

“SPELLS” IN NON-DIABETIC  
PATIENTS: often not  
hypoglycemia

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# Definition of hypoglycemia

- BG under 60 with symptoms.

# CAVEAT

- BG is under 60 in many patients asymptotically during the day and is often not pathological.

# HYPOGLYCEMIA SYMPTOMS

- They are often vague and concerning to the patient and the provider (in people with and without diabetes).
- They often mimic panic/anxiety attacks

# HYPOGLYCEMIA SYMPTOMS

- Hypoglycemia symptoms are mostly catecholamine symptoms.
  - shakes
  - sweats
  - nervous
  - panic
  - hunger
  - rapid heart rate
  - fight or flight sensation
  - sense of impending doom

# WHY SYMPTOMS ARE OFTEN MISTAKEN FOR HYPOGLYCEMIA

- Anything that causes release of catecholamine might have symptoms similar to hypoglycemia.
- The symptoms feel bad and are scary.
- Eating/Drinking might or might not help. Carbs or any type of intake.
- Hunger itself causes similar symptoms, and is partially caused by catecholamine release, and since these are the same symptoms as hypoglycemia, people mistake hunger to be hypoglycemia. Stretching the stomach muscle itself might improve symptoms.
- Panic/Anxiety have similar symptoms often due to catecholamine release.

# WHY SYMPTOMS ARE OFTEN MISTAKEN FOR HYPOGLYCEMIA

- Healthy people, especially common in women, can have many asymptomatic BG's under 60 in a typical day
- Glucometers are inaccurate for low BG's. The accuracy of glucometers worsens with high and low BG's.
- During a spell, perfusion to fingers might be decreased, leading to a falsely low BG reading.
- Small frequent meals and avoiding simple carbohydrates might seem to improve the symptoms, even if not due to hypoglycemia.
- People (and physicians) often use the rule: if it feels like low BG, it must be low BG.

# WHY SYMPTOMS ARE OFTEN MISTAKEN FOR HYPOGLYCEMIA

- Patients are often convinced they are suffering from low BG, that the physician is convinced even without proof.
- Internet searches often mention hypoglycemia.
- If in the hospital, low fingerstick BG's are often incorrectly low, especially if the patient has poor peripheral perfusion (vascular issues), dehydration, vasoconstriction, etc. Confirm with stat venous BG before treating if this won't delay treatment too long if the patient is acutely symptomatic.



# SPELLS: low BG or not?

- Need to try to separate spells into:
  - 1. those that are true hypoglycemia
  - 2. those that are not hypoglycemia

# WHIPPLE'S TRIAD to suggest the symptoms might be from low BG suggesting insulinoma

- Symptoms known or likely to be caused by hypoglycemia especially after fasting or heavy exercise.
- A low plasma BG measured at the time of symptoms. .
- Relief of symptoms when the BG level is raised.

# SPELLS: questions to ask

- What triggers a spell?
- Any particular time of the day?
- Were any new meds or supplements started?
- Are there symptoms every time the BG is low on the glucometer?
- Is the patient well hydrated?
- Any family history of spells?
- How long do the spells last?
- Any behavioral changes or movement changes with the spells?

# SPELLS: Questions to ask

- Is there confusion with the spells?
- How long do the spells last?
- What improves the spells?
- Do the spells resolve sometimes or always spontaneously?
- Do these require carbohydrates to improve (sometimes or always)?
- Do the spells occur at night while asleep?
- How long have the spells been occurring?
- How often do the spells occur and are they becoming more frequent or more prolonged?

# SPELLS: Questions to ask

- Do the spells occur on weekends or vacation?
- Stressors at work or home?
- Does anyone at home take or have diabetes medications (pills or insulin)?

# NEED TO CONFIRM HYPOGLYCEMIA

- It is often difficult to prove hypoglycemia.
- Need to confirm with venous blood at a laboratory before eating or treating with glucose.
- Hard to get a venous BG at a lab when feeling so poorly.
- Hard to get a stat venous BG as an inpatient before treating, since hypoglycemia protocols initiate treatment immediately when a fingerstick is low.
- If a person as an outpatient knows when the spell will happen (for instance after breakfast, or if not eating in 4-8 hours), they can wait in the lab till they start feeling poorly and then get a BG level drawn.

# True Hypoglycemia in a non-diabetic

Reactive hypoglycemia (often in people with obesity and metabolic syndrome, and often is triggered by eating carbs).

Cortisol deficiency (primary adrenal or pituitary cause).

Malnutrition (celiac disease, eating disorder, cancer, etc.).

Hepatic failure.

Certain meds (sulfa drugs, some floxins, etc.).

Insulinoma: rare. Fasting and post-prandial hypoglycemia.

# True Hypoglycemia in a non-diabetic

- Surreptitious, malicious, or inadvertent use of insulin secretagogue. Insulin and c-peptide levels will be high when BG is low. Need to obtain these levels before treating with glucose or glucagon. Sulfonylurea urea blood or urine screen might be positive.
- Surreptitious, malicious, or inadvertent use of insulin. In this case, when the BG is low, insulin level will be high and C-peptide level will be low. Need to obtain these levels before treating with glucose or glucagon.
- Nesidioblastosis (for instance: post-gastric bypass: islet cell hyperplasia). post-meal hypoglycemia



# INSULINOMA

- With hypoglycemia: insulin and c-peptide level will be high or non-suppressed.
- Perhaps MIBG scan or octreotide scan after biochemical confirmation of insulinoma.
- Treatment: surgery by an experienced surgeon, often using intra-operative ultrasound.
- Caveat: care with palliating with octreotide: the first dose might worsen hypoglycemia. Must be done in the hospital.

# True Hypoglycemia in a non-diabetic

- Remember: early hypoglycemia symptoms (shakes, sweats, anxiety, hunger) are due to catecholamine release.

CONDITIONS CAUSING “SPELLS” THAT ARE  
NOT HYPOGLYCEMIA BUT MIMIC IT

# CONDITIONS CAUSING SPELLS THAT ARE NOT HYPOGLYCEMIA BUT MIMIC IT

- Low BP including: NMH (neurologically mediated hypotension)
- POTS (postural orthostatic tachycardia syndrome)
- Other cardiac (dysrhythmia, etc.)
- Dehydration
- Salt deficit
- Seizures, including partial
- Other neurologic (autonomic neuropathy, Shy-Drager, etc.)

# CONDITIONS CAUSING SPELLS THAT ARE NOT HYPOGLYCEMIA BUT MIMIC IT

- Monoclonal gammopathy
- Mastocytosis
- Pheochromocytoma
- Psychogenic (anxiety, panic attacks, etc.)
- Medication side effect
- Hunger
- Etc.

# WORK UP

- To check for low BG:
  - venous BG with symptoms prior to treating with glucose or glucagon
  - if venous BG is low, simultaneous venous BG and c-peptide level
  - ?consider a fasting challenge: difficult to do and uncomfortable for the patient and often not covered by insurance if no evidence of hypoglycemia
  - No imaging unless lab tests indicate a potential cause. Don't get CT's or MRI's or Ultrasounds of abdomen or pelvis or pituitary till biochemical evidence to suggest this is needed.

# WORK UP

- Remember that imaging for insulinoma often does not detect any mass even if one is present in the pancreas.
- Remember: insulinoma is rare.
- Consider ACTH stimulation test to rule out adrenal insufficiency, especially if BG has been found to be truly low.

# WORK UP

- Complete metabolid panel with liver panel and kidney function tests.
- SPEP or IEP (for MGUS/Myeloma).
- Tryptase (for mastocytosis).
- CBC with diff.
- Celiac panel if BG is truly low.
- Plasma free metanephrines (or 24 hour urine metanephrines/catecholamines).
- AM cortisol level, perhaps ACTH stimulation test.



# WORK UP

- TILT TABLE TEST: this is the test that might most important in my practice to check causes of “spells” to look for NMH and POTS.  
Note: patients with NMH might have normal or high or low resting BP.
- Possible 24 holter monitor or longer cardiac monitoring.
- Possible EEG (rule out seizures) soon after a “spell”.
- Check BP during an episode (but the BP, even if drops, might have corrected itself in only seconds to minutes after a hypotensive episode).

# WORK UP: less likely causes, but...

- Consider mold issues.
- Consider infectious issues (Tick borne disease, mosquito borne disease, etc.).
- Consider heavy metal screen.
- Consider checking the water purity, especially if the patient has a well.
- Consider allergy testing.

# TREATMENT

- Small frequent meals (low in simple carbs) might help symptoms even if BG is not the issue. BUT don't stop looking for other causes.
- Increase fluid intake often needed.
- Increase salt intake (with NaCl pills) if needed and if safe to do.
- If NMH: referral. Increase salt intake, increase fluid intake, possibly meds: Midodrine, Fludrocortisone, Beta-Blocker, etc.
- Possible cardiology referral.
- Possible neurology referral.