Recurrent Comas Due to Secret Self-Administration of Insulin in Adolescents With Type 1 Diabetes

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The incidence of severe hypoglycemia ranges from 0.02 to 0.07 per patient-month in a large series of adolescents with type 1 diabetes (1–4). Parents and physicians usually attribute these hypoglycemic accidents to mistakes in the management of diabetes: excessive insulin dosage, unusual exercise, meal omission, etc. In one-third of these episodes, however, the circumstances of hypoglycemia remain unclear (5,6). The fear of recurrence usually prompts the patient or his parents to decrease insulin doses and increase glucose monitoring (7). In few cases, however, severe hypoglycemia repeats, leading physicians to search for an organic cause. These investigations are almost always negative. Because lack of compliance is frequent among adolescents, we hypothesized that recurrent comas could be due to self-administration of insulin of which parents and physicians are not aware, a cause that has received little attention in literature (8–10) but carries a high risk of medical and judicial errors, morbidity, or even mortality.

RESEARCH DESIGN AND METHODS

— Since 1990, we investigated 322 cases of recurring hypoglycemic comas in 149 adolescents with type 1 diabetes. All went through careful interviews and medical examinations. Plasma levels of cortisol, growth hormone, and IGF-I were normal. No celiac disease antibodies were found. Epilepsy was ruled out. Plasma C-peptide was undetectable in all children. A total of 19 adolescents had a very unusual frequency of coma. Of these 19, 16 admitted, either at the time of events (3 of 16) or 1–7 years later (13 of 16), to the surreptitious self-administration of insulin. These 16 patients are compared with the 133 other patients using nonparametric tests for comparing means and Fisher's exact test for comparing categorical variables. Data are expressed as means ± SE or percent.

RESULTS

— The 16 adolescents who admitted to secret self-injections (group A) and the other 133 patients with repeated hypoglycemic coma (group B) were comparable with respect to age, duration of diabetes, and HbA_{1c} level but showed marked differences regarding other characteristics (Table 1). Group A showed a majority of girls, a higher frequency of coma, a lower declared insulin dose, and more frequent familial difficulties than group B (Table 1). Fewer group A patients reported the occurrence of mild hypoglycemic episodes during the period of repeated comas. Notably, 3 of 16 patients in group A (18.8%) measured blood glucose levels more than five times daily, versus only 5.3% in group B.

Based on each patient's history, we subclassified group A patients within three groups, according to the reasons for secretly self-injecting insulin. Seven patients used insulin self-injections to deliberately induce coma, using doses of 1,000–4,000 units for suicide attempts in a psychotic girl and 40–60 units of regular insulin in six cases who were considered normal by a child psychiatrist. Marked familial difficulties, including an incest attempt, hidden abortion, and/or deep alcoholism, were present in five of seven families.

Five other adolescents used 3–7 night injections per week of 20–30 units of regular insulin in an attempt to normalize their glucose levels. Numerous episodes of symptomatic hypoglycemia were detected by the school teacher or the parents but were minimized or denied by the adolescents. They used an average of 4.3 glucose measurements per day, as recorded on their meters. Hidden injections were performed in response to a strong parental pressure to normalize glycemia, directly related to unreasonable fears of future blindness.

Four other adolescents used secret injections to mask poor control, secondary to prolonged periods where they skipped their usual injections. None monitored blood glucose. Injections started when the patient felt he had gone "too far." The child psychiatrist considered these adolescents normal. Marked familial difficulties and school failure were present in three cases.

In 5 of 16 cases, secret self-administration of insulin recurred once or twice during the patient's initial hospitalization, despite monitoring by the medical staff. In four of five cases, insulin vials, syringes, or pens were discovered taped under the furniture of bathroom or toilets.

CONCLUSIONS

— Repeated hypoglycemic comas are not rare in insulin-treated juveniles (2,4,11). Among 2,679 French children and adolescents surveyed in 1996, 338 (13.8%) had at least one and 123 of 338 patients had two severe hypoglycemic comas during the 6-month study. The frequency of coma in these studies was thus much lower than in the 16 adolescents reported here. Recurrence of severe hypoglycemia has been related to age, duration of diabetes, glycemic control, psychiatric problems, or socioeconomic factors in some (12,13) but not in all studies (3,4,11). The 16 cases reported here were characterized instead by a large predominance of girls, a frequent declared use of low insulin doses, frequent familial difficulties or ma-

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A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—*Main characteristics of adolescents with type 1 diabetes referred for the diagnostic evaluation of repeated hypoglycemic coma*

	Admitted secret self-injections (group A)	Other patients (group B)
n	16	133
Sex (female/male)	15/1	68/65
Age (years)	12.9 ± 0.5	12.3 ± 0.1
Duration of diabetes (years)	6.2 ± 0.7	6.1 ± 0.1
HbA_{1c} (%)	8.1 ± 0.3	8.2 ± 0.1
Declared insulin dose (units · kg^{-1} · day^{-1})	0.64 ± 0.11*	0.97 ± 0.13
Patients with dose <0.5 units · kg^{-1} · day^{-1} (%)	9/16 (56.3)*	5/133 (3.8)
Frequency of coma over the observed period‡	1.10*	0.39
Marked familial difficulties (%)	8/16 (50.0)*	8/133 (6.0)
Reported mild hypoglycemia (%)	5/16 (31.3)*	102/133 (76.7)
Blood glucose measurements >5 per day (%)	3/16 (18.8)†	7/133 (5.3)

Data are means ± SE or *n* female/male, unless otherwise indicated. *$P < 0.001$; †$P < 0.02$; ‡per patient-month.

jor fears of complications. On an individual basis, however, we found no specific feature allowing to recognize secret insulin self-injections. The proof of the cause almost always escapes in the short term so that the physician remains faced with denial by the patient and can rely solely on suspicion. We stress that all children with more than two repeated comas within a 3-month period should immediately be hospitalized to allow in-depth discussions with physicians, nurses, and psychiatrists after the physician has made clear that secret self-administration of insulin is suspected. Instead of struggling with the patient to obtain "the truth," a firm and comprehensive diagnosis is key to prevent or reduce further recurrence.

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