Human Insulin-Induced Lipoatrophy

A successful treatment with glucocorticoid

Alberto J. S. Ramos, MD
Marcella A. Farias

Before the development of purified insulin in the 1970s, lipoatrophy was a common complication of insulin therapy (1,2). With the arrival of human insulin, lipoatrophy has decreased dramatically, becoming a rare problem in clinical practice. Lipoatrophies are considered an adverse immunological side effect of insulin therapy, and in some cases they are mediated by a local high production of tumor necrosis factor-α, which leads to a dedifferentiation of adipocytes in the subcutaneous tissue. The treatment with corticosteroids is useful because of its immunomodulating properties and also because it is able to produce a differentiation of adipocytes (2–4).

In most reported cases of insulin-induced lipoatrophies, there were attempts of changing the injection areas without any evidence of improvement (5–8). Kumar et al. (9) in a single-blind study used small amounts of dexamethasone, adding 4 μg/unit to insulin injections, in nine patients with marked lipoatrophy in both thighs. A mix of insulin and dexamethasone was injected into one thigh and insulin without dexamethasone was injected into the other. This way, each patient was her own control subject. Six patients showed significant improvement. None used human insulin (9).

We report a case of localized lipoatrophy in a patient treated with human insulin since the onset of type 1 diabetes when the application of betamethasone was effective in stopping and reversing this abnormality.

RESEARCH DESIGN AND METHODS — We studied a 6-year-old multiethnic girl who was diagnosed with type 1 diabetes when she was 5 months old and then presented a glycemic level >600 mg/dL, ketoacidosis, and sepsis. She has been, since then, intermittently followed at the Endocrinology and Diabetes Unit of Alcides Carneiro University Hospital.

RESULTS — On the first medical appointment after hospital discharge, the patient was between the 20th and 30th percentiles for weight and between the 10th and 20th percentiles for height, according to the National Center of Health Statistics criteria. She was receiving 13 units daily of recombinant DNA human insulin (NPH associated with regular insulin), with an HbA1c (A1C) level of 15.1% (reference value 4.0–6.2%). The patient’s mother has participated effectively in the treatment by monitoring her daughter’s glycemic levels (15 glycemic tests per month) at home and doing partial rotation of injection sites.

When she was 32 months, she returned to our care to investigate abdominal rotation of injection sites. However, there were also lipoatrophic lesions in these areas. Her mother tried to return to the first sites of injections because of the smaller intensity of pain the patient felt.

The chosen treatment was the injection on lipoatrophic areas of a mix of insulin and betamethasone, using 0.075 mg of corticoid in each injection. This had been tried successfully in the 1970s (10). She returned to our care after 1 month of hospital discharge, with an A1C of 8.8%, using 14 units daily of NPH insulin mixed with betamethasone. In November 2004, 6 months following this treatment, a total remission of lipoatrophy occurred (Fig. 1B).

CONCLUSIONS — We report a case of complication when following a recombinant DNA human insulin treatment, a rare observation in current clinical practice. Due to the rarity of this phenomenon it is difficult to find a sufficient number of cases to make a more extensive evaluation. This is the second case of lipoatrophy of 328 people with type 1 diabetes in using 10 units daily of NPH insulin with two circumscribed localized lipoatrophic areas of ~5 cm in diameter on both arms (Fig. 1A). She was presenting an A1C of 10.4%. According to her mother’s report, the patient had been presenting atrophic lesions on injections areas for a year, at which point she looked for medical assistance in the city where she lives. Many treatments were tried, mainly the change of injections sites. However, there were also lipoatrophic lesions in these areas. Her mother tried to return to the first sites of injections because of the smaller intensity of pain the patient felt.

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Figure 1—A: Lipoatrophic area in the right arm. B: Total remission of lipoatrophic area.
our care. In both cases, the use of beta-
methasone associated with insulin was ef-
fective. Due to the natural anxiety of the
reported patient’s parents and the child
being too young—unlike the subjects in
Kumar et al. (9)—we have chosen the
treatment of all areas with lipoatrophy at
the same time. Also unlike Kumar et al.
(9), we have chosen the use of fixed doses
of corticoids (0.075 mg/dose). It is possi-
ble that the use of corticoid doses per unit,
in cases in which the patients use high
insulin doses, can cause hypercorti-
solism; even so, this did not occur on the
patients followed by Kumar et al., proba-
bly because of the lower insulin doses re-
quired by his patients (36.7 ± 18 units/
day [means ± SD] before and 38.2 ± 18
units/day during the therapy) (9).

Since the advent of human insulin
and insulin analogs, an important reduc-
tion in the number of people with lipoat-
rophy caused by insulin therapy
occurred. We need other reports like this
one as well as multicentric controlled
studies to establish which is the best treat-
ment for this rare but mutilating insulin
therapy complication.

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