An 82-year-old woman is brought to the emergency department by her son because of a 1-week history of nausea. She has had a decreased appetite resulting in a 4.5-kg (10-lb) weight loss over the past month. She has atrial fibrillation, congestive heart failure, and well-controlled type 2 diabetes mellitus. Medications include lisinopril, digoxin, furosemide, and glipizide. Her pulse is 60/min and regular, and blood pressure is 130/70 mm Hg. Visual acuity is 20/20. Deep tendon reflexes are absent at the knees and ankles bilaterally. Her serum glucose concentration is 120 mg/dL. Arterial blood gas analysis shows no abnormalities. Which of the following is the most likely cause of this patient's symptoms?

(A) Digoxin toxicity  
(B) Hyperthyroidism  
(C) Inadequate control of blood glucose concentration  
(D) Lacunar cerebral infarction  
(E) Subacute meningitis
### Learning Objectives

**The listener should be able to:**

- Describe the changes in drug pharmacokinetics that typically occur with aging.
- Understand the risks and benefits associated with prescribing digoxin in association with other drugs.
- Recognize the signs and symptoms of digoxin toxicity, as well as how to manage digoxin toxicity.
- Recognize the signs and symptoms of lacunar cerebral infarctions.
- Recognize the signs and symptoms of subacute meningitis.
- Recognize the signs and symptoms of hyperthyroidism and the most common cause of hyperthyroidism in the elderly.
- Recognize the signs and symptoms of hypoglycemia and the most common cause of recurrent hypoglycemia.
- Describe the side effects of sulfonylurea oral hypoglycemics.

### Key Teaching Points

- As people age, the relative increase in body fat and decrease in lean muscle mass results in a wider distribution of fat soluble drugs and less wide distribution of water soluble drugs, increasing the elimination time and prolonging the duration of action of fat soluble drugs. Several commonly used drugs including digoxin, are excreted primarily by the kidney and multiple studies suggest kidney function may decrease by as much as 1/3 from young adulthood to old age in the absence of renal disease.

- Although digoxin is commonly prescribed drug in elderly patients to treat atrial fibrillation and symptoms of CHF, it is no longer first line for either condition due to its narrow therapeutic index (0.8-2 ng/ml) and interactions with many other drugs. Electrolyte abnormalities including hypokalemia, hypomagnesemia, and hypercalcemia increase patient susceptibility to toxic effects of digoxin. Therefore drugs that cause these electrolyte disturbances, such as loop diuretics that cause hypokalemia potentiate digoxin toxicity. Since digoxin is secreted by the the kidneys, nephrotoxic drugs may also contribute to digoxin toxicity.

- Acute signs and symptoms of digoxin toxicity include cardiac arrhythmias, GI complaints of anorexia, nausea, vomiting, and abdominal pain, as well as neurological symptoms of confusion and weakness. Chronic symptoms include anorexia, nausea, vomiting, abdominal pain, lethargy, delirium, confusion, weakness, and visual changes. Management includes ECG, serum digoxin concentration, serum K, BUN, and creatinine. Treatment includes correction of electrolyte abnormalities and administration of digoxin Fab.

- Lacunar cerebral infarctions are small lesions that occur in the distribution of the basal ganglia, pons, cerebellum, anterior limb of the internal capsule, and deep cerebral white matter. They clinically manifest as contralateral pure motor or pure sensory deficit with ipsilateral ataxia with crural paresis. Dysarthria with clumsiness of the hand may also be present. Deficits may progress over 24-36 hours before stabilizing.

- Patients with subacute meningitis typically have an unrelenting headache, stiff neck, low-grade fever, and lethargy for days to several weeks before they present for evaluation. Cranial nerve abnormalities and night sweats may be present. This syndrome overlaps that of chronic meningitis.

- The most common cause of hyperthyroidism is Grave’s Disease with thyroid-
stimulating immunoglobulin IgG autoantibodies that bind to TSH receptors and cause increased release of thyroid hormone. However, the most common cause of hyperthyroidism in the elderly is Plummer’s Disease, multinodular toxic goiter, and accounts for about 15% of total cases. A thyroid scan would show patchy uptake. Signs and symptoms include, nervousness, insomnia, irritability, tremor, sweating, heat intolerance, increased appetite with weight loss, diarrhea, palpitations, weakness, elevated blood pressure, tachycardia, proptosis, pretibial myxedema, brisk deep tendon reflexes. In the elderly, classic symptoms of hyperthyroidism may be absent and the only manifestations may be weight loss, weakness or atrial fibrillation. Diagnosis with serum TSH level which would be low. Treatment includes Beta-blockers, methimazole and propylthiouracil. Definitive treatment would be ablation with radioactive iodine 131 or subtotal thyroidectomy.

- The most common cause of hypoglycemia is drug-induced secondary to insulin or oral hypoglycemics with patients striving for too tight blood glucose control. Symptoms occur at a blood glucose level of 40-50mg/dl. Symptoms include sweating, tremors, increased blood pressure, increased heart rate, anxiety and palpitations secondary to epinephrine release. Also irritability, altered mental status, weakness, headache, confusion, convulsions, coma due to neuroglycopenia. The diagnosis is made with a blood glucose level. Treatment is to give sugar-containing foods if the patient can eat or glucagon IM if the patient is unable to eat.

- Sulfonylureas were the first oral hypoglycemics. They work by binding to ATP-dependent potassium channels on the pancreatic beta cell membranes and inhibiting repolarization. The cells remain depolarized and increase insulin secretion from the beta cells. Side effects include hypoglycemia and weight gain.

Comments

References


