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Case Report

Growth Hormone Therapy in Panhypopituitarism Secondary to Craniopharyngioma

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Abstract

A 10-year-old boy was referred for assessment of growth failure. After normal early growth, he showed progressive decline in height velocity. Endocrine evaluation revealed severe growth hormone (GH) deficiency, and neuroimaging identified a suprasellar cystic lesion compatible with craniopharyngioma. Subtotal resection followed by stereotactic radiotherapy resulted in panhypopituitarism, requiring replacement with desmopressin, levothyroxine, hydrocortisone, and testosterone. Subsequent GH therapy improved final height to 170.6 cm. Treatment adherence was initially poor but improved markedly after switching to an automated injection device. This case highlights the importance of neuroimaging in GH deficiency, careful multidisciplinary follow-up after craniopharyngioma, and the crucial role of adherence-enhancing devices in optimising long-term GH therapy outcomes.

Keywords: *Growth Hormone Therapy; Panhypopituitarism; Craniopharyngioma*

Case Presentation and Discussion

A 10-year-10-month-old male was referred from primary care for evaluation of growth. His growth had followed the 50th percentile until age 3, after which his height velocity progressively declined.

Family history: Healthy father with early pubertal spurt; healthy mother, menarche at 12 years; no endocrinopathies or consanguinity. Target height: 171.02 cm.

Perinatal and medical history: Normal pregnancy and term delivery (40+1 weeks). Birth weight 3160g (-0.63 SD), length 50 cm (-0.26 SD), not SGA. Normal neonatal period. Immunisations up to date. No relevant previous illnesses or allergies.

Physical examination (first visit): Chronological age 10.9 years; height 137.3 cm (-1.03 SDS), weight 31.87 kg, BMI 18.88 kg/m^2 (-0.03 SDS). Normal phenotype, good general condition. Pubertal development: penis 6 × 2 cm, testes 6 ml, no pubarche or axillary hair. Rest of physical exam unremarkable.

Initial investigations: Bone age 10.75 years, consistent with chronological age, predicted final height 171.6 cm (in line with genetic target). Follow-up every 5 - 6 months revealed progressive fall in height percentile.

At 13.6 years, height was 147.1 cm (-1.77 SDS), weight 40.1 kg, height velocity 3.09 cm/year (percentile 0, -5.35 SDS). Tanner G2, P2, testes 8 - 10 ml. Two GH stimulation tests showed subnormal peaks (< 5 ng/ml): insulin tolerance test (peak 3.18 ng/ml, IGF-1 226 ng/ml); glucagon test (peak 2.86 ng/ml). Pituitary gonadotropins and TSH were normal.

Brain MRI revealed a suprasellar cystic lesion (2.1 × 1 cm) with ring enhancement, compressing the pituitary stalk-suggestive of craniopharyngioma. CT confirmed coarse calcifications of the cyst wall.

Diagnosis

Craniopharyngioma - a rare, benign epithelial tumour of the sellar or parasellar region, frequently causing neurological, visual, and hypothalamic-pituitary dysfunction.

Treatment and postoperative course

At 13.96 years, subtotal resection was performed via right pterional craniotomy. Histopathology confirmed craniopharyngioma.

Immediate postoperative findings: Polyuria (central diabetes insipidus), hypernatremia (Na 160 mEq/L), ACTH < 5 pg/ml, cortisol 3 µg/dl, free T4 0.71 ng/dl, TSH 0.06 mIU/L, LH < 0.1 mIU/ml, FSH 0.5 mIU/ml, testosterone 0.05 ng/ml, PRL 12.0 ng/ml. Replacement therapy was started with desmopressin 120 µg/day, levothyroxine 50 µg/day, and hydrocortisone 10 mg/day.

Neuroimaging follow-up: Residual suprasellar cystic remnant (6.7 × 12 × 13 mm) extending towards the right optic nerve and smaller enhancing cysts (3 mm) at the chiasmal level. Stereotactic radiotherapy was performed.

Follow-up and endocrine management

At 14.9 years: Height 151.9 cm (-1.91 SDS), growth velocity 4.3 cm/year (17.9th percentile), bone age 13.5 years (predicted adult height 169.7 cm). Puberty G2, testes 8 ml. The patient developed body image concerns and social withdrawal due to delayed puberty. Testosterone therapy was initiated (50 mg IM every 4 weeks, increased to 250 mg), with poor response.

At 15.3 years: Height 152.8 cm (-2.27 SDS). MRI unchanged, showing stable calcified remnants. Multidisciplinary consensus (including neurosurgery) confirmed no contraindication to GH therapy. Parents expressed concern about final height.

At 15.5 years: Height 154.4 cm (-2.43 SDS), bone age 13.75 years (predicted height 168.9 cm). Somatotropin was initiated at 0.025 mg/kg/day. Compliance was initially poor due to injection aversion. After counselling, the device was switched to an automated injector (Saizen®), which improved adherence and reduced anxiety.

At 19.1 years: Final height 170.6 cm (+0.89 SDS), testes 8-10 ml (Tanner P2-3). He was transferred to adult endocrinology on levothyroxine 150 µg/day, hydrocortisone 15 mg/day, desmopressin 120 µg/day, testosterone 250 mg/4 weeks, and GH 0.024 mg/kg/day.

Conclusion

Brain MRI is mandatory in all children with GH deficiency when both stimulation tests show peak GH < 5 ng/ml, to exclude structural lesions. Long-term GH therapy demands sustained adherence; poor compliance leads to suboptimal growth outcomes. Automated injection devices that hide the needle, provide electronic monitoring, and send reminders may significantly enhance patient acceptance and treatment adherence [1-7].

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