

## GLYCOSURIA AND PREGNANCY

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**G**LYCOSURIA is frequently found during pregnancy. It means sometimes that the patient is a diabetic, but usually it signifies only a temporary or an insignificant condition. In the first instance treatment is indicated; in the second no treatment is required. The condition should never be disregarded, however, until it has been definitely determined whether or not it is of diabetic or of innocent origin.

Two cases taken from a larger series will be sufficient to illustrate the problem presented by the presence of glycosuria in pregnancy and the necessary steps for differentiating innocent from diabetic glycosuria.

**CASE I.** The patient was a young married woman 24 years of age, who consulted me because of the presence of sugar in the urine. There was no familial history of diabetes. During childhood the patient had had measles, diphtheria, and scarlet fever. She had been married 6 years and had two children, the youngest being 5 months old. During her last pregnancy her obstetrician had found sugar in the urine about a month before parturition, but the patient was told that it might be milk sugar and no further attention was paid to the circumstance.

During the 6 months since parturition the patient had had no special symptoms until a week before she consulted me when she began to have excessive thirst and frequency of urination. She consulted her family physician who found a marked glycosuria and prescribed a diet which she had followed for the 3 days before I saw her. At this time her fasting blood sugar was 107 milligrams per 100 cubic centimeters of blood. There was a slight trace of acetone, and the sugar content of the urine was 1 plus. Although her blood sugar was normal when I first saw her, in view of the fact that the patient had had glycosuria just before parturition and had so recently shown definite clinical signs of diabetes, I advised a glucose tolerance estimation which was performed on the following day. The characteristic blood sugar curve of diabetes was obtained as is shown on the chart (Fig. 1, Case 1). It will be noted that the fasting blood sugar on this date was 167 milligrams per 100 cubic centimeters of blood, whereas the day before it was only 107 milligrams per 100 cubic centimeters of blood. The morning urine on the day of the glucose tolerance test showed only a trace of sugar, whereas on the preceding day, although the blood sugar content was lower, the urine sugar was one plus (1). During the glucose tolerance test, the pa-

tient took in 100 grams of glucose, and excreted in the urine 16.76 grams.

The practical points illustrated by this case are the following: When glycosuria is discovered during pregnancy it may be, and often is, a sign of the initiation of the diabetic status, when the earliest changes—the hydropic degeneration of the beta cells of the islands of Langerhans—are taking place. If the condition is cared for at this stage, the patient stands a good chance of recovery, of a restoration of the islands to a normal or nearly normal status, as Copp and Barclay have shown by their work with dogs at the Physiatrie Institute(2). These investigators undertook to discover the conditions under which the cells of the islands of Langerhans would regenerate. To this end they ablated about four-fifths of the pancreas in each of a group of dogs and let the wound heal, thus rendering the dogs

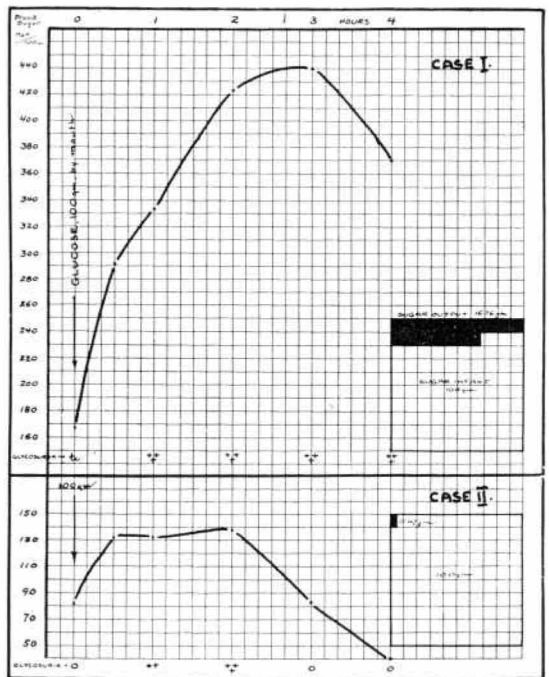


Fig. 1. Chart showing blood sugar curves in Cases 1 and 2.

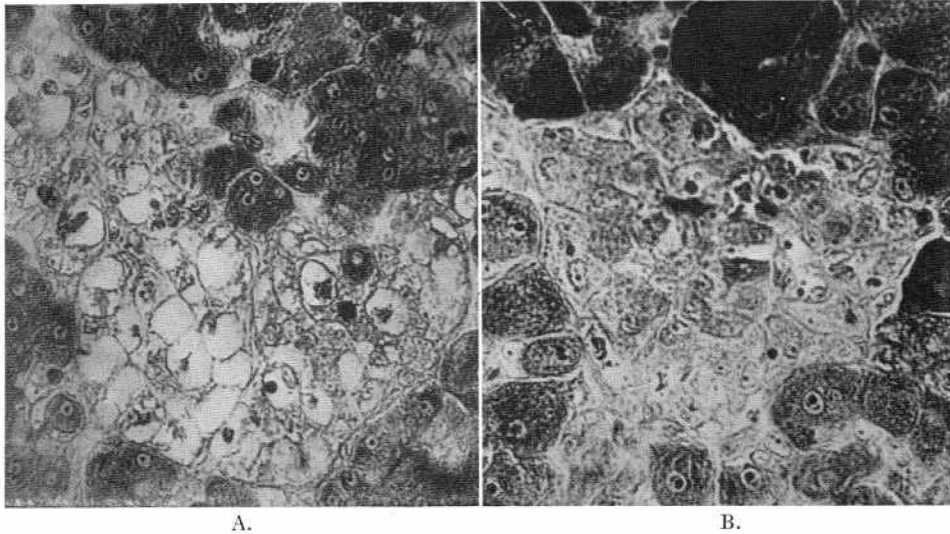


Fig. 2. Photomicrographs of excised pancreas (dog) showing, A, hydropic degeneration of the beta cells; B, restoration of cells of islands of Langerhans. (From Copp and Barclay.)

potentially diabetic. As long as these dogs were kept on a regulated diet, there was sugar in the urine and the blood sugar level remained normal. But when these potentially diabetic dogs were overfed, the blood sugar increased and the dogs began to excrete large quantities of sugar in the urine and to show the signs of general physical failure, such as are exhibited by uncontrolled diabetic patients. After the animals had been subjected to this overfeeding for from 7 to 9 weeks, the authors excised a piece of the pancreas in which they were able to demonstrate the hydropic degeneration of the beta cells (Fig. 2, A).

The dogs were then placed on proper diet and insulin was administered. The urine promptly became sugar free and the blood sugar normal. After they had been subjected to this controlled regimen for from 7 to 9 weeks, again a portion of the pancreas was excised and examined and the cells of the islands of Langerhans were found to be restored (Fig. 2, B).

These findings provide a concrete demonstration of what we have repeatedly seen clinically; that is, that when diabetes is treated early in its development, there is a good chance of restoration of the insulogenic function; but if the treatment is postponed until

the islands are gone—fibrosed—nothing will bring about their regeneration.

It is for this reason that when glycosuria occurs during pregnancy, it should never be ignored as a chance occurrence, as due “perhaps to sugar of milk,” but the patient should be subjected to a rigid examination to determine the exact status.

As a rule, the diagnosis is quickly and easily made, except in borderline cases, by making a blood sugar estimation 2½ hours after a heavy meal of carbohydrates. If this blood sugar value is 160 milligrams per 100 cubic centimeters of blood, or more, we can safely say that we are dealing with a diabetic patient, in whom, however, the condition may clear up after parturition, provided the condition is properly controlled in the meantime. On the other hand, if the blood sugar estimation in the above test is 90 milligrams per 100 cubic centimeters of blood, or less, then we may know definitely that we are dealing with the renal type of glycosuria which requires no treatment.

**CASE 2.** This patient was a young married woman 24 years of age, who was in the third month of her first pregnancy. There was no familial history of diabetes. During childhood she had had measles, mumps, chickenpox, diphtheria, and whooping cough; and later in life tonsillitis, grippe, and pleurisy. Ten years before a tonsillectomy had

been performed; and an appendectomy 7 years before.

The patient had been referred to me by her obstetrician who 2 weeks before had found sugar in her urine. The frequency of urination had been increasing, so that when I first saw her she had to get up every 2 hours during the night. When I first saw her, her fasting blood sugar was 73 milligrams per 100 cubic centimeters of blood, and there was no glycosuria. Three days later I made a glucose tolerance test, the results of which are illustrated in the chart (Fig. 1, Case 2). This normal curve shows that we were dealing with a patient with a low renal threshold for sugar, for although the highest blood sugar excursion was 138 milligrams per 100 cubic centimeters of blood, glycosuria was present at the end of the first and again at the end of the second hour. The total output of sugar was but 0.47 grams, in marked contrast to the output of the first patient.

The two cases here described show the two contrasting findings in cases in which glycosuria is present in pregnancy. They show that the glycosuria in itself is but a symptom and

is not of final diagnostic significance; but that it calls for further investigation. The first case required treatment for diabetes, while the second case did not require such treatment. On the one hand, to disregard the presence of sugar in the urine in such cases might mean that the patient would be deprived of a vitally needed protection; and on the other, to subject every such patient to the routine treatment for diabetes might mean a dietary restriction and a psychic strain which the patient could and should be spared.

#### REFERENCES

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2. COPP, E. F. F., and BARCLAY, A. J. The restoration of hydropically degenerated cells of the pancreatic islands in dogs under insulin treatment. *J. Metab. Res.*, 1923, iv, 445-451.