Case Report

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Marked reduction in the hospital admission rate of a man with nonislet cell tumor hypoglycemia after starting steroids: a case report

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Introduction and importance: Nonislet cell tumor hypoglycemia (NICTH) is a rare cause of hypoglycemia. It results from the secretion of insulin-like growth factor 2 from various tumors, which acts on insulin receptors, increasing glucose utilization by the tumor. Among the treatment options for patients with NICTH, steroids have the best palliative effects.

Case presentation: The authors present the case of a man with metastatic lung cancer who had multiple hospitalizations for hypoglycemia and associated anorexia, weight loss, and depression. After receiving steroids, the patient's hospital admission rate due to hypoglycemia reduced, depression improved, and weight loss reversed.

Clinical discussion: Steroids, diazoxide, octreotide, glucagon infusion, and recombinant growth hormone have shown good results in treating NICTH. Steroids have many advantages: they are easy to administer and relatively inexpensive. In our patient, steroids had the added benefit of improving the appetite with subsequent weight gain and controlling depression. They also significantly reduced the readmission rate.

Conclusion: NICTH is a rare cause of hypoglycemia. Glucocorticoids show better palliative effects than other medical treatments. In our patient, steroids dramatically reduced the number of hospitalizations due to hypoglycemia while improving the appetite, weight, and depression.

Keywords: hospital admission rate, hypoglycemia, NICTH, palliative, steroid

Introduction and importance

A nonislet cell tumor is a rare cause of hypoglycemia that was first discovered in 1929 by Nadler and Wolfer in a patient with hepatocellular carcinoma[1]. The incidence of this condition is unknown but nonislet cell tumor hypoglycemia (NICTH) is reported to be four times less common than insulinoma. However, the true incidence may be higher as NICTH remains unrecognized in many patients[2].

The pathophysiology of NICTH includes secretion of 'big' insulin-like growth factor 2 (IGF-II) from a wide variety of tumors, which acts on insulin receptors and increases glucose utilization by the tumors[2–6]. Another mechanism by which nonislet cell tumors cause hypoglycemia is decreased hepatic glucose output, associated with the destruction of liver cells because of tumor infiltration.

There are multiple causes of NICTH, including gastrointestinal, endocrine, reproductive, respiratory, renal, and mesenchymal tumors. The treatments for NICTH include therapy with steroids[7–9], diazoxide[10], octreotide[10], glucagon infusion[11], and recombinant growth hormones[10,11], and surgery[12]. Steroids, however, are especially advantageous for patients with advanced cancer who require palliative treatment for multiple symptoms[7–12]. To support this claim, we present the case of a man with metastatic lung cancer who required multiple hospitalizations for hypoglycemia and associated anorexia, weight loss, and depression. The patient responded dramatically to steroids, with a notable reduction in the rate of hospital admission for hypoglycemia along with alleviation of depression and weight loss symptoms. This report conforms to the Surgical CAse REport (SCARE) 2020 Criteria[13].

HIGHLIGHTS

- A nonislet cell tumor is a rare cause of hypoglycemia.
- Patient with nonislet cell tumor hypoglycemia responds better to steroids than other treatment modalities.
- Glucocorticoids have superior palliative benefits than other medical treatment. They improve appetite, promote weight gain, and reduce the symptoms of depression in patients with nonislet cell tumor hypoglycemia.
- Steroids are inexpensive, easy to administer, and can dramatically reduce the number of hospitalizations for hypoglycemia in patients with nonislet cell tumors.

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Case presentation

A 72-year-old male of Mediterranean descent was recently diagnosed with stage IV nonsmall cell lung cancer. The patient presented to a physician with symptoms of weight loss greater than 22 kg and severe depression. After 2 months, the patient visited the emergency department for drowsiness and blurred vision. The patient was started on tube feeding, but his plasma glucose level remained low at 21 mg/dl. Dextrose saline (10%, D10) was administered intravenously at a rate of 100 ml/h; however, hypoglycemia and drowsiness persisted despite the administration of D10. Therefore, the patient was admitted to the ICU.

The patient's past medical history was significant for nonsmall cell lung cancer; he had undergone a right lung lobectomy, followed by chemo- and radiation-therapy, since he was not able to afford the cost of immunotherapy. His social history indicated chronic tobacco use. He was a retired teacher and had been residing at an assisted living facility under close supervision during the period of the current study. The patient's family history was unremarkable.

On physical examination, the patient appeared malnourished with a body mass index of 14. Significant lower limb edema was present. The patient's vital signs were as follows: blood pressure, 96/60 mmHg; heart rate, 98 beats per min; temperature, 36.4°C.

A formal workup for hypoglycemia was performed. The diagnosis of NICTH was made after ruling out other causes of hypoglycemia (including exogenous insulin/sulfonylurea intake, insulinoma, hypothyroidism, adrenal insufficiency, or liver failure). The patient had suppressed C-peptide immunoreactivity, low levels of insulin and IGF-I, and elevated IGF-II levels (Table 1).

After being diagnosed with NICTH, the patient was administered 40 mg of intravenous solumedrol thrice a day, and subsequently, his hypoglycemia improved. The medication was then switched to 30 mg of oral prednisone daily. Subsequently, improvements in appetite, mood, and malaise were observed. However, after being transferred to a skilled nursing facility, the patient refused to continue steroid therapy for fear of potential side effects such as hypertension, osteoporosis, and steroid-induced psychosis. Therefore, therapy with octreotide and diazoxide was started. However, in the following month, the patient required up to 10 hospital admissions and 12 emergency room visits for severe hypoglycemia. Consequently, the patient agreed to try oral steroids to control the symptoms.

After discontinuing octreotide and diazoxide and starting oral prednisone at 30 mg daily, the patient required only two admissions in 40 days (admission rate for hypoglycemia was reduced by ~90%). In addition, improved appetite, weight gain of up to 15 kg, resolution of depression symptoms, and stabilization of blood pressure were observed.

Table 1

Laboratory data

Test	Result	Normal reference
Morning cortisol level	21 mcg/dl	6–23 mcg/dl
TSH	3.1 mIU/l	0.4–4.0 mIU/l
C-peptide	0.2 ng/m	0.5–2.0 ng/ml
Insulin	< 3 mcU/ml	5–20 mcU/ml
IGF-I	39 ng/ml	41–279 ng/ml
IGF-II	934 ng/ml	288–736 ng/ml

IGF, insulin-like growth factor; TSH, thyroid stimulating hormone.

Clinical discussion

Diazoxide, octreotide, glucagon infusion, and recombinant growth hormones have been reported to be effective in treating NICTH[7–12]. However, steroids have several advantages over these medications. For example, glucagon, growth hormones, octreotide, and diazoxide are relatively expensive. In addition, octreotide, glucagon, and recombinant growth hormones are injectable medications, and it can be challenging to administer these to frail patients confined to their homes. Steroids provide the added benefit of palliation for multiple symptoms. In our patient's case, therapy with steroids not only led to the resolution of hypoglycemia but also provided the added benefit of increased appetite, weight gain, and alleviation of depression.

Patients with cancer often present with many symptoms and are unable to receive definitive treatment. In our patient's case, therapy with steroids was superior to other medical therapies in terms of palliative benefits, reduction in the number of hospital visits for hypoglycemia, and the alleviation of associated symptoms.

Conclusion

A nonislet cell tumor is a rare cause of hypoglycemia. The diagnosis is confirmed in patients with hypoglycemia and tumors when other causes have been ruled out. Glucocorticoids have superior palliative benefits to other medical treatments, and in our patient's case, steroid therapy led to a drastic reduction in the number of hospitalizations for hypoglycemia while improving appetite, promoting weight gain, and reducing the symptoms of depression.

Ethical approval

Given the nature of the article, a case report, no ethical approval was required.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Patient perspective

The patient did not present his point of view.

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Author contribution

All authors contributed to this manuscript. I.E.: data collection, data interpretation, literature review and writing the initial draft; T.E.: supervision, review and editing.

Conflicts of interest disclosure

The authors have no conflict of interest to declare.

Research registration unique identifying number (UIN)

This is not an original research project involving human participants in an interventional or an observational study but a case report. This registration was not required.

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