Acquired brain injury-induced hyperphagia successfully treated with a GLP-1 agonist

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Background

Hyperphagia is a potentially serious complication following brain injury (BI). The exact mechanisms are unknown and likely multifactorial. They include injury to the hypothalamus or frontal lobes as well as the effects of medications and changes in activity and mobility. Untreated, resultant weight gain can cause significant morbidity in its psychologic, metabolic, and physiologic effects. Several glucagon-like polypeptide 1 agonists (GLP-1s) were approved since 2005 for the treatment of diabetes mellitus (DM) and obesity. Their usefulness in other conditions is not well studied. We present two cases of hyperphagia after BI successfully treated with GLP-1s.

Case presentations

Case 1: A 54-year-old female with a history of multiple traumatic brain injuries (multiple falls and a ski accident) complained of years of insatiable hunger leading to a greater than 20-pound weight gain. With tremendous will-power, she adapted a strict meal-plan and relieved her hunger by drinking water instead of eating (10-12 liters a day). She sipped so much water that her sodium remained 123 – 133 mmol/L (ref: 135-146) with dilute urine. Pituitary function was normal. Medications for chronic BI-related headaches and depression: bupropion XL 300mg daily
topiramate 300mg twice daily, sertraline 150mg daily, temazepam 30mg at bedtime, and sumatriptan 100mg as needed for headache.

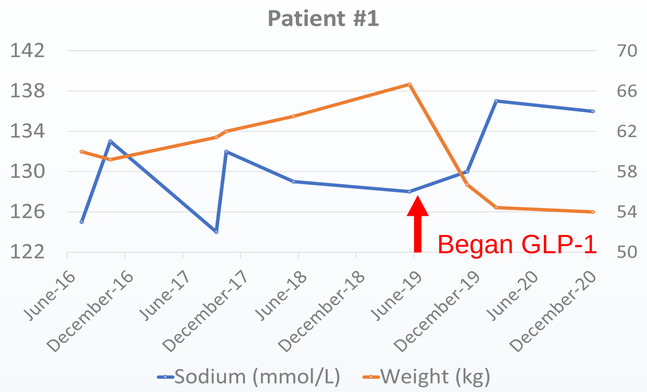
Intervention

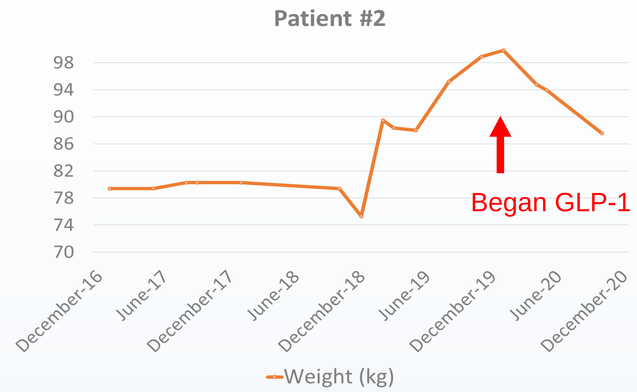
Case 1: Semaglutide 0.25mg/week was started and increased to 0.5mg/week. Within the first six months of treatment, she experienced 22 pounds of weight loss (15% of maximum weight), hunger relief, less water sipping behavior, and more enjoyment of food. Her sodium rose to 137 mmol/L.

Case 2: A 40-year-old female had a history of sudden intracranial hemorrhage complicated by ischemic stroke. Treatment included craniectomy and aneurysm clipping. She developed a rapid, documented, weight gain of 45-pound over thirteen months. She reported excessive hunger, but was unable to stop the weight gain despite aggressive lifestyle modification attempts. Thyroid and cortisol levels were normal. In addition to weight gain, she suffers since this event from chronic headaches, complex regional pain syndrome, anxiety, and depression. Medication: amitriptyline 50mg at bedtime, baclofen 20mg twice daily, and gabapentin 600mg three times daily.

Intervention

Case 2: Liraglutide 0.6 mg/day was started and increase to 1.8mg/day. Within nine months of treatment to date, she has experienced 26 pounds of weight loss (11.8% of maximum weight) with associated decrease in subjective hunger. She reports no side effects.





Discussion

Weight gain after BI can result from decreased mobility and activity levels. It can be a side effect of medications used for depression and anxiety from BI. Many patients, however, suffer from hyperphagia. The exact mechanisms of this are unclear and likely multifactorial. Das reported a 42-year-old man who developed aggressive outbursts, disinhibition, and inability to control food intake following a frontal lobe subdural hematoma after a car accident. This was attributed to frontal lobe injury [1]. In a study of 107 patients with traumatic BI, 42% had weight gain by a median follow up of 38 months. These patient had a high rate of hyperphagia and behavior disinhibition. The authors proposed mechanisms of ventromedial hypothalamic or brain stem dysfunction, or disinhibition and poor impulse control due to frontal lobe injury [2]. Management of hyperphagia is challenging and requires a multidisciplinary approach including behavior management, diet modification, and graded activity [3]. Current pharmacological interventions include topiramate, minimizing medications associated with weight gain, and increasing medications that assist in impulse control. GLP-1s were first approved for treatment of diabetes in 2005 and for obesity in 2010. They induce of satiety by actions in the peripheral and central nervous system, including the brainstem and hypothalamus. It is possible that GLP-1s may act on the causal mechanism for increased hunger in some BI hyperphagia patients. Alternatively, they may have their clinical effect through a parallel pathway. Although they can be used in any obese patient, GLP-1s have not been specifically studied in this population.

In our two patients, initiation of GLP-1 therapy proved life-changing. They are both very grateful and satisfied with the results of weight gain and relief from constant hunger.

Conclusion

Hyperphagia in BI is an incompletely understood condition that carries significant morbidity and for which there are a paucity of recognized, targeted treatments. GLP-1 antagonists are potent in treating obesity, and they may be an effective option for acquired brain injury-induced hyperphagia. Further studies are warranted to investigate the application of GLP-1s and other treatment options in these patients.

References

1. Das A, Elwadhi D, Gupta M. Secondary Eating Disorder: A Reality? Case Report of Post Brain Injury Sequelae. Indian J Psychol Med. 2017;39(2):205-208.
2. Crenn P et al. Changes in weight after traumatic brain injury in adult patients: a longitudinal study. Clin Nutr. 2014 Apr;33(2):348-53.
3. Rowell AM, Faruqui RA. Persistent hyperphagia in acquired brain injury: an observational case study of patients receiving inpatient rehabilitation. Brain Inj. 2010;24(7-8):1044-9.