of the organisms were sensitive to penicillin. His haemoglobin was 56%. Radiographs showed bronchiectasis of the right lower lobe. He was treated with 50,000 units of penicillin intratracheally each day for 8 days and then 80,000 units for 5 days. There was marked subjective improvement; the volume of sputum was reduced to less than a third of its previous volume and became inoffensive, he began to sleep well, and his appetite returned. The physical signs in his chest, though less well marked, were still present, and his haemoglobin rose to 84%. He again took a considerable interest in life, and looked forward to having a lobectomy performed, which, as a result of the improvement in his general condition, was thought to be a reasonable risk.

Discussion

These three examples illustrate the types of case in which intratracheal penicillin would be of value. An early case was so improved that the patient declined lobectomy, as she felt there was nothing wrong with her. In the second case the patient was enabled to get over the latter months of pregnancy and delivery without any extra difficulty arising from her chest condition. In the third case a patient who was clearly going downhill was rendered fit enough for lobectomy to be considered.

There would appear to be two uses for this form of therapy: (1) to improve the general condition of the patient before lobectomy; (2) to sterilize the bronchial cavities at regular intervals, especially during the winter. It might be used to replace bronchoscopy with suction or the creosote chamber. Intratracheal therapy should be combined with daily postural drainage, and can easily be performed upon an out-patient. It is inevitable that the cavities will become reinfected with pathogenic organisms, and it is too early to say how long they will remain sterile, but in cases in which the predominant pathogen in the cavities is penicillin-sensitive the treatment does provide a means at least of temporary improvement.

Summary

The technique of intratracheal administration of penicillin is described.

Three illustrative cases are reported in which this treatment was beneficial.

We wish to thank Dr. J. D. Fiddes, medical superintendent, and Dr. J. B. Penfold, pathologist, St. Andrew's Hospital, Billericay, for valued co-operation.

REFERENCE

- Knott, F. A., and Clark, W. H. (1945). *Lancet*, 1, 468.

EFFORT SYNDROME IN THE WEST AFRICAN SOLDIER

BY

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There is no reference in the literature to effort syndrome in the West African, nor have I been able to find any paper dealing specifically with this condition in black-skinned people. This paper records 12 cases of effort syndrome in West African soldiers serving with the Royal West African Frontier Force (R.W.A.F.F.), and seen in a general hospital on the Gold Coast between Dec., 1941, and Dec., 1942.

Observations

The signs and symptoms of effort syndrome as tabulated by Wood (1941) were used as a basis for diagnosis, and questions were directed to elicit any of the symptoms not mentioned by the patient. A thorough physical examination was made in each case, and such investigations as examination of the blood for malaria parasites, radiographs of the chest, and erythrocyte sedimentation rates were carried out when necessary in order to exclude a physical cause of the disability.

The symptoms complained of were breathlessness (in all cases), palpitation (in 10 cases), fatigue (9), dizziness, precordial pain, cramps, and sweating (8), headache and frequency of micturition (6), trembling (5), nervousness, insomnia, and paraesthesiae (4), sighs, throbbing in the head, and anorexia (3), flushing, dry mouth, and diarrhoea (1). The symptoms occurred on exercise in all cases and on excitement in four.

Of signs, tremor was present in 7 cases, excessive sweating of axillae or palms (6), nervousness, overacting heart, and resting pulse rate over 100 a minute (5), hyperpnoea or tachypnoea and cold clammy hands (4), asthenic posture (1). Sighing and hyperaesthesia over the site of precordial pain were not noted in any case; flushing cannot be observed in black men. The highest blood pressure recorded was 142/82. The chest expansion, measured at the fourth rib, varied from 3/8 to 2½ in., with an average of 1½ in.; a similar average was obtained in 16 controls, but I have the impression that the West African is a poor thoracic breather and cannot be compared with the European in this respect. A standard of breath-holding for 30 seconds was adopted; six patients failed in this. The average time was 32 seconds, with a minimum of 8 and a maximum of 55 seconds. In 11 controls the average time was 64 seconds, varying between 30 and 110 seconds. I found it difficult to get satisfactory co-operation in this test, but the controls appeared to try harder than the patients, many of the latter breathing before they had any apparent distress or discomfort. An exercise tolerance test, as recommended by the Horder Committee on Effort Syndrome (1940), was carried out. In 8 cases the pulse failed to return to its original rate within one minute after the end of the exercise, and in 3 cases within two minutes. Three patients were distressed after the test.

Case Histories

Case 1.—A Kumasi (Ashanti) Christian, aged 35. Speaks English very poorly. Private in Gold Coast Regiment (G.C.R.). Service 1 year 8 months. Symptoms started 9 months ago in East Africa while doing P.T. Sent to hospital, in which he remained for three months, having 10 injections into the arms and 10 into the buttocks. Had dysentery in E. Africa 2 months before the onset of the present disability. Likes the Army, but "owing to my sickness I want to be discharged and go home." Did heavy work as a farmer in civilian life. Strong and active as a child. Nothing relevant in family history.

Case 2.—A Creole (Sierra Leone) Christian, aged 26. Speaks excellent English. Shorthand-typist before the war. Private in the West African Army Medical Corps (W.A.A.M.C.). Service 1½ years. Symptoms began 6 months ago in E. Africa during P.T. Admitted to hospital, where he remained in bed for a month with a diagnosis of "rheumatic carditis"; malaria parasites were found in the blood. Has remained well on light duty since discharge from hospital, but on one occasion, when he was obliged to do some heavy work, experienced precordial pain and a sensation as if his chest were being clamped. He now feels that physical work might "humbug" his heart. Volunteered for service in the W.A.A.M.C., where his superior education might be of use, rather than risk conscription at a later date into a combatant unit, for which he did not think himself strong enough. Finds Army life "rough." A keen scholar as a child, being a veritable bookworm. "I always had a notebook in my pocket." Passed the Cambridge School Certificate at the age of 14½. Not popular with other children, who were jealous of his scholastic achievements. Not keen on sport. "Cricket is a decent game, but football is all bullying." Family history: nothing relevant.

Case 3.—An Accra (Ga.) Christian, age doubtful—about 45. Speaks English fairly well. Bus-driver as a civilian. Sapper in W.A. Engineers. Service 2½ years. Symptoms started 4 months ago while mine-lifting in E. Africa. To hospital for 7 weeks: received 20 injections into arms and buttocks. Had dysentery while in hospital. Was told that he had heart disease and should not do any hard work. Likes the Army, but is not happy in his unit. Did well at school. At the age of 9 cut his foot while playing football, and has never played since, because he thinks it is too dangerous. (West Africans play football unshod.) Reliant on his parents. Family history not obtained.

Case 4.—An Accra (Ga.) Christian, aged 31. Speaks English fairly well. Carpenter in civil life. Corporal in W.A. Engineers. Service 4½ years. Symptoms started 9 months ago during an air raid in E. Africa, and has been unable to do heavy work since then. Likes the Army, but is sure that he cannot carry out his duties in his present health. Strong and active as a child, but would not play football, because "you get wounded plenty." Family history: two nephews (twins) have fits; otherwise nothing relevant.

Case 5.—An Ashanti Christian, aged 25. Speaks English well. Lorry driver as a civilian. Private in G.C.R. Service 2 years 4 months. History of 1 year 8 months. Onset of symptoms in E. Africa during P.T. In hospital for 6 weeks. He was told that he should never do heavy work again. Likes the Army, except that his chest troubles him. Did well at school ("I was always clean and smart"); popular with other children, but especially with the clever ones. Had never avoided physical exertion until onset of present disability. Nothing relevant in family history.

Case 6.—An avatime Christian, aged 22. Speaks English well. Lorry-driver and farmer before military service. Private in W.A.A.M.C. Two years' service. History of 13 months. Symptoms started while serving in E. Africa. Intelligent and active as a child. Does not enjoy football in the Army because "the other side try to injure you." While in E. Africa was much upset by the news of his father's death, the patient being the eldest son, and so responsible for the rest of the family.

Case 7.—An Akim Abuakwa (Fanti) Christian, aged 23. Speaks very little English. Civil occupation, mason. Private in G.C.R. Three years' service. Symptoms first occurred while on the march in E. Africa 9 months ago. To hospital for a month. Has been told by doctors on two occasions that he should not do heavy work again. Has done only light duty since returning to the Gold Coast 2 months ago. Healthy and active as a child, but not especially clever. No relevant family history.

Case 8.—A Kumasi (Ashanti) Christian, aged 28. Speaks English well. Grocer before the war. Driver in W.A. Army Service Corps. Service 2 years 1 month. Nine years' history. Symptoms started while at school, but lasted only a few weeks, being cured by a native doctor. Left school six years ago, and did light work in his father's grocery store. Joined the Army and remained well until 18 months ago, when the symptoms recurred after he had been in E. Africa for 3 months. Attended hospital for 10 months as in-patient or out-patient and received about 20 intravenous injections. Informed that his heart was the cause of the trouble. Did no further heavy work in E. Africa. Has been on full duty since return to Gold Coast 3 months ago. Patient was timid and retiring as a child. Would not stand up to other children, but reported any bullying to the teacher "because we were forbidden to fight." Similarly, he was once assaulted and robbed, but called for his father instead of defending himself, "for the man was bigger than I." Was very reliant on his parents. History of abnormality of behaviour in one brother and two distant relatives.

Case 9.—A Twi Christian, aged 35. Speaks English fairly well. Blacksmith. Sapper in W.A. Engineers. Service 2 years. Disability began 12 months ago during service in E. Africa. In hospital for 6 months, but with no improvement. Had 17 intramuscular and intravenous injections. Told by his doctor that his heart and chest were weak. Symptoms have persisted since return to Gold Coast with diagnosis of "V.D.H. and cardiac enlargement." Likes the Army, "but my sickness troubles me too much." Schooling interfered with by ill-health and persistent pain in the ribs. Would not play games at school because they were not properly controlled and he tired too quickly. Avoided quarrels with other children. "It is my habit not to fight; I was born like that." Thirteen years ago drank palm wine in which ju-ju medicine had been placed; he became "nearly mad," and would shout and sing in the street. Cured by fetish priest. Doubtful history of pulmonary tuberculosis in two brothers. (Screening of this patient's chest showed no abnormality in lungs or cardiac shadow.)

Case 10.—An Osu (Ga.) Christian, aged 29. Speaks a little English. Bus-driver as a civilian. Driver in W.A.A.S.C. Service 2½ years. Symptoms started 8 years ago, but stopped when he joined the Army. They recurred 6 months ago, after a lorry accident. Improvement followed treatment by a native doctor, but the disability had become worse again. Dominated by father, who did not like him to mix with other people. Not very clever at school. Did not play football for fear of injury; he used to run occasionally, but not much, because he never won. History of insanity in grandmother.

Case 11.—An Anlo (Ewe) Christian, aged 25. Speaks a little English. Fisherman in civil life. Private in W.A.A.S.C. Service 4 months. Had symptoms for a short time before joining the Army, but they recurred 3 months ago. Is afraid that he may die. Likes the Army, but "my sickness hinders me." Education interfered with by ill-health, chiefly abdominal trouble. Avoided exertion because it would hurt his heart. History of insanity in uncle.

Case 12.—A Krobo (Ga.) Christian, aged 29. Speaks English well. Lorry-driver as a civilian. Signaller in W.A. Corps of Signals. Service 2 years. Symptoms for 16 months. In hospital a year ago for 6 weeks; records of this admission not available. Strong and active as a child. Clever scholar. Nothing relevant in family history.

Discussion

The difficulties facing the physician who attempts a psychiatric investigation of the West African native are very great, and no attempt has been made to diagnose the psychological abnormalities underlying these cases. It will be noted that patients Nos. 2, 4, 8, 9, 10, and 11 were disinclined to exertion from childhood, especially with regard to competitive sport. Two patients (Cases 2 and 8) did light work as civilians, but sedentary occupations are few in West Africa. The first 9 patients had served in the Abyssinian campaign in 1940-1.

Factors which may have initiated or fostered the patients' disabilities are:

(a) *Acute Fear.*—The symptoms in Case 3 started immediately after the man had tripped over and fallen on a mined road, and in Case 4 after the patient had had to run some distance and dive into a slit trench, having been caught unawares by an enemy airplane.

(b) *Infection.*—Case 2 had malaria parasites in the blood on admission to hospital in E. Africa. Case 1 had dysentery about 2 months before the onset of symptoms, and Case 3 a week after admission to hospital in E. Africa.

(c) *Encouragement of Patient's Conviction of Physical Disability.*—Cases 1, 2, 3, 5, 7, 8, 9, and 12 had been retained in hospital for periods varying from one to six months. Cases 1, 3, and 9 received many injections, which were almost certainly antispasmodic. Syphilis occurs in the West African, but yaws is universal. (Kahn tests were positive in four cases in this series.) Patients Nos. 2 and 9 were told that their hearts were affected, and No. 5 that he would never be able to do hard work again; No. 8 stated that his heart had been examined frequently, and that he had been told it was beating too fast. Every patient made spontaneous mention of his heart during the interview or examination.

In order to illustrate the most striking feature of this investigation a very brief account of the geography of the Gold Coast is necessary. The country forms a rough rectangle, about 350 by 190 miles, with its long axis running from north to south, and its base resting on the Gulf of Guinea. It is divided into three parts—the Gold Coast Colony in the south, the Northern Territories (N.T.) in the interior to the north, and Ashanti between the two. British Mandated Togoland skirts the eastern flank of the country. The West African soldiers, recruited in the Gold Coast and serving with the R.W.A.F.F. in 1941-2, were supplied by the three main districts as follows: Northern Territories, 53%; Ashanti, 10%; Gold Coast Colony, 34%; miscellaneous, 3%. The accompanying map shows where the patients in this series lived. It will be observed that, with the exception of Case 2, all the patients hailed from the southern half of the country, and that the Northern Territories, supplying 53% of the native strength, did not provide a single case.

Sketch map showing incidence of cases. The capital towns are marked. The figures in brackets represent percentage of troops serving with R.W.A.F.F. (Gold Coast) in 1941-2. Case Nos. indicate where each patient lived. Case 2 came from Freetown, Sierra Leone.

What is the explanation of the preponderance of cases from the Colony and the apparent immunity of the N.T. man? It is provided, I suggest, in the lower standard of mentality found in the people of the N.T. compared with that of the Colony natives. Not only are the latter a more intelligent people

inherently but their mental outlook has been, and is being, changed by contact with Europeans, and there is evidence that this Europeanization is an important factor in determining the liability of the West African to suffer from effort syndrome. European coastal trading posts were established nearly 500 years ago by the Portuguese. European influence was at first confined to the vicinity of such posts, but it gradually spread, and by the Bond of 1844 British "power and jurisdiction" were accepted by many of the tribes living in what is now known as the Colony. To-day a relatively large proportion, although still a minority, of the people in the Colony are European in their outlook; their mode of living and thinking has been affected by close contact with Europeans, and by the radio, cinemas, newspapers, and so on. It is these southern tribes which supply the African lawyers, priests, and doctors, and "black-coated" workers such as teachers, clerks, and accountants. Our relations with Ashanti were of an interrupted and sanguinary nature until, after the Siege of Kumasi, Ashanti became a British colony in 1901, since when European influence has been steadily increasing. It is noteworthy that of the three patients from Ashanti two lived in Kumasi, the capital town and administrative centre, while the third lived only 10 miles north of the town. The Northern Territories became a British protectorate in 1901, but this change has had comparatively little effect on the life of the native.

All the patients under review showed evidence of their contact with Europeans. Thus they all spoke English—only one so poorly that an interpreter was required throughout the interview; but I would estimate that in a general ward an interpreter would be required in at least half the cases if a full history was to be obtained. Further, all these patients were Christians; in a general surgical ward of 40 beds 20 patients were Christians, 15 pagans, and 5 Mohammedans. Huxley (1944), surveying conditions in British West Africa, states: "Not more than one child in about ten gets any education at all," yet only one of the patients had received no schooling. On the whole their intelligence was well above that of the average native of the Gold Coast. I had the opportunity of observing Case 2, the Creole from Sierra Leone, who was posted to the hospital as a nursing orderly, and I found him to be perhaps the most intelligent African in the unit, being secretary to a study circle formed by some of the English-speaking personnel.

The response of the individual to mental conflict and such emotions as anxiety and fear, though depending to a great extent on his innate personality, is also affected by his upbringing, education, and experiences. It is generally accepted that a crude solution to mental conflict—as, for instance, conversion hysteria—is found more often in the less intelligent, while in the more intelligent occur such reactions as effort syndrome, which are subtler and less obviously related to the causative emotion. In the last war Rivers (1918) pointed out that conversion hysteria was more common in the "other ranks" and effort syndrome in the officers, and he suggested that one possible cause may be found in the difference of education, the officer being more widely educated and his mental life more complex and varied. I think it is reasonable to apply Rivers's hypothesis to the Gold Coast West African as between Colony man and N.T. man, taking into consideration the generally lower plane of intellect found in the West African. The patients in this series have, on the whole, been much influenced by "white" civilization. Their sphere of thought has been widened, and their ability to reason increased by knowledge and experience, this process being, of course, accompanied by a repression of the cruder instincts through a stricter mental censorship. The N.T. man still thinks simply, his powers of reasoning are limited, and he is much influenced by suggestion. During the period under review many cases of conversion hysteria were seen in the hospital; I regret that I have no figures or notes available, but I feel safe in stating that the majority of these cases were N.T. men. Certainly I found the language difficulty a great hindrance in getting *en rapport* with these cases, in contrast to the comparative ease with which one conversed with the patients with effort syndrome.

Summary

Twelve cases of effort syndrome in West African soldiers are recorded, and a summary of the case histories is given. Some of

the possible predisposing causes are noted. It is suggested that the influence of European civilization is an important factor in determining the incidence of effort syndrome in the West African, and evidence is offered in support of this suggestion.

My thanks are due to Prof. Sir Francis Fraser, and to Dr. G. L. Alexander of the Colonial Medical Service, for criticism and advice; to Lieut.-Col. R. R. Bomford, R.A.M.C., who encouraged me to undertake this investigation; to Major T. Hodgson, M.B.E., R.W.A.F.F., for the figures relating to the enlistment of recruits; and to the Director-General, Army Medical Services, for permission to publish this paper.

REFERENCES

- Horder Committee on Effort Syndrome (1940). *British Medical Journal*, 2, 201.
Huxley, J. (1944). *Times*, June 7, p. 5.
Rivers, W. H. R. (1918). *Ment. Hyg.*, 2, 513.
Wood, P. (1941). *British Medical Journal*, 1, 767.

Medical Memoranda

Confluent Smallpox Treated with Penicillin

The use of penicillin in the case recorded below was a logical attempt to minimize secondary infection of the very extensive lesions of a severe confluent smallpox. The view that the patient had everything to gain and nothing to lose was encouraged by Prof. J. W. S. Blacklock, of Glasgow Royal Infirmary, to whom I am indebted for the generous supply of penicillin. The diagnosis was one of great simplicity, and the prognosis was given as the gravest possible by Sir Alexander Macgregor, medical officer of health, Glasgow, Dr. R. J. Peters, deputy medical officer of health, and Dr. J. Watson, medical superintendent, Robroyston Hospital, Glasgow.

CASE HISTORY

The patient was an unvaccinated merchant seaman aged 38. He presumably contracted smallpox in a North African port, but the disease did not develop until he was at sea, bound for home. In the morning of March 26 he shivered repeatedly, and complained of headache, pains in the limbs, and sore throat. He was isolated in the ship's hospital, there being considerable fever and constitutional upset. The eruption began to appear on the forehead late on the 28th. He was removed to Robroyston Auxiliary Hospital on March 30, shortly after the ship reached port.

He was afebrile when seen on admission, and seemed only moderately ill. The eruption was very pronounced over the whole body. On the face it was made up of coalescing vesicles of large size. The scalp was markedly involved, though confluence was not so complete. There were numerous vesicles on the mouth, palate, and gums, especially so where teeth had been removed. Some degree of laryngitis could safely be attributed to lesions in the respiratory passages. On the trunk the rash was profuse and was papular and papulo-vesicular. On the wrists and hands it was practically confluent, particularly over a scar on the left leg. The trunk had very numerous lesions, there being many even on sites usually free of eruption. Of the lesions in general it can be said that the areolae were marked on the head and neck and less so elsewhere.

It was expected that a stormy illness would follow a rash of such profusion, and accordingly penicillin was given by intramuscular injection, it being feared that delirium might interfere with a continuous intramuscular drip. He was given 20,000 units of calcium penicillin early on March 31, by which time he was again sharply febrile. The injections were repeated every fourth hour, and later, as the rash matured, every third hour. By April 4 it was obvious that the illness was not likely to prove as severe as had been expected, and, the patient being fully co-operative, a continuous intramuscular drip was started, which gave him considerable relief. He received 100,000 units daily till April 7, by which date he was free of all constitutional upset and in fact convalescent, it being the 13th day since the onset. In all he received 800,000 units of penicillin. The highest temperature was 101.8° F., recorded on the 8th day of illness. Thereafter there was a steady fall by lysis. At no time was there any feature of clinical interest in the heart, lungs, or urine.

COMMENT

The evolution of the rash presented some points of interest. On the face it followed a fairly classical course, becoming a wholly confluent pustular mask. Crusting and desiccation were, however, pronounced by the 7th day of efflorescence, or the 9th day of his illness. Thereafter the skin of the face cleared rapidly. Facial oedema lasted no more than 24 hours, and was never very severe. At the time of his discharge, on April 25, there was no evidence of excess granulation tissue, and pitting promised to be minimal. On the trunk and limbs two features were noticeable: most of the lesions failed to increase in size after starting penicillin therapy, and most of them crusted, without going on to pustulation, on or about the 6th day after the eruption first appeared. Desquamation was complete everywhere except on the palms and soles by the 13th day of the eruption, or the 15th day after the onset of the illness.