

Hypoglycemia: Work-up and Management

Presented by: Erin Meyers, MD, MS

Mentored by: Elizabeth Bowen, MD

May 24, 2022

1. Hypoglycemia is a plasma glucose concentration (typically less than 70) that is low enough to cause symptoms/signs, including impairment of brain function. It is confirmed by documentation of Whipple's triad.
 - a. Symptoms include autonomic responses (sweating, weakness, tachycardia, tremor, etc) and neuroglycopenia (irritability, confusion, seizure, loss of consciousness).
 - b. Whipple's triad: symptoms consistent with hypoglycemia, low plasma glucose when symptoms are present, relief of symptoms after glucose level is raised.
2. Causes of hypoglycemia
 - a. Sick patient
 - i. Drugs: Insulin, insulin secretagogue, alcohol, others
 - ii. Critical illness: Hepatic/renal/cardiac failure, sepsis, inanition
 - iii. Hormone deficiency: cortisol, glucagon and epinephrine
 - iv. Nonislet cell tumor
 - b. Seemingly well patient
 - i. Endogenous hyperinsulinism: Insulinoma, functional beta cell disorders (nesidioblastosis) including noninsulinoma pancreatogenous hypoglycemia and post gastric bypass hypoglycemia, insulin autoimmune hypoglycemia, insulin secretagogue
 - ii. Accidental, surreptitious, or malicious hypoglycemia
3. Diagnostic testing
 - a. Obtain oral agent screen and insulin antibodies
 - b. Mixed meal test for post prandial symptoms (symptoms occur within five hours of eating) or 72-hour fast for fasting symptoms
 - c. Samples for both tests include glucose, insulin, C-peptide, proinsulin, and BHOB and interpretation is the same
4. Pursue localizing studies once endogenous hyperinsulinism is confirmed
 - a. CT, MRI, transabdominal US, Gallium Ga-68 DOTATATE PET
 - b. Endoscopic ultrasonography
 - c. Selective arterial calcium stimulation
5. Treatment
 - a. Insulinoma: Surgical removal is mainstay of treatment but nutritional modifications and medications (diazoxide and octreotide) can be used if surgery is contraindicated.
 - b. Noninsulinoma pancreatogenous hypoglycemia syndrome (NIPHS)/Post gastric bypass: Nutritional modification and medication (acarbose) for mild to moderate symptoms. Partial pancreatectomy can be done for severe or refractory symptoms.

References

1. Cryer PE. Mechanisms of hypoglycemia-associated autonomic failure in diabetes. *N Engl J Med.* 2013 Jul 25;369(4):362-72. doi: 10.1056/NEJMra1215228. PMID: 23883381.
2. Cryer PE, Axelrod L, Grossman AB, Heller SR, Montori VM, Seaquist ER, Service FJ; Endocrine Society. Evaluation and management of adult hypoglycemic disorders: an Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab.* 2009 Mar;94(3):709-28. doi: 10.1210/jc.2008-1410. Epub 2008 Dec 16. PMID: 19088155.
3. Noone TC, Hosey J, Firat Z, Semelka RC. Imaging and localization of islet-cell tumours of the pancreas on CT and MRI. *Best Pract Res Clin Endocrinol Metab.* 2005 Jun;19(2):195-211. doi: 10.1016/j.beem.2004.11.013. PMID: 15763695.
4. Okabayashi T, Shima Y, Sumiyoshi T, et al. Diagnosis and management of insulinoma. *World J Gastroenterol.* 2013;19(6):829-837. doi:10.3748/wjg.v19.i6.829