Fibrous Silicates (in Price's Textbook of the Practice of Medicine, section on the pneumoconioses) (1956)
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PRICE'S TEXTBOOK
OF THE
PRACTICE OF MEDICINE

BY VARIOUS AUTHORS

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presence may be suspected when there is intense dyspnœa leading to death from respiratory or right heart failure. Where the changes are those of massive fibrosis, progression is less rapid unless active pulmonary tuberculosis, unresponsive to treatment, supervenes. The course of pulmonary tuberculosis is generally modified by coal pneumoconiosis and often its presence cannot be identified confidently in life. This is in contrast with the severe type of infection which occurs in patients with silicosis. Thus in coal pneumoconiosis the miner is more breathless than ill and dies of *miners' asthma*, whereas in silico-tuberculosis he is ill as well as breathless and dies of *miners' phthisis*.

Treatment.—As in the case of silicosis treatment is entirely symptomatic. Young men with quite advanced simple pneumoconiosis are usually not seriously disabled, whereas men with progressive massive fibrosis are much disabled and their disability increases both with age and with deterioration in radiographic appearances. It has been shown that simple pneumoconiosis does not progress in the absence of further exposure to coal dust, whereas massive fibrosis is nearly always progressive whether or not dust exposure ceases. This is a strong argument in favour of periodic radiographic examinations. Measures directed towards dust suppression are wet cutting, wet drilling, water infusion of the coal face and hand spraying of the coal face before the coal is pulled down. Adequate ventilation is, of course, essential in reducing dust concentration.

3. FIBROUS SILICATES

The fibrous silicates include asbestos, talc, sillimanite and sericite.

(*a*) ASBESTOSIS

Ætiology.—Asbestos is the name given to a series of minerals composed of the silicates of magnesium and iron crystallised in silky and fibrous form. Canada produces 65 per cent. of the world's asbestos. It is mined both in open pits and by underground methods. In Great Britain the main processes involved in the asbestos industry include the crushing and disintegration of the raw material, carding and card cleaning and finally the spinning of the yarn and weaving of the cloth. Besides being woven, asbestos is ground and mixed with cement and plastics to make insulating slabs and many other articles. Asbestosis can follow employment in any of these processes but the risk is greatest in the crushing, disintegrating, carding and card cleaning processes, where there is most dust. It seems that the fibrosis is caused by mechanical irritation from the asbestos fibres during the movements of respiration and that this peculiarity is related to the flexibility of the fibres not possessed by other foreign bodies.

Pathology.—Large areas of the lung are tough owing to the presence of fibrous tissue; emphysema, although extensive, is usually localised to the lower and anterior parts of the lungs, and there are many pleural adhesions. On histological examination the alveolar walls are diffusely thickened, there is generalised fibrosis and throughout the lung tissue are seen fibres of asbestos and asbestosis bodies.

Symptoms.—The average length of exposure before the onset of symptoms is 7 years. Dyspnœa is the most conspicuous symptom and it may be out of proportion to the signs found in the chest. There is often a non-productive cough with pain between or under the shoulders, and behind the sternum, but hæmoptysis does not occur except in the presence of pulmonary tuberculosis. Clubbing of the fingers is not uncommon; examination of the chest shows limitation of respiratory excursion sometimes with medium crepitations of a metallic tone in both bases. Asbestos bodies are found in the sputum. These are golden-yellow structures of beaded form, elongated and often with bulbous ends and varying in length from 20 to 200 microns. An asbestos fibre forms the central core in the body.

The radiograph shows a diffuse ground-glass or fine cobweb appearance, mainly at the lung bases. It changes later into a fine punctate stippling and extends to involve the middle and upper zones, although the extreme apices usually remain unaffected. The interlobar pleura is thickened and there is a shaggy appearance to the heart outline.

Prognosis.—Fibrosis develops more rapidly than in the case of silicosis and death may occur within 5 years of the onset of symptoms. The incidence of associated pulmonary tuberculosis although not as high as in silicosis, is significant. Bronchial carcinoma supervenes in more than 10 per cent. of cases.

Treatment.—Treatment is symptomatic only. In asbestos mining wet-rock drilling is imperative. In factories and textile mills the principle of locally applied exhaust ventilation must be enforced to prevent the escape of asbestos dust into the air of any room in which work is done. Suppression of dust in the cleaning of carding machines is best ensured by the use of a revolving brush fitted with a cover and connected to a portable vacuum cleaner. By the use of closed-in machines handling should be reduced to a minimum. Dust washes must be used where necessary. In Great Britain legislation has been so effective in controlling the disease that, with few exceptions, cases now diagnosed have industrial histories going back before 1931.

(*b*) TALCOSIS

Talc is a hydrated magnesium silicate. It is used as a toilet powder, as a dusting agent for rubber tyres and gloves, in ceramics and in the manufacture of paper. Talc pneumoconiosis has occurred mostly in the mining and milling industry. Disability is less than might be suggested by the radiographic appearance of nodular shadows distributed diffusely over both lung fields. There is, however, an increased susceptibility to pulmonary tuberculosis.

(*c*) SILLIMANITE PNEUMOCONIOSIS

The sillimanite group of minerals are all aluminium silicates and are used in the manufacture of high-grade refractories. Radiographic and histological changes have been found in workers exposed to the dust, although there is no disability.

(*d*) SERICITE PNEUMOCONIOSIS

Sericite, which is a fibrous variety of muscovite, has, without justification, been suggested as a cause of pulmonary disease. The fibre particles are too small to produce the sort of reaction which is found in asbestosis; they are, however, often present in the lungs of miners with silicosis because of the association of sericite with quartz.

4. NON-FIBROUS SILICATES

The minerals in this group are complex aluminium silicates combined with potassium, magnesium or iron. When inhaled as dusts, they cause no disability but are capable of producing the radiographic changes of pneumoconiosis.

(*a*) MICA

Mica is transparent and heat resistant, and is therefore used for the chimneys of oil lamps and for peep-holes in furnaces and stoves. Because of its high resistance

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