PULMONARY ACARIASIS IN MONKEYS

BY

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In view of the attention recently directed to the possible significance of mites in the causation of certain pulmonary disorders such as asthma, bronchitis, and "eosinophil lung" in the Tropics (Soysa and Jayawardena, 1945; Carter, Wedd, and D'Abrera, 1944), it may be of interest to refer to earlier observations on pulmonary acariasis in monkeys, since this condition is probably known to but few medical men.

Some Observations on the Condition

I first became aware of the phenomenon in 1933. When dissecting a *Macacus* monkey in Hong Kong I noticed small nodules scattered through the lungs. To the naked eye they resembled early tuberculous foci, although no other manifestations of tuberculosis were seen. On teasing out some of the nodules minute arthropods were found, which were subsequently identified by Dr. R. Hoeppli, of the Peiping Union Medical College, as mites probably belonging to the genus *Pneumonyssus*. The histological appearances are as follows:

The nodules consist of capsules, the walls of which are composed of cellular granulation tissue. The lumen of each capsule is lined by epithelial cells and usually contains an arthropod lying among cellular detritus. The tissue comprising the walls of the capsules consists of fibroblasts, leucocytes, eosinophils, plasma cells, and endothelial cells. Very little formed fibrous tissue is seen and no giant cells have been noted. A constant feature is the presence of heavy pigmentation due to granules lying within histiocytic endothelial cells. This pigment does not give a ferrocyanide reaction, and since it closely resembles similar pigment visible within the gut of the parasites it is probably of faecal origin.

The eosinophils do not appear to be more numerous than is commonly seen in granulation tissue. Unfortunately, no haematological studies were done, so it is not known whether an eosinophilia was present in the peripheral blood.

The nodules are generally in close proximity to bronchioles, but in no instance could direct continuity be detected between a bronchiole and the lumen of a capsule. The surrounding lung tissue on the whole has a healthy appearance, although vascular congestion is excessive and erythrocytes are present within the alveoli in some areas.

The general features of a typical nodule, with a mite lying within it, may be seen in the accompanying photomicrograph.

Photomicrograph of a nodule in a monkey's lung. A mite is seen in section in the lumen of the capsule. ($\times 50$)

Dr. Hoeppli drew my attention to a paper by Weidman (1915) giving a systematic description of similar acarids found in the lungs of a *Macacus rhesus* monkey in Philadelphia. That paper also gives a bibliography of earlier reports of acarids found in the lungs of monkeys.

Comment

The demonstration in monkeys of pulmonary lesions due to mites might be held to lend strong support to the concept of pulmonary acariasis in man. It should be borne in mind, however, that the life histories of the species of mites infesting the lungs of monkeys have not been established (so far as I am aware), and that it is not improbable that these mites may normally exist as ectoparasites on the skin of the host. Should this be the case, the habits peculiar to simians present an obvious explanation of how the parasites may readily be aspirated into the air passages. Nevertheless, if man be exposed to environmental conditions resulting in the aspiration of extraneous mites, it would be reasonable to suppose that, as in monkeys, structural lesions may ensue. That such lesions may give rise to symptoms requires no great stretch of imagination.

It is of interest to note that Soysa and Jayawardena (1945), in connexion with the radiological findings in their cases of asthma associated with mites in the sputum, describe "a remarkable mottled effect produced by small, discrete, ill-defined spots disseminated throughout both lung fields." It would seem likely that these shadows resulted from lesions similar to those described in the monkey.

Pending the opportunity for post-mortem investigation of human cases, the experimental production of pulmonary acariasis in monkeys might be expected to throw further light on the problem.

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FULMINATING GAS GANGRENE

A FATAL CASE WITH UNUSUAL ACCOMPANYING FEATURES

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During the war the risk of gas gangrene has been minimized by prompt and careful surgery and by the routine employment of serum and bacteriostatics. Nevertheless sporadic cases are still encountered, and occasionally, as in the following instance, the infection progresses so rapidly that treatment is of little avail.

Clinical History

On Sept. 9, 1944, during an aerial bombardment in North Italy, Cpl. B., aged 24, sustained a large penetrating wound of the upper and outer aspect of his right thigh. The injury was complicated by a fracture of the right femur involving the great trochanter and the neck of this bone. Eight hours later, at a field surgical unit, Major Birt carried out a thorough wound toilet, introduced calcium penicillin locally, and applied a Tobruk plaster. Sulphanilamide was administered by mouth to a total dosage of 14 g. The patient was transported by air to a base hospital, arriving at 3 p.m. on Sept. 11.

When we examined him shortly after his arrival he was obviously very ill, and intense toxæmia was evidenced by a pulse rate of 140 a minute and a subnormal temperature. In addition there were transient delirium, mild jaundice, and coldness and pallor of the right foot. The Tobruk plaster had been admirably applied and split before admission, and since further loosening failed to restore circulation, it was clear that the femoral artery had been damaged or obstructed. Transfusion of plasma, followed by two pints of whole blood, did not bring appreciable improvement, and as the systolic blood pressure remained in the neighbourhood of 90 mm. Hg we decided against operative intervention. The appearance of the wound and crepitation in its vicinity indicated that gas gangrene had arisen, and penicillin was therefore administered intramuscularly (200,000 units in 36 hours).

On Sept. 12 the patient's general condition was distinctly worse (temperature 101° F., pulse rate 150). He had become much more deeply jaundiced than is usual in toxæmia, and the picture was further confused by the discovery of malaria parasites (B.T.) in the blood films. During a subsequent lucid period he was able to inform us that he had suffered from malaria on five previous occasions.