
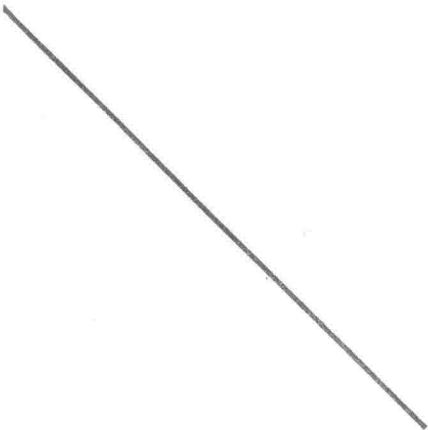


JUNE 1962

COMPLICATIONS OF GYNECOLOGIC SURGERY

Edited by

CLAYTON T. BEECHAM, M.D.



HOEBER MEDICAL DIVISION
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FOREWORD

THE DETAILS of the care of the pregnant diabetic are both complex and worrisome to all obstetricians. This Symposium contains authoritative articles which are most informative and should be of much help to those who care for these problem patients.

Practical considerations in the management of diabetes mellitus in pregnancy are presented in detail. In addition, to promote better understanding of the requirements which lead to successful treatment, the pathologic physiology is stressed.

It is to be noted that nearly all contributors have emphasized the need for a team approach if better than average results are to be obtained. Such an approach is needed if the control of the diabetic state is to be of the variety called "excellent." Excellence of control in the instance of the pregnant diabetic patient is even more important than in the instance of the nonpregnant diabetic.

I am grateful to the contributors, who have given so generously of their time and talents.

ROBERT B. WILSON, M.D.

MANAGEMENT OF DIABETES MELLITUS DURING PREGNANCY

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IN THE CARE of the pregnant diabetic, proper management of the diabetic state is the primary consideration. The management of her diabetes mellitus from day to day through pregnancy, delivery, and the postpartum period is a major concern of the health team, consisting of the obstetrician, the internist, the nurse and the dietitian to whom her care is entrusted. The over-all topic of diabetes and pregnancy is considered elsewhere in this Symposium from the standpoint of pathophysiologic aspects (carbohydrate metabolism, endocrine patterns, renal function), practical therapeutic considerations (prenatal care, time and mode of delivery, anesthesia, care of the infant), and complications both of the pregnancy and of the diabetes (toxemia, degenerative complications). This permits exclusive and detailed consideration here of the clinical diabetes mellitus and its management.

DIAGNOSIS OF DIABETES MELLITUS DURING PREGNANCY

The diagnosis of diabetes and its accurate appraisal are essential preliminaries to rational therapy. The diagnosis is of special importance because of the acknowledged hazards of unrecognized diabetes during pregnancy.²⁶

The diagnosis of diabetes may be facilitated on the one hand by the diabetogenic effect of the pregnancy,¹⁵ by which an otherwise latent impairment of glucose tolerance is aggravated, by the lowered renal threshold for glucose of pregnancy,³⁵ leading to the discovery of glycosuria, and by the increased likelihood that the patient will seek medical attention, at least for the pregnancy. Establishing the diagnosis, on the other hand, may be made more difficult by the lowered value for fasting blood sugar during pregnancy,¹⁰ especially for those who rely primarily on this determination as a screening test for diabetes. There is good

The author is indebted to Drs. C. F. Gastineau and L. O. Underdahl for critical review of the manuscript, and to Miss Ruth Franklin for assistance in the preparation of the portion of the paper concerned with diet.

agreement that when clinical suspicion of diabetes exists, a glucose-tolerance test should be done.^{10, 26, 38}

In the glucose-tolerance test at the Mayo Clinic, an oral glucose load of 1 gm. per kg. of body weight is employed, and the "true blood glucose" is determined with the AutoAnalyzer. In 95 per cent of normal adults, the level of fasting blood glucose is between 65 and 90 mg./100 ml.¹⁹ The diagnosis of diabetes is established by the repeated finding of concentrations of 110 mg./100 ml. or more. We insist upon adequate nutrition during the 3 or more days preceding the test. If the concentration of blood glucose is 150 mg./100 ml. or more at 1 hour and 110 or more at 2 hours, diabetic impairment of glucose tolerance is confirmed. If the value for fasting blood glucose or the other values fall between normal and decisively diagnostic values, the possibility of diabetes cannot be excluded. Modification of the diagnostic criteria must remain flexible, however, especially if intense glycosuria occurs during the glucose-tolerance test. To this end, quantitative determination of urinary glucose remains an important adjunct of this test.

It is essential to keep the patient under close observation and to re-evaluate her condition periodically for evidence of progression of the suspected diabetes to a diagnosable stage. When it is not possible to arrive at a definite diagnosis and there is urgent need to be decisive, as in a nonpregnant patient, a cortisone-glucose tolerance test⁴ or an intravenous tolbutamide-tolerance test³³ may help to resolve the dilemma.

Clinical clues to the diagnosis should not be omitted from consideration. A family history of diabetes and an obstetric history suggestive of maternal prediabetes³⁸ help strengthen the suspicion that the patient has diabetes.

CLASSIFICATION

Whether the diabetes is newly established or of long standing, it is helpful to classify the patient and to grade the diabetes. White's classification³⁶ takes into consideration severity of the disease, age at onset, duration, and presence or absence of complications. It is widely used for evaluation of data. My colleagues and I use a therapeutic classification or grading, described elsewhere in this Symposium (see the article by Wilson and Morrison). It is usually supplemented by stating the duration of the disease, its relative insulin-sensitivity, and its complications. Use of the measures necessary to control the diabetes as the sole means of classification gives at best a relative estimate of the severity of the disease. A patient who is ketoacidosis-resistant, who had the onset of her diabetes after maturity, and who is using 80 U. of insulin daily may have a milder disease from the viewpoint of ease of therapy

and prognosis than one who is ketoacidosis-prone, who had a juvenile onset of her diabetes, and who needs only 20 U. of insulin daily.

What matters more than classification is to what extent the therapeutic measures restore to normal the disturbed homeostasis of carbohydrate, fat, and protein of diabetes. Accordingly, "perfect" or "excellent" control of diabetes is a state in which the diabetic organism is rendered temporarily "nondiabetic" through therapy. Such control not merely replaces the relative or absolute insulin deficiency on the basis of which the patient is diagnosed as having diabetes mellitus, but also restores the minute-to-minute normal status of the body's biochemistry, which in the nondiabetic is automatically regulated. There is evidence indicating that with present-day methods, "perfect" full-time restoration of all blood chemical values to normal and "complete" chemical control may not be possible,^{1, 11} even in the patient with milder-grade, stable, maturity-onset diabetes. Even while homeostasis of blood glucose is maintained, physiologically important constituents of the blood may continue to have abnormal patterns.

A practical compromise for criteria of satisfactory diabetic regulation is maintenance of nutritional balance (maintenance of normal weight), normal-range fasting, and 2- to 3-hour postprandial concentrations of glucose in the venous blood, absence of detectable glucose in freshly voided antecibal specimens of urine, and absence of ketosis and insulin reactions. Such a compromise usually necessitates permitting some early postprandial hyperglycemia and with it some glucosuria; without this early hyperglycemia, in later postprandial hours symptomatic hypoglycemia may result. The degree of glucosuria so permitted can be a good measure of the accuracy with which the diabetes is regulated. It is generally agreed that the 24-hour urinary excretion of glucose ought not to exceed 5 per cent of the ingested carbohydrate. A patient so maintained may be expected to be biochemically well regulated during all hours of the day and night except during a period of about 2 hours after each of the three major meals. Expecting perfect chemical control for even 18 of the 24 hours may be excessive, in view of what has been learned about nighttime fluctuations of blood glucose in supposedly well-controlled diabetes.²⁵

PRACTICAL MEASURES RELATING TO ACCURACY OF DIABETIC CONTROL

These measures follow from the definition of ideal or excellent regulation of diabetes.

Maintenance of optimal weight is attempted. Weighing is best done under identical circumstances, that is, without clothes, before breakfast,

after urination, and the like; it preferably should be done weekly to avoid concern over minor fluctuations from day to day. If diabetic control is inaccurate, the weight may vary by several pounds because of urinary loss of glucose and fluid.

Determination of blood glucose levels after fasting and at specified intervals after meals may be very helpful in documenting the accuracy of diabetic control. My colleagues and I determine the fasting blood glucose at every prenatal visit of the more severely diabetic patients and in addition, determine the 3-hour postprandial blood glucose level as often as necessary in patients whose diabetes is hard to regulate. An example of the frequent use of blood-glucose determinations was provided by Pedersen,²³ who obtained four blood tests a day on his hospitalized patients for prolonged periods.

Quantitative analysis of the urine as one 24-hour specimen or as major fractions thereof provides an excellent guide to the accuracy of diabetic control,²¹ even if one allows for the lowered threshold for glucose during pregnancy. The fractions may be collected in 5-hour periods during the day and in a 9-hour period during the night to conform to a standard hospital routine. Six-hour fractions, in our experience,⁷ yield the same information but involve a rescheduling of mealtimes and the interruption of sleep. Such quantitative determination of the urinary excretion of glucose is a satisfactory guide to the use of multiple-dose insulin therapy, the effect of dietary changes, the effect of exercise, and the like. It is not practicable for home use, as the tests available to the patient are only semiquantitative.

Qualitative tests for sugar in "fresh" specimens of urine help in estimating the immediate state of glucose excretion, and they can provide rough guides to the range of blood-glucose concentrations if some nearly simultaneous estimations of blood glucose have been done. Tests on such "fresh" specimens, i.e., ones voided soon after the bladder has been emptied, are required of our patients before each meal and at bedtime.

Qualitative tests are done, as a rule, by means of paper tape impregnated with glucose oxidase (Tes-Tape or Clinistix). In pregnant patients this method of testing is occasionally too sensitive. When the low renal threshold for glucose leads consistently to positive results in the face of normal or even low concentrations of blood glucose, we recommend the use of a less sensitive technique in which a copper-reduction reaction is employed (Clinitest). If even this test gives positive results at normal or low concentrations of blood glucose, the results can at least be more readily graded.

It is helpful to have the patient or the hospital laboratory determine