TREATMENT IN GENERAL PRACTICE

This article is one of a series on the management of some of the metabolic diseases met with in general practice.

TREATMENT OF DIABETIC COMA

BY

R. D. LAWRENCE, M.D., F.R.C.P.

In this insulin era diabetic coma is becoming a rare condition and theoretically should never occur. Impending coma should lead to diagnosis and treatment with insulin in the early precomatose condition, when a dangerous outcome can be easily averted by adequate treatment. When full diabetic coma has developed, either through the negligence or ignorance of the patient or relatives or through the lack of immediate action by the doctor, a fatal condition may occasionally develop. But diabetic coma as a cause of death should have disappeared by now.

Diagnosis

The differentiation between diabetic and other comas is easy if the rule of a routine test of urine—obtained by catheter if necessary—is not omitted in all severely ill and unconscious patients. Albuminuria is always present in diabetic coma, and its finding should never be allowed to suggest a renal condition until the urine has been examined for sugar and acetone. The diagnosis will be suggested by history of progressive thirst, wasting, and weakness; by ensuing vomiting or abdominal colic; by air hunger with a smell of acetone in the breath; and by slow drowsiness leading to coma. Confusion may most easily arise in known insulin cases between true diabetic coma (ketone intoxication) and unconsciousness from an overdose of insulin (hypoglycaemic coma). The former may occur in an insulin case either from total omission of insulin or from irregularity in treatment or incidental infections. It may be very difficult for a doctor suddenly called to such a case to decide between the unconsciousness of true diabetic coma and insulin coma, and I have seen some patients lose their lives through the wrong treatment being given.

The main clinical differences are contrasted in Table I.

TABLE I

	Diabetic Coma	Insulin Coma
Onset	Gradual	Very sudden
Tongue	Dry	Moist
Respiration	Deep; air hunger Acetone in breath	Quiet None
Skin	Dry; blue colour	Sweating common
Dehydration	Marked	Absent
Pulse	Rapid; feeble	Normal; bounding
Blood pressure	Low	Normal
Eye tension	Usually low	"
Nervous system	No pathognomonic signs	Convulsions frequent
Chemical tests:		
Urine sugar	+++	Nil or trace
Ketones	+++	"
Albumin	Very common	Very rare
Blood sugar	Very high	Very low

It should be remembered that in insulin coma some sugar may be found in the first catheter specimen, because this was secreted into the bladder perhaps some hours before, when the blood sugar was high. But the next sample obtained from the indwelling catheter will

be sugar-free. If any doubt remains about diagnosis an unconscious diabetic should be immediately treated with sugar (1 oz.) for hypoglycaemia. This should abolish the insulin coma within fifteen minutes, will do little if any harm to the diabetic coma, and gives time to think and decide on further treatment.

Coma and Precomatose Conditions

Diabetic coma is due to the poisons of disordered fat metabolism (the acetone or ketone bodies) which accumulate in severe diabetes whenever insufficient sugar (glucose) is being metabolized. The treatment therefore consists in burning large amounts of sugar by large and repeated injections of insulin, the sugar being given to provide fuel for the insulin and to prevent hypoglycaemia. Besides this it is necessary to treat the dehydration and circulatory collapse which is usually present, because if the latter is severe the patient may die before and in spite of the removal of the ketosis by insulin. The treatment of collapsed and profoundly comatose patients usually demands prolonged and difficult treatment (intravenous saline, etc.) which can hardly be carried out in the patient's home, and I would advise doctors to send such cases at once to an efficient hospital after a large intravenous injection of insulin (40-50 units). Precomatose cases (indeed the condition should never be allowed to go beyond this stage) that can swallow and retain sugar and fluids can be easily treated at home by the following simple method (Table II).

TABLE II

Diet and Insulin Control by Urine Tests*	
Diet	<p>Carbohydrate, 40 grams: By day, 4-hourly By night, 4-hourly</p> <p>The following contain 10 grams of carbohydrate: Sugar 2 large lumps or 2 teaspoonfuls Glucose ... ½ oz. or 2 full teaspoonfuls Benger's ... ½ level teaspoonfuls Horlick's ... 2 heaped teaspoonfuls Ovaltine ... 2 very full teaspoonfuls Orange juice 4 oz. Milk 7 oz.</p> <p>Give water between feeds</p>
Insulin	<p>Test urine for sugar before each dose (catheter if necessary)</p> <p>Give At Units</p> <p>4-hourly 6 p.m. 40 if Benedict's test is red or yellow = +++ sugar 10 p.m. 30 if green with copper deposit = trace 2 a.m. etc. 20 if blue = no sugar</p>

Date	Time	Urine Sugar	Ketones		Insulin	Carbohydrates
			Fe Cl	Rothera		
21/3/32	6 p.m.	+++	+++	+++	40	40 grams (40 gm. glucose + lemon juice)
	10 p.m.	+++	+++	+++	40	" "
22/3/32	2 a.m.	+++	++	+++	40	40 gm. (8 teaspoonfuls Benger's)
	6 a.m.	+++	0	+++	40	" "
	10 a.m.	Trace	0	++	30	" "
	2 p.m.	0	0	+	20	" "
	6 p.m.	Trace		0	30	" "
	10 p.m.	Trace		0	30	" "
23/3/32	2 a.m.	0		0	0	
	6 a.m.	+		0	30	40 grams (8 teaspoonfuls Benger's)

Patient is then put on 120 grams carbohydrate + insulin 40 units twice daily

* The figures in italics may vary with the requirements of each case.

Carbohydrate and Insulin Treatment

If vomiting has been present and is likely to recur, washing out the stomach may stop it entirely and should be carried out. Regular amounts of carbohydrate are given by mouth every four hours (chosen from the foods shown in Table II), and the insulin is started with 40 units intravenously and continued four-hourly. The urine is tested every four hours, and the dose of insulin varies with the degree of glycosuria. Forty units are prescribed for heavy sugar, 30 for moderate sugar, and 20 or 10 units for no sugar. In this way the patient is supplied with adequate amounts of sugar and insulin but is safeguarded from hypoglycaemia. The choice of what carbohydrate to give, the urine testing, and insulin dosage can be carried out by an efficient nurse. Abundance of fluid should be taken by mouth.

This treatment usually removes all ketosis in twenty-four to thirty-six hours, and a change can then be made to three or two doses of insulin a day. The patient may remain drowsy for many hours after the ketosis is lessening, and if the pulse is good no alarm need be felt.

General Treatment

Apply warmth and complete rest, as in all cases of collapse. Circulatory stimulants are usually indicated: strophanthin, 1/100 grain; coramine, 1-2 c.cm.; caffeine, 3 grains; adrenaline, 3 minims—subcutaneous and repeated. Bicarbonate of soda is not essential, but hastens the removal of the acidosis (2 drachms four-hourly up to 1 oz. in total). The bowels should be opened by aperient or enema, but drastic purgatives may cause collapse. Sepsis and toxæmias, often the cause of the coma, must be sought for and treated.

Dehydration and Circulatory Collapse

Some patients may be seen for the first time in profound coma, with intense dehydration and circulatory collapse, a rapid and almost imperceptible pulse, and a blood pressure under 70 mm. Hg. These require insulin and sugar treatment as above, but still more fluids to restore the body fluid lost by polyuria and vomiting. In such cases large amounts of intravenous normal saline are immediately necessary. One or two pints is not enough, and frequently three to six pints must be given slowly over one to two hours' infusion to restore the circulation. Such infusions should be continued in whatever amounts are necessary to restore the eye tension and bring the blood pressure over 100 mm. Hg. The best procedure is to give these large amounts of intravenous saline at first and to continue them later with added 5 per cent. glucose by continuous drip infusion into a vein. This may be necessary for twenty-four to forty-eight hours to resuscitate profoundly collapsed cases, and it is obvious that such treatment can be performed only under hospital conditions. Fluids, glucose, insulin, and any necessary stimulants (adrenaline, 2 to 3 minims) can be given in the continuous intravenous infusion. If circumstances are such that intravenous therapy is impossibly difficult, rectal normal saline or 5 per cent. glucose can be administered (remember that their retention is doubtful); or, better, normal saline with 5 per cent. glucose subcutaneously in the breasts or axillae.

Difficulties in Desperate Cases

A not infrequent complication is oliguria or even anuria when the blood pressure is extremely low or dehydration extreme. Urine is usually present in large amounts in the bladder when the patient is first seen, but after this

may become so scanty as to be insufficient for tests to regulate the insulin dosage. In such cases some 40 grams of carbohydrate and 20 units of insulin should be administered four-hourly, unless blood-sugar control is to hand. In such cases blood tests may show that the insulin is not reducing the blood sugar, and one may be tempted to prescribe much larger doses—100 to 200 units or more. I am doubtful if these large doses are of greater value, the failure to act being due to the poor circulation and the failure of tissues under such conditions to perform any metabolic exchanges rather than to an insufficiency of injected insulin. If enormous doses have been injected and recovery results hypoglycaemia must be watched for later. It is almost certain that the absolute level of the blood sugar does not matter and that sufficient insulin and glucose will always bring about recovery if circulatory collapse can be averted.

The treatment of diabetic coma can be thus summarized: (1) Treat the ketosis with repeated and large doses of insulin and sugar to balance it. (2) Correct dehydration and prevent circulatory collapse by abundance of fluids.

LONDON UNIVERSITY CENTENARY

LONDON SCHOOL OF MEDICINE FOR WOMEN

A luncheon party in honour of the centenary of the University of London was given at the London (Royal Free Hospital) School of Medicine for Women in Hunter Street, Bloomsbury, on July 2nd, with the dean, Miss Bolton, M.D., in the chair. The guests of honour were the Earl of Athlone, Chancellor of the University, the Right Hon. Oliver Stanley, President of the Board of Education, Sir Alan Garrett Anderson, M.P. for the City of London, and Lady Barrett, President of the Medical School. The chairman prefaced the toast of "The University of London" with a few words of welcome to all the guests, particularly the foreign and Dominion delegates, the Members of Parliament, of City companies, and of the London County Council. Miss Bolton said that they were honoured by the presence of the Chancellor, and she thanked Lord Athlone for the keen and friendly interest he took in all the departments of the university. They were proud that London University had been the first to open its doors to women on equal terms with men. They were glad to have among them also the President of the Board of Education, thus showing his interest in the training of medical women; Sir Alan Anderson, whose work for the school and hospital was known to every past and present student; and Lady Barrett, also "one of us." The Chancellor, in a brief reply to the toast, confessed that he had earned a bad mark for not hitherto managing to visit the school, but he was delighted to be with them that day in the presence of so distinguished and representative a gathering. He rejoiced in the success of the London School of Medicine for Women and gave it an assurance of continued support from the university authorities. Even if there was still a slight prejudice against women doctors in some quarters he did not think there was any reason to worry, because every day women were gaining their position. He knew it was not very easy to find work for all the women doctors the school would like to turn out, but this in time, he thought, would right itself, and there was certainly need of them in many places. After luncheon the school and hospital were on view to the guests, who included medical delegates from Canada, Australia, India, Ceylon, Malta, the United States, France, Sweden, Switzerland, Turkey, Rumania, and Estonia.

Luncheon at St. Mary's Hospital Medical School

Among the many celebrations in connexion with the centenary of London University was a luncheon given by the dean and staff of St. Mary's Hospital Medical School