THE TREATMENT OF DIABETES.*

BY A. S. WOODWARK, C.M.G., C.B.E., M.D., F.R.C.P.

I have been asked to discuss the treatment of diabetes. I shall assume, therefore, that it is unnecessary to speak about the signs, symptoms, and diagnosis of the disease, except that I will say a few words about the importance of the blood-sugar tolerance test.

As you know, at the present time the mere presence of sugar in the urine is not considered enough upon which to base a diagnosis of diabetes. Before such a diagnosis can be made, it is essential that the blood-sugar tolerance test should be carried out. This is done by giving the patient, on a fasting stomach, 50 g. of glucose. At the beginning of the test the blood and urine are examined for the amount of sugar present. In a healthy person the amount of sugar present is said to be not higher than 0.18 per cent. in the blood. On a fasting stomach, in a healthy individual, it is below this, but it rises after taking glucose, and reaches its greatest height at the end of about an hour. The amount declines to where it was at the beginning after about two hours. In the case of a diabetic subject the percentage of sugar in the blood rises and still remains raised at the end of two hours; it never diminishes so as to approach or reach the normal.

Having carried out that test, you are able to state whether or not you are dealing with a case of diabetes. Before arriving at this diagnosis there are certain pitfalls, or certain conditions, which you have to consider. These are, roughly, the following.

First of all there is renal glycosuria. As the blood in our system containing sugar runs through the kidney and over the lining membrane, that membrane acts as a filter, and if our particular filter is not high in state of efficiency there is apt to be leakage of sugar; this is expressed by saying that the renal threshold value is lowered, lower in some people than in others, so that sugar leaks at a lower level. If the test is carried out as I have described, you find that the curve of renal glycosuria is like the normal curve, except that it is a little lower; and yet accompanying such a curve you find sugar is present in the urine. That means you are dealing with a case of renal glycosuria.

As to the other conditions in which you may find sugar, you need never be at a loss to make a diagnosis, because the concomitant symptoms render the position clear. Exophthalmic goitre, tumours of the brain, and similar conditions I do not propose to discuss now. But I would mention that the "alimentary glycosuria" of our student days is no longer held to occur.

Another condition, which is sometimes described, but with which again I shall not deal now, at least in detail, is the "lag" curve, where the blood-sugar rises, but falls again to the normal, though it may take longer than two hours to do so. At first the curve seems as if it will develop into a diabetic curve, but it is found to be slowly returning to the normal.

With regard to the treatment of diabetes, the only advance which has been made during the last few years has been the introduction of insulin; but it must be clearly understood that while insulin is of great value in removing symptoms, acting, as one writer said, in a manner similar to a crutch for a
lame man, it is in no sense a cure. The necessity for a scientifically constructed dietary for these patients is as great now as it ever was.

Given a case of diabetes, therefore, you have to consider whether you will merely diet the patient or whether you will combine dieting with the use of insulin. Supposing you decide to diet alone, this should always be because there is some good reason for not using insulin. Some patients absolutely refuse it. Where there are not real reasons to the contrary insulin is indicated in all cases of diabetes.

As to when insulin should be given, I would say that when coma is commencing, or threatening, you have no choice. Again, if the patient, though he shows no glycosuria, is not taking sufficient diet to support life, and to enable him to carry on his work or his business, you must give him a large diet and insulin. And it is especially indicated if on the diet he is taking he is losing weight, in which case you must increase his diet and give insulin.

For the dieting in association with the giving of insulin there are three methods in vogue. The first is to let the patient eat what he likes and endeavour to make up for the pancreatic insufficiency by giving an appropriate amount of insulin. This is a practically impossible thing to do, and it should be attempted only in exceptional cases.

The second method is the "ladder dietary." For this there are carefully drawn-up dietary tables, with a proportional increase in the constituents, giving a fixed diet for each day up to the fourteenth. One places the patient for three days on what is practically a "starvation diet," until the sugar has entirely disappeared from the urine. After that the diet is built up, day by day, as long as sugar continues to be absent from the urine. When sugar reappears you can either drop back to the diet of the day before or you can proceed to give him small doses of insulin. You then continue up the ladder until the same contingency arises, and you deal with that on similar lines, until at the end of the fourteenth day you have arrived at a diet which is suitable for the patient, and he is having that amount of insulin which will enable him to be sugar-free. It is not reasonable to attempt such a method in the case of patients who are very emaciated or very exhausted, and in all cases it is extremely irksome to have to weigh out the diet in such precise amounts, gradually ascending the scale of nourishment.

The third method is to put the patient upon what is known as a "skeleton dietary," such as the one that follows:—

This dietary is much less irksome than the ladder dietary. Accompanying the skeleton dietary there are certain rules and regulations which must be clearly understood by all patients. This diet may or may not require insulin. Having observed whether it is sufficient or not, by the general sense of well-being and increase of weight, you then gradually add to the dietary where necessary, controlling the addition by small amounts of insulin.

### A Skeleton Dietary.

#### Breakfast. oz. Lunch. oz.
- Milk ..... 1
- Bacon ..... 2
- Egg (J) Butter ..... ½
- Oatmeal Supplement. oz. Tea. oz.
- Milk ..... ½
- Butter ..... 1
- Cheese ..... 2
- Vegetables (Group A) 4 Butter ..... ½

With any of the above meals as much tea, coffee, meat extracts, and lemons as desired.

During the last six years every officer, sister, and soldier who has been invalided from the services with diabetes has been admitted into a special ward under my charge. Attached to this ward there is a resident pathologist, trained sisters, orderlies, and clerks. The work is done in a manner that is beyond reproach, and whatever treatment is suggested on good authority is given a trial.

As general practitioners you know you have to deal with diabetic subjects who cannot be seen by you at fixed times twice a day, and for that reason these patients are taught how to give themselves insulin, and how to weigh out their diet, before they leave the hospital.

Having put the patient on to the exact dietary which he requires and given him all instructions, you send him out with a copy of his diet and instructions such as the following:—

### Diet and Instructions.

Name and address of patient.

A letter has been sent to your medical attendant informing him of the advice which has been given you in order that he may know the requirements of your case. You should immediately place yourself in his care and proceed in accordance with his advice.

As it is not known to what extent your own doctor will find it practicable to provide the treatment himself or by deputy, you have been instructed and practised as to how to make the actual injections yourself, but the decision whether it is necessary for you to do so will rest with your own doctor.

### Particulars of Treatment found by Investigation to be Necessary in your Case.

Your diet has been arranged in accordance with the diet sheet given you in order that your principal meals follow the injections of insulin. You must carefully observe the diet and take the exact amount of food as put down. You must not eat or drink anything except the articles of diet mentioned on the diet sheet. With any of these meals you may take tea, coffee, beef-tea, or water in as large a quantity as desired. Whilst it is not necessary for you to have any alcohol, you may take if you wish  a day. There is no objection to smoking in moderation.

**Groups of Vegetables.**

You must not select vegetables or fruit at any one time from more than one of the following groups.

An injection of insulin is necessary 15 minutes before breakfast and again before the evening meal. An injection at these times must on no account be omitted, nor must
the taking of the meal be delayed beyond 15 minutes. The dose of insulin must be exactly ... c.c.m.* at ... A.M. and ... c.c.m. at ... P.M.

* This is equivalent to ... units per diem.

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
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</thead>
<tbody>
<tr>
<td>8 oz. of—</td>
<td>6 oz. of—</td>
</tr>
<tr>
<td>Cabbage.</td>
<td>Cauliflower.</td>
</tr>
<tr>
<td>Celery.</td>
<td>Beetroots.</td>
</tr>
<tr>
<td>Sea-kale.</td>
<td>Marrow.</td>
</tr>
<tr>
<td>Mushrooms.</td>
<td>Rhubarb.</td>
</tr>
<tr>
<td>Sprouts.</td>
<td>Endive.</td>
</tr>
<tr>
<td>Tomatoes.</td>
<td>Asparagus.</td>
</tr>
<tr>
<td>Lettuce.</td>
<td>Leeks.</td>
</tr>
<tr>
<td>Spinach.</td>
<td>Radishes.</td>
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<tr>
<td>Watercress.</td>
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<th>Group C</th>
<th>Group D</th>
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<tr>
<td>4 oz. of—</td>
<td>2 oz. of—</td>
<td>1½ oz. of—</td>
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<tr>
<td>Currents.</td>
<td>Peaches.</td>
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<tr>
<td>Parsnips.</td>
<td>Watermelon.</td>
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</tr>
<tr>
<td>Apples.</td>
<td>Gooseberries.</td>
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<tr>
<td>Pears.</td>
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Supply, Renewal, and Care of Instruments.

In the event of your having to make the injections yourself you will provide yourself with two glass syringes and two rustless needles. You must take the greatest care of them, as without them you will be unable to give yourself the insulin which is necessary to keep you in health. You must be provided with two, so that in the case of accident you will not be prevented from carrying out the treatment.

Do not keep more than one syringe in use at a time, but make sure that the one in reserve is available and ready for immediate use if necessary. On no account omit to renew immediately a syringe which becomes defective. Do not leave yourself dependent upon one only.

The needles must be treated with great care to prevent their points becoming blunt, or the needle itself breaking or becoming choked. Always keep a needle in reserve. Do not use first one and then another. Never be without two needles.

Reminder of instructions already given to you.

You will remember:—

1. That before making an injection you must thoroughly scrub with soap and water and then dab with iodine the place where the injection is to be made, and that before inserting the needle into the bottle of insulin you must wipe the rubber cap with iodine.

2. That before using the syringe you withdraw the plunger from the barrel and place both in a clean saucepan, cover with warm water, and then bring to the boil; that after boiling, the syringe, if removed immediately, will dry in a few moments and must not be wiped, and that after use the syringe is again to be boiled and then replaced in the case.

3. That similarly the needles should be boiled with the syringe before use, the wire being first withdrawn, and that after use it is to be boiled again, the wire being replaced in the needle before putting away.

4. That you take great care of your bottles of insulin, keeping them in a cool place and properly sealed.

Supplies of Insulin.

You have been told above to see your doctor at once, and you will look to him to arrange for all future supplies of insulin.

Change of Residence.

If you change your address, either permanently or temporarily, you should ask your doctor to communicate with the doctor to whose care you are being transferred.

Special Warning.

Should you find yourself to be suffering from any of the following symptoms you should at once inform your doctor:

(a) If the place where you have injected yourself becomes inflamed.

(b) If you are suddenly taken ill with:—

headache, shivering,
giddiness, sweating,
chilliness, difficulty in breathing,
trembling, drowsiness or exhaustion.

(c) If you find you are losing weight, which is best discovered by your weighing yourself once a week.

(d) If there is a return of your symptoms such as increase of thirst or quantity of urine.

In all instances when you report to your doctor remember to take a specimen of your urine.

You need to tell him to be particularly careful lest hypoglycemia arises. Acting on this diet sheet, the patient must be weighed periodically with great care. If patients are losing weight or are not feeling well obviously you must alter the diet by adding a little more carbohydrate or in certain cases taking a little away. If a patient has warnings that hypoglycemia may arise he will tell you that this tendency occurs at about the same time each day— that is to say, midway between meals. You can do a great deal for these people by simply taking some food from the meal next due and giving it an hour before.

One should be equally careful in seeing that diabetics take means to protect themselves from colds. For some reason these people are extra-ordinarily liable to get bronchitis, pneumonia, or pulmonary tuberculosis. When we were students we were taught that diabetic coma was the commonest fatal ending to diabetes, but nowadays the commonest termination is a pulmonary complication.

Very occasionally one finds that patients get pains from the injections of insulin. There are several brands or kinds of insulin, and when such pain occurs it is a good plan to change from one brand to another. I do not see much of it now, but I have seen edema, without any change in the urine, of an extraordinary character happen. Such edema can be disregarded; it will pass off more or less gradually.

Diabetic patients are very liable to have neuritis and other complications, and these must be dealt with on the ordinary recognised lines; you must give aspirin and salicylic compounds. Eye changes are much benefited by giving insulin; I have seen patients who could hardly see at all improve to such an extent that before leaving the hospital they could read large-sized print.

As to how long injections of insulin should be continued, at present there is no answer to that question. I can only tell you that in my series of
cases some have died from the disease, some have so far improved that the dose could be lowered, and in the case of three or four I felt justified in discontinuing it at least for a time. But by far the larger majority have continued with the same dose, or have had it increased. The suggestion has been put forward that the giving of insulin allows the pancreas to rest and rehabilitate itself, thus tending towards cure and making the necessity of continuing insulin cease, but so far this has not been proved to be the case.

Some patients complain of headache and general lassitude and tiredness. A large number of these are suffering from an excess of acetone in the urine. In order to overcome that you must either reduce the intake of fat or increase the amount of the carbohydrate. The whole question of getting rid of the acetone is one of getting a readjustment of the diet on the lines I have indicated, together with a correct amount of insulin as well.

When these patients develop tuberculosis it is very difficult to do much for them. Certainly larger doses of insulin should be given them, and though in some cases it may not seem to be doing any traceable good it is advisable always to persist with the insulin. The amount of insulin must be increased in all cases where carbuncles, boils, or other complications appear.

Probably it is not possible to keep, in private practice, diabetic charts such as are kept in hospital, so I will describe them. The amount of carbohydrate given is shown in a yellow graph, the caloric value of the food is shown in black, the amount of the sugar in the urine is in red, and the amount of insulin the patient is taking is shown in green. These enable one to see how the case is progressing and how one factor counterbalances the other.

Having got your patient on to insulin treatment, and being sure he understands all the instructions, it is a good plan to have such patients periodically examined by a pathologist, to ascertain whether the blood-sugar has altered at all. MacLean’s method, like many others, requires a good deal of experience before accurate readings can be made.

There are many little facts in connexion with diabetes which no one has explained. For instance, if you exclude the Jewish race you can be practically sure that 95 per cent. of your diabetic patients have got blue eyes. A large number of them come from the Eastern countries, and this may have a relation to this colour question. Another thing I have noted is that these patients are mentally more shrewd and astute at their work than the ordinary person. Sometimes one form of carbohydrate appears to suit better than others; thus oatmeal may be better borne than bread. In such a disease as this, and with the people themselves taking such an interest in their condition, it is essential to discuss every detail with them. At the same time do everything possible to avoid introspectiveness, and to correct the habit of ascribing every symptom of which they complain to diabetes.

ABDOMINAL PAIN IN PREGNANCY.

BY

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Many cases of abdominal pain in pregnancy, pain that is often severe, sometimes continuous, at other times occurring in crises, show no physical signs of any kind.

Some people are undoubtedly sensitive to the stretching of the uterus and abdominal wall and to uterine contractions; but to the majority these gradual processes, with the incessant foetal movements, do not cause more than discomfort. Many women call for support of the pregnant abdomen, others cannot put up with any pressure on the skin. Parous women, however, generally need some form of corset or belt.

Constipation and flatulence are almost of universal occurrence during pregnancy, frequently giving rise to pain. In many, the stretching of the round ligaments, causing pain either in the groins or the sides of the uterus on one or both sides, is a matter of complaint between the twelfth and thirtieth weeks.

The commoner organic causes of abdominal pain in pregnancy are usually easily recognised, though sometimes the differential diagnosis may be difficult.

It may be suitable to consider them in three groups, those where the pain (1) appears limited to the uterus, (2) originates in the adnexa, (3) is that of associated conditions.

1. Pain Limited to the Uterus.

(a) Undue stretching of the uterus, in cases of dual pregnancy sometimes, always in acute hydramnios, gives rise to great pain, breathlessness, and palpitation. The sudden increase of amniotic fluid is simple of diagnosis, as it is rare, of sudden development, and may be associated with albuminuria and other toxæmic signs. The chronic or gradual cases of hydramnios may present more difficulty in their differential diagnosis from an ovarian cyst complicating pregnancy, or an associated ascites. In a case seen for the first time, it should be remembered that in some patients with ovarian tumours there may be a history of amenorrhœa, the breasts may be enlarged and secrete fluid, and the colour even of the vagina more congested than usual from pressure. In such cases chief reliance will be placed on the general contour of the swelling, the fluid thrill, and the absence of foetal parts. The ovarian cyst complicating pregnancy may give considerable trouble in diagnosis, but ascites should not, though it may co-exist with hydramnios.

(b) Fibromyomata are more common in pregnant women than is usually thought, a fact that proves
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