

Original Articles.

REPORT ON THE ALLEN TREATMENT OF DIABETES.

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DR. FREDERICK M. ALLEN of the Rockefeller Institute, New York, read a paper in Boston Dec. 2, 1914, before the Suffolk District Medical Society, on his new starvation treatment of diabetes, following the principles laid down in his monograph "Glycosuria and Diabetes." We were so much impressed by his paper that we decided, at the suggestion of Dr. Roger I. Lee, who was then in charge of the service, to try the treatment on a series of cases.

Previously to this our treatment of diabetes on the West Medical Service had been to start the patient off with a fairly high carbohydrate intake, about 100 grams; with 100 grams of protein and 250 grams of fat, or more, and gradually to work down from this, first cutting down the carbohydrate, and then, if the patient did not become sugar-free, cutting down the protein. The fat was always kept high and many patients received over 4,000 calories, our old idea being to make the patient gain weight if possible. If the patient lost weight we were afraid, and we feel that one of the most important things that Dr. Allen has brought out is that a diabetic can lose a good deal of weight with considerable advantage to himself and no harm. We also used "vegetable days" and "oatmeal days"—usually with rather poor results. As to starvation, we were afraid of it, although in one or two cases we had used a semi-starvation day, with thick cream and black coffee, but never for periods of longer than one day at a time. With this treatment our diabetics did fairly well, but the process of getting them sugar-free was a tedious one and a good many cases continued to excrete 0.1% or 0.2% of sugar no matter what we did.

We do not intend to discuss the theory of the Allen treatment—he did that in his original paper—but merely to report our very successful series of cases, in order to show that his treatment is simple, safe and very efficacious in rendering and keeping a patient sugar-free, in a much shorter time than was possible by the old method; that anybody can do it, and that there is no danger of coma.

Our method of treatment, following Dr. Allen's very closely, is as follows: As soon as the patient enters the ward he is put on house diet

without extra bread or potatoes and kept on this for two days to determine his tolerance for ordinary diet and the severity of his diabetes. On the third day he is put to bed and given nothing but black coffee with one ounce of whiskey every two hours from 7 A.M. to 7 P.M.—7 ounces of whiskey in all—representing about 800 calories. The whiskey is usually well borne, although in one or two of the female cases it had to be omitted as it caused nausea. If there is much acidosis, as indicated by the amount of diacetic acid and acetone in the urine, sodic bicarbonate is given, otherwise not.

The patient is kept on this regime until he is sugar-free; in most of our cases it took either two and a half or three days to accomplish this. The loss of weight is very slight; the relief of symptoms, such as pruritus, polydipsia, etc., is very striking and we have never seen any indication of acid poisoning in the cases we have treated by this method. On the whole, patients seem to bear starvation remarkably well. We have never starved a case longer than three days, but would not have hesitated to do so had there been any sugar in the urine at the end of this time.

As soon as the patient is sugar-free he is given a "vegetable day," i.e. vegetables containing not over 5% of carbohydrates, boiled twice, with a carbohydrate content of about 15 grams after boiling (in the boiling about half the carbohydrate is lost). After a single vegetable day the diet is changed to:

Carbohydrate	15 grams
Protein	25 grams
Fat	150 grams

(Our vegetable diets, as well as several other sample diets are given below). From this the diet is slowly raised, increasing first the fat, then the protein and lastly the carbohydrate. The fat is never raised above 200 grams and the calories seldom above 2,200. On this the patients hold their weight, feel well and usually remain sugar-free. They do not gain weight; but as Dr. Allen says, it is much better to be lean and healthy than to be fat and carry one or two per cent. of sugar. Indeed, in some of the more robust cases who are obese, it seems desirable to get rid of this and the calories are kept low on this account. This is supported by Dr. Allen's experiments with his de-pancreatized dogs, for he found that as soon as he tried to make these dogs grow fat they died, whereas if he fed them on only a small amount, and was content to let them stay very lean, they did very well.

Our series is small, and perhaps we have been lucky, but in no case have we had any unfortunate results—never any sign of coma. In every case the patient has become sugar-free and has stayed so, on a reasonable diet which enabled him to hold his weight.

Some of these were severe cases of diabetes,

young people, whom we had treated before by the old method and could not get sugar-free.

When the patient is discharged from the ward he is given written diet slips with two or three menus which he can use on different days, figured out carefully to correspond with his tolerance. The two most important things to remember in this treatment are the following:

First, do not raise the diet too quickly after starvation, and pay just as much attention to the protein intake as to the carbohydrate.

Second, do not worry if the patient loses weight; it will not hurt him.

CASE REPORTS.

The first three are cases which were treated first with the old method and could never be made sugar-free, running from 0.1% to 0.2% of sugar. On the new treatment they responded promptly and were discharged sugar-free.

CASE 1. A woman of 64, diabetic for two years. She was sent in from the out-patient department, where she had been receiving a diet of 50 grams of carbohydrate and 50 grams of protein. On this diet she was putting out 8 grams of sugar a day with moderately strong acetone and diacetic acid reactions in her urine. When the carbohydrate was cut, in the ward, to 30 grams she put out 3 grams of sugar a day. She complained of severe pruritus vulvae. After 16 days of this treatment she continued to put out from 0.1% to 0.2% of sugar a day. Allen's treatment was then started, and after one day of starvation she was sugar-free and remained so for four days on a diet of carbohydrate, 20 grams; protein, 30 grams; fat, 150 grams. The itching had gone. Then the protein was raised to 80 grams, with the carbohydrate at 20 grams, and she immediately showed 1.5% of sugar. This is very important; the protein should not be raised too quickly. This we did not realize in our earlier cases.

A second starvation day, followed by two vegetable days, and a more careful raising of the diet—as follows—kept her sugar-free, and she was discharged so. Her diets were:

- Dec. 12. Carbohydrate, 20 grams.
Protein, 30 grams.
Fat, 150 grams—1500 calories. No glycosuria.
- Dec. 15. Carbohydrate, 30 grams.
Protein, 30 grams.
Fat, 200 grams—2000 calories. No glycosuria.
- Dec. 20. Carbohydrate, 30 grams.
Protein, 40 grams.
Fat, 180 grams—2000 calories. No glycosuria.
- Dec. 26. Carbohydrate, 40 grams.
Protein, 40 grams.
Fat, 180 grams—2000 calories. No glycosuria.
- Dec. 30. Carbohydrate, 50 grams.
Protein, 50 grams.
Fat, 180 grams—2000 calories. No glycosuria.

Weight at entrance, 119 pounds.

Weight at discharge, 116 pounds.

CASE 2. A Jew of 49, at entrance had 175 grams

of sugar (5.5%), acetone slight, diacetic acid absent. Treated for three weeks with the old method, he got down to a diet containing carbohydrate 15 grams, protein 50 grams—but still put out from 3 to 8 grams of sugar a day. By the old method we could not do away with the last traces of sugar.

The Allen treatment was started with two starvation days. On the second he was sugar-free—but showed 2.6 grams of sugar the following day on 12 grams of carbohydrate and 40 grams of protein. (This was one of the earlier cases when the diet was raised too quickly after starvation.) After one more starvation day and two vegetable days he stayed sugar-free while the diet was raised slowly to 30 grams of carbohydrate and 45 grams of protein, calories about 2000. Discharged sugar-free on this diet.

Weight at entrance, 109 pounds.

Weight at discharge, 110 pounds.

CASE 3. A man of 35, a severe diabetic, entered Dec. 28, 1914. He had been in the hospital the previous July for a month and could never be made sugar-free with the old method of treatment. At entrance he was putting out 2.5% of sugar (135 grams) per day with strongly positive acetone and diacetic acid tests. Two starvation days made him sugar-free, but we made the mistake of not using twice boiled vegetables for his vegetable day after starvation. So on this day he got about 30 grams of carbohydrates, and for a few days he showed from 0.2% to 1% of sugar. Another starvation day was given him and he became sugar-free. This time his vegetables were closely restricted and he was given only enough twice-boiled vegetables to provide about 15 grams of carbohydrates. After this the diet was raised very slowly. He remained sugar-free for three weeks and was discharged so on.

Carbohydrate, 30 grams.

Protein, 40 grams.

Fat, 200 grams.

At no time did he receive more than 2200 calories.

Weight at entrance, 139 pounds.

Weight at discharge, 138 pounds.

These three cases were the first ones we tried, and in each one of them we made the mistake of raising the diet too quickly—either allowing too many vegetables on the vegetable day, or raising the protein too quickly afterwards. With the later cases, after we had more experience, there was no more trouble.

CASE 4. A Greek (male) of 48, diabetic for two months, entered Jan. 14, 1915, with 3.8% (65 grams) of sugar and moderate acetone reaction. There was no diacetic reaction present at entrance. After one starvation day he became sugar-free, but was kept on starvation one day longer and then started on vegetables in the usual way. After the third day a moderate amount of diacetic acid appeared in the urine and continued. The ammonia rose from 0.7 grams per day to 2.6 grams per day, and then varied from 0.3 to 1.5 grams per day. No symptoms of acidosis.

Jan. 18. Carbohydrate, 15 grams.

Protein, 25 grams.

Fat, 150 grams—1360 calories. No glycosuria.

Jan. 20. Carbohydrate, 15 grams.
Protein, 25 grams.
Fat, 200 grams—1571 calories. No glycosuria.

Jan. 24. Carbohydrate, 25 grams.
Protein, 35 grams.
Fat, 200 grams—1760 calories. No glycosuria.

Jan. 26. Carbohydrate, 35 grams.
Protein, 40 grams.
Fat, 200 grams—1838 calories. No glycosuria.

Jan. 29. Carbohydrate, 45 grams.
Protein, 50 grams.
Fat, 200 grams—2194 calories. No glycosuria.

Jan. 31. Carbohydrate, 50 grams.
Protein, 60 grams.
Fat, 200 grams—2347 calories. No glycosuria.

Discharged Feb. 1 sugar-free on this diet.
Weight at entrance, 160 pounds.
Weight at discharge, 156 pounds.

This was not a severe case and responded very easily to treatment.

CASE 5. A female of 59, a diabetic of two years' standing, excreted 2.6% of sugar on Jan. 16, 1915, with no acetone or diacetic acid reactions in the urine. Severe pruritus vulvae. Starved two days; sugar-free on the second starvation day, with disappearance of the pruritus.

Jan. 21. Carbohydrate, 15 grams.
Protein, 25 grams.
Fat, 150 grams—1595 calories. No glycosuria.

From this time the diet was slowly raised until on Jan. 30 she was getting

Carbohydrate, 35 grams.
Protein, 45 grams.
Fat, 200 grams—2156 calories.

She was sugar-free on this and was discharged to the out-patient department after a two weeks' stay in the wards.

Weight at entrance, 135 pounds.
Weight at discharge, 133 pounds.

CASE 6. A man of 52, entered Jan. 10, 1915, with 1% of sugar. He entered for arteriosclerosis and hypertension and the sugar was found in the routine examination of the urine. He was kept on house diet for a few days and his sugar rose to 3.5%. No acetone or diacetic acid. After two days of starvation he became sugar-free and continued so as the diet was slowly raised. He was kept sugar-free in the ward eighteen days and was sugar-free on Feb. 6 with a diet of

Carbohydrate, 60 grams.
Protein, 60 grams.
Fat, 200 grams—2280 calories.

On Feb. 7 the protein was raised to 80 grams and 0.2% of sugar appeared in the urine. The protein was then reduced to 60 grams and he remained sugar-free on this diet and was discharged so.

In this case after starvation a moderate amount of acetone appeared and continued. No symptoms of acidosis. The ammonia ran from 0.3 to 1.0 grams per day.

Weight at entrance, 160 pounds.
Weight after three weeks' treatment, 156.
Maximum caloric intake, 2525.

CASE 7. A young man of 25, diabetic for eight months, entered Jan. 20, 1915, with 6.6% (112 grams) of sugar and strongly positive tests for acetone and diacetic acid. After a period of two starvation days he was sugar-free and actually gained three pounds in the process of starvation (probably due to water retention).

His diet was then raised as follows:—

Jan. 24. Carbohydrate, 15 grams.
Protein, 25 grams.
Fat, 150 grams. No glycosuria.

Jan. 26. Carbohydrate, 20 grams.
Protein, 35 grams.
Fat, 175 grams. No glycosuria.

Jan. 29. Carbohydrate, 20 grams.
Protein, 45 grams.
Fat, 200 grams. No glycosuria.

Jan. 31. Carbohydrate, 30 grams.
Protein, 45 grams.
Fat, 200 grams. No glycosuria.

At entrance his ammonia was 1.7 grams per day; after the starvation days it ran from 0.9 grams to 0.3 grams per day. The acetone was a little stronger than at entrance; the diacetic absent except on three days.

On Feb. 5 he was still sugar-free (having been so since his starvation days two weeks previously, and weighed 127 pounds, a gain of seven pounds since entrance. At no time did he receive over 2150 calories.

This was a very satisfactory case; no doubt the carbohydrate could have been raised to 50 or 60 grams, but he was doing so well that we felt it unwise to go any further.

CASE 8. A young man of 20 entered Jan. 30, 1915, with 4.5% (75 grams) of sugar, acetone moderate, no diacetic acid. After two days of starvation he became sugar-free and continued so on two vegetable days. After this his diet was raised as follows.

Feb. 3. Carbohydrate, 15 grams.
Protein, 25 grams.
Fat, 150 grams—1320 calories. No glycosuria.

Feb. 8. Carbohydrate, 20 grams.
Protein, 35 grams.
Fat, 175 grams—1850 calories. No glycosuria.

Feb. 14. 25 grams.
Protein, 50 grams.
Fat, 175 grams—1880 calories. No glycosuria.

It seemed wise to keep this case on a restricted diet for a considerable length of time, as he was a severe diabetic, and so we did not attempt to push up the carbohydrate. He is still in the wards, doing very well on this diet, sugar-free and holding his weight.

Weight at entrance, 116 pounds.
Weight Feb. 14, 115 pounds.

Ammonia at entrance was 1.3 grams per day. On the first starvation day it dropped to 0.3 grams, never rose above 0.7 grams, and on Feb. 14 it was 0.16 grams per day. Moderately strong acetone and diacetic acid reactions.

ACETONE, DIACETIC ACID AND AMMONIA.

Of course the great bugbear of any starvation treatment is coma. We have seen no coma nor any signs of it in the eight cases we have treated.

The ammonia has always been low, only in one case reading as high as 2.5 grams per day, which is not at all a high ammonia. Indeed, in most of the cases it has been very low, usually under a gram a day. This very possibly is due to the low protein intake.

We have seen nothing constant in the appearance or disappearance of the acetone and diacetic acid while on starvation. In one case both disappeared, in others they increased slightly and in others stayed practically the same. (Rough quantitative estimations only.)

WEIGHT.

It will be seen that in most of the cases there has been no striking change in the weight, and we feel that most diabetics while in the ward, at any rate, can get along very nicely on 2,000 calories. The patients are kept in bed only during the starvation; after this they are up and around the ward.

No patient has lost more than 5 pounds during his treatment (most of our cases were in the wards about a month) and no patient has gained more than 7 pounds. In most of the cases it will be seen that the weight at discharge was practically the same as at entrance. Of course the patients were not doing any vigorous work or exercise, and it is quite possible that outside the hospital they would not be able to get along on a diet of such a low caloric value.

Now it is one thing to treat a diabetic in a hospital ward where the diets, urine, etc., can be accurately controlled, and quite another thing to treat him at home. All our diabetics have been discharged to the out-patient department, and it has been found that practically all of them, no matter how well they may do on the ward, show sugar on their return to the out-patient department, perhaps a week or two after they have left the ward. For this reason we have had some very careful diets figured out (for which we are indebted to Miss Eckman, the dietitian of the hospital) and with these diets the patients can keep on just exactly the same food that they had while in the hospital. The time has been too short for us to follow many of these cases on the outside, but we feel that most of them, who are of the average intelligence and perseverance, will do well.

TABLE I.

Protein	10 grams	
Carbohydrate	15 "	
Fat	7 "	
Calories	200	
String beans	4 heaping tablespoonfuls	120 gms.
Carrots	2 " "	70 "
Asparagus	4 " "	150 "
Spinach	3 " "	135 "

Cucumbers	3 heaping tablespoonfuls	75 gms.
Celery	6 medium pieces.....	100 "

The vegetables are twice boiled.

TABLE II.

Protein	7 grams	
Carbohydrate	15 "	
Fat	6 "	
Calories	150	
Asparagus	2 heaping tablespoonfuls	75 gms.
Onions	2 " "	150 "
Spinach	2 " "	100 "
Cabbage	2 " "	65 "
Celery	6 medium pieces.....	100 "

The vegetables are twice boiled.

TABLE III.

Protein	29 grams	
Carbohydrate	16 "	
Fat	167 "	
Calories	1654	
Butter	3 squares	50 gms.
40% cream	8 ounces	
Eggs	1	
Bacon	2 slices	50 "
Salmon	small helping	50 "
Cabbage	3 heaping tablespoonfuls	100 "
Turnips	2 " "	100 "
Parsnips	4 slices	100 "
Carrots	3 heaping tablespoonfuls	100 "

TABLE IV.

Protein	22 grams	
Carbohydrate	14 "	
Fat	155 "	
Calories	1597	
Butter	3 squares	50 gms.
40% cream	8 ounces	
Steak	1 small slice	50 "
Bacon	2 slices	50 "
Parsnips	8 slices	200 "
String beans	8 heaping tablespoonfuls	100 "
Cabbage	12 " "	100 "

TABLE V.

Protein	38 grams	
Carbohydrate	26 "	
Fat	198 "	
Calories	2107	
Butter	3 squares	50 gms.
40% cream	5 ounces	
Eggs	2	
Chicken	1 small slice	25 "
Bacon	2 small slices	50 "
Spinach	2 heaping tablespoonfuls	100 "
Onions	1 " "	100 "
Salt pork	2 small slices	50 "
Celery	6 medium slices	100 "
Lettuce	100 "
Olive oil	1 tablespoonful	13 "
String beans	3 heaping tablespoonfuls	100 "
Tomatoes	3 " "	100 "

TABLE VI.

Protein	47 grams	
Carbohydrate	34 "	
Fat	183 "	
Calories	2046	
40% cream	5 ounces	
Eggs	1	
Cream cheese	3 cubic inches	60 gms.
Bacon	2 large slices	75 "
Haddock	1 small helping	50 "

Olive oil	2	tablespoonfuls	25	"
Lettuce	10	leaves	50	"
Potato	1	heaping tablespoonful.	25	"
Beets	3	"	100	"
Spinach	2	"	100	"
Almonds	10	large	15	"

TABLE VII.

Protein	50	grams
Carbohydrate	48	"
Fat	180	"
Calories	2200	

Butter	4	squares	60	gms.
40% cream	1	cup		
Eggs	2			
Steak	1	small slice	60	"
Bacon	2	large slices	60	"
Ham	2	small slices	60	"
Lettuce	10	leaves	50	"
Asparagus	1	heaping tablespoonful.	35	"
String beans	1	"	35	"
Spinach	1	"	50	"
Orange	1	large	250	"
Bread	2	small slices	35	"

TABLE VIII.

Protein	45	grams
Carbohydrate	65	"
Fat	230	"
Calories	2600	

Butter	7	squares	105	gms.
40% cream	10	ounces		
Eggs	1			
Lamb chop	1		100	"
Spinach	4	heaping tablespoonfuls	200	"
Corn	2	"	100	"
Grape fruit	1		600	"
Kidney beans	2	heaping tablespoonfuls	70	"
Peas	2	"	60	"

TABLE IX.

Protein	62	grams
Carbohydrate	30	"
Fat	250	"
Calories	2700	

Butter	3	squares	40	gms.
40% cream	6	ounces		
Eggs	1			
Salt pork	3	slices	100	"
Bacon	2	slices	50	"
Chicken	1	small slice	50	"
Chops	1		100	"
Turnips	2	heaping tablespoonfuls	140	"
Cabbage	3	"	100	"
Cauliflower	2	"	120	"
Asparagus	3	"	100	"
String beans	3	"	100	"
Parsnips	8	slices	200	"
Bread	2	small slices	35	"

TABLE X.

Protein	77	grams
Carbohydrate	52	"
Fat	266	"
Calories	3011	

Butter	4	squares	60	gms.
40% cream	10	ounces		
Eggs	2			
Turkey	1	slice	100	"
Bacon	2	slices	50	"
Lettuce			10	"
Potato	1	heaping tablespoonful.	50	"
Squash	1	"	50	"
Bread	3	small slices	50	"
Celery	2	stalks	25	"
Almonds	8	large	10	"

Tea and coffee with saccharin is allowed with all these diets.

The bacon and pork is weighed uncooked, and in the calculation of fat and calories, allowance is made for the fat lost in cooking.

The calories in these diets are usually put in round numbers; a variation of 6 or 8 calories, one way or another, makes no difference.

LABYRINTHITIS FOLLOWING OPERATION FOR ATRESIA.

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THIS paper considers a case of atresia of the external auditory meatus with unfortunate complications following operation which has puzzled not only the writer but those with whom he has discussed the case. Let me sketch it out roughly that you may see at a glance the picture in its entirety.

HISTORY AND COURSE.

An apparently normal boy of fifteen years, Joseph D. by name, came to the hospital clinic complaining of deafness on the left. He gave a history of a mastoid operation on this side when a baby, and a brief record of the operation was found, but the writer was unable to discover either then or later any present trace of it, so complete was the healing. Examination revealed a normal ear on the right and a normal auricle on the left, with the left auditory canal entering only as far as the bony isthmus, where it became occluded by a solid bony wall. Hearing tests revealed a functioning cochlea. He had been advised by men at the New York Eye and Ear Infirmary (patient's statement) to have an operation performed on this ear. The fact that the canal was already patent two-thirds of the way, making an operation seem relatively simple, was probably instrumental in persuading them to this conclusion, as it did three of us who saw the case in Worcester. The operation was performed in December, 1913, or thirteen months ago. The technic consisted in continuing the canal opening by chisel and curette, somewhat after the method of the Heath operation, until a tympanum was reached. This was carefully left alone. After five days the artificial canal was skin-grafted, not the middle-ear. The hearing was improved. Granulation tissue began to spring up actively in the middle ear, though the operator had thought himself successful in not injuring this cavity. After two weeks a very slight irregularity of gait (toward the left) was noted but not given any significance. In three weeks the boy walked home from the hospital and, on the way, first showed any marked labyrinthine symptoms by falling. Vertigo became rapidly worse. An ocular nystagmus was present and was such as a labyrinthitis on the operated side would give. Clear negative spinal fluid under pressure was removed, without relief. The boy gradually became unruly, irrational, and at times very noisy. He could not stand alone without falling (to the left). His speech was thick and slurred, like that of a drunken man. After waiting two months from the first operation, it was decided that the vertigo would not disappear without