Spontaneous Growth Hormone (GH) Secretion in an Eight-Year-Old Boy with Cushing's Disease

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Introduction

Impaired linear growth in children with Cushing's disease results mainly from inhibited insulin like growth factor I (IGF-I) bioactivity, decreased type 1 collagen synthesis and suppressed growth hormone (GH) secretion (1).

Case Report

An 8 2/12-year-old boy was referred because of excessive weight gain of 13 kg within 15 months. Height was at the 10 th centime (c.) and the weight (related to 50th c. of height) was above the 97th c. Clinical examination showed cushingoid body image and pubic hair (Tanner 2-3) Both testes had a volume of 3 mL. Bone age was 6 years (Greulich Pyle). Initial endocrinological findings and computertomography showed no evidence of tumor. Between the age of 10 and 11 years, growth velocity decelerated dramatically After repeating the endocrinological examinations, the source of the suspected Cushing's disease was located by magnetic resonance imaging. Within the first 5 months after extirpation of an adrenocorticotropin (ACTH)-producing chromophobic pitu-

itary adenoma, there was a weight reduction of 10 kg and a catch-up growth of 4.8 cm. Calculated height velocity was 11.5 cm/year.

10 days before surgery and 4 months after tumor extirpation, blood samples were collected by a pump (Camedia, Sweden) every 20 min, from 20.00 to 01.00. Values of serum GH were measured by radioimmunoassay (RIA) (Serono Italy). The sensitivity was 0.5 ng/mL. An arginine test (0.5 g/kg of 10 % arginine HCl in 0.9 % NaCl infused i/v at a constant rate over 30 min) was performed, including measurements of prolactin and insulin. IGF-I and IGFBP-3 were measured by commercial RIA systems.

In overnight profile of spontaneous GH before operation, serum GH concentrations showed levels between 0.68 and below 0.5 ng/mL (0.574 ± 0.075). Five months after surgery, they were between 1.43 and below 0.5 ng/mL (0.64 ± 0.264). Calculated areas under the curves demonstrated no significant statistical differences. On using arginine, GH raised only marginally (1.47 ng/mL). We found no evidence of hyperinsulinemia (<800 pmol/L) or hyperprolactinemia (40 mU/L). IGF-I (152 ng/mL) and IGFBP-3 (3.05 mg/L) showed normal and subnormal values respectively.

The inhibitory effect of cortisol on GH is due to increased hypothalamic somatostatin

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secretion (2). Despite a clearly accelerated growth rate after tumor removal, we found no significant difference between GH secretion before and after surgery. Arginine, which is thought to stimulate GH secretion by decreasing hypothalamic somatostatin tone, was unable to normalize the GH response. We measured normal IGF-I and IGFBP-3 levels after removal of the adenoma. Normal IGF-I and IGFBP-3 levels have been demonstrated in children with Cushing's disease (1). In contrast to GH deficiency in craniopharyngioma, the normal values of prolactin and insulin excluded any influence of these hormones on postoperative catch-up growth. After the diminution of endogenous cortisol, initial catch-up growth may be the result of increased IGF-I bioactivity.

References

1. Giustina A, Wehrenberg WB. The role of glucocorticoids in the regulation of growth hormone secretion. Mechanisms and clinical significance. *Trends Endocrinol Metab* 1992; 3: 306-11.
2. Lima L, Arce V, Diaz MI, Presguerres JFA, Devesa J. Glucocorticoids may inhibit growth hormone release by enhancing beta-adrenergic responsiveness in hypothalamic somatostatin neurons. *J Clin Endocrinol Metab* 1993; 76: 439-44.
3. Bang P, Degerblad M, Thoren M, Schwander J, Blum W, Hall K. Insulin like growth factor (IGF) I and II and IGF binding protein (IGFB) 1, 2, and 3 in serum from patients with Cushing's syndrome. *Acta Endocrinol* 1993; 128: 397-404.