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.

REFERENCES

- Carter, H. F., Wedd, G., and D'Abrera, V. St. E. (1944). *Indian med. Gaz.*, **79**, 163.
Soysa, E., and Jayawardena, M. D. S. (1945). *British Medical Journal*, **1**, 1.
Weidman, F. D. (1915). *J. Parasitol.*, **2**, 37.

FULMINATING GAS GANGRENE

A FATAL CASE WITH UNUSUAL ACCOMPANYING FEATURES

BY

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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.

Later in the day gas could be felt crepitating in the tissues of the abdominal wall and the right foot became frankly gangrenous. That night the patient sank into coma, and death occurred at 11 a.m. on Sept. 13—44 hours after admission to hospital.

Main Post-mortem Findings

During the necropsy gas was readily expelled from the tissues in the neighbourhood of the wound, and the whole of the anterior abdominal wall crepitated on pressure. Later the subcutaneous tissues were seen to be heavily bile-stained and there were areas of gas formation throughout the abdominal musculature.

Gangrene of the right leg was found to have resulted from a large ante-mortem clot which blocked the most proximal two inches of the femoral artery. There was no evidence of vascular trauma. Via the femoral canal, gas had passed upwards, distending the whole length of the psoas sheath. It was also present in large quantities in the loose tissues around the ascending colon. The cystic duct was so acutely kinked by gaseous inflation of the neighbouring tissues that the tense gall-bladder could not be emptied. Owing to the manipulation entailed, it was not possible to estimate the degree of compression exerted on the common bile duct. The liver was pale, and fatty degeneration had obviously occurred. There was moderate enlargement of the spleen, and its pulp was firm, with prominent trabeculae.

The only pulmonary pathology was a terminal basal pneumonia, but the thorax had been invaded by gas bubbles via the right side of the diaphragm and the right pectoral muscles were heavily infected. The left ventricle of the heart was collapsed and the myocardium was pale and friable.

It was not possible to culture specific organisms from the wound, but sections of liver provided interesting information. Well-marked dilatation of the hepatic ducts and generalized granular degeneration of liver cells were observed. Frequent areas of focal necrosis contained nests of rod-shaped bacilli which were presumably *Cl. welchii*. Sections of the kidney proved surprisingly normal; toxic changes were obvious, but no areas of focal necrosis could be detected.

Summary

In spite of careful and comparatively early treatment of a large wound, followed by the introduction of calcium penicillin, gas gangrene arose and caused death within four days.

Points of particular interest were: (1) The coexistence of toxic and obstructive jaundice. (We have never before observed displacement and kinking of the bile ducts by an accumulation of gas.) (2) The concentration of the infective process in the liver with comparatively slight renal damage. (3) The coexistence of anaerobic gangrene and gangrene resulting from vascular occlusion. (4) The fact that the patient's resistance was almost certainly lessened by frequent attacks of malaria.

We are grateful to our commanding officer, Col. R. A. Stark, for permission to report this case.

Medical Memoranda

Carotinaemia in the Tropics

The first record of carotinaemia in the Tropics was that of Sequeira (1936), who diagnosed the condition in two Europeans resident in East Africa. They had a marked yellow discoloration of the skin of the palms, the palmar aspects of the fingers, and the soles and heels. The clinical diagnosis was corroborated by the pathological findings. A careful investigation of their diets failed to reveal any cause for the condition. In the same paper there was reported the occurrence, in a male adult of the Muganda tribe, of a similar yellowish discoloration of the skin of the palms and soles. The diet of this African was also investigated, and was found to be the normal native diet, consisting mainly of plantains. On clinical grounds it appeared to be a case of carotinaemia, but it was not possible to test the blood serum for carotene.

A further five cases, all in Europeans—two from Kenya, two from Nigeria, and one from India—were described by Manson-Bahr and Ransford (1938). In all five the carotene pigment was demonstrated in the serum. In none of them was there any definite evidence of excessive consumption of foods with a high carotene content. Four of the cases gave a history of intestinal infection, and all were distinctly below the normal standards of health. The authors state that they had never observed carotinaemia among perfectly normal individuals who had returned after prolonged tropical residence. This condition of physical impairment with carotinaemia is directly contrary to the experience, in England, of Almond and Logan (1942), who found no evidence of ill-health among their cases.

CASE HISTORY

In 1943 a Grenadian planter aged 45, of African descent, medium brown complexion, was sent to me for an opinion as to the cause of his condition, provisionally diagnosed as atypical jaundice. He stated that for approximately 10 years he had suffered from a persistent yellow discoloration of the hands and feet; apart from that his health had been excellent. He was residing in a malaria-free district and had not had an attack of malaria for over 20 years.

The palms of the hands showed a marked orange-yellow tinge; this was less noticeable, though still plainly evident, on the palmar aspects of the fingers. A considerable degree of discoloration was present on the soles of his feet. The sclerotics were clear, the urine normal, and the blood pressure 120/80. On general examination nothing abnormal was noted beyond a faint suggestion of an orange tinge in the skin, particularly that of the face. This very slight alteration in colour, combined with the natural degree of pigmentation, gave him an appearance of good health far above the average. On being questioned with regard to his diet he said that he was particularly fond of papaw, of which he consumed from 3 to 5 lb. daily. Miller and Robbins (1937) estimated that papaw (*Carica papaya*) contained, on the average, 2,500 international units of vitamin A per 100 g. of edible material.

The three-layer test was applied in which equal quantities of serum, alcohol, and petroleum ether were shaken up in a test-tube and then left to settle. Lipochromes were found to be present in abnormal amount, since the top layer had a strong yellow tinge. Greene and Blackford (1926) stated that this positive result was pathognomonic of carotinaemia.

I am indebted to Dr. J. Whiteman, D.M.O., Grenada, for bringing this case to my notice.

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REFERENCES

- Almond, S., and Logan, R. F. L. (1942). *British Medical Journal*, **2**, 239.
Greene, C. H., and Blackford, L. M. (1926). *Med. Clin. N. Amer.*, **10**, 733.
Manson-Bahr, P., and Ransford, O. N. (1938). *Trans. roy. Soc. trop. Med. Hyg.*, **32**, 395.
Miller, C. D., and Robbins, Ruth C. (1937). *Biochem. J.*, **31**, 1.
Sequeira, J. H. (1936). *E. Afr. med. J.*, **13**, 198.

Two Cases of Erysipeloid treated by Penicillin

The administration of sulphonamides is generally very effective in the treatment of erysiploid. The response to treatment by penicillin would appear to be prompt and rapid.

CASE HISTORIES

Two Army cooks, aged 42 and 34 respectively, were cutting up a carcass of fresh veal; one already had a small non-infected abrasion of the left ring-finger, the other cut his left middle finger during the process. Inflammatory swelling of the affected fingers began around the sites of trauma on the following day, being accompanied by sensations of stiffness and aching. On the eighth day of the illness the clinical picture in each patient was almost identical. The whole of the affected fingers including the knuckle and a small area of the palm of the hand, together with the contiguous sides of the proximal phalanges of adjacent fingers, was the site of a slightly tender bluish-red erysiploid. A firm margin to the swelling could be traced, and flexion of the affected fingers was minimal and painful to perform. The epitrochlear and axillary glands were not clinically enlarged, and there was no constitutional disturbance.

Sodium penicillin was given intramuscularly—15,000 units as the initial dose and 15,000 units 3-hourly until totals of 485,000 units and 560,000 units had been administered. In each case after 24 hours the swelling had markedly decreased, flexion of the finger was easier, and the aching sensation and tenderness had practically gone. On the third day penicillin therapy was stopped; the definite edge of the swelling could no longer be detected, and flexion of the finger was almost complete. By the fifth day there remained only a slight discoloration of the skin over the affected area, and a collar of desquamation of the epidermis around the small traumata which had been the original entry points of the infection.

I wish to thank Col. T. F. Arnott, O.B.E., T.D., R.A.M.C., for permission to publish these notes.

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Sir Farquhar Buzzard visited Leeds on March 16 for a meeting of the Provincial Hospitals Regionalization Council of the Nuffield Trust, held at the General Infirmary at Leeds. The Council had previously had a number of consultations with representatives of the voluntary hospitals, meeting the Lord Mayor of Leeds, members of the City Council, and others concerned with the co-ordination of hospital services. A report was made to the Council in regard to the development of two joint bodies in furtherance of the co-ordination scheme with which the Trust is associated. The first of these is in Gloucestershire, Somerset, and Wiltshire; the second concerns the formation of a joint body for the Essex area; they will receive and consider reports of the surveys of hospital services in their areas. The Council was addressed by Mr. William Gissane, clinic director and surgeon-in-chief of the Birmingham Accident Hospital.