CARDIAC COMPLICATIONS IN CARDIAZOL TREATMENT: OBSERVATIONS IN FOUR CASES.*

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THE history, pharmacology, physical and chemical properties of cardiazol have been recorded in many publications recently, and our knowledge has been derived from them. Our technique and method of giving the injections have been more or less on the lines laid down by Meduna and described by Kennedy in the *Journal of Mental Science* of November, 1937. We used a 10% solution and usually commenced with 3·5 c.c. or 4 c.c., giving bi-weekly injections. The dosage necessary to produce a convulsion varied with different individuals. When a convulsion was not induced the dosage of the next injection was increasd by ·5 c.c. or 1 c.c., depending on the reaction of the previous injection. The course was terminated by weekly injections. Our highest dose was 9·5 c.c. The injections were given in 10–15 seconds, and occasionally the first stage of the convulsion came on before the needle was withdrawn. Latterly we reduced the time of the injection to 10 seconds. No definite rule can be laid down as to the number of epileptic attacks to be induced.

The number of cases treated in the observation wards of the Southern General Hospital, Glasgow, and so far recorded by us has been 29.†

The first cases treated by us had symptoms of at least one year's duration. Subsequently we were able to pick earlier cases. Our highest number of injections in one case has been 40. In our 29 cases 593 injections were given, with 347 convulsions resulting.

Results of treatment have been as follows:

	Number treated.	Remitted.	Discharged.	Certified and sent to mental hospital.	Remaining.
Male . .	23	11	9	4	10
Female . .	6	2	3	2	1

* Read at the Annual Meeting of the Royal Medico-Psychological Association at Ilkley, July 8, 1938.

† I am continuing this treatment as a routine with certain selected types of schizophrenia as they are admitted to the wards, and hope to publish results of 100 cases. The treatment is not being confined solely to the schizophrenias.—A. D.

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Two male patients showing remissions are still in hospital owing to bad social conditions at home, and the question of their disposal has not been settled.

One female patient showing no improvement was taken home by relatives.

One male patient discharged has relapsed, has been readmitted, and is receiving another course of injections.

From our results it is apparent that the earlier the case is treated the more probability there is of remission.

All the cases treated had healthy hearts at the commencement of treatment, nevertheless auricular fibrillation was observed in 3 cases and temporary heart-block happened in one case.

Details of these four cases follow:

CASE 1.—J. G—, female, aged 21. Hebephrenic. General physical health good. Blood-pressure 125/75. She received 19 injections (4 c.c. to 7 c.c.) over a period of seven weeks with 10 convulsions, average duration 46 seconds. After the last injection gross reduplication of the second mitral sound was apparent. In 24 hours the reduplication was slight; in a further 6 hours it was barely perceptible, and in another 18 hours was not detectable. No cardiac medication was attempted. She was kept in bed for a week, after which she was allowed to walk about the grounds and showed no signs of cardiac discomfort. The patient made a good recovery, and was discharged after three months in hospital. She reported back at the out-patient clinic for four weeks and then obtained employment as a domestic. Reports subsequently from the Health Visitor are very satisfactory.

CASE 2.—S. O—, male, aged 26. Catatonic. He was in good general health and of muscular build. Blood-pressure 125/70. He received 25 injections (4 c.c. to 9 c.c.) over a period of sixty days, 13 convulsions being induced, with average duration 55 seconds. Complete arrhythmia of pulse developed after the 25th injection and lasted 90 seconds. The apex-beat was found to have moved to the left 1 in. Six hours later there was again complete arrhythmia showing auricular fibrillation with a deficit of 92–76.

The irregularity lasted three days, during which he was kept in bed. No drugs were administered.

The agitated state of this patient and of the previous one also made electro-cardiograms illegible. A week after the return of rhythm to normal he was allowed up, and in a month was playing football without signs of distress. The apex-beat was palpable 3½ in. from midline. The mental state of this patient improved, but he is still in hospital. He had a history of five years duration.

CASE 3.—D. S—, male, aged 19. Catatonic of asthenic build, but without signs of physical disease on routine examination. Mental symptoms of two years' duration. Electrocardiogram showed right side preponderance. Blood-pressure 100/60. He received 18 injections (3 c.c. to 4 c.c.) spaced over a period of nine weeks, 9 convulsions being induced, with average duration of 55 seconds. Blood-pressure before 1st, 4th, 12th and 14th injections was 100/65, 110/75, 120 80 and 130/80. No fit being induced, a second reading was taken in two minutes. These second readings were respectively 140/80, 140/75, 135/80 and 130/80, giving an average rise of 19/13 after each injection.

Before 2nd, 3rd, 7th and 15th injections they were 105/85, 110/75, 150/75 and 120/85.

After the subsequent convulsions they were 155/90, 105/80, 110/75 and 130/85, the average rise after a convulsion being 5/4, i.e., less than the rise after an ineffective injection. After the last injection arrhythmia of pulse developed and lasted 12 hours. An electrocardiogram showed partial flutter. Functional efficiency could

not be assessed because of the patient's mental state. After three weeks an electrocardiogram showed the same degree of right-side preponderance as the first tracing. Subsequently this patient's mental condition changed. Previous to course of injections he was in a state of resistive stupor. He became restless, exhibiting stereotyped movements and developed kleptomanic habits. He was certified and admitted to a mental hospital.

CASE 4.—H. H—, male, aged 36. Hebephrenic, with symptoms of two years' duration. There was no evidence of organic disease. Blood-pressure 130/80. He was given two injections, the first 4 c.c. in 5 seconds. A convulsion lasting 72 seconds was induced. At the conclusion of this his pulse dropped to 30 per minute. This lasted for a period of 6 minutes. The pulse then gradually increased to 70 per minute in 5 minutes. The second injection was 4 c.c. given in 6 seconds. A convulsion was induced lasting 57 seconds. The pulse again dropped to 30 per minute, lasting 8 minutes, and then gradually increased to 90 in 2 minutes. It was irregular in rate, rhythm, and force, and suggestive of auricular fibrillation. The last sounds were very irregular in character and there was an irregularity. When the pulse-rate dropped to 30 in this case it was suggestive of partial heart-block. An electrocardiogram was not taken owing to faulty apparatus. Treatment was stopped after the second injection.

His mental state has improved, and he will probably be discharged.

In this case it will be observed that the rate of injection was quicker, and that though cardiac irregularity manifested itself after the first injection, a second injection was given with the same result. With the other three cases we were not prepared to continue the treatment once cardiac irregularity was detected. They had had a long course of injections, and our knowledge of cardiazol was not sufficient to rule out cumulative action. Its behaviour in the other cases certainly does not support this theory.

Our results we consider very encouraging, and as stated previously, the treatment will be continued as a regular routine in these observation wards.

We are indebted to Dr. Briggs, Medical Superintendent, for facilities for carrying out this treatment, and to Dr. Ford Robertson for suggestions and advice.