



Ketogenic Diet as Adjunctive Therapy to Metabolic Derangements Associated with Cushing's Disease

ORIGINAL PUBLICATION

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BACKGROUND

Cushing's disease (CD) is a disorder of hypercortisolism related to exposure to high levels of cortisol originating from a pituitary mass. The metabolic derangements associated with CD include visceral obesity, elevated blood pressure, dyslipidemia, type II diabetes mellitus and insulin resistance. CD physical exam findings include round face, dorsal fat pad, central obesity, abdominal striae, acne, and ecchymosis.

PATIENT PRESENTATION

HPI: 37-year-old male of Asian descent using a low carb (LC) diet to address weight gain and elevated blood sugars in 2019. Patient initially lost 35 lbs on a LC diet. Other symptoms included easy bruising, central obesity, headaches, hematuria, and hypertension. In October of 2021 the patient was admitted to the hospital for hypertensive urgency, with a blood pressure of 216/155. Patient underwent a hypertension workup and was discharged on hydrochlorothiazide, labetalol, amlodipine and lisinopril and advised to follow a low salt diet. Patient followed up with a primary care doctor, cardiologist and hematologist before contacting our office in January of 2022.

Significant physical exam findings: BP 160/120, moon facies, abdominal striae.



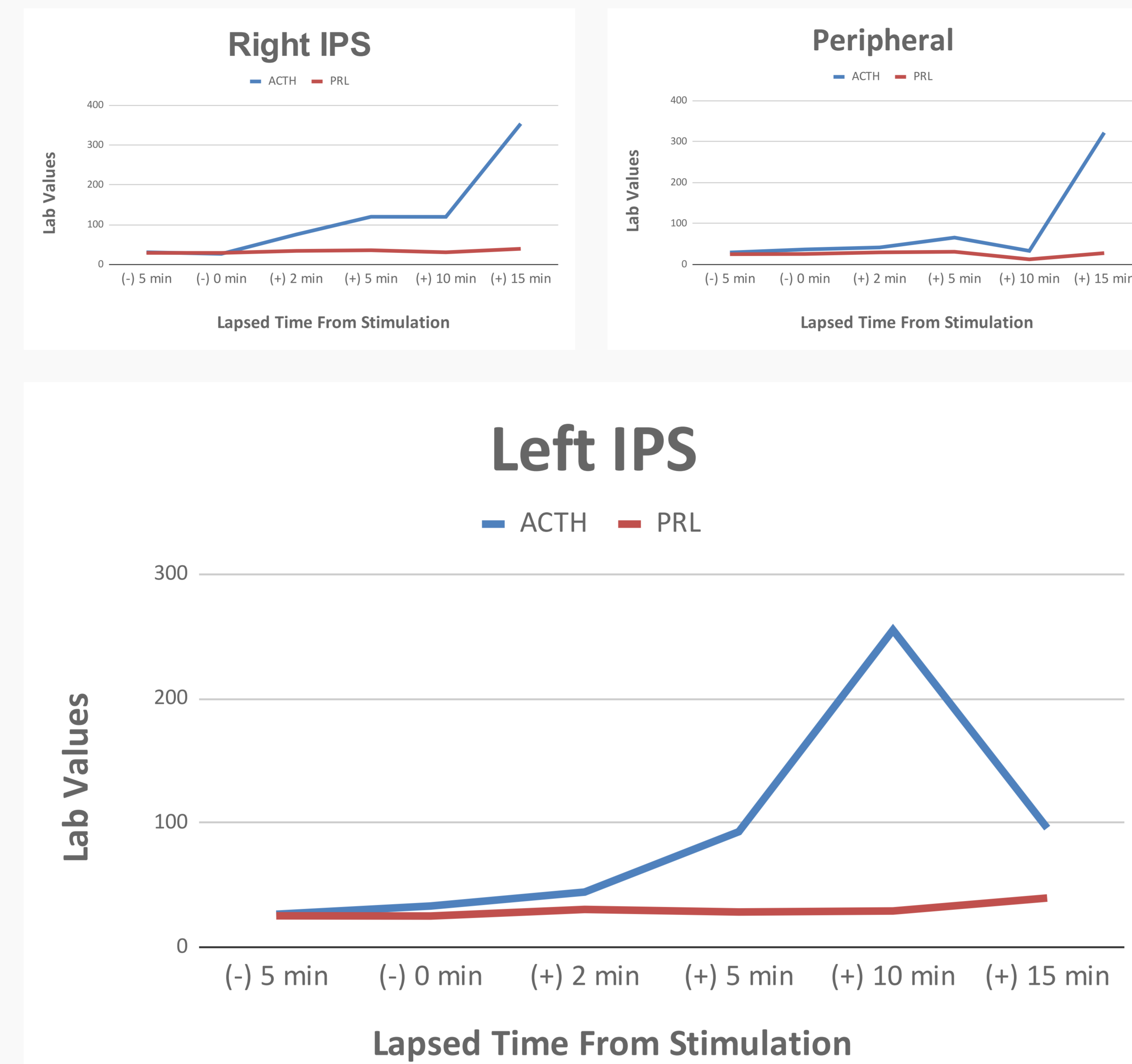
A. 2019 after initial weight loss

B. 3/2022 office visit

WORK UP

- (+) Low dose dexamethasone suppression test
- Elevated plasma ACTH: 27.2 pg/mL
- MRI: 4 mm lesion in central pituitary gland

RESULTS OF INFERIOR PETROSAL SINUS SAMPLING



Inferior Petrosal Sinus Sampling: increased ACTH in B/L inferior petrosal sinus and peripheral measurements after CRH stimulation. R inferior petrosal sinus to peripheral ratio 3.60 and L IPS:P 7.65

CLINICAL COURSE

Our patient underwent a pituitary tumor resection followed by a course of hydrocortisone. One year after surgery our patient is off steroids and continues to maintain a LC diet. Our pt's glucose, triglycerides and LDL have come down significantly post-operatively on a LC diet.

PROGRESSION OF METABOLIC MARKERS BEFORE AND AFTER SURGERY ON 11/2022

	11/2020	10/2021	2/2022	3/2022	8/2023
Glucose mg/dL	85	115	99	98	92
Total Cholesterol mg/dL	231	284	275	258	203
Triglycerides mg/dL	63	83	88	208	64
HDLc mg/dL	71	56	50	60	45
LDLc mg/dL	148	206	210	157	146

ROLE OF LC DIET AS ADJUNCTIVE THERAPY

Many metabolic derangements and symptoms of CD can remain after traditional therapy [1]. As shown with our patient a LC diet can help reverse many of these derangements.

Weight Loss: Patients treated for CD found their weight remained largely unchanged after treatment [1]. Low carb diets have proven greater efficacy than low fat diets for weight loss in literature [2,3].

Hypertension: A LC diet has been shown to reduce blood pressure by lowering insulin and producing ketones. Insulin has been demonstrated to raise blood pressure through several mechanisms including renal sodium reabsorption and activation of sympathetic nervous system [4]. It is thought that the production of ketones has a natriuretic effect on the body and therefore lowers systemic blood pressure [3].

Lipid Profile: Triglyceride levels in patients with CD after treatment remained high [5]. LC diets have significant impact on lowering triglyceride levels and increasing HDL levels [4].

Insulin Resistance: Insulin resistance is a common comorbidity of hypercortisolism which can improve with a LC diet [6,7].

Cortisol Levels: Current treatment of CD includes medications which block cortisol production and/or cortisol secretion [8]. Literature shows that a LC diet can minimize systemic cortisol levels through various mechanisms [2,9].

CONCLUSION

After treatment, metabolic derangements of CD can remain. However, after treatment our patient continued a LC diet and was able to improve his blood sugars, cholesterol and blood pressure. Overall, this case shows the power of nutritional intervention as an adjunctive therapy to treat the metabolic derangements associated with CD.

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