NEUROLOGICAL MANIFESTATIONS SEEN DURING CARDIAZOL AND INSULIN TREATMENTS.

By DONALD BLAIR, M.B., Ch.B.Cantab., D.P.M.Lond.,
Assistant Medical Officer, Cane Hill Hospital (L.C.C.).

THE outstanding successes claimed in the treatment of schizophrenia by two such apparently different forms of treatment as insulin and cardiazol lead to a comparison of their effects on body and mind. Amongst those who have studied the two methods individually are Angyal and Gyarfas (1937), and Georgi and Strauss (1937),

Experience of cardiazol effects during the treatment of 20 cases and administration of over 400 injections, and of insulin during the observation of a large number of insulin "shocks", has convinced me that cardiazol and insulin have much in common regarding the various psycho-motor, somato-motor and visceromotor phenomena they produce.

INSULIN EFFECTS.

There are many descriptions of the generalized pattern of reaction to insulin (e.g., Isabel Wilson (1936), Parfitt (1937), Lewis A. Golden (1937), de Morsier and Bersot (1938).)

Briefly the changes of this category occurring in insulin treatment may be summarized as the following:

I. *Before coma.*

(*a*) Early pallor, later usually replaced by normal colour or a deep flush, rarely progressing to an ashen hue; variation in pulse-rate and size of the pupil, perspiration, salivation.

(*b*) Slight twitching of the eyes and mouth in the early stages; later sucking, chewing and munching movements; pouting, grimacing and staring.

(*c*) Myoclonic twitchings and movements, sometimes generalized and sometimes confined to the upper limbs or limbs of one side, and of varying degrees of intensity.

(*d*) Forced tonic movements, spasms and twitchings, torsions, writhings and opisthotonos.

(*e*) Epileptic fits.

(*f*) Psycho-motor restlessness.

https://doi.org/10.1192/bjp.84.352.776 Published online by Cambridge University Press

II. *During coma.*

(*a*) Marked perspiration and salivation. Change of pulse-rate—usually slow, occasionally fast, and sometimes irregular.

(*b*) Myoclonic twitches and movements.

(*c*) Flexor and extensor spasms.

(*d*) Epileptic fits.

III. *After coma.*

Speaking of recovery following the administration of glucose, Parfitt, 1937, says: "In general there is a rapid recovery backwards through the stages described."

The phenomena of this last phase gradually become less, and disappear as the patient returns to normal consciousness.

The number of the above symptoms present and the variety of their pattern and degree of individual intensity vary considerably from one patient to another. The tendency of each patient's movements to follow an individual pattern has been insufficiently emphasized.

Wortis (1937) says: "It seems justifiable to talk of reaction types, though the types are by no means stable, but are liable to undergo gradual or even sudden change under treatment."

Cardiazol Effects.

Generalized descriptions of cardiazol fits have been given by Cook (1938), Kennedy (1938), and Finkelman *et al.* (1938), amongst others, but little has been said of the movements occurring before or after the fits. Below is a table showing the variation of these phenomena occurring in 20 consecutive cases treated by me with cardiazol. The reactions of each individual were found to be remarkably consistent, and Wortis's dictum may be said to apply to these cases also.

The phenomena described as occurring before the coma are considered as those before the onset of the first clonic movements of the genuine fit. The time from the completion of the injection to the onset of the fit is so short that it does not give great opportunity for detailed recordings; nevertheless, the varying response of cases during this period was quite definite, and was further and more markedly confirmed on the occasions when an injection failed to produce a fit. There was no case in which at least one such opportunity did not occur, and in a few the occasions mounted into double figures. In every case, following the technique of Meduna, a second injection was given after the patient had calmed down, and, except on a very few occasions, a fit resulted.

After the cessation of the true convulsion there is always a period of quiet and inert coma, and none of the phenomena recorded as occurring after the fit appeared until a minute or more after the fit had ceased. The duration of their manifestation varies from a few seconds up to several minutes.

Table Recording Various Psycho-, Somato- and Viscero-Motor Phenomena Occurring in Twenty Cases of Schizophrenia Treated with Cardiazol.

Case No.	Present age.	Duration of psychosis.	Type of schizophrenia.	Motor condition prior to treatment.	Motor phenomena seen following cardiazol injections.	
					Before the fit.	After the fit.
1	25	1½ years	Paranoid	Normal	No movements	Occasional sweating. Salivation. Psycho-motor restlessness.
2	27	2½ ,,	,,	Hyperactive. Perpetually on the move. Kept up a continuous nonsensical chatter	Pale colour. Sweating (occasional). Psycho-motor restlessness	Pale complexion. Salivation. Psycho-motor restlessness.
3	26	9 months	Catatonic	Mildly hyperactive. Grinning and grimacing	Pale. No movements	Colour always pale and ashen. Vomited on nearly every occasion. Quiet recovery. Marked extra systoles lasting for about ten minutes.
4	19	3 ,,	,,	Stuporous and anergic	No movements	Slight psycho-motor restlessness.
5	35	8 years	,,	Grinning and manneristic. Sits about most of the day	Marked writhing and twisting (whether a fit followed or not)	Recovery always quiet.
6	36	3 ,,	Paranoid	Normal	Quiet. Flushing. Cough occasionally	Psycho-motor restlessness.
7	28	4 ,,	Catatonic	,,	Quiet. Marked flushing	Salivation. Psycho-motor restlessness.
8	25	2½ ,,	,,	..	Twitching of eyes and mouth. A few myoclonic movements	Quiet recovery. Munching and sucking movements of mouth and lips.
9	33	1 year	,,	Mute. Anergic. Sitting about all day. Unemployable	Flushing. Cough nearly every time. Eye and mouth twitchings	Salivation. Chewing and sucking. A few myoclonic twitchings.
10	28	4 years	,,	Mute. Anergic. Unemployable	Marked mouth movements of a sipping type (very similar to those seen in monkeys)	Marked mouth movements similar to those before the fit. Myoclonic twitchings. Psycho-motor restlessness.
11	28	7 ,,	,,	Mute. Anergic. Unemployable	Myoclonic movements. Waving of arms (occasionally)	Myoclonic twitches. Psycho-motor restlessness.

12	28	1½ ,,	Paranoid	Normal	No movements	Usually quiet. Occasionally restless.
13	21	2 ,,	Hebephrenic	Sat about all day. Very seldom talked. Unemployable	Psycho-motor restlessness	Salivation. Myoclonic twitchings. Psycho-motor restlessness.
14	27	3½ ,,	Catatonic	Anergic	Quiet	Very marked munching and sucking movements. Myoclonic twitchings. Psycho-motor restlessness.
15	38	9 months	Paranoid	Quiet	,,	Myoclonic twitchings. Psycho-motor restlessness.
16	25	2½ years	Catatonic	In a dull and anergic condition. Never spoke. Sat about all day. Unemployable	Twitchings of eyelids, lips and face. Generalized tremors of the body and limbs on one occasion	Quiet recovery.
17	25	1½ ,,	,,	Apathetic and anergic. Led a sedentary existence	A few myoclonic twitchings. Psycho-motor restlessness	Myoclonic twitchings. Psycho-motor restlessness (occasionally).
18	28	6 ,,	Paranoid	Normal movements	Psycho-motor restlessness (occasionally). Usually quiet	Quiet.
19	32	8 ,,	Catatonic	In bed all day. Liable to outbursts of cardiac excitement and over-activity	Cough. Myoclonic twitchings	Salivation. Marked psycho-motor restlessness.
20	31	8 months	,,	In bed all day. Never talked. Extreme anergia. Resistant to all attention	No change	Quiet recovery.

N.B.—The terms "myoclonic movements" and "myoclonic twitchings" are used in a synonymous sense except that the former is reserved for the more severe types of these movements.

Regarding the visceromotor changes, excessive salivation was fairly frequent, perspiration of a degree sufficient to warrant the conclusion that it was due to anything other than the movements of the fit was rare, but in one case (No. 1) it was so consistently excessive as to be considered of visceromotor origin (sweat-glands). Reference to the changes in pulse-rate and quality is not made except where they were of marked persistence. Changes of rate and rhythm of some sort or another (e.g., extra-systoles, sinus arrhythmia, tachycardia and bradycardia) were found to occur in most patients after the fits were over, but in nearly every case these ceased within a few minutes, and became less in frequency as the treatment progressed. They are, therefore, not recorded except when they were particularly persistent.

The 20 cases treated were all males. Their ages varied from 19 to 36 years, and the duration of psychosis from 3 months to 8 years.

In giving the injections the tourniquet was invariably released before the commencement of injection of the cardiazol, and not kept on until the end of the injection as described by Cook (1938).

It will be seen from the above table that during the treatment of 20 cases with cardiazol, psychomotor, somatomotor and visceromotor phenomena closely resembling those occurring in insulin therapy were manifested.

Regarding such neurological manifestations in hypoglycæmic shock, Lewis A. Golden (1937) says, "Speculation in the present state of our knowledge may be interesting but is quite valueless". The object of this paper is not to enter into such theoretical speculations, but merely to point out some similarities in these phenomena seen in cardiazol and insulin treatments.

We may sum up by saying that a comparison of the effect of the insulin shock and cardiazol convulsion treatments of schizophrenia indicates that they have much in common in the bodily effect they produce during their periods of activity, and in particular that in both treatments the motor reactions vary from one case to another, but that each individual tends to react in a constant way.

I have to thank Dr. A. A. W. Petrie for permission to refer to cases treated at Banstead Hospital.

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