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On the Cover

What’s the diagnosis?

Case description:
The patient is a 61-year-old man with a history of hypertension and ESKD on hemodialysis and Sevelamer who presented with nausea and vomiting. He was found to have an acutely obstructing type IV paraesophageal hernia, with intrathoracic herniation of stomach and transverse colon, and underwent repair. One week later, he developed severe abdominal pain and hypotension; laparotomy revealed transverse colonic volvulus, severe colonic distention, and possible rupture. A right hemicolecotomy was performed.

Images:
Left: Yellow-magenta crystal with “fish scale” texture and injured colonic mucosa (600X)
Middle: Yellow crystal (arrow) within submucosa of colon wall. Ischemic colonic mucosa on left; muscularis propria on right (40X)
Right: Purple crystal with “fish scale” texture in serosal exudate (200X)

Teaching points:
These features are characteristic of Sevelamer crystals. This is an unusual case of colonic perforation associated with embedded Sevelamer crystals.

- Sevelamer consists of a non-absorbable hydrogel with ammonia (NH3) on a carbon backbone; its anion is either carbonate (Renvela) or hydrochloride (Renagel). The acidity of the stomach dissociates the polymer from its anion and protonates it to NH4+, allowing it to bind phosphate (PO4-) within the intestine resulting in lower serum phosphate levels.
- Sevelamer crystals within the gastrointestinal tract have been associated with gastrointestinal mucosal injury, ulceration and necrosis (PMID: 24061514).
- The relationship between Sevelamer crystals and colon perforation is uncertain in this and other cases. The mechanism or causation for bowel injury has yet to be demonstrated.

Risk factors for gastrointestinal sevelamer crystals or bowel injury have not been identified; there is no apparent association with dose or formulation (PMID: 28852493).

(Images and text provided by Erik Handberg MD1; Arlette Habashi MD1; Abdallah Alali MD2; Jessica Weiss MD2; Nicole K. Andeen MD; and Jessica L. Davis MD1. 1Department of Pathology and 2Division of Nephrology, Department of Medicine, Oregon Health & Science University, Portland, Oregon)