

# HYPOGLYCEMIA

- Reduction of plasma glucose to a level that induces symptoms and signs
  - Altered mental status
  - Sympathetic nervous stimulation
- Usually  $< 50$  mg/dl
- Highly variable
- Abnormalities of mechanisms of glucose homeostasis

- Whipples triad
- Documentation of low blood sugar
- Presence of symptoms
- Reversal of symptoms with restoration of blood sugar values

# Pathophysiology

- Symptoms
  - Sympathetic activation and brain dysfunction secondary to decreased blood glucose
- Sympathoadrenal
  - Sweating /palpitations/anxiety/hunger
- Neuroglycopenia
  - Confusion/difficulty in concentration/irritability/focal impairments/ hallucinations/coma/death

# Pathophysiology

- Adrenergic symptoms precede neuroglycopenia
- Primary stimulus for release of catecholamines is absolute level of glucose
- Previous blood sugar levels can influence
- Hypoglycemia unawareness
- Repeated episodes can blunt symptoms

# Etiology

- Medication change / overdose
- Infection
- Diet change
- Metabolic changes
- Fasting
- Insulin producing tumors
- Hepatic disease

# Fasting hypoglycemia

- Causes
- Inherited – enzyme deficiencies that restrict hepatic glucose release
- Inherited defects in fatty acid oxidation- restrict the extent to which non neural tissues can derive their energy from FFA
- Nesidioblastosis- budding of insulin secreting cells from the pancreatic duct

- Drugs – ethanol/ OHA/ insulin/ INH/ fluoxetine/ SSRI/ ACE inhibitors/ lithium/ tramadol
- Sulphonyl urea overuse/ abuse
- Exogenous insulin
- Endogenous insulin- insulinomas/ non beta cell tumors



# Reactive hypoglycemia

- Idiopathic
- Alimentary – GI procedures- rapid entry and absorption of glucose into the intestine- excessive insulin response to a meal
- Congenital enzyme deficiencies - fructose intolerance/ galactosemia

# Other causes

- Auto immune – insulin and insulin receptor antibodies
- Hormonal deficiencies- hypoadrenalism  
hypopituitarism
- Critical illness- hepatic/ renal/ cardiac/ MODS
- Exercise
- Pregnancy
- Renal glycosuria
- Ketosis
- starvation

# Clinical presentation

- History
- Neuro glycopenic
- Adrenergic
- Fasting- usually in the morning before food
- Reactive- more common in obese patients/ insulin resistance/ rarely loss of consciousness, no severe neuro glycopenia

# Clinical presentation

- Blurred vision/ pupils constricted or dilated or not reacting
- Hypotension/ hypertension/arrhythmias
- Coma/ confusion/ fatigue/ diplopia/ agitation/ strokes/ tumors/ convulsions
- Dyspnoea/ tachypnoea/ acute pulmonary edema
- Dehydration
- Atypical in elderly and the very young

# Differentials

- Hepatic failure
- TIA
- Cardiac dysrhythmias
- Endocrine disorders
- Substance abuse- ethanol/ cocaine
- Hypoglycemic agents
- CNS disorders
- Psychogenic

# Work up

- Look for
  - Infection
  - DKA
  - Cardiac and neurologic causes
- 
- Glucose and insulin levels
  - Simultaneously
  - 72 hour fasting
  - C peptide levels increased with insulinoma and sulphonyl ureas/ low or normal with exogenous insulin

# Imaging

- Usg
- CT
- MRI

# Treatment

- GLUCOSE / GLUCOSE/ GLUCOSE
- Underlying causes



# Complications

- Acute sequelae
- Coma/ cardiac arrest/ death
- Permanent deficits increase with
- Prolonged hypoglycemia- hemi paresis/  
memory impairment/ apraxia/ ataxia/  
diminished language skills

# Medication

- Dextrose
- Glucose elevating agents
- Glucagon- inhibits glycogen synthesis/  
enhances non carbohydrate glucose  
formation
- Insulin secretion inhibitors – diazoxide- direct  
inhibitor/ octreotide- somatostatin receptor
- Anti neoplastic agents- streptozocin – tumor  
inhibitor

# Hypoglycemia Patient Questionnaire

- How well can you recognize symptoms
- How often do you have symptoms
- Have you needed assistance
- Do you check your glucose before driving
- Do your relatives know what to do

THANK YOU