Cushingoid features, and biopsy-proven Candida esophagitis. Initial testing was consistent with ACTH-dependent Cushing syndrome: elevated 24 hour urinary cortisol excretion (1,310.54 mcg/24h; n <50 mcg/24h), abnormal 1 mg dexamethasone suppression test (68.3 ug/dL), and elevated ACTH level (200 pg/mL; n: 7.2–63.3 pg/mL). MRI was negative for a pituitary lesion but abdominal CT revealed an 8.8 cm liver mass with biopsy consistent with a well-differentiated neuroendocrine tumor, WHO Grade 2. Subsequent ^{68}Ga-DOTATATE-PET/CT noted DOTATATE uptake in the liver lesion, a 0.9 cm right pulmonary nodule, and the pancreatic tail without CT correlate. Initially, the patient was prescribed mifepristone and spironolactone for hypokalemia. Given her NET of unknown primary, metastatic disease, and immunocompromised state due to hypercortisolism, the patient was not a candidate for surgical resection of her NET but was instead referred for bilateral adrenalectomy. However, she rapidly decompensated from complications of her hypercortisolism prior to surgery. Her weakness progressed to immobility, and she developed acute psychosis manifested as agitation and mutism. The patient was immediately admitted to the hospital where she developed new-onset atrial flutter and myelosuppression requiring multiple transfusions. She underwent urgent bilateral adrenalectomy, but despite surgery, her postoperative course was complicated by hypoxemic respiratory failure and shock. The patient shortly thereafter expired from pulseless electrical activity arrest.

Conclusion: This atypical case of an ectopic ACTH-secreting NET highlights the life-threatening complications associated with severe hypercortisolism, including: opportunistic infection, severe metabolic abnormalities, psychosis, myopathy, and critical illness that can incite myelosuppression and unstable arrhythmias. These patients can quickly deteriorate and are at high risk for mortality. Early diagnosis and swift reversal of their hypercortisolism with bilateral adrenalectomy are oftentimes needed to prevent these potentially fatal complications.

Pediatric Endocrinology

PEDIATRIC SEXUAL DIFFERENTIATION, PUBERTY, AND BONE BIOLOGY

Effect of Pubertal Induction with Gonadotropins and GnRH Therapy in Male Hypogonadotropic Hypogonadism: Meta-Analysis

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Background: The use of gonadotropins is a recent strategy for inducing puberty in adolescent males with hypogonadotropic hypogonadism (HH). Testosterone use has been discouraged in patients who desire to preserve fertility. Human chorionic gonadotropin (hCG) has been recommended for inducing puberty in HH; however, several clinicians administer hCG in combination with other gonadotropins. The benefits of using combination gonadotropin therapies (hCG+) over hCG monotherapy in prepubertal adolescent males with HH has not been clearly established. We performed a meta-analysis to assess the outcomes of hCG compared to hCG+ in terms of virilizing effects and testicular growth in peripubertal boys with HH.

Methods: We evaluated for heterogeneity among studies. We calculated pooled means for the post-treatment mean testicular volume (MTV), testosterone (T) level, and penile length for the hCG monotherapy and hCG+ treatment groups. We performed a meta-regression analysis to examine the contribution of various factors to post-treatment outcomes including baseline T level, age, treatment duration, and study quality.

Results: The meta-analysis included seven studies. All participants were prepubertal (age range: 13.3–25.9 years), with weighted mean treatment durations of 10.95 months for hCG monotherapy and 28.2 months for hCG. There was significant heterogeneity in baseline age ($Q = 121.71$; $df = 1$; $P < 0.001$) and T levels ($Q = 436.74$; $df = 1$; $P < 0.001$) between the two treatment groups. The hCG+ group had a larger post-treatment MTV, but it was not significantly different between the two groups (6.60 mL [95% CI, 3.18–10.02] for hCG monotherapy vs. 10.02 mL [95% CI, 8.30–11.75] for hCG+; $P = 0.079$). Post-treatment T levels differed significantly between the two groups (101.89 ng/dL [95% CI, 50.7–153.08] for hCG monotherapy vs. 424.10 ng/dL [95% CI, 304.59–543.62] for hCG+; $P < 0.0001$). A meta-regression analysis of post-treatment T levels showed that baseline age, baseline T level, and study grade did not contribute significantly to the difference between treatment groups. Treatment duration explained 3.04% of the difference between the two groups ($P < 0.0001$). After adjusting for treatment duration, the post-treatment T level remained significantly higher in the hCG+ group compared to the hCG monotherapy group. The hCG+ was also associated with better outcomes for post-treatment penile length, although these findings relied on data from only three studies.

Conclusion: Our study indicates that hCG+ therapies provide potential benefits over hCG monotherapy for pubertal induction in males with HH, regarding T levels and penile growth, with no difference in testicular growth between treatments. Prospective pediatric studies are needed to assess the benefits of these therapies in patients with HH and, ultimately, to establish guidelines for gonadotropin therapy in the adolescent population.

Thyroid

BENIGN THYROID DISEASE AND HEALTH DISPARITIES IN THYROID I

Quality of Life Following Treatment for Graves' Disease: A Comparison of Radioactive Iodine Ablation and Surgery

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Introduction: Quality of Life (QoL) is reduced in patients with Graves' disease, however the impact of treatment modality is unclear, with conflicting evidence from recent studies (1–3). We hypothesized that surgery would have a greater impact than radioiodine on QoL in Graves' disease, especially with regard to the physical-symptom subdomain.