Esophageal Mucosal Calcinosis: A Rare Site of Calcium Deposition in End-Stage Renal Disease

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Abstract

A 37-year-old man with end-stage renal disease on peritoneal dialysis presented with generalized weakness and odynophagia due to oral ulcers. Labs revealed neutropenia and pancytopenia of unclear etiology, hyperphosphatemia, and hypocalcemia. Esophagogastroduodenoscopy revealed distal esophageal esophagitis and hemorrhagic erosive gastropathy. Biopsy confirmed esophageal mucosal calcinosis with dystrophic calcification. Immunohistochemistry was negative for CMV, HSV1, and HSV2. Patient was treated with intravenous pantoprazole, Carafate, and magic mouthwash. His condition improved, and he was discharged to home. Calciphylaxis rarely occurs in the esophageal mucosa; there are less than five cases reported worldwide. Malignancy and infection need to be ruled out as these may also cause esophageal mucosal calcinosis.

Introduction

Esophageal mucosal calcinosis (EMC) is extremely rare. GI tract mucosal calcinosis (MC) tends to involve the gastric, rather than esophageal, mucosa in ESRD (end-stage renal disease) patients on hemodialysis. Historically, calcinosis refers to patients developing diffuse, thick white plaques within the esophagus which are indicative of calcium deposition. The buildup of calcification has been observed to be circumferential, encasing multiple subcutaneous regions including arteries. Patients who develop MC seem to have a combination of conditions including chronic renal failure, hyperphosphatemia, elevated calcium phosphorus product, hypocalcemia, hyperparathyroidism, and vitamin D deficiency making the condition's etiology and subsequent pathogenesis difficult to determine.
We report the 5th case of EMC worldwide.

Case Report

A 37-year-old Thai male with ESRD on peritoneal dialysis since 2005 presented with generalized weakness and odynophagia due to oral ulcers, resulting in poor PO intake. He denied drinking alcohol, illicit drug use, or smoking.
On exam his abdomen was soft, non-distended, non-tender, without any guarding.
Past medical history included hypertension and COVID-19 in January 2022.
Laboratory tests revealed neutropenia and pancytopenia, hyperphosphatemia, and hypocalcemia.
EGD revealed distal esophageal esophagitis and hemorrhagic erosive gastropathy. Biopsy showed ulcerative esophagitis with dystrophic calcification, consistent with esophageal mucosal calcinosis. No intestinal metaplasia was noted.
Immunohistochemistry was negative for CMV, HSV1, and HSV2.
The patient was treated with pantoprazole 40mg IV every 12 hours, Magic Mouthwash 5ml qid, and Carafate 10mg qid.
He was transferred to a cancer center where he had a bone marrow biopsy performed which was negative. His symptoms resolved and the patient was discharged to home.

Table 1. Comparison of documented cases of esophageal mucosal calcinosis

	Varghese G, et al. 2016	Garber A, et al. 2017	Machavarapu A, et al. 2017	Huber A, et al. 2017	Baek JS, et al. 2022(our case)
Age/gender	52/M	76/F	57/F	68/M	37/M
Cause of renal failure	ESRD	ESRD	ESRD	ESRD	ESRD
Duration of dialysis	UN	6 years	17 months	5 years	UN
Phosphorous levels	UN	Normal/ 3 months prior (6.1mg/dL)	Normal	High/Normal after transplantation	Elevated (4.6mg/dL) - (9.5 mg/dL)
Calcium levels	UN (patient was treated with Cinacalcet)	Normal	Normal	High/Normal after transplantation	Low (7.7mg/dL)/ Normal (8.6mg/dL)
Phosphate binders	N	N	UN	N	PhosLo 1334 mg TID
Vitamin D supplements	N	MVI	UN	N	Calcitriol 0.5 mcg QD
Sites of calcium deposits	Mid-distal esophagus	Upper third of the esophagus	GI tract in rectum	Esophagus	Esophagus
Pathological findings	Esophageal mucosal calcinosis	Active inflammation and ulceration with small foci of subepithelial and intraepithelial calcification consistent with EMC	Acute ulceration with concentric calcification of capillary walls consistent with calciphylaxis	Erosive esophagitis with basophilic calcium deposits within the fibrinopurulent exudate and squamous mucosa	Ulcerated esophagitis with basophilic calcium deposits within the fibrinopurulent exudate and beneath the squamous mucosa.
Treatment with sodium thiosulfate	Y	Y	Y	N	N
Other co-morbidities	N/a	DM II Hyper-parathyroidism pneumonia	DM hypertension hyper-parathyroidism	DM II	COVID-19 Hyper-tension

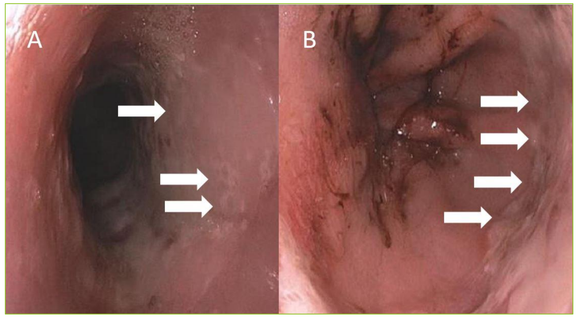

Figure 1. A: Circumferential thick white esophageal plaques with friability and circular erosions along the mid esophagus spanning down to the GE junction. B: Circumferential thick white esophageal plaques with friability and circular erosions along the GE junction. Blood seen in the center is due to severe hemorrhagic gastropathy from coagulopathy.

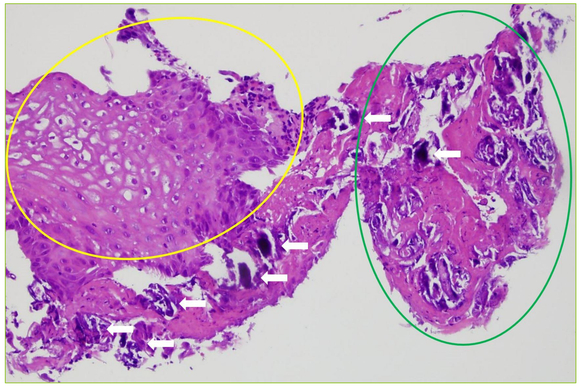

Figure 2. Biopsy showing ulcerated esophagitis with basophilic calcium deposits (white arrows) within the fibrinopurulent exudate (circled in green) and beneath the squamous mucosa (circled in yellow) (H&E, original magnification 200x).

Discussion

Gastrointestinal tract mucosal calcinosis (MC) may be dystrophic, metastatic, iatrogenic, or idiopathic in etiology. The most frequent of these is metastatic calcification in normal tissue secondary to hypercalcemia or hyperphosphatemia. Calcification of esophageal tumors, although uncommon, is seen primarily in leiomyomas. Esophageal mucosal calcinosis is due to a combination of factors involving acidosis and the phenotypic differentiation (and apoptosis) of vascular smooth muscle cells (VSMC) into chondrocytes or osteoblast-like cells. These changes, along with the passive accumulation of calcium and phosphate, induce calcification. Acidosis is well-known to promote inflammation of the arterial walls, releasing cytokines that induce vascular calcification.
The benefits of treatment with sodium thiosulfate remain unclear.

Conclusions

Esophageal mucosal calcinosis is extremely rare. An ample collection of cases should help devise standardized treatment options and establish management guidelines for this condition.

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