Team-based learning assignment in clinical pharmacokinetics P-313

February 18, 2014

1. JM is a 66-year old female who underwent Roux-en-Y gastric bypass surgery six months ago. Prior to the surgery, she weighed 315 pounds, and had a waist circumference of 43 inches. She says she’s doing “pretty good”, but does complain of feeling more tired than usual and not having much energy over the past few weeks.

**VS:** BP 136/78 HR 62 RR 12 Afebrile

Wt: 240 lbs Ht: 66 inches

Hgb: 11 g/dL Hct: 35%

**PMH:**

Type 2 Diabetes

HTN

s/p MI

Hyperlipidemia

Obesity s/p gastric bypass surgery

**Current Medications:**

Lisinopril 20 mg po daily

Metoprolol XL 50 mg po daily

Atorvastatin 20 mg po daily

Aspirin EC 325 mg daily

Metformin 1000 mg po BID

Insulin 70/30: 28 units qAM 18 units qPM

The physician at the Obesity Clinic has scheduled an appointment for JM to meet with the pharmacist. You are asked to review her medications for appropriateness based on her history of bariatric surgery. Identify **TWO** drug related problems and provide a ***brief*** rationale for your medication related plan.

2. Describe pharmacokinetic and/or pharmacodynamic changes you would anticipate for phenytoin and haloperidol when used in elderly patients.

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Student names (List only names of students present): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Group number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A. Decreased intestinal length and surface area lead to reduced absorption of extended-release preparations. These products likely have passed through the GI tract before absorption is complete. Avoid extended-release, delayed-release or film-coated formulations and substitute immediate release products for more reliable absorption s/p gastric bypass.

**Recommendation: Metoprolol tartrate 25 mg po bid**

B. Due to the decreased stomach size after restrictive bariatric procedures, there is an increased risk of gastrointestinal ulceration with regular NSAID and salicylate use. (generally with ASA doses > 81 mg). The decision to adjust her ASA regimen should be made in consultation with her cardiologist to assess the risks vs. benefits. Also, enteric coated formulations may not be as well absorbed s/p surgery.

**Potential recommendation: Aspirin 81 mg po daily Risk vs. benefit discussion!!**

1. After bariatric surgery, there is the potential for significantly decreased insulin needs due to reduced caloric intake, weight loss, and hormonal changes. Insulin sensitivity and glucose tolerance are increased after surgery due to anatomical changes in the GI tract which lead to upregulation of glucagon-like peptide (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP). These peptides induce insulin secretion. Type 2 diabetes may resolve in ~80% of patients after gastric bypass surgery.

**Recommendation: Increase frequency of blood glucose monitoring utilize/educate regarding sliding scale insulin to access new insulin needs and prevent hypoglycemic episodes.**

1. Her symptoms of fatigue and H/H lab results may suggest iron deficiency anemia. Iron absorption is significantly impacted because the duodenum is bypassed in bariatric procedures; there is also a decrease in hydrochloric acid production. **Recommend ferrous sulfate plus vitamin C** to increase the absorption of iron by creating a more acidic environment. Intravenous iron products may be necessary for severe cases of iron deficiency anemia.
2. Consider bone mineral density testing. Bariatric surgery results in a decrease in hydrochloric acid production, affecting many calcium salts that are dependent on an acidic environment for absorption (calcium carbonate). Absorption can be improved by using a different salt form.  **Recommend calcium citrate plus vitamin D** for osteoporosis prevention. (post-menopausal females: 1200-1500 mg elemental Ca + 1000-1200 IU vitamin D daily)
3. All bariatric surgery patients should receive a **daily multivitamin** to maintain adequate vitamin/mineral stores.
4. Suggest complete anemia work-up and **initiate vitamin B12 supplementation if necessary**; either monthly subcutaneous injections or 1000 mcg po daily to prevent pernicious anemia and peripheral neuropathy.

2a. Phenytoin

1. Protein bound to albumin: increased risk of toxicity in patients with hypoalbuminemia (total concentration normal or decreased but free fraction is increased). Risk is greater in malnourished or frail elderly.
2. Patient may also have decreased hepatic clearance due to age or decline in Phase I metabolism which will contribute to increased free concentrations.
3. IM route not preferable (fosphenytoin) due to decreased muscle mass. (phenytoin should never be given IM regardless if elderly or not).

2b. Haloperidol

1. ↑ risk of torsades (increased sensitivity to meds that prolong QT interval
2. Change in BBB permeability which causes increased sensitivity to psychoactive medications
3. Decreased dopaminergic neurons and receptors leading to increased EPS effects.
4. Decreased cholinergic neurons leading to increased sensitivity to anticholinergic meds.
5. IM route not preferable due to decreased muscle mass.
6. Risk of orthostatic hypotension