

HYPOGLYCEMIA

(Last updated 11/05/2019; Reviewers: Devang Sanghavi; MD; Tabinda Jawaaid, MBBS)

PRESENTING COMPLAINT: Palpitations, diaphoresis, tremor, transient neurological deficit,

FINDINGS

- **A** Check airway
- **B** ↑RR, rapid and shallow
- **C** ↑HR, rapid or irregular heart rate, elevated BP
- **D** Variable altered (V,P,U,D)*
- **E** Confusion, irritability, nervousness, tremor, sweating
- **L_{PC}** Non-Diabetic: ↓Glucose (<45-50mg/dl), Diabetic: ↓Glucose (<60mg/dl)
- **U_{PC}** Transabdominal ultrasound to rule out other causes of symptoms

***V** (verbal), **P** (pain), **U** (unconsciousness), **D** (delirious)

U_{PC} (point of care ultrasound) **L_{PC}** (point of care labs)

DEFINITION: Low serum glucose <70 mg/dl but varies (see above)

OTHER HISTORY

Predisposing factors: Insulin overdose, intensive diabetes treatment, drugs, sepsis, cardiac failure, liver failure, renal failure, adrenal insufficiency, insulinoma, alcohol, myocardial infarction, anorexia nervosa

Signs and Symptoms: Cognitive impairment, syncope, behavioral changes, rarely coma and seizure, occasional tachycardia

DIFFERENTIAL DIAGNOSIS

Sepsis, myocardial infarction, hepatic failure, renal failure, insulinoma, anorexia nervosa

OTHER INVESTIGATIONS

- **Labs:** Serum electrolytes (potassium, sodium and magnesium)
- **Diagnostic steps:**
 - Hypoglycemic patient is diabetic vs non-diabetic
 - If non-diabetic, does the patient satisfy Whipple's triad (fasting hypoglycemia <50mg/dL, symptoms of hypoglycemia, immediate relief of symptoms after the administration of IV glucose)
- **Labs:**
 - **Diabetic patients:** measure serum glucose to confirm hypoglycemia
 - **Non-diabetic patients:** measure serum glucose, insulin, C-peptide, proinsulin, and beta-hydroxybutyrate concentrations, insulin antibodies

- **Other tests in non-diabetics:** liver function tests, screen for oral hypoglycemic agents, consider 72 hour fasting test, mixed-meal test.
- **Additional tests**
 - Complete blood count and blood cultures (if suspected infection); Electrocardiogram and cardiac enzyme (if cardiac ischemia suspected); liver function test (ALT,AST, alkaline phosphatase level) (If hepatic failure suspected); serum creatinine and BUN/Cr levels (if renal failure is suspected)
- **Monitoring:** Serum glucose level, serum potassium level, serum insulin level
- **Imaging:** If suspecting insulinoma transabdominal ultrasonography, CT and MRI

THERAPEUTIC INTERVENTIONS

- **Initial Therapy:** IV dextrose (25g of 50 percent glucose [dextrose]) or if no IV access 0.5 to 1.0 mg Glucagon given as a SC/IM injection
- **Subsequent Therapy:** Depending on the etiology of hypoglycemia, continuous dextrose infusion may be needed.
- **Asymptomatic hypoglycemia:** Repeat testing of blood sugar levels, ingesting carbohydrates, adjusting the insulin or oral hypoglycemic regimen

MANAGEMENT AFTER STABILIZATION

- **Specific Treatment based on etiology**
 - Discontinue offending drugs; treat underlying (critical) illnesses
 - Tumor reduction surgically, or chemotherapy or radiation in cases of non-islet cell tumor
 - In cases of autoimmune hypoglycemia, glucocorticoids or other immunosuppressant can be used.
 - In cases of diabetics with hypoglycemia, modification of regimen to balance glycemic control and avoid hypoglycemia.
 - In ICU setting the target blood sugar level should be <180mg/dl
- **Prevention:** Avoid oral hypoglycemic agents in management of inpatient diabetics, less intensive glycemic control of inpatient diabetics, regular self-monitoring of blood glucose, flexible insulin regimen rather than fixed insulin regimen, basal bolus insulin regimen rather than the sliding scale regimen in treating inpatient diabetics; patients with chronic kidney and liver disease are at increased risk

CAUTIONS

- Look for infectious source and treat with appropriate antibiotics
- Complications: Seizures, concern for long-term cognitive sequelae

ALGORITHM

REFERENCES & ACKNOWLEDGMENTS

Acknowledgement: *Pablo Moreno Franco, MD; J. G. Park, MD*

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