Height and Diabetic Neuropathy

The interesting and stimulating article by Gadia et al. (1) reports a correlation between tallness and the presence of impaired conduction and chronaxie in the lower extremities of diabetic patients that did not occur in nondiabetic people of similar height. In diabetic and nondiabetic subjects, the same hydrodynamic factors are present when venous pressure in the legs increases with height, which is directly related to the vertical distance from the right atrium down to the appropriate vein in the lower extremities. This increase occurs when the person is sitting or standing and is equal to the height of a column of blood extending from the ankle or knee, respectively, to the right atrium. Therefore, in patients with diabetes there must be a special sensitivity to the decreased capillary perfusion resulting from the increased venous pressure. I can think of no other physiological principle that might account for the eloquent results of the study by Gadia et al.

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Glucose-to-Insulin Ratio in Intravenous Tolbutamide Test Predicts Long-Term Therapeutic Outcome in NIDDM

Dietary caloric restriction and sulfonylureas have been used to ameliorate hyperglycemia in non-insulin-dependent diabetes mellitus (NIDDM). However, many patients do not respond satisfactorily to these treatments and need insulin in their clinical treatment (1). Whether a long-term prediction of successful management with diet and sulfonylureas in NIDDM can be made by a simple clinical β-cell function test is unknown. To address this problem, we correlated plasma insulin response to an oral glucose tolerance test (OGTT) or an intravenous tolbutamide test (IVTT) before treatment with the modes of therapy employed at the 5th yr of follow-up in NIDDM patients. Thirty-four patients with NIDDM diagnosed according to the reported criteria (2), treated without insulin or untreated, were admitted to our hospital for the study. After an OGTT and an IVTT, they were treated initially with diet alone or diet plus sulfonylureas according to their individual response. Thereafter, follow-up was made for at least 5 yr. Fasting plasma glucose (FPG) was monitored at our outpatient service once or twice per month. When their glycemic control became poor, patients were advised to be readmitted, and their response to diet plus sulfonylureas was reevaluated. Institution of insulin therapy was considered when, without intercurrent illness, FPG could not be lowered below 140 mg/dl with diet plus glyburide or chlorpropamide up to 15 or 500 mg/day, respectively, under the surveillance of compliance to these treatments during initial admission or readmission. Before completing the follow-up, 8 patients moved to other hospitals and dropped out of the study. Within 0.5 yr of the follow-up, 4 patients were switched to insulin treatment. The number of patients on insulin thereafter was increased to 6 and 8 by the end of the 1st and the 3rd yr of follow-up. Finally, at the end of the 5th yr, among 26 patients who completed the follow-up, 10 patients (3 men, 7 women, aged 28–72 yr at entry) were on insulin, and they were classified as insulin-receiving (IR) patients. Duration of diabetes for the IR patients from initial diagnosis to the time they started to receive insulin was between 2 and 25 yr. Among the remaining 16 patients who managed either with diet alone or diet plus sulfonylureas throughout the study, 12 patients with FPG <140 mg/dl at $>70\%$ of the determinations in the 5th yr of follow-up were considered to be in good glycemic control. These 12 patients (7 men, 5 women, aged 28–66 yr) were defined as non-insulin-receiving (NIR) patients. Four patients with higher FPG than the above criteria were not included in the NIR group.

IR patients showed higher plasma glucose values than NIR patients with comparable insulin values during OGTT. In contrast, lower insulin responses to IVTT were seen in IR patients. To discriminate between individual patients in both groups, parameters obtained in both OGTT and IVTT were compared as shown in Fig. 1. Higher FPG and lower peak plasma insulin with the IVTT (mean ± SD 12.0 ± 6.4 vs. 26.8 ± 15.5 μU/ml, $P < .05$) were seen in IR patients. Peak plasma insulin and a ratio of incremental insulin area above the basal level to the corresponding incremental glucose area (IIA/IGA) were comparable. Individual values of peak plasma insulin with IVTT and FPG showed considerable overlap despite significant difference between the mean values of both groups. A ratio of FPG to peak insulin with an IVTT gave a clear separation of individual patients with different therapeutic outcomes; i.e., all but 1 IR patient had values of this parameter >11, and none of the NIR patients exceeded 11 (Fig. 1*E*).

The usefulness of measurements of basal and glucagon-stimulated levels of C-peptide to differentiate diabetic patients requiring insulin therapy from those who do not has been suggested (3,4). However, in these studies, long-term follow-up for outcome of the selected

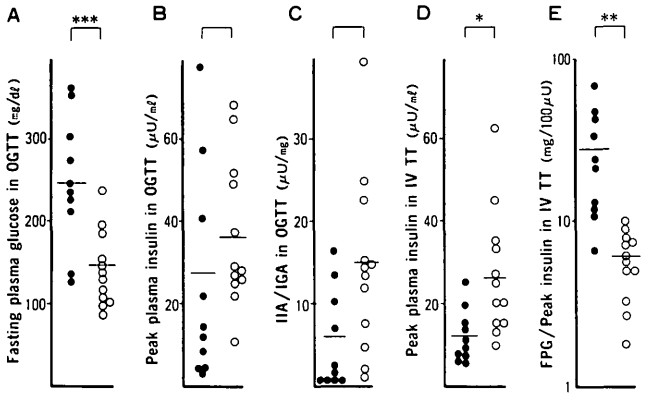

FIG. 1. Parameters obtained with oral glucose tolerance test (OGTT) (*A–C*) and with intravenous tolbutamide test (IVTT) (*D, E*) were compared between insulin-receiving (●) and non-insulin-receiving (○) patients. IIA/IGA, ratio of incremental insulin area above basal to incremental glucose area. FPG, fasting plasma glucose. Significant difference of mean values shown with *horizontal line*, *$P < .05$, **$P < .01$, and ***$P < .001$.

therapy was not made. The value of these measurements might be limited to the immediate future. Although confirmation of sensitivity and specificity based on larger populations of patients is needed, our study suggests that if NIDDM patients have a ratio of glucose to peak insulin with an IVTT <11, the possibility of successful management with diet and sulfonylureas, at least for the following 5 yr, is very high. In conclusion, a measurement of plasma insulin by an IVTT may serve as a simple clinical test for β-cell function to make long-term predictions regarding therapeutic outcome in NIDDM. For this purpose, an algorithm based on a glucose-to-insulin ratio is better than a value for insulin only. Insulin response to OGTT did not correlate with later therapeutic outcome.

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Treatment of Impotence With Vacuum-Operated Erection Assistance Device

Impaired sexual function has long been recognized as a problem among diabetic men (1,2). Although some progress has been made in understanding the pathophysiologic mechanisms resulting in loss of erectile function in diabetes (3), the treatment of impotence in diabetic patients remains extremely difficult and often disappointing. Eventually, most patients face the difficult decision of whether to resort to an implantable penile prosthesis.

The search for less invasive procedures has led to development of vacuum-operated erection assistance devices (EADs). We evaluated the effectiveness of a nonconstrictive EAD supplied by the Synergist Institute (Houston, TX) in 27 impotent patients (15 diabetic, 12 nondiabetic; aged 40–75 yr) from the endocrine clinic of the Veterans Administration Medical Center (Fig. 1). Duration of impotence was 3.6 ± 0.5 yr (mean ± SE) in diabetic and nondiabetic patients. The point of entry was the existence of impotence, and no effort was made in either group to identify patients with psychogenic versus organic cause of impotence. Clinical evaluation of all patients included a complete physical examination,

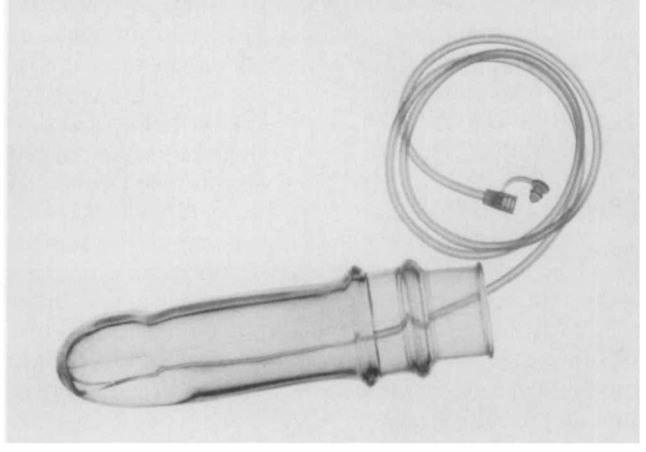

FIG. 1. Erection assistance device (EAD; Correctaid) made from medical-grade soft silicone according to penile size of patient. Tubing, one end of which opens inside EAD, runs within wall and can be locked at other end to maintain vacuum. Vacuum is created by suction applied by patient to open end of tubing. After intercourse, vacuum is broken by opening clamp on open end of tubing. Device is then removed, washed thoroughly with liquid soap, and stored until next use.