SOME ASPECTS OF PNEUMONIA AMONG AFRICAN TROOPS IN THE GOLD COAST AND THE RESPONSE OF THIS DISEASE TO SULPHAMERAZINE.

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The following observations were made in a military hospital during the first six months of 1946. Pneumonia during this period accounted for approximately one-fourth of all admissions to the Medical Division. Most of the cases occurred among African repatriates from the Far East, since of the 89 cases studied here, 73 were repatriates. The diagnosis was confirmed radiologically in all cases and the course of the disease studied clinically and on the X-ray film and screen. Detailed bacteriological and biochemical investigations were unfortunately not practicable. The majority were treated with sulphamerazine, with a small control series on sulphasamide.

THE CLINICAL PICTURE.

Only true cases of lobar pneumonia are discussed. Four cases of primary atypical pneumonia were seen and are not included.

The patients were young male Africans (average age 20 to 30 years) who showed no evidence of any preceding debilitating illness and for the majority this was their first visit to a hospital.

The clinical types were two: A, the classical type 78 cases; B, the aberrant type 11 cases.

Class A.—Typically the patient gave a history of sudden illness with cough, shivering, fever and pleuritic pain accurately localized. He was febrile, temperature 103° to 104° F., dyspnœic and able to cough up sputum of a mucopurulent or “rusty” character; the alæ nasi were mobile. Clinical examination of the chest showed signs of congestion over one lobe. The later signs of consolidation were rarely seen on admission as the illness was then seldom more than twenty-four hours old. Detection of early middle lobe cases was found more difficult even by listening carefully high into the axilla; indeed it was easier and quicker to establish the diagnosis from the history, especially the location of pain, the general appearance of the patient and the movement of the chest. The response to chemotherapy was significant—the temperature falling to normal in twenty-four hours, with an equally remarkable clinical improvement. Some patients gave a history of a preceding respiratory infection, but in only one was a definite bronchitis observed to precede a lobar pneumonia.

Class B.—Here the patient had a pneumonia which showed unusual presenting features and/or clinical course. Of these 11, 4 had an unusual onset presenting as pyrexias of uncertain origin for forty-eight hours before a respiratory
involvement was evident. One of these was associated with meningismus and later proved to be a right upper lobe pneumonia. The remainder were virulent infections (4 of these 7 were bilateral cases) with considerable toxæmia. These showed little or no response to sulphonamide therapy.

The clinical course of both types is summarized as follows: Recovery 88; death 1.

Complications.

Pleurisy, serous ... ... ... ... 3
Empyema ... ... ... ... Nil
Abscess ... ... ... ... Nil

The effusions were small and did not significantly prolong the recovery.

Laboratory Investigations.

These included routine sputa, blood films, full leucocyte counts including differentials and blood culture in the severe cases.

Sputa.—Number of cases examined 87; pneumococci present in 50 (unfortunately typing was not possible); streptococci and staphylococci in 32; Micrococcus catarrhalis 5; no acid-fast bacilli found in any case.

Blood culture was done in all severe cases but no case of bacteriæmia was detected.

Blood films (thick and thin) were examined routinely in all cases. Malaria parasites (ring forms of Plasmodium falciparum) were seen in only one case. The patient was given a complete course of mepacrine (2.7 grammes) concurrently with the sulphonamide, and the progress was not appreciably different from the rest. The microfilaria of Loa loa were present in another and here also the course of the disease was not appreciably altered.

The Leucocyte Response.—Number examined 84; total W.B.C. count—10,000 per c.mm., or less, 53; polymorphonuclear leucocytosis in 31 (maximum count 32,600 per c.mm.).

It must be remembered that the majority of Africans have a low leucocyte count with a relative lymphocytosis so that the neutrophil and lymphocyte figures correspond, or are reversed—possibly the response of a system to repeated and varied protozoal infections, though Europeans living in the tropics also tend to show an increase of lymphocytes in the differential leucocyte count apart from protozoal infections. No significant information could be deduced from the results of the differential leucocyte counts.

Radiological Investigations.

Portable films were often not possible on the day of admission but serial screening supplemented by films was practised, commencing usually within two days of admission and repeated at two to three day intervals with up to 7 examinations during the period of hospitalization. (The set used was a Watson "Mobilex" and care was taken to keep the kV. and ma. output as constant as possible.) The African is a sturdy patient and tolerates screening better than his European brother.

The case-incidence of the disease in the various lobes is indicated in Diagram
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1. These figures do not include an additional 5 representing those of bilateral disease.

The predilection for the right lower lobe is notable.

The appearances of the lesions were more interesting but it must be remembered that they represent those seen under the influence of active treatment not the natural history of the disease.

In only ten cases was the typical picture of a massive lobar consolidation seen. The usual picture seen in 64 cases of this series was an irregular opacity usually situated towards the periphery of a lobe. The remaining 15 patients showed a similar picture but here it was a clearly defined rounded focus two to three inches in diameter rather similar to a large Assmann focus (see Diagram 2).

In the case of a middle-lobe involvement or base of upper lobe, the postero-anterior picture sometimes suggested a lesion confluent with the hilum—"a central pneumonia." Lateral positioning showed the process to be situated more peripherally. In no case was an early lesion seen confluent with the hilum. These findings are contrary to those stated by Shanks, Kerley and Twining (1938) who consider that the process commences at the hilum and extends outwards. However they do note that peripheral lesions are often found in children. The situation of the lesions in this series is in accordance with the findings of Loeuschcke (1931) who claims to have identified the original focus of infection in 47 cases of lobar pneumonia, and in all these it was near the periphery of the lung, usually in a dorsolateral position. Loeuschcke's work (1931) was in accordance with the later experimental work by Terrell, Robertson and Coggshall (1933) on the pathogenesis of pneumonia which replaced the earlier hypothesis of Blake and Cecil (1920).

Apart from the site of the lesions the most striking feature was their transience; they were very much lesions in time as well as in space. Even after forty-eight hours a definite change in the form of a decreasing shadow was noticeable. This change coincided with the clinical improvement of the patient and by the time chemotherapy was complete the lesion in the average case was fast disappearing. It is appreciated that the picture seen was only a shadow but its close correspondence with the clinical condition was notable. In all the cases that shadow had disappeared leaving only some increase in the vascular pattern by the time the patient left the hospital. The average stay in
hospital was thirteen days; the minimum period seven and the maximum thirty days.

Unfortunately no correlation between the character of the lesion and the serological type of pneumococcus was possible.

**Effects of Treatment.**

The details of treatment were as follows: Number of cases treated, 89; sulphamerazine only, 68; sulphamerazine and penicillin, 6; sulphadiazine only, 14; sulphadiazine and penicillin, 1.

*Sulphamerazine* is 2 (p-Aminobenzenesulphonamide-4-Methylpyrimidine).

This drug is the mono-methyl derivative of sulphadiazine; it is more soluble than the latter and less likely to cause urinary obstruction. When given by the mouth it is rapidly absorbed and slowly excreted so that it gives a higher and more persistent blood level than any other sulphonamide in the same dosage.

The drug was given four-hourly commencing with 4 grammes, then 2 grammes, 2 grammes and thereafter 1 gramme for a period of four to five days, giving an average total of 30 grammes. Treatment was continued for an extra day in severe cases. Fluids were given liberally—12 to 15 pints per twenty-four hours. This dosage is heavy and though no blood estimations were assayed, the blood level of sulphamerazine was presumably in the region of 12 to 16 mgm. per cent during the five days. This was the figure determined by Genecin *et al.* (1945) in their series treated with maximal doses. As a rule no opium preparation was given though an occasional exception was made for the early distressed case. Careful nursing was stressed and the patient disturbed as little as possible for screening. The response to treatment was satisfactory—crisis occurred in twenty-four to forty-eight hours and convalescence was rapid and uneventful. An expectorant mixture was often beneficial after completion of chemotherapy.

Toxic symptoms with sulphamerazine were minimal and less than those seen with sulphadiazine. Occasional nausea was noted, but vomiting was seen in only one case. Marked cyanosis was not observed. There was no case of oliguria or evidence of renal damage. Drug fever was seen in only one case.

Of 68 cases treated with sulphamerazine, 62 resolved completely with an average stay in hospital of twelve days.

In the control series of 15, 14 cases resolved completely with sulphadiazine with an average stay in hospital of sixteen days.

Thus 6 cases failed to respond to sulphamerazine but did so dramatically (this word is chosen with care) when transferred to penicillin. The cause of this failure was not obvious apart from the fact that the pneumonias were all severe (4 of them were bilateral).

The following is illustrative:—

Pte. K. M., aged 28, was admitted to hospital one week after disembarkation from India, with bilateral pneumonia. The temperature was 103°F., the sputum "rusty" and contained numerous pneumococci, W.B.C. 16,800 per c.mm. with 90 per cent neutrophils, 10 per cent lymphocytes, 0 per cent eosinophils, 0 per cent monocytes and 0 per cent
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basophils. The patient was started on routine sulphanemazine and this continued for six days (total 32 grammes). There was little improvement and the temperature continued 101° to 103° F. Treatment was changed to penicillin 50,000 units immediately then 15,000 units three-hourly to a total of 410,000 Oxford units. The crisis occurred in twenty-four hours and convalescence thereafter was rapid and progressive. X-ray appearances of chest (see Diagram 3).

Whenever possible Clinical and X-ray examination were repeated one month after discharge from hospital. No relapse nor evidence of delayed resolution was noted.

Epidemiology.

An interesting feature of this series is the occurrence of a relatively large number of cases among healthy young Africans living under crowded conditions. The incidence among repatriates from India was nearly four times that among local units. Also during this time there was no case of pneumonia among European troops, where accommodation was better.

The determining factors are obviously: (1) The virulence of the organism; (2) the susceptibility of the individual. Both are problems difficult to elucidate in detail, especially the latter. The influence of environment would seem important, and certainly the effects of crowding and climate.

Several medical officers on troopships noted that the incidence of pneumonia was much lower in the early stages of the voyage from India to West Africa, even though there was a fairly sudden change from hot to cool climate when passing through the Suez Canal. The incidence of the disease was greatest during the last three to four days of the voyage and during the first four days in the transit camps where crowding was also inevitable. Crowding and close contact continued over a period (in this instance about three weeks) appears a definite predisposing factor.

Close quarters appears to be the most important factor in causing a rise in pneumonia incidence in Africans. Outbreaks of pneumonia have in fact followed short voyages in troopships, as for instance from the Gambia to the Gold Coast, while any temporary overcrowding, occurring in training camps, has invariably resulted in a rise in the pneumonia rate. This increase in pneumonia in Africans occurs not only with recruits but with soldiers who have had three to four years Army life. (Personal communication from Brigadier Findlay.)

Climate also plays its role, though a minor one; that of the Gold Coast is
warm (shade 85° F.) and humid (relative humidity 75 per cent to 80 per cent), with little seasonal variation. This combination appears to lower the resistance of epithelial tissue to infection—the relatively greater incidence and chronicity of respiratory and skin conditions is well known to medical officers on the "Coast."

Though lobar pneumonia is not usually regarded as an infectious disease its infectivity is very definitely seen here, and though there was no cross-infection among patients, one nursing orderly went down with a severe attack. It would seem advisable to re-emphasize the infectiousness of this disease. Price (1941) recommends that no case of pneumonia should be nursed in a general ward of a hospital and the doctor and nurse in attendance should wear gauze masks.

Incidentally only one case of meningococcal meningitis was admitted to hospital during this period.

CONCLUSIONS.

(1) The very definite infectivity of lobar pneumonia in Africans is again noted.

(2) The radiological appearances in treated lobar pneumonia suggest lesions much smaller than usually described, and further that these lesions are very short lived.

(3) Sulphamerazine is an eminently suitable drug for the treatment of lobar pneumonia in Africans and is rather better than sulphadiazine in the tropics. Both are very definitely inferior to penicillin which is certainly the choice for acute fulminating cases.

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REFERENCES.

Blake and Cecil (1920).