenograms have remained stable during three years of follow up.

The term kaolin (china clay) is derived from the Chinese "Kau-Ling" or high ridge, a hill near Jauchau Fu, China, where the clay was first mined. The Chinese were the innovators of kaolin technology, using it first 3,000 years ago for pottery and porcelain, and 1800 years later as a coating for another Chinese invention - paper. Kaolin is a non-fibrous hydrated aluminum silicate widely used to improve the appearance and printing characteristics of paper. Kaolin is also used in the manufacture of paints, adhesives, rubber, ceramics, china ware, insulation bricks, fertilizers, detergents, and food industries. In the United States, kaolin is mined mainly in Georgia and South Carolina along a strip of land called the 'fall line'. Kaolin is found in 10-15 foot seams in the ground under 10-60 feet of overlying soil.

Middleton described lung disease in China clay workers in 1936¹. Since then other investigators have described both radiologic and pathologic changes occurring secondary to kaolin exposure²⁻⁵. The radiologic evidence of the disease is usually found only in workers who have worked with kaolin for more than 15 years. The usual chest roentgenographic manifestation is a diffuse bilateral fibro-nodular pattern. In patients with heavy exposure to dust, large nodular densities in the upper

lobes (complicated pneumoconiosis) are seen, the so called "angel's wings" appearance. Prevalence rates for pneumoconiosis among active kaolin workers have varied between 0.7 to 9%

There is no correlation between the presence of pneumoconiosis and the presence of cough, sputum production, wheezing or breathlessness. Pulmonary function tests have shown either no decrease or minimal decline in forced vital capacity (restrictive ventilatory defect). There is no suggestion of airways obstruction.

We recently analyzed the kaolin dust levels and chest roentgenograms in 65 workers at a Georgia kaolin mine⁵. Ours is the first study to perform detailed pulmonary function tests including plethysmographic lung volumes and arterial blood gases in workers with kaolinosis. The highest dust levels were found in the processing area. Pulmonary symptoms were found predominantly in cigarette smokers. Five of the 65 workers had roentgenographic evidence of pneumoconiosis (7.7%). The forced vital capacity, thoracic gas volume, and residual volume in workers with pneumoconiosis were slightly lower than those without, but were within the normal range. It appears that kaolin has a minimal effect on pulmonary function, even in those workers with obvious radiologic manifestations.

References

1. Middleton EL. Industrial pulmonary disease due to the inhalation of dust. *Lancet* 1936;2:59-64.
2. Lynch KM, McIvey FA. Pneumoconiosis from exposure to kaolin dust: Kaolinosis. *Am J Pathol* 1954;30:1117-22.
3. Edenfield RW. A clinical and roentgenologic study of kaolin workers. *Arch Environ Health* 1960;5:392-403.
4. Kennedy T, Rawlings W, Baser M, Tockman M. Pneumoconiosis in Georgia kaolin workers. *Am Rev Respir Dis* 1982;127:215-220.
5. Altekruse EB, Chaudhary BA, Pearson MG, Morgan WKC. Kaolin dust concentrations and pneumoconiosis at a kaolin mine. *Thorax* 1984;39:436-441.