affecting the lungs and kidneys, which had not, however, involved the intestine. Rabbit No. 389, after gaining weight to a remarkable extent, finally wasted rapidly and died on July 23. It proved to have tuberculosis of lungs, kidneys, and intestines, but the tuberculosis of the lungs, although widespread, was markedly restrained in type. Rabbit No. 391 continued to gain weight until September 13, when, as it had never shown any symptoms of illness during six months, it was killed and examined. No trace of tuberculosis was found in the organs or tissues; but, microscopically, columns of polynuclear leucocytes crowded together, apparently within lymphatics, were observed in certain areas of lung substance, although the lungs were otherwise quite healthy. Anthracite dust was also seen, though not abundantly, in the lung sections examined; and anthracite dust was present in the tracheo-bronchial lymphatic glands. Dust was to be seen as well in the lungs of Rabbits No. 388 and 389, as also in the walls of the intestine of No. 389. In all three it was in small quantity, and never in the large masses seen when anthracite and numerous dead human tubercle bacilli are introduced into the lungs.

Discussion

The average period of survival of the three rabbits infected with living bovine bacilli was seventy-five days; that of the two rabbits infected with the same dose of bovine bacilli along with 0.2 gramme of anthracite dust, and subsequently dying, was 116 days. This is what might be expected if the anthracite had adsorbed a considerable amount of the toxic substances produced by the tubercle bacilli in the course of their growth. Once the growing tubercle bacilli had been transported to new sites away from the anthracite dust they would, of course, increase rapidly and cause the death of the animal.

The complete freedom from tuberculosis of the third rabbit, No. 391, is difficult to explain. It might, of course, have died of it at a later date, but the absence of signs of tuberculosis in the tissues makes this unlikely. It was not anticipated that any of the animals infected could survive, but rabbit No. 391 appears to have developed enough immunity during the "protected" phase to stamp out its tuberculosis completely.

Conclusions

The addition of a small quantity of anthracite dust to quanta of living bovine tubercle bacilli has led, in five animals, to their survival for considerably longer periods than the five control rabbits receiving bovine bacilli alone, and, in one, to complete recovery up to six months.

This appears to be due to the adsorption by anthracite dust of a proportion of the toxic products of living tubercle bacilli in the tissues.

My thanks, for much help in these experiments, are due to Dr. Enid Williams, Mr. J. Moore, and Mr. J. Taylor. I am indebted to Dr. R. Lessing for the sample of anthracite dust used; to the Medical Research Council for authority to purchase some of the animals employed; and to Prof. J. B. Duguid for permission to work at this subject in his laboratory.

REFERENCES

- Cummins, S. L. (1940). *Brit. J. exp. Path.*, **21**, 64.
— Weatherall, C., and Waters, E. T. (1931). *J. Hyg., Camb.*, **31**, 464.
— and Williams, Enid M. (1938). *Ibid.*, **38**, 638.

In a letter to the *South African Medical Journal*, July 27, 1940, Dr. H. Huserl states that during the four-years war of 1914-18, when he was an Army surgeon in the Turkish Army in Asia Minor, he had a patient who had burns "of all degrees" over three-quarters of the body surface. In the absence of any other remedy he applied powdered charcoal and the patient recovered.

CONVULSIVE CARDIAZOL THERAPY IN CARDIOVASCULAR DISORDERS

BY

RANKINE GOOD, M.B., Ch.B.

Senior House Officer, Carstairs Hospital

In a previous paper (Good, 1940) I demonstrated that convulsive cardiazol therapy may result in the temporary appearance after the convulsion of cardiac abnormalities due to an exhaustion and anoxaemia of the heart muscle, the heart itself undergoing a temporary and varying degree of acute dilatation, with quick recovery from all of these abnormal phenomena. These occurrences can be easily demonstrated electrocardiographically and radiographically, and would seem in themselves to be contraindications to the use of convulsive therapy in patients with diseased or injured hearts. Further, the numerous abjurations of writers on this topic to eschew patients with cardiovascular disease might make one doubly sceptical if one did not reflect that there are no cases on record of catastrophes resulting from convulsive therapy in patients whose hearts are diseased.

The subject is important at the present time—as one can envisage the employment of some quick and effective form of therapy in the mental cases anticipated as the result of air raids—all the more so since it has been found by Sutherland (personal communication in June, 1940) that in some soldiers with certain types of conversion hysteria cardiazol has proved a brief and efficacious method of treatment. In my own short experience of the treatment of similar cases and in psychoneurotic states in which the predominant signs and symptoms of the patient's illness are focused upon the cardiovascular system, more especially on the heart ("the effort syndrome," "disordered action of the heart") the results have been similarly encouraging. There is the additional fact that the incidence of cardiovascular disorders is higher among civilians than among combatants, and thus the decision whether or not to use cardiazol in these cases would be one of moment.

My purpose is to demonstrate that the possibly beneficial results of convulsive therapy in cases of mental illness need not be withheld because of the existence of cardiovascular disease, past or present. To this end six cases are quoted. Only the relevant details are given.

Illustrative Cases

Case 1.—A housewife aged 49 was admitted to hospital on December 15, 1938. She was frail, undernourished, and of sallow complexion. There was no evidence of cyanosis, oedema, dyspnoea, jaundice, or arteriosclerosis. The pulse was regular in rate and rhythm, and the blood pressure was 170/100 mm. Hg. There was cardiac dullness enlarged to four and a quarter inches to the left of the mid-sternal line in the fifth interspace. The sounds were somewhat soft in tone. A harsh systolic bruit at the mitral area was conducted upwards and outwards to the posterior axillary line. A soft systolic murmur at the aortic area. There were no signs or history of cardiac decompensation. Cardiazol therapy was started on December 26 with an initial subconvulsive dose of 2 c.cm. Including her last dose on January 30, 1939, the patient received fifteen injections, none exceeding 2.5 c.cm., and she had only one convulsion—from the third dose of 2 c.cm. on December 30—with no immediate subconvulsive result. On the evening of January 7 her breathing became noisy and laboured, and her pulse poor in quality and rapid. Chest examination showed signs which were taken to be indicative of acute pulmonary oedema and which responded after some time to three doses of 1/100 grain of atropine sulphate at four-hourly intervals. The following morning she was conscious. Vomiting was copious in amount, was bilious, and was repeated ten times; jaundice started. On January 16 her

condition deteriorated. Glycosuria and acetonuria appeared, both clearing up with 10 units of insulin given thrice daily half an hour before meals. A trace of albuminuria present on admission had not cleared up, and the jaundice increased. The patient died on February 4 after running a pyrexia of unknown origin for a week and with numerous rhonchi in the chest during the last two days.

Case 2.—A widowed housewife aged 55 was admitted on November 16, 1938. She was sallow-complexioned and undernourished. Typical mental depression, but the presence of eye signs, absent abdominal reflexes and ankle-jerks, and hyperaesthesia of the soles of the feet caused the cerebrospinal fluid to be examined and a blood Wassermann to be made. The latter was positive and the C.S.F. findings were fairly typically paretic. The arteries were sclerotic, with irregular walls. On December 10 20 c.cm. of malarial blood was injected. Malarial therapy was stopped on January 5, after the occurrence of four typical malarial rigors, owing to a somewhat profuse rectal haemorrhage (10 oz.), which was followed in two days by two moderately severe rectal crises. On January 30, as an experiment to see whether her depression (presumably paretic in origin) could be influenced by other than anti-specific measures, she was given cardiazol therapy, despite the fact that her arterial walls were sclerotic and her heart sounds were weakened by the four malarial rigors. She was discharged "much improved" on March 25, and told to report to the out-patient department for anti-syphilitic drug treatment in the first instance. She had received in the wards nine injections of cardiazol, with the production of eight convulsions.

Case 3.—A housewife aged 64 was admitted on January 31, 1939, after having been a complete invalid for the previous eight years, confined to bed either at home or in general hospitals, where she had been thrice treated by physicians of repute for angina pectoris; there seems to be little doubt, therefore, as to the correctness of the diagnosis. Her admission to the mental observation wards was necessitated by the development of mental symptoms. She was a thin undernourished woman with indifferent heart sounds. A course of cardiazol therapy was started on February 1, and altogether twenty-one injections were given, two of which produced a major convulsion. She was discharged on April 5 as a social recovery, with no signs of invalidism. Three months later she was reported as being on holiday and walking on the average six miles a day.

Case 4.—An unmarried female nurse aged 47 was admitted on March 29, 1940. She was thin and of very pale complexion, and had a history of scarlet fever at the age of 19. There was cardiac dullness, enlarged to four and a half inches to the left of the mid-sternal line in the fifth interspace. A rough double murmur was heard over all four cardiac areas, being most marked over the mitral and aortic, and loudly propagated respectively into the left axilla and upwards along the great vessels of the neck, which pulsated visibly. From April 4 to May 25 she received twelve injections, nine of which produced a major convulsion. The effect of two of these convulsions on the heart was especially studied: the cardiac rate remained regular, but the murmurs disappeared for about five minutes after the convulsion, when, upon the gradual slowing of the heart, they returned, a temporary prominence of the murmurs being audible at the aortic area, compared with the other areas. She recovered, and was discharged on May 31.

Case 5.—An unmarried minister aged 50, who had had his left leg amputated through the lower third of the femur during the war of 1914-18, was admitted on December 21, 1928, as a case of paranoid schizophrenia, with alcoholic and depressive episodes. During the first of these latter he attempted suicide in 1924 by shooting himself with a revolver, the bullet being eventually located an inch to the left of the vertebral column. Sir William Macewen operated and found that the bullet track had involved the left ventricular wall; the pericardial sac was opened to facilitate the stitching of the wound (and also, presumably, to clear out the effused blood). At this operation an inch of the sixth rib in the mid-scapular line was resected, and on April 25, 1940, when cardiazol treatment was begun, this gap had closed to half an inch. Owing to his restless destructive habits (including

attacks upon his artificial limb) the patient had been practically confined to bed for several years before treatment was undertaken. This treatment consisted of twelve injections, each of which produced a major convulsion. Bradycardia of approximately 30 per minute occurred after one convulsion.

Case 6.—A married civil engineer aged 60 was admitted to hospital on July 14, 1937. His chest was markedly emphysematous and asymmetrical, the left side being more prominent than the right. Air entry at the right base was poor. He had a long history of respiratory trouble. There was cardiac dullness obscured by emphysema, with short and sharp cardiac sounds. On admission his blood pressure was 120/80 mm. Hg. and between then and the beginning of treatment it fluctuated considerably, and at one time was 98/68. During the same period he had spells in which the cardiac rate became irregular owing to the occurrence of extrasystoles. At the time of beginning treatment his blood pressure was 150/90, and his heart rate was comparatively rapid and irregular as a result of extrasystoles. Electrocardiographic examination was confirmatory, and in addition a degree of myocarditis was reported. Cardiazol therapy was not advised on account of the heart condition. However, the patient received twenty injections between January 27 and March 12, 1940, fifteen of them each producing a major convulsion, after most of which (as determined by auscultation) the heart remained regular in rate for about two minutes. The pulse during the same interval was very poor in quality. About February 22, 1940, the cardiac rate became permanently regular and the cardiac sounds improved in quality.

Discussion

The foregoing cases have been specially chosen, as each gave evidence of a considerable degree of cardiovascular disorder. Many other cases which presented less marked though similar abnormalities when treatment was begun could have been cited. Treatment in all save Case 1 was terminated because of mental improvement.

In none of the cases, not even in Case 1, was there any evidence that treatment had worsened the already damaged cardiovascular system. Indeed, signs to the contrary were forthcoming. Case 6, for instance, showed clinical improvement in that the heart sounds remained permanently regular and the pulse of good quality until temporary dismissal from hospital on April 1, 1940.

Case 1 is quoted because it was the first case showing cardiovascular disorder to be convulsed by me, and there is no reason to believe that the solitary cardiazol convulsion that occurred in any way contributed to the patient's death five weeks later. (Compare Case 4, in which nine convulsions occurred despite a worse cardiac condition.) It is also doubtful if the numerous rhonchi which filled her chest before she died were the result of an acute pulmonary oedema, as, contrary to the experience with her first attack, the chest condition did not improve with atropine. In any case, acute pulmonary oedema may occur as the result of the convulsion without any evidence of cardiac disease. The progressively deepening jaundice in this patient pointed to some toxic condition, either affecting or originating in the liver, as the cause of death. Unfortunately, permission for a post-mortem examination was not received.

It might be objected that the presence of albuminuria in Case 1 is in itself a contraindication to cardiazol treatment. I have found to the contrary, however. I have now treated a few cases in which there has been no increase in the albuminuria (not, however, in itself an indication that no superadded damage was wrought on the kidneys), and in one case the albuminuria was absent at the end of treatment, although it is not suggested that the cardiazol caused its disappearance.

With regard to body tissues generally, it is difficult to see, on purely theoretical grounds alone, why damage of any description should result and thus constitute a possible

contraindication. Certainly from a practical point of view any such contraindications are non-existent, and I have been restrained in only one case—a heart case in which compensation was poorly established. From the cardiovascular point of view it is not apparent why organic disease of this system, provided it is well compensated, should contraindicate the use of convulsive therapy, even though the heart be recently weakened as in Case 2, in which malarial treatment had been given a short time before.

It is not easy to conceive of a method that will accurately estimate the increased work that is thrown on the diseased heart during the one or two minutes of the convulsion. At a very outside estimate, however, it should not exceed, say, one hour's heavy exercise (as indulged in many times over in the working day by a manual labourer with heart disease but seeking admission for a complaint originating in an altogether different system, both cardiovascular disorders being found accidentally and presumably existing for a considerable time before being discovered) or the day's work of a nurse (Case 4), with the considerable amount of physical strain entailed and the superimposition of a further strain from a hyperexcitable disposition extending over years on a heart presumably diseased. There is, however, the essential difference between the additional work imposed on the heart by normal effort and that endured from the cardiazol convulsion; for in the latter the increased work occurs under anoxaemic conditions, as during the convulsion the patient either does not breathe or takes at the most one or two short gasps when the clonic stage of the convulsion is nearing its end. That such conditions do undoubtedly affect the heart is shown in my previous paper, but the affection so resulting is of a temporary nature, though others have arrived at a different conclusion (Schmitt, 1939).

Summary

The main purpose of this paper is to demonstrate that cardiovascular disorders of even a severe degree—provided they are well compensated, and whether existing alone or in the presence of advancing years and of diseases of other systems—are not contraindications to the employment of convulsive therapy. Further, electrocardiographic examination in these cases provides no criteria indicative of how well or how badly the patient will stand up to the convulsion.

I am indebted to Dr. A. D. Briggs, superintendent, Dr. A. Dick, visiting psychiatrist, Southern General Hospital, Glasgow, and to Dr. A. MacNiven, superintendent, Glasgow Royal Mental Hospital, for permission to publish these cases. I am also indebted to Dr. R. G. Lendrum, Western Infirmary, Glasgow, for his kind collaboration in connexion with the electrocardiography.

REFERENCES

- Good, R. (1940). *J. ment. Sci.* **86**, 260.
Schmitt, D. (1939). *Z. ges. Neurol. Psychiat.*, **166**, 108.

R. Chevillard (*Thèse de Paris*, 1940, No. 314), who records twenty-two cases, one of which is original, states that owing to failure to diagnose correctly the extent of an injury a foreign body may penetrate the orbit and remain there for years without being recognized. The fact that an intra-orbital foreign body may remain unsuspected depends on its nature, size, degree of asepsis, and, most of all, on its location. As x-ray examination is the only certain means of revealing the presence of an intra-orbital foreign body, every injury to the face requires a radiographic examination whenever the penetration of a foreign body is possible, even if penetration appears unlikely. The symptoms which, after a variable time, reveal the presence of a hitherto unsuspected foreign body are sepsis or motor paralysis. When these symptoms appear extraction of the foreign body is urgent. The operation of choice is orbitotomy.

THE BENZYL BENZOATE TREATMENT OF SCABIES

BY

R. ERNEST KING, B.Sc., M.B., Ch.B.

Surgeon Lieutenant, R.N.V.R.

Scabies, which in normal times is regarded as a trivial disease, has been raised to a position of considerable importance during the past year owing to the outbreak of hostilities. The massing of large numbers of troops under cramped and unsanitary conditions, the evacuation of children from slum areas, and the overcrowded and unhygienic sleeping arrangements in public air-raid shelters provide perfect conditions for a wide dissemination of *acarus* infection.

According to the official history, half of the admissions to hospital from the armies in the field during the war of 1914–18 were due to lack of cleanliness and to infestation by vermin. Scabies was by far the commonest of these diseases. Uncomplicated scabies was found to be rare, nine-tenths of the total number of cases showing the presence of boils, secondary infected sores, or pyogenic dermatitis. It is also recognized that the scratching of the skin caused by the intense itching gave impetus to the spread of lice-borne infections such as trench fever, relapsing fever, and typhus.

Search for a Non-irritant Sarcopicide

A constant search for an effective non-irritant sarcopicide has continued for many years, and though a large number of drugs have been recommended, sulphur in its various forms has continued to be widely used. This agent, especially in the form of the ointment, is dirty and tedious in application, and often produces a dermatitis worse than the disease it is intended to cure. Indeed, the use of sulphur has coloured almost the entire field of the therapeutics of scabies, and all the well-known methods of treatment have this substance as their basis. The sodium thiosulphate–hydrochloric acid method as advocated by Huber (1938) depends on the reduction of the thiosulphate by the acid, with the production of a fine deposit of sulphur on the skin. Six applications are necessary to produce a cure. McKenna (1933) recommends “mitigal,” a proprietary sulphur-containing lotion, as the safest treatment, and states that a cure can be obtained in ten days. The kathiolan of Ehlers-Marcussan, which is said to bring about a cure in twenty-four hours, is recommended by Roxburgh (1936) and others. These methods, however, as with all sulphur remedies, often cause a disagreeable and resistant sulphur dermatitis, as well as being uncertain in their action.

The Benzyl Benzoate Method

Although many sulphur-free remedies, such as creolin, rotenone, and others, have been used, the only one to achieve certainty of action together with ease and rapidity of application is the benzyl benzoate method introduced by Kissmeyer (1937). This treatment, which has been adopted as a general routine in Denmark, has failed to achieve in this country the recognition that its qualities merit.

In a series of 100 cases of scabies occurring in a naval establishment, 80% of which were infected and of longer than two weeks' duration, treatment by one application of benzyl benzoate lotion proved completely successful. No unpleasant after-effects were noted, except a slight generalized burning sensation, which usually lasted for about fifteen minutes. In 3 cases of gross pyodermitis