PROLONGED NARCOSIS IN MANIC-DEPRESSIVE PSYCHOSIS.

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Introduction.

As there is still considerable hesitancy in the adoption of this valuable form of therapy, I am glad to have an opportunity of stating the case for a more widespread application of prolonged narcosis to the manic-depressive disorders. A legitimate diversity of opinion exists as to the propriety of using any drug with a toxic action over a long period, especially so when it introduces an extraneous, and maybe serious, risk into a disease of itself non-fatal, and with a large recovery-rate. With attention to detail in the treatment, and with the addition of the Cardiff modification of prolonged narcosis, we are satisfied that toxic symptoms arising during the administration of somnifaine—the drug used—can be controlled, and the risk heretofore associated with this form of therapy eliminated.

Historical.

I need hardly touch upon the historical aspect of prolonged narcosis treatment apart from saying that it is not new, having been originated by Wolff (1) as far back as 1901, and written about more extensively by Kläsi and others since 1920. Many substances had been tried for the purposes of the treatment, but it was not until 1922 that Kläsi (2) chose somnifaine as the drug of most value, and used it for inducing prolonged narcosis in 26 cases of schizophrenia. The publication of his results led to a more extensive trial of somnifaine on the Continent, and, as was to be expected with a non-specific and dangerous form of therapy, opinion varied considerably as to its utility and safety. All, however, agreed that if the toxic symptoms associated with the drug employed could be eliminated, prolonged narcosis as a form of treatment in mental disorder would be a valuable addition to our therapeutic armamentarium.

Dangers.

The dangers associated with prolonged narcosis are so important that no one should consider using the treatment without at first thoroughly familiarizing

himself with them ; and they are summarized *in toto* in an article by Ström-Olsen (3) in the *Journal of Mental Science* for October, 1933. Toxic symptoms arising from the exhibition of somnifaine may be grouped under three headings—peripheral, central and metabolic ; and are : rashes and albuminuria, disturbances of co-ordination, pyrexia, epileptiform seizures and fall of blood-pressure, ketosis, vomiting, cyanosis, coma and cardiac collapse. It is in these last symptoms that the real dangers associated with the treatment lie, and it is these very symptoms which are the expression of carbohydrate upset, and can be, as they are in Cardiff, controlled. This control of upset carbohydrate metabolism is a most important therapeutic advance.

Biochemical.

Biochemically it was shown by Quastel (4), working in the laboratory of the Cardiff City Mental Hospital, that narcotics exerted a profound inhibitory action on the oxidation by the brain of substances important in carbohydrate metabolism, viz., glucose, lactic acid and pyruvic acid ; and he also showed that there was a parallelism between the narcotic power of the drug and its inhibitive power on glucose oxidation of brain—the stronger the barbiturate the greater its inhibitive power. This *in vitro* discovery, coupled with the clinical fact of the frequent presence of ketonuria during prolonged narcosis, suggested a similar upset of the carbohydrate metabolism of the liver, and this, on further experiment with liver slices in the presence of narcotics, was shown to be the case. The disturbed carbohydrate metabolism sets up a condition of ketosis, with such symptoms as ketonuria, vomiting, cyanosis and coma. Again, cardiac complications were found to be both frequent and dangerous, and these also were considered to be associated with carbohydrate upset and impaired nutrition of the cardiac muscle.

Armed with such facts, the next step was to prevent or treat such toxic symptoms as they arose, and it was considered on physiological grounds that such prevention could best be achieved by the administration of insulin and glucose (8), the insulin being necessary for the proper metabolism of glucose in the liver—the more so since this metabolism was now being inhibited by a narcotic. As it is well known that the addition of insulin increases glycogen utilization in the perfused heart, its action in counteracting cardiac muscle impairment was an important accessory factor in its employment. The clinical course of the cases now treated with this important addition of insulin showed that its inclusion was fully justified by results ; for, whereas formerly serious toxic symptoms were the rule rather than the exception, now conditions were reversed, and toxic symptoms under conditions of careful nursing were rarely such as to cause serious misgivings.

During the past year Yates and I have been investigating the serum calcium of patients undergoing prolonged narcosis, with a view to determining

what fall in serum calcium occurred during the treatment, and to determine whether this fall was sufficient to cause toxic symptoms. Ten cases in all were investigated under somnifaine-insulin-glucose narcosis, and an average maximum fall in serum calcium of 12% was observed. This effect was not dependent upon dietary factors, and it was not found great enough to warrant any serious modification of the treatment as applied. In one case, however, treated without insulin and glucose there was a maximum fall of 19%. This occurred within four days of beginning the treatment, and suggested the necessity for some form of therapy to maintain calcium metabolism at a normal level during the narcosis. I only mention the point here as a reminder that an approach towards a pathological fall in serum calcium is possible without insulin. Also, observations by various workers—Staul (5), Davies, Dickens and Dodds, etc. (6)—have shown that therapeutic exhibition of insulin results in an increase in serum calcium.

Rationale of the Treatment.

It is not my intention in this short paper to discuss the many theories put forward as to the mode of action of this form of treatment. Since it is unknown, I propose only to propound one that seems to me to be feasible, viz., that the treatment exerts its beneficial effect by ensuring a period of prolonged rest—an important factor in the type of case we are discussing—in which is effected a lessening of emotional tension and an inhibition and correction of faulty modes of thought and action. This embraces the three fundamentals of affection, cognition and conation, and, by its simplicity, is probably more reasonable than many more abstruse theories that have been formulated.

Management of Cases and Dosage.

From the clinical point of view, apart from contra-indications to be mentioned, the management of the patient and the dosage prescribed are the most important factors in the treatment. Too much stress cannot be laid on skilled nursing, as it is on this to a great extent that the success of the treatment depends. In Cardiff the practice is to nurse all patients undergoing prolonged narcosis in the same ward on either side, so that they will always be under the care of a sister thoroughly familiar with the treatment in all its aspects.

Treatment should be carried out on a low bed in a darkened, single room, as this isolation of the patient in a darkened room, by cutting off all noise and extraneous stimuli, considerably enhances the action of the narcotic and reduces the amount required to maintain sleep. In the beginning, at Cardiff, the practice was to nurse patients in the open dormitory. Then it was found that they required 6–8 c.c. daily to keep them asleep. Now we rarely use

more than 4 c.c. daily, and never more than 6 c.c. The procedure we adopt is first of all to give an explanation to the patient on simple lines, and, according to his capacity of appreciation, of the reason we think it necessary for him to undergo this particular treatment. From the point of view of future psychotherapy, it is important to gain his confidence from the start. We point out the analogy of the beneficial effect of an ordinary good night's rest to a person burthened with the worries and anxieties of everyday life, and then explain that our aim is to give him complete rest for a much longer period so that he will wake up free from his distressing symptoms, irrespective of what they are —a form of crude suggestion permissible in the circumstances.

We lay particular emphasis on daily urine examination, using a morning specimen, throughout the period of the narcosis. In practice, this examination is controlled—one specimen being examined by the ward sister, a confirmatory one by the laboratory. Contrary to the experience of others, we find no difficulty in getting morning specimens of urine. If we failed to do so, we should discontinue treatment until we did. The presence of acetone in the urine, which appears in about 50% of cases at one time or another, during the period of treatment, calls for an increase in the dose of insulin of from 10 to 15–20 units. If, after this, the acetonuria is not controlled, we discontinue treatment until it is. From experience of over 300 treatments, the last 200 of which have been free from serious symptoms, this is the point to which we attach the greatest importance. If ketonuria is controlled, as it can and should be, either by increasing the insulin or stopping the treatment, the likelihood of severe toxic symptoms arising is very small indeed. We have never had any hesitation in stopping treatment if untoward symptoms arise.

Fluid diet and plenty of glucose and water is given throughout the course. We allow porridge and milk for breakfast, beef-tea, rice pudding or custard and milk for dinner, egg and milk and jelly for tea, and Benger's food or cocoa for supper. The question of feeding times is left to the nurse in charge. There is no stipulated time, the patient not being fed until he is sufficiently awake to negative the danger of food getting into the trachea. Opportunity is taken at this time to attend to his toilet and personal needs, the whole performance of feeding and toilet taking not more than 10–15 minutes. Thereafter the patient is ready to fall asleep again. Although they get quite a liberal fluid diet, it is noticeable that patients are generally hungry and ask for food whenever they become drowsily awake. We never have to resort to tube-feeding or to catheterization, and we rarely get vomiting. Apart from simple suggestion and encouragement by the nursing staff, we do not attempt psychotherapy during the course of treatment, since contact cannot be sufficiently established to make the effort worth while. After the course is finished, and when the effects of the drug have worn off, psychotherapy and occupational therapy are immediately instituted.

From experience of a large number of cases, the tendency in Cardiff has

been to a gradual reduction in dosage, and now we rarely give more than 2 c.c. twice daily—one injection in the morning and one in the afternoon. The injections are given intramuscularly in the thigh. We find this amount sufficient to keep the average, isolated patient asleep for the greater part of the day. If this amount is not sufficient, and the circumstances warrant it, we do not hesitate to give a further 2 c.c. If we think that more than 4 c.c. is inadvisable, we give ʒij paraldehyde instead. We do not in any case exceed 6 c.c. somnifaine in the 24 hours, as, above this dose, toxic symptoms will inevitably arise, leading at least to interruption of the course, if not to more dangerous sequels. After each injection of 2 c.c. somnifaine, we give 10–15 units of insulin subcutaneously in the arm, and, of course, glucose *ad lib.* by the mouth. We have tried giving somnifaine by mouth, but abandoned the method in favour of injection, as we found the oral method more toxic.

Contra-indications to Treatment.

Contra-indications to treatment by prolonged narcosis are arterio-sclerosis, myocardial degeneration, respiratory disorders and toxic and exhaustive conditions from whatever cause. We never use it in cases of acute delirious mania, or in any case where the psychosis has reduced the patient to an exhausted state on admission. It is particularly dangerous in these cases, and, if employed, there is every possibility of a fatal outcome.

Indications for Stopping Treatment.

These may be summarized as follows:

(1) *Tachycardia.*—Especially if accompanied by a fall of more than 25 mm. Hg in the systolic blood pressure. If continued, cardiac collapse may occur.

(2) *Ketonuria.*—Without insulin and glucose, this appears in over 70% of cases. With insulin and glucose it appears in some 50% of cases in minor degree. If it does not disappear, as it generally does, on increasing the insulin, treatment should be suspended until it does.

(3) *Vomiting.*—This is a complication rarely met with when glucose and insulin are used. It was not uncommon before the modification. If persistent, it is an indication of severe ketosis, and treatment should be terminated.

(4) *Pyrexia.*—Transient pyrexia, not over 100° F. and not due to a pulmonary complication, can safely be ignored. Missing out the next injection of somnifaine due is generally sufficient to establish normal temperature. Here I might mention that patients undergoing prolonged narcosis are, as is to be expected, very susceptible to respiratory disorders, and should not be exposed to treatment in a ward where colds or influenza are prevalent.

(5) A dusky complexion and extreme drowsiness are complications which depend on the amount of the drug administered.

Skilled nursing, awareness of the danger-signals, continued watchfulness, the use of insulin and glucose and abundant fluids, and a fixed rule that treatment should be interrupted whenever the occasion calls for it, will reduce mortality in this form of treatment to *nil*.

Review of 133 Cases of Manic-Depressive Psychosis Treated by Prolonged Narcosis in the Cardiff City Mental Hospital.

Forty-five of these 133 cases have already been dealt with by Drs. Ström-Olsen and Muriel McCowan (7), my two predecessors at Cardiff, and published in this Journal of October, 1934. Of these cases, which include, as do the further series, mania, melancholia, benign stupor and involutional melancholia, there were: 37·7% recovered (17 patients), 29% improved, (13 patients) and 33·3% unchanged (15 patients).

Recovery then, as now, means restoration to normal mental health, and improvement means that the patient has established contact with his environment and is able to occupy himself at therapeutic occupations. As the previous authors stated at the time, it was not suggested that those figures represented the recovery-rate in the manic-depressives treated, for all except 4 cases sooner or later made a complete recovery from their psychotic phase without treatment. What they stressed was that recovery in 37·7% of them ensued without doubt as a result of the treatment, and that attacks which would have lasted weeks or months were cut short by a 10–14 days' narcosis. These words, with which I am in complete agreement, equally apply to the series of 88 further cases treated in Cardiff since that time.

These 88 cases can be subdivided as follows:

35	were cases of recent or recurrent mania	19 men. 16 women.
48	,, ,, melancholia . . .	24 men. 24 women.
4	,, ,, involutional melancholia	2 men. 2 women.
1	was a case of benign stupor . .	1 woman.
88		88

Of these:

	Recovered.	Improved.	No change.	
Mania . . .	12 (34·3%) .	12 (34·3%) .	11 (31·4%)	= 35
Melancholia . .	18 (37·5%) .	13 (27%) .	17 (35·4%)	= 48
Involutional . .	2 (50%) .	.. .	2 (50%)	= 4
Benign stupor .	.. .	1 (100%) .	..	= 1
				88

In round figures :

Total .	32 (36·3%) .	26 (29·5%) .	30 (34·1%)

Both series combined (i.e., 133 cases) show :

		Recovered.	Improved.	No change.	
Ström-Olsen and McCowan . .	(1)	17 (37·7%) .	13 (29%) .	15 (33·3%) =	45
Present . .	(2)	32 (36·3%) .	26 (29·5%) .	30 (34·1%) =	88
Total . .		49 (36·8%) .	39 (29·3%) .	45 (33·8%) =	133

Both combined show individually :

	Recovered.	Improved.	No change.	
Mania . . .	23 (41·9%) .	18 (32·7%) .	14 (23·6%) =	55
Melancholia . . .	21 (32·3%) .	18 (27·7%) .	26 (40%) =	65
Involutional . .	4 (44·4%) .	1 (11%) .	4 (44·4%) =	9
Benign stupor . .	1 (25%) .	2 (50%) .	1 (25%) =	4
				133

The two sets of figures show a striking similarity in the percentage of those recovered, improved and unchanged; and, though the numbers are very small from a statistical point of view, yet they are large enough to show that, roughly speaking, attacks of manic-depressive psychoses can be cut short in 30% of cases within a period of 2–3 weeks. Such being the case, prolonged narcosis has justified itself as a form of therapy in this psychosis, especially so when we consider our ignorance of its causation and our limitations where its treatment is concerned.

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