

Persistent Hypoglycemia in a Diabetic Patient

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Introduction

Hypoglycemia occurs commonly in the diabetic patient. In some clinical situations, a hypoglycemic workup is indicated when concerned about an endogenous cause. Even so, iatrogenic causes of hypoglycemia in known diabetics must be ruled out to avoid unnecessary testing and therapy. In the setting of severe hypoglycemia, understanding the etiology is crucial as this could ultimately lead to death if untreated.

Case Presentation

HPI - A 69 year old African American male was admitted for persistent symptomatic hypoglycemia (dizziness, blurry vision, sweats, lethargy, and fatigue). He is a known diabetic of 6 years duration with good glycemic control. He was admitted to the hospital twice, within a 5 month time frame, with glucose levels in the 30's.

PMH/PSH – CAD, ICM, HTN, HLD, CKD, DM2, Pacemaker placement

Social history – Single, Disabled, Former Smoker, No EtOH, No illicit drugs

Family History – Mother: DM2, Father: Heart Failure

Medications – Plavix, Triamcinolone cream, Losartan, Carvedilol, Spironolactone, Furosemide, Aggrenox, Allopurinol, Omega-3 Fatty Acids, ASA, Ranitidine, Lovastatin, Nitroglycerin

Physical Exam – Hypotension, otherwise VSS, exam unremarkable other than 1+ pitting edema in bilateral lower extremities

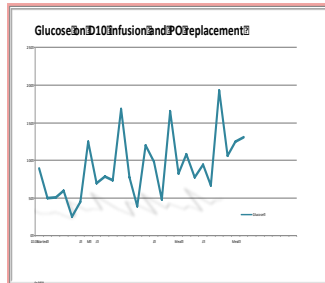
Labs – revealed low glucose, elevated creatinine, elevated BUN

Medication Reconciliation – An extensive medication reconciliation ensued, evaluating administration of insulin secretagogues (patient previously was on glimepiride). He and his family were adamant that he was not taking any glucose lowering agents as previously instructed at his last hospitalization for the same problem.

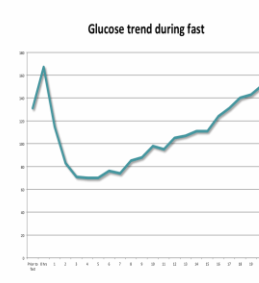
Hospital Course

- Persistent hypoglycemia despite multiple Dextrose 50 injections
- D10 drip started with and still with some persistent hypoglycemia. (Graph 1)
- A 72 hour fast was initiated, and the glucose trend while fasting is demonstrated in Graph 2. It was anticipated that the patient's glucose level would quickly drop when withholding food and D10.
 - Initial glucose within normal range
 - Quickly equilibrated and blood glucose unexpectedly began to rise.
 - Pro-insulin, C-peptide, and insulin levels were drawn and all elevated at start of fast.
- After the fast was initiated the patient's family brought his medications from home for review.
 - Glimepiride 4 mg amongst his medication bottles.
 - Admitted to usage for 2 days prior to admission.
 - The fast was terminated and medication counseling for cessation ensued

Graph: 1 On D10 Infusion



Graph 2: Glucose during fast



Discussion

Hypoglycemia in the diabetic patient:

Hypoglycemia in the diabetic patient is usually secondary to exogenous insulin and/or oral diabetic agents whether it be accidental, surreptitious, or malicious.

In this patient the use of exogenous agents was adamantly denied by patient and family, he had received counseling on this multiple times before. Therefore, the concern in an otherwise well individual would broaden the differential to include:

- 1) Insulinoma
- 2) Nesidioblastosis
- 3) Insulin autoimmune hypoglycemia

If Whipple's triad is present, a 72-hour fast is the diagnostic test of choice in determining the etiology of hypoglycemia. This involves monitoring of glucose levels and correlating levels of Insulin, Pro-insulin, C- Peptide, and Beta-hydroxybutyrate with hypoglycemic level.

Sulfonylurea induced hypoglycemia:

Hypoglycemia is a well known side effect of oral sulfonylureas. In a study comparing glyburide to glimepiride, prevalence of more severe hypoglycemia with glyburide was suggested to be due to renal clearance. Even so, hypoglycemia remains a major side effect of Glimepiride.

Treatment:

The first intervention is cessation of the offending agent (in this case Glimepiride). Next is supportive treatment of hypoglycemia with dextrose infusions and carbohydrate rich oral intake with close glucose monitoring until medication has cleared. There has also been some efficacy shown with utilization of Octreotide as an antidote for sulfonylureas.

Prevention:

Ultimately, prevention is the best intervention. Adequate counseling on proper use and, in this case, cessation should be offered, followed by close follow-up.

Symptoms, Signs, or both	Glucose (mg/dl)	Insulin (μ U/ml)	C-Peptide (nmol/liter)	Proinsulin (pmol/liter)	β -Hydroxybutyrate (mmol/liter)	Glucose increase after glucagon (mg/dl)	Circulating oral hypoglycemic	Antibody to insulin	Diagnostic interpretation
No	<55	<3	<0.2	<5	>2.7	<25	No	No	Normal
Yes	<55	>>3	<0.2	<5	\leq 2.7	>25	No	-/+	Exogenous Insulin
Yes	<55	\geq 3	\geq 0.2	\geq 5	\leq 2.7	>25	No	-	Insulinoma, NIPHS, PCRH
Yes	<55	\geq 3	\geq 0.2	\geq 5	\leq 2.7	>25	Yes	-	Oral hypoglycemic agent
Yes	<55	>>3	>>0.2	>>5	\leq 2.7	>25	No	+	Insulin autoimmune IGFs
Yes	<55	<3	<0.2	<5	\leq 2.7	>25	No	-	
Yes	<55	<3	<0.2	<5	>2.7	<25	No	-	Not Insulin (or IGF) mediated

IGF(s), post prandial hyperglycemia.
 * If C-peptide and proinsulin concentrations are low.
 † Insulinoma (or ICM) or PCRH.
 ‡ Evaluation and Management of Adult Hypoglycemic Disorders: An Endocrine Society Clinical Practice Guideline. The Journal of Clinical Endocrinology & Metabolism, March 2008, 94(3):709-728.

References

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