It was my intention to have discussed with you this afternoon the more appropriate means of dealing with vomiting and hæmatemesis as symptoms of gastric ulcer; the time at our disposal, however, has elapsed, and their consideration must await another opportunity.

ON THE TREATMENT OF DIABETES MELLITUS, ESPECIALLY OF ITS MORE ADVANCED FORMS.

BY KARL GRUBE, M.D.

IN this paper I propose to offer some suggestions in reference to the treatment of diabetes mellitus, which I have found of the greatest use in dealing with diabetic patients, and which is based on 187 cases which I attended, partly alone, and in part with the late Dr. R. Schmitz, who doubtless could have laid claim to the widest experience in this disease, having treated more than 3000 cases. By far the greater number of my cases were treated at Neuenahr; but what I wish to say as to the treatment holds good equally in cases where the patient is attended at home. The knowledge of diabetes, a disease which seems to become more frequent every year, showing in this respect, as well as in others, an affinity to some diseases of the nervous system, is still very limited. Scarcely anything of its etiology is known. The one certain point about it seems to be that there are several distinct forms of the disease, and that some of the cases generally understood to be diabetes mellitus have no right to that appellation. One has to distinguish between glycosuria and actual diabetes. Dr. Schmitz, in a paper recently published,¹ laid great stress on this distinction. He wrote: "Each case of glycosuria can be one of two forms: either we must recognise the glycosuria as the characteristic symptom of a genuine and independent disease, as is generally the case, or, as is more seldom, we must look upon it as a complication which sets in during the course of the disease. The causes of the glycosuria in either form are decidedly not similar, but the effects of it are absolutely alike. In both forms severe and slight cases are to be found, and incurable and, though rarely, curable ones." Most of what is known as to the treatment of diabetes is known by experience *in homine vivo*, and I may here point out the interesting fact that it has been long known from experience that in very advanced cases, in which coma diabeticum is imminent, it is absolutely necessary to give chiefly food containing a large quantity of carbohydrates. Why that should be so has been but recently learned from Dr. Hirschfeld² who found by experiment that acetonuria can be produced in healthy persons by giving them food consisting only of albumen and fat, and that it can be arrested by adding some carbohydrates. He found at the same time that by giving carbohydrates in sufficient quantity he could prevent the appearance of acetone in the urine in such diseases where there is a tendency to acetonuria—for instance, in high fever. The appearance of acetone and diacetic acid in the urine of patients suffering from diabetes must be explained by the fact that in severe cases of this disease the carbohydrates for the most part leave the body unchanged, because the organs have lost the faculty of oxidising them. Therefore the diabetic patient must be regarded as a person living only on albumen and fat. The only way of preventing acetonuria becoming too intense and developing into coma diabeticum is to impregnate the system with carbohydrates. I have experienced the truth of this statement in several cases. I will here give a short account of one of the most striking cases in which this was done with great success, and which I still have under my care.

CASE 1.—A man aged thirty-nine years, whose father and sister had died from diabetes, and whose brother is suffering from the same complaint, had been under what I may be

allowed to call the "orthodox" treatment of diabetes, living for two years almost entirely on meat, fish, and eggs. Fortunately for him, he was unable to tolerate this limited diet and occasionally allowed himself, contrary to orders, potatoes or bread. When I first saw the patient at Neuenahr he was in a very reduced condition and quite unable to walk. His feet were slightly swollen by œdema; his cheeks had that peculiar redness which I have often seen in diabetic patients and which seems to have the same origin as the like phenomenon in consumption. The breath was strongly tainted with that peculiar odour supposed to be caused by the presence of acetone in the blood. The tongue and the lips were very dry and excoriated, and the patient suffered from a burning thirst and dryness of the throat. On examination, the urine showed the presence of 5 per cent. of sugar and a large amount of acetone and diacetic acid. The patient was exceedingly drowsy and had suffered from constipation for four days. As I thought that coma diabeticum was on the point of developing I advised him to take but very little meat or fish once a day, no eggs, but as many potatoes as he liked, and one ounce of bread twice a day. At the same time he was taking Neuenahr water, and was ordered twenty drops of spirit of nitrous ether in a little wine or whisky three times a day. In order to relieve the constipation he was ordered an enema every morning. After two days I again examined the urine, and found, as I expected, an increase of sugar, the amount being now 6.3 per cent., but no diacetic acid and very little acetone. The thirst was much less torturing, the tongue was less dry, and the odour from the breath was scarcely perceptible. For two more days the patient kept to the same diet, but was now taking only half the quantity of bread. On the fifth day I began a stricter diet, but nevertheless allowed potatoes freely. The result was that in three weeks' time the amount of sugar had fallen to 1.1 per cent. The patient was able to walk again for about half an hour at a time, had no abnormal thirst, and could sleep through the night from 10 P.M. till 7 A.M. without being disturbed by micturition, whereas previously he was obliged to micturate three or four times during the night. This improvement has continued during the last three months.

The first thing in dealing with diabetes is to remember that all cases cannot be treated alike. There are principles which hold good in all cases, but, on the other hand, each case requires its own special treatment. I believe it to be one of the greatest mistakes, especially in severe or advanced cases of diabetes, to keep the patient to a diet consisting purely of meat, fish, eggs, and such substitutes for bread as gluten-bread, &c. I do not deem it advisable to give up carbohydrates entirely, not even for a time; in fact in each of my cases the patient was allowed to take potatoes at least twice a day in moderate quantity. This was the principle on which Dr. Schmitz acted for years, and in no one case was the result otherwise than satisfactory. He very rightly pointed out in the above-mentioned pamphlet that if no farinaceous food was allowed him the patient, who could not tolerate such a one-sided diet, would indulge against orders and was likely to take more than was advisable for him. Therefore it was better to allow a small quantity and keep the patient strictly to it. His and my own experience both show that brown bread and toast are more injurious than plain white bread. All fruit, I think, should be forbidden, as no kind of fruit contains less than between 8 and 10 per cent. of sugar, and fruit is a form of food more easily dispensed with than are potatoes and bread.

On this point I may be allowed to add some remarks on the use of saccharin, which of late has become very general as a substitute for sugar. I have no objection to patients taking a small quantity of it, but if used too freely it is apt to cause indigestion. It has but lately been discovered that "lavalose" is a better substitute, and one which the diabetic organs are able to utilise. I have proved its efficacy in eight cases. Its great value lies in the fact that it is in itself nourishing, while, on the other hand, saccharin is useless to the system. Doubtless further investigations will show its usefulness in diabetes.

As is natural in the case of a disease so prevalent and yet so little understood as diabetes, a great number of remedies have been recommended, some of them on apparent physiological grounds and others because they had been found of use in diseases which seem to be related to diabetes. Scarcely one can be pointed to as having

¹ Prognose und Therapie der Zuckerkrankheit nach eigenen Erfahrungen. (Prognosis and Therapeutics of Diabetes Mellitus based upon Personal Experience.) 1892.

² Die Bedeutung der Acetonurie für die Prognose des Diabetes. (The Signification of Acetonuria in the Prognosis of Diabetes.) Deutsche Medicinische Wochenschrift, 1893, No. 38.

specific effect upon the disease. Some mineral waters—especially the alkaline waters of Neuenahr, Carlsbad, and Vichy—are known to be of great importance in the treatment of diabetes. I have only tried those of Neuenahr, and have found the effects of them to be very beneficial. In what way the waters operate cannot be exactly ascertained, but it is certain that after a short use by the patient some of the troublesome symptoms—more especially the thirst and the dryness of the throat—are alleviated. It was Dr. Schmitz's opinion that the alkaline waters aided the system to oxidise the carbohydrates.

Another point of great value in the treatment of diabetes is insisting on bodily exercise unless the patient's strength is already too far reduced. Massage is of great importance, especially the kneading of the muscles. It alone tends to decrease the amount of sugar. It has to be remembered that exercise should never be carried to excess. There are sometimes traces of albumen in the urine to be found after over-fatigue. Massage much more easily prevents the possibility of over-fatigue, because the amount of exercise that is desirable for the patient can be thereby more easily controlled.

Weakness of the heart is a common symptom of advanced diabetes; it is scarcely necessary to say that in such cases especial care is needed in order to avoid overstrain.

Neuralgic pains in the limbs and trunk form a frequent and troublesome symptom of the disease, intercostal neuralgia being especially common. In such cases one has to avoid massage of the tender parts. Sometimes the pains decrease when the amount of sugar diminishes, but often they still remain when the sugar has diminished or has even quite disappeared. In such cases the antineuralgic remedies are sometimes of use, and sometimes electricity lessens the pains, the faradaic or galvanic current being used.

In a case of developed coma diabeticum the prospect is, as a rule, a hopeless one. The chief thing is to prevent the occurrence of the symptom in the manner I have described above.

These are, in short, the main points of the treatment of diabetes, to which I wished to draw attention. In giving them here I desire to point out that in my opinion it is a great mistake to treat the patients too one-sidedly, and to think it the chief part of the treatment to exclude the taking of carbohydrates. The important point of the treatment is not to carefully avoid the carbohydrates, but rather to try to induce in the patient's system the faculty of again utilising them.

CASE 2.—A man aged fifty-six years had been suffering from what he called "nervousness" since his boyhood; diabetes was discovered two years ago. On May 20th the patient was very drowsy, and the breath had a chloroform-like smell; in fact, after a consultation of about ten minutes' duration the whole room was pervaded by it. The heart was in a normal condition; the tension of the pulse was a little above normal. The patient had been constipated for eight days. As coma diabeticum seemed to be imminent, he was ordered to stay in bed. He was allowed only very little meat, but as much as he liked of potatoes and bread. Two tablespoonfuls of castor oil were ordered to be taken early the following morning, and, this having had no effect, he was given four grains of resin of jalap, after which the bowels were relieved of an immense amount of nearly black-looking, ill-smelling fæces. The examination of the urine showed a specific gravity of 1030, 5.1 per cent. of sugar, much acetone, no diacetic acid, and traces of albumen. The patient continued the diet for two days, taking at the same time half a pint of Neuenahr water three times a day. On the 24th the urine showed a decrease of the sugar to 2.6 per cent., having a specific gravity of 1027; only small traces of acetone were now observed. He was now ordered to take meat or fish twice a day with potatoes; for breakfast he was allowed cocoa and some eggs, but bread was withheld for five days. As he did not take care to keep his bowels open he was constipated again for four days, during which time I did not see him. On the 29th the sugar had increased to 3.6 per cent.; the acetone also showed a decided increase. The specific gravity was 1027. The diet was not changed, but care was taken that the patient had a good motion at least every second day. On July 30th he left Neuenahr, very much improved. The sugar had decreased to 1.9 per cent., the specific gravity of the urine being 1024; there were still traces of albumen, but there was no acetone.

CASE 3.—A married woman aged forty-two years, a very nervous lady, had been diabetic for two years—that is to say, the presence of sugar had not been discovered till then; but it seems to me highly probable that she had suffered from diabetes already for six years, having had at that time neuralgic pains, as well as the teeth having become loose. She had been in Carlsbad twice, but she had not derived any benefit there. She had also that peculiar odour already alluded to in the other cases; she was very weak and anæmic; her cheeks had a hectic flush; the heart and lungs were normal; the knee-jerks were present. On examination of the urine there were found 4 per cent. of sugar and traces of albumen; its specific gravity was 1032, and there was a fair amount of acetone. She felt very drowsy and exhausted, and had not been to stool for four days. She was ordered to stay indoors for the next two days, and to eat only bread and potatoes, &c., with very little meat, and to drink half a pint of Neuenahr water twice a day. During the first two weeks she improved greatly, gaining flesh and being able to walk for about half an hour without resting. The amount of sugar decreased to 1.6 per cent., the specific gravity being 1023, but the acetone did not decrease. During the third week she caught a slight cold; a few days after that she felt very weak again and suffered from dryness in the throat and mouth; the lips and tongue were very dry and felt rough as a nutmeg grater. The following was the condition of the urine: sp. gr., 1030; sugar, 3.6 per cent.; albumen, a trace; acetone, in abundance. She had always adhered strictly to the diet—in fact, too strictly—not taking any farinaceous food, but only meat, fish, and eggs, and a small quantity of vegetables, although I had told her to eat potatoes twice a day. She remembered having been told that bread, and especially potatoes, were poison for diabetic people. Two days later I was called to her early in the morning, after I had seen her the night before, when she seemed to be otherwise quite well, except for the dryness and weakness. I found her very drowsy, and she only recognised me on my addressing her very loudly. She had slept till 2 A.M.; at that time she had a motion and got up to do her hair. After doing this she felt very sleepy, and from this condition she became comatose. She died in the afternoon without again becoming conscious. The examination of the urine, taken while she was comatose, revealed the presence of much acetone and of diacetic acid. This case is very instructive, and there are some points connected with it to which I should like to direct attention. Firstly, there had been a most decided improvement during the first two weeks; the amount of sugar had decreased, and the general state of the health had very much improved, but the acetone did not disappear, because I think she had not eaten a sufficient amount of potatoes. I fear that I omitted to sufficiently impress upon her that they were a necessity. Secondly, it seems probable that she might have lived some time longer and kept fairly well had she not caught cold. It is a well-known fact that a slight complication such as a cold or a catarrh of the stomach tends to hasten the end in diabetic patients by bringing on coma diabeticum. Therefore great care is necessary to avoid these complications and to impress upon the patients the danger that is likely to arise from contracting colds.

CASE 4.—This patient was a girl fifteen years of age. Her brother died from diabetes when fifteen years old, and one sister at the age of seventeen years. She had been twice to Carlsbad. The first time she derived great benefit from her visit; the second time she experienced no benefit. She looked fairly well and suffered only from cramps in her calves and from thirst. She, too, had the peculiar odour of diabetes. The examination of the urine on June 14th gave: sp. gr., 1037; sugar, 4.9 per cent.; albumen, traces. As the urine contained no acetone, the case seemed more hopeful. She was ordered half a pint of Neuenahr water three times a day, and to eat no bread for five days, but was allowed to take potatoes three times a day. The examination of the urine on June 21st gave: sp. gr., 1032; sugar, 3.1 per cent. She was kept on this diet till July 15th, when she left Neuenahr, the last examination of the urine having given: sp. gr. 1020; sugar, 0.1 per cent. There was no albumen.

I think these cases will suffice as an exemplification of what I have said above. I could easily give fifty more in which the same result was achieved as in the last case, but I should only tire the reader. As to the duration of the improvement, I wish only to add that many of the patients had been under

the treatment of the late Dr. Schmitz for several years, and that in many of them the improvement had been lasting, the patients having been careful to keep to the medium course between foods too rich in carbohydrates and those containing none.

Beaumont-street, W.

A CASE OF EXTRA-UTERINE FŒTATION; RUPTURE OF LEFT FALLOPIAN TUBE ABOUT THE SIXTH WEEK OF PREGNANCY; LAPAROTOMY; RECOVERY.

By CLELAND LAMMIMAN, F.R.C.S. ENG.,
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ON May 4th, 1892, I received a message from a friend that he was in attendance upon a case of extra-uterine fœtation, and that the case was urgent. I found a lady suffering from intense prostration, with a scarcely perceptible pulse, extremely blanched, and evidently in a most alarming condition from internal hæmorrhage. The abdomen was tender and tumid; no change in position or bulk of the uterus could be detected per vaginam, but there was some fulness in the left ovarian region and in Douglas's pouch. She had last menstruated six weeks previously, and had had no symptom of uterine or ovarian disease, her periods occurring every four weeks and lasting for three or four days. She was thirty-five years of age, had been married for some years, and had one child. On the forty-second day of her pregnancy she felt some pain in her left abdominal side, and this continued during the forty-third, forty-fourth, and forty-fifth days. On the forty-sixth day, after walking a mile, she was seized with severe pain in her abdomen and lay down with a sense of great illness, nausea, and rectal distress. Her prostration was so intense that soon she could not raise herself. She vomited continually and suffered greatly from thirst. A consultation was afterwards held, and the diagnosis of the medical attendant was confirmed, and, considering the extreme danger of the patient, I resolved to give her the last chance by performing laparotomy. Chloroform was administered, but in a few minutes the hæmorrhage was evidently re-started, the pulse stopped, and she was apparently dying. Appealing to her friends, I was begged at all hazards to save her if it were in my power. As rapidly as possible I reached the peritoneum in the middle line, opened it to the length of the skin wound (four inches), and found the abdomen to be tensely filled with blood, which gushed out in large quantities. When the flow had diminished sufficiently to allow of my seeing what was held by my fingers, I examined the right tube and ovary and found them to be healthy. The uterus was slightly enlarged in antero-posterior measurement; the left ovary was as large as a bantam's egg; the Fallopian tube, and indeed the whole appendage, was greatly thickened and obviously very friable—its fixation was so pronounced that it was most difficult to draw it to the surface without tearing it or its pelvic attachment through the infundibular ligament. Again and again hæmorrhage in large quantity obscured the view of everything, but at last, seizing the ovarian end of the appendage between my left thumb and finger and the uterine end between those of my right hand, I stopped the bleeding and found upon the anterior surface of the Fallopian tube, which I now raised, a rent close to the uterus, one inch and a quarter long, from which some placental structures were protruding. While the tube and ovary were suspended I passed a double ligature of stout carbolised silk through the broad ligament opposite the centre of the rent, and, the tube being tied at both sides, I cut away that portion which contained the rent, not being able to include the ovary because of its brawny fixation, for it was evident that the strain would have torn the broad ligament away from its attachment to the pelvic bone. The peritoneal toilet was now begun, but hardly had the sponging commenced when the hæmorrhage again started in alarming quantity, and I found that the ligature on the uterine side had in a measure torn through; so another was placed with transfixion nearer the womb. Again the sponging commenced, followed again by bleeding, necessitating another transfixion and ligature on the ovarian end of the tube.

Again I sponged out a quantity of blood and clots, but, finding the amount growing less, and as the patient was in the most extreme circumstances compatible with life, I placed a large drainage-tube in the lower end of the wound and as rapidly as possible placed the sutures. For a few days a considerable quantity of broken-down blood-clot was syringed from the drainage-tube by a sublimate solution. The temperature rose during the week as high as 101.5° F.; but she made a good and straightforward recovery, and on June 12th walked downstairs and upstairs. I need hardly say that in the midst of such hæmorrhage the six weeks' fœtus was not discovered. The patient is now in robust health.

The difficulties encountered in this case were in the main those of furious hæmorrhage due to tearing out of the ligatures. The structures upon which they were placed, and which indeed in every direction surrounded the ruptured Fallopian tube, bore prominently, and to an excessive degree, the geloid character that alone belongs to the umbilical funis.

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THE DETERMINING CAUSE OF SEX, WITH CASES.

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SOME two years ago I placed on record in the pages of THE LANCET a provisional theory of sex determination. Briefly stated, that theory maintained that the causation of sex was primarily a matter of nutrition affecting the ovum at the time of fertilisation. I held then (and hold still) that the ovum which is fertilised pre-menstrually, being a stronger and more vital one, tends towards the male side; and that the ovum which is fertilised post-menstrually, having lost much of its vitality, gets a bias towards the female side. This theory is consistent with the fact that while in lower vertebrates, and invertebrates as well, the female is as a rule the stronger, in mammalia the male is the larger. Therefore it needs a more vigorous ovum in the quadruped to develop into a male than is required for a female conception. The publication of my views in THE LANCET was followed by an interesting discussion to which I need not refer here save to remark that when charged with neglecting the rôle of the spermatozoon in fertilisation and sex-production I remarked that my theory simply dealt with results. My critics, equally with myself, are largely ignorant of the exact part played by the male element in impregnation. We know it is as necessary (in mammals at least) as the ovum. What I maintain is that, given fertilisation, it is a question of vitality and nutrition on the part of the ovum which decides the sex of the resulting embryo. Each sex is evolved out of and from a common type. The embryo pursues, for a time a straight path, then deviates to the male or female side. The impetus to this deviation, on my view of things, is given at the commencement of its existence as a fertilised ovum. The longer fertilisation is delayed after its extrusion from the ovary the greater likelihood is there of the ovum developing into a female embryo, and *vice versa*. Hermaphroditic products can be explained on this theory by fertilisation taking place at the mean between the pre- and post-menstrual period: the ovum remains in *equilibrium*, as it were, and tends to develop the common or double type of organism.

I appealed in my former paper for clinical proofs of my theory. To this appeal one member of the profession has generously responded—Dr. J. Kerr, of Crawshawbooth, near Manchester. Before glancing at Dr. Kerr's memoranda I may be permitted to quote from the *New York Medical Record* three passages of interest in connexion with my theory, a statement of which, I presume, must have been published in the pages of that journal. In its issue for April 15th, 1893, I find the following:—"Determination of the sex, by George Abbott, M.D., Hamburg, N.Y.—In the *Medical Record* of Feb. 18th, on p. 213, is a statement relative to procreation of sex, which is in such accord with my own observations that I am constrained to give a couple of confirmatory instances. Over thirty years ago I delivered a young woman of a daughter, who had been married just nine months and a few days. Her mother said that at the time of the wedding her daughter had but just recovered from her menstrual period. A year or so after this