HYPOGLYCEMIA

(Last updated 11/05/2019; Reviewers: Devang Sanghavi; MD; Tabinda Jawaid, 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<sub>PC</sub> Non-Diabetic: ↓Glucose (<45-50mg/dl), Diabetic: ↓Glucose (<60mg/dl)
• U<sub>PC</sub> Transabdominal ultrasound to rule out other causes of symptoms

*V (verbal), P (pain), U (unconsciousness), D (delirious)
L<sub>PC</sub> (point of care ultrasound)  U<sub>PC</sub> (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:
  o Hypoglycemic patient is diabetic vs non-diabetic
  o 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:
  o Diabetic patients: measure serum glucose to confirm hypoglycemia
  o 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**
  o 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**
  o Discontinue offending drugs; treat underlying (critical) illnesses
  o Tumor reduction surgically, or chemotherapy or radiation in cases of non-islet cell tumor
  o In cases of autoimmune hypoglycemia, glucocorticoids or other immunosuppressant can be used.
  o In cases of diabetics with hypoglycemia, modification of regimen to balance glycemic control and avoid hypoglycemia.
  o 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
REFERENCES & ACKNOWLEDGMENTS

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