If you're preparing for the United States Medical Licensing Examination® (USMLE®) Step 3 exam, you might want to know which questions are most often missed by test-prep takers. Check out this example from Kaplan Medical, and read an expert explanation of the answer. Also check out all posts in this series.

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This month's stumper

A 38-year-old woman with systemic lupus erythematous (SLE) and hypertension presents with frequent nephrolithiasis. Her stones are composed of calcium oxalate. Her SLE has been managed with immunosuppressive therapy, with no recent flares.

She also takes hydrochlorothiazide for her hypertension. Her blood pressure is 142/68 mm Hg and her pulse is 77 beats per minute. On physical examination, there is mild tenderness and warmth of the knee joints; the remainder of the exam is unremarkable. A chest X-ray is normal. Laboratory values are:

- Sodium: 139 mEq/L.
- Potassium: 2.7 mEq/L.
- Chloride: 116 mEq/L.
- Bicarbonate: 13 mEq/L.
- Urea nitrogen: 18 mg/dL.
- Creatinine: 0.8 mg/dL.
Calcium: 11.1 mg/dL.
Phosphate: 2.7 mg/dL.
Parathyroid hormone: 20 pg/mL (normal: 10-65 pg/mL).
Parathyroid hormone-related protein: Undetectable.

Which of the following is the most appropriate treatment for this patient's nephrolithiasis?

A. Discontinuation of hydrochlorothiazide.
B. High-dose bicarbonate replacement and phosphate supplementation.
C. Parathyroidectomy.
D. Potassium citrate and low-dose oral bicarbonate replacement.
E. Vitamin D replacement therapy.
The correct answer is D.

Kaplan Medical explains why

This patient has type 1 (distal) renal tubular acidosis (RTA), metabolic acidosis, low serum bicarbonate, hypokalemia and hypercalciuria. The lab findings are consistent with hypercalcemia that has led to calcium oxalate stones. It is associated with autoimmune disorders. The hypokalemia is a consequence of distal excretion of potassium. Hypercalciuria may be a consequence of chronic acidosis resulting in bone resorption and decreased calcium reabsorption in the proximal tubule.

Alkalination of the urine reverses all the effects of type 1 RTA. Treatment includes potassium citrate and bicarbonate supplementation. Potassium citrate (citrate is rapidly metabolized to bicarbonate) is the preferred therapy to correct the acidemia in stone-formers with type 1 RTA. Citrate is more palatable than bicarbonate solutions when orally ingested, and concurrent hypokalemia can also be corrected.

Why the other answers are wrong

**Choice A:** Hydrochlorothiazide causes calcium reabsorption and is used to treat hypercalciuria. This woman's hydrochlorothiazide should not be discontinued.

**Choice B:** High-dose bicarbonate replacement and phosphate supplementation is the treatment modality for type 2 RTA. Inability to resorb bicarbonate by the proximal tubule is the primary defect in this disorder. Type 2 RTA is not typically associated with nephrolithiasis.

**Choice C:** A parathyroidectomy is not necessary since hyperparathyroidism is not present.
Choice E: This patient does not present with vitamin D deficiency. Thus, vitamin D supplementation is not needed.

Tips to remember

Type 1 renal tubular acidosis presents with metabolic acidosis, low serum bicarbonate, hypokalemia and hypercalciuria. Potassium citrate prevents further formation of calcium oxalate stone in type 1 RTA by correction of the acidemia.

For more prep questions on USMLE Steps 1, 2 and 3, view other posts in this series.