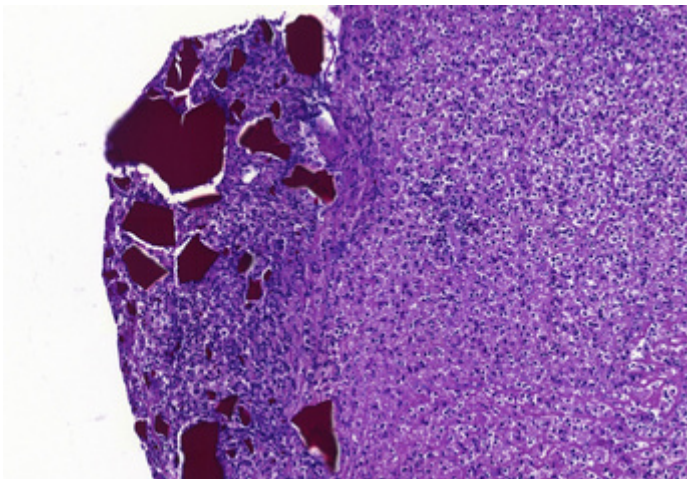
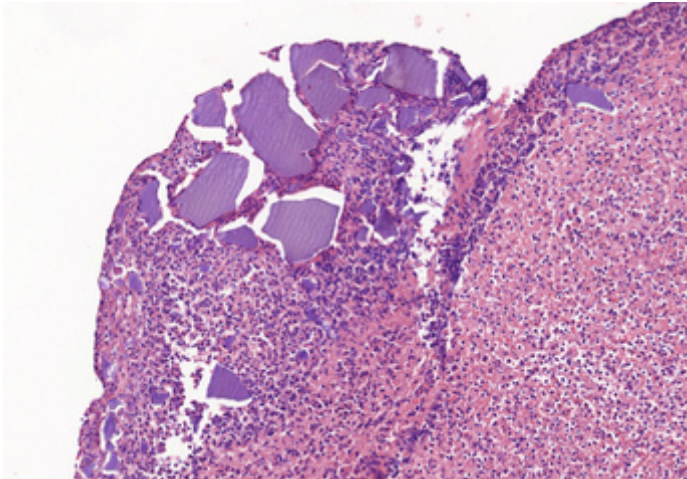
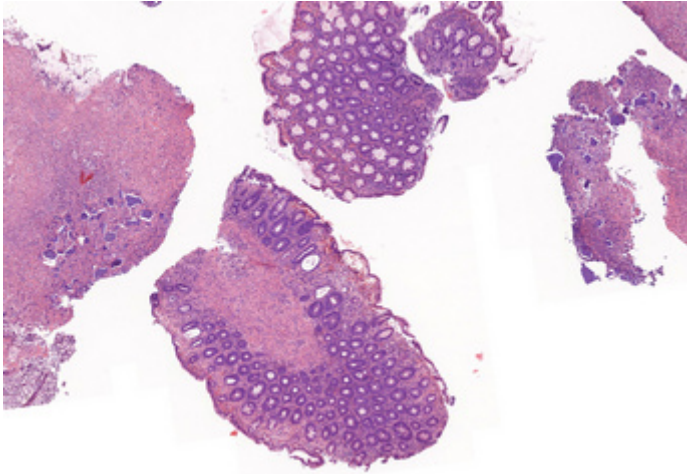
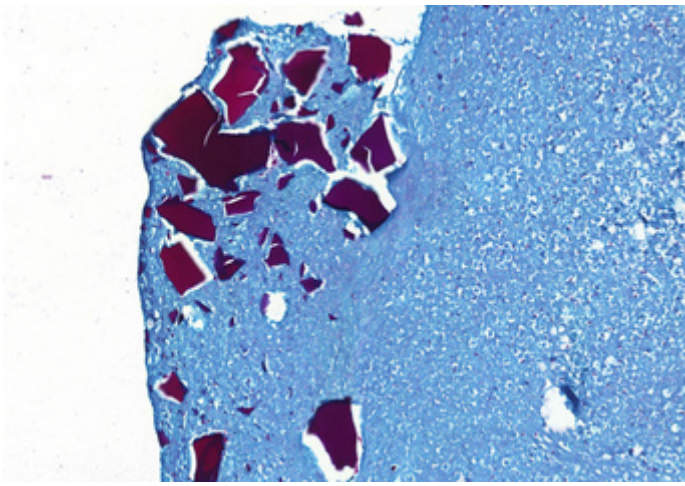


September 2017

Colon biopsies of a 78-year-old male.

What is your diagnosis?





Diagnosis:

Kayexalate resin induced colitis with ulceration.

Comment:

The microscopic picture shows a biopsy specimen from the colon with lamina propria hyalinosis, withering crypts, focal hemorrhage and active inflammation [Panel A]. Basophilic, polygonal, cracked crystals showing a mosaic pattern on H&E stain [Panel B], maroon color using Ziehl-Neelsen [Panel C] and period acid-Schiff (PAS) stain [Panel D], were recognized within inflammatory exudate and necrotic debris, in keeping with the morphology of Kayexalate resin induced ulceration.

Sodium polystyrene sulfonate (SPS) also known as Kayexalate is a cation-exchange resin most frequently used in patients with chronic kidney failure to control hyperkalemia. Experimental evidence implies that gastrointestinal side effects are caused by sorbitol, a compound, which is mixed with SPS as a cathartic agent, to decrease the risk of constipation.

Clinical symptoms usually develop from few hours to 1-2 weeks after the administration of SPS. Kayexalate can injure the whole gastrointestinal tract, with usually the lower tract being more significantly damaged. The most common manifestations include mucosal inflammation, erosion, ulceration and perforation.

Microscopically the mucosal inflammation shows an ischemic pattern with withering crypts and lamina propria hyalinization. Necrotic debris from ulcerated areas is frequently seen; sometimes pseudomembranous areas are also present. The pathognomonic finding is the presence of basophilic polygonal sharp-edged, cracked, nonpolarizing resin particles showing a mosaic pattern on high power magnification embedded in the injured mucous membrane or in the necrotic debris.

SPS shows a maroon color reaction with Ziehl-Neelsen and PAS stains. However, the H&E morphology of the SPS resin crystals is fairly characteristic, and given the adequate drug history no further ancillary studies are usually needed. It is important to note, that sometimes, SPS crystals can be identified attached to the uninjured mucosal surface without any clinical significance. Differential diagnosis includes other colitides with ischemic or pseudomembranous pattern (e.g. genuine ischemia, *Escherichia coli* (EHEC type) colitis, *Clostridium difficile* infection) and other morphologically resembling particles as bile acid sequestrant resin (not basophilic but pinkish-yellow), phosphate sequestrant resin (not basophilic but reddish-orange, not showing mosaic pattern) and mucosal calcinosis (more coarse, not showing mosaic pattern, positive reaction with von Kossa stain).

For further reading:

- Gonzalez RS, Lagana SM, Szeto O, et al. Challenges in Diagnosing Medication Resins in Surgical Pathology Specimens: A Crystal-Clear Review Guide. *Arch Pathol Lab Med.* 2017; doi: 10.5858/arpa.2016-

0587-RA. [Epub ahead of print]

- › McGowan CE, Saha S, Chu G, et al. Intestinal necrosis due to sodium polystyrene sulfonate (Kayexalate) in sorbitol. *South Med J*. 2009; 102:493-497.
- › Rashid A, Hamilton SR. Necrosis of the gastrointestinal tract in uremic patients as a result of sodium polystyrene sulfonate (Kayexalate) in sorbitol: an underrecognized condition. *Am J Surg Pathol*. 1997;21:60-69.

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