Controlled Versus Free Diet Management of Diabetes

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Clinical experience has led the authors to believe that continuous aggressive treatment of diabetes, directed toward the maintenance of physiologic conditions including normal levels of blood sugar, is of the greatest importance in reducing the incidence and severity of degenerative complications. *Ideal* control implies that a quantitated diet providing ample minerals, vitamins and calories derived from the proper distribution of carbohydrate, protein, and fat has been so well utilized by adequate insulin effect that blood and urine tests for sugar are invariably normal. Although this ideal is rarely attained, a consistent, conscientious effort to reach it will usually result in reasonably good control. On the other hand, in recent years some have advocated plans of treatment which provide much less rigid control and thus by the authors' standards fall far short of being adequate therapy for diabetes.[1-6] These plans allow, in general, a free selection of diet as well as disregard of glycosuria and hyperglycemia as long as acidosis is absent.

CLASSIFICATION OF CASES ACCORDING TO TREATMENT

The correlation between the degree of control maintained and the incidence and severity of degenerative vascular complications was recently determined in more than 300 youthful patients with diabetes of more than 10 years' duration, who were recalled to the office or hospital for observation and examination.[7] Two hundred and twenty-one of these cases have been divided into three groups, according to the degree of control maintained and the type of treatment followed in the management of their diabetes. All patients who had actually followed the type of careful treatment recommended to them by the authors were considered together as a group representing "controlled" treatment (73 cases). A second group, hereafter referred to as the "coma" group, included all patients who had been in diabetic coma on one or more occasions, regardless of the cause of coma or the degree of control maintained at other times (48 cases). The third group was

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composed of those patients (100 cases) who, despite advice to the contrary, had on their volition followed a "free diet" regimen of management similar to that advocated by Tolstoi and others.

With few exceptions, the patients in the "coma" group had had consistently poor control of diabetes. None of the 100 patients in the "free diet" group had ever been in coma or severe acidosis, as determined by review of their clinical and laboratory records covering many years of office and hospital visits. Each of the above three groups was further subdivided according to whether diabetes had been present for 10 to 15 years, 15 to 20 years, or 20 to 34 years.

INCIDENCE OF DIABETIC COMPLICATIONS

After the patients had been grouped according to type of treatment and duration of diabetes, an attempt was made to determine the relative incidence and severity of the two most commonly observed vascular complications of diabetes which can be objectively evaluated, namely retinopathy and calcification of peripheral arteries. Depending upon the findings of certified ophthalmologists as to retinal changes, the patients were grouped into five grades—from normal through grade 4. Similarly, the x-rays of all patients were evaluated and graded (normal through grade 4) according to degree of vascular calcification observed in roentgenograms of the aorta, pelvis, and legs.

Since 10 to 15 years of diabetes are usually required for the development of vascular degenerative lesions regardless of the type of management,[8-10] a true picture of the relationship in diabetic patients between the type of management followed and the complications resulting therefrom can be obtained only from those patients who have had the disorder for 15 or more years.

Among the 92 patients who had had diabetes for more than 20 years, 74 per cent of those in the "coma" group were found to show arterial calcification of an advanced degree, as did 80 per cent of those who followed a "free diet" regimen. In contrast, only 44 per cent of patients in the controlled group showed advanced blood vessel calcification, despite 20 or more years of diabetes. A similar correlation was noted between the incidence of advanced degenerative retinal lesions and the various degrees of control of diabetes. A greater incidence of retinopathy was noted after 15 years of diabetes among the patients in the "coma" and "free diet" groups than was found among patients in the controlled group.

When the incidence and severity of both retinopathy and vascular calcification were jointly correlated with the type of management of diabetes, the occurrence of complications in relation to degree of control became even more obvious. Among the 92 patients with diabetes of 20 to 34 years' duration, advanced lesions of both the blood vessels and eyes were observed more than twice as frequently in the "free diet" and "coma" groups (57 and 65 per cent of cases, respectively), as they were in the controlled group (25 per cent of the cases). Only 7 per cent of patients on a free diet regimen for 20 or more years were found to have minimal vascular complications as compared with 41 per cent of patients with controlled diabetes. No patient whose diabetes had been managed on a free diet regimen for 20 or more years had both normal retinae and blood vessels without evidence of calcification.

During this study 62 patients were observed who had clinical manifestations of renal vascular disease, which the authors refer to as diabetic nephropathy.[11] Among the entire study group of 221 cases, not one of the patients who had maintained a satisfactory degree of

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control of diabetes was observed to have manifestations of nephropathy. Only 13 (20 per cent) of the 62 patients with this form of renal disease had made any serious or sustained attempt at control of diabetes.

VALUE OF CONTROL

The above observations attest to the importance of controlled treatment of diabetes in reducing the incidence of complications among young patients with severe diabetes of long duration. These vascular degenerative complications are responsible for more deaths and debility among this group of individuals than are all other causes.[12] Attention to control of diabetes should begin early and aggressive treatment should be maintained continuously from the time the diagnosis is first made.

DISCUSSION

DR. HENRY T. RICKETTS *(Chicago, Ill.):* The data seem to establish the thesis that good control of diabetes possibly prevents and certainly postpones or minimizes the onset of vascular complications. One should not forget, however, that even with good control a very considerable proportion of young diabetic patients develop vascular lesions after 20 years.

Drs. Wilson, Root and Marble would admit immediately that the control of their best group, although labeled good, was not ideal; and I suspect that if we could obtain ideal control the incidence would be considerably less.

Now the fact that by good control one can at least minimize or postpone these lesions implies that there is something about diabetes which causes them. However, this has been questioned by some investigators on the following grounds—first, that in many instances where control has been admittedly poor for 20 years, vascular lesions are sometimes minimal—not usually, but sometimes; secondly, that in certain cases in which the disease is diagnosed for the first time and is demonstrably mild, vascular lesions are already present.

Now these discrepancies have been explained by variations in constitutional factors, hereditary factors, unknown factors. These explanations are, of course, quite hypothetical. It would be most desirable if one could find a situation in which there was nothing but diabetes operating. Vascular lesions appearing in such an organism would presumably occur without antecedent hereditary or constitutional factors.

This situation is to be found, though perhaps not to our full satisfaction, in the lesions appearing in experimentally produced diabetes in animals. Dr. Lukens, as you are aware, reported some years ago the occurrence of intercapillary glomerulosclerosis in a dog with pituitary diabetes. We do not know what that dog's ancestors were like, but presumably they were in pretty good shape. Also, intercapillary glomerulosclerosis has been reported in diabetic rats by the South American group and one or two others.

In our own work we have found changes in the coronary artery of a dog with alloxan diabetes of three years' duration. The dog, having excreted about 100 Gm. of glucose every day in the urine for a continuous period of 30 months, died when he was 36 months of age. In a coronary artery there could be seen intimal thickening at several points, a rupture of the internal elastic lamina, and invasion of the underlying tissues by phagocytes containing lipids. The rest of the artery was essentially normal and another artery from the same dog was entirely normal, too.

The kidney of another dog with diabetes produced by pancreatectomy showed changes. In this case diabetes was also of 30 months' duration and about 100 Gm. of glucose were lost each day in the urine. The dog died at the age of 36 months. Neither of these dogs, you see, was old. There could be seen very distinctly thickened afferent arterioles in certain glomeruli. Lesions of this type were moderately numerous and were present in perhaps 10 or 15 per cent of the glomeruli.

These are only two cases of experimental diabetes. They do not prove the thesis at all conclusively. The well-controlled diabetic dogs, with diabetes of comparable duration, have not yet died so their tissues cannot be compared. Thus, final judgment will have to be reserved. But this type of observation at least suggests the following conclusion: that diabetes alone in the absence of hereditary or constitutional factors is capable of inducing lesions of blood vessels. It is, of course, improper to state that this is the only factor, or can be the only factor in the human situation, but I can certainly subscribe to the conclusions of Dr. Wilson and his group that, knowing what we do about the effect of poorly controlled diabetes in at least making lesions worse and probably producing them, good control is a goal at which we should all aim.

DR. JOSEPH H. BARACH *(Pittsburgh, Pa.):* Two important questions face the physician who would treat diabetic patients. The first is, "Can diabetes be controlled?" and the second is "Can the diabetic be controlled?" and, if so, what are the rewards of good control?

I should like to call attention to recent studies dealing with these points. For the sake of better information we divided our patients into two groups: private and dispensary patients. Of these, our experience has been that private patients, constituting a more intelligent group and living on a higher socio-economic level, are and can be more cooperative than dispensary patients.

A survey of diabetic control in 85 diabetics in the private group, including 23,000 urine sugar tests by patients themselves, revealed that 80 per cent of the specimens were sugar free, 8 per cent had only a trace, and 12 per cent of the specimens showed 1.8 per cent or more of sugar. In effect, this means that when patient and doctor cooperate, the patient can be under good control 88 per cent of the time. Considering that a goodly portion of sugar shown in the 12 per cent group occurred in patients who were careless knowingly, it is evident that good diabetic control can be maintained, if the doctor knows what to do and if the patient is properly interested.

In dispensary cases we obtained only 60 per cent of sugar free specimens. The same conditions prevailed for blood sugars. Private cases showed relatively normal blood sugars in 66 per cent, while dispensary patients showed satisfactory blood sugars in only 50 per cent.

These observations, in so far as we are concerned, show that in the diabetic good control can be successfully maintained. That being the case, we come to the second question, "What are the rewards of good control?"

In recent times much has been said about the ocular complications of diabetes that has had an almost rude awakening effect on all of us who treat diabetics. On this point I speak from my own experience only and I wish to say that the story is not as bad as it seemed to be at first sight. In a series of 120 private patients, covering a period of 1 to 27 years, 45 per cent showed diabetic retinopathy and 55 per cent did not. In 156 dispensary cases, also covering a period of 1 to 27 years, 50 per cent showed retinopathy whereas 50 per cent did not. Obviously, the number of patients with diabetes of more than 10 years' duration was considerably smaller than those with less than 10 years. What was more striking was that during the first 5 years of diabetes, dispensary cases showed eye lesions in 34.5 per cent, while private cases showed only 24 per cent. In the 5 to 10 years' period, dispensary cases showed an incidence of 27 per cent of retinopathy while private cases showed only 20 per cent.

At this point, I would like to call attention to the fact that the small red punctate lesions commonly seen in retinae of diabetics are not hemorrhages; they are aneurysmal dilatations of small vessels. They are comparatively seldom seen in nondiabetics. These angiomatous lesions do not bleed, the surrounding area does not show extravasated blood or evidences of absorbed blood. They are fixed, not transient; they do not come and go. They do not have the clinical significance or the prognostic meaning of retinal hemorrhages; or like the flame hemorrhages, the exudates and choroidal lesions of hypertension, nephritis and other disease entities.

In summary, I wish to say that where there is good diabetic control we have found that retinopathies are fewer in number. Our studies show also that the lesions are milder and that they come on later in the disease. All in all there is less blindness.

DR. JAMES LEE WILSON (Closing): We agree that control of diabetes is a matter of relativity. Certainly, among our group of cases with good control, some did not have the perfect results we would like to see. Ideal control is practically nonexistent; but it pays to try to reach that goal as closely as possible.