Case #37

NAME Educational Activities Committee

Case provided by:

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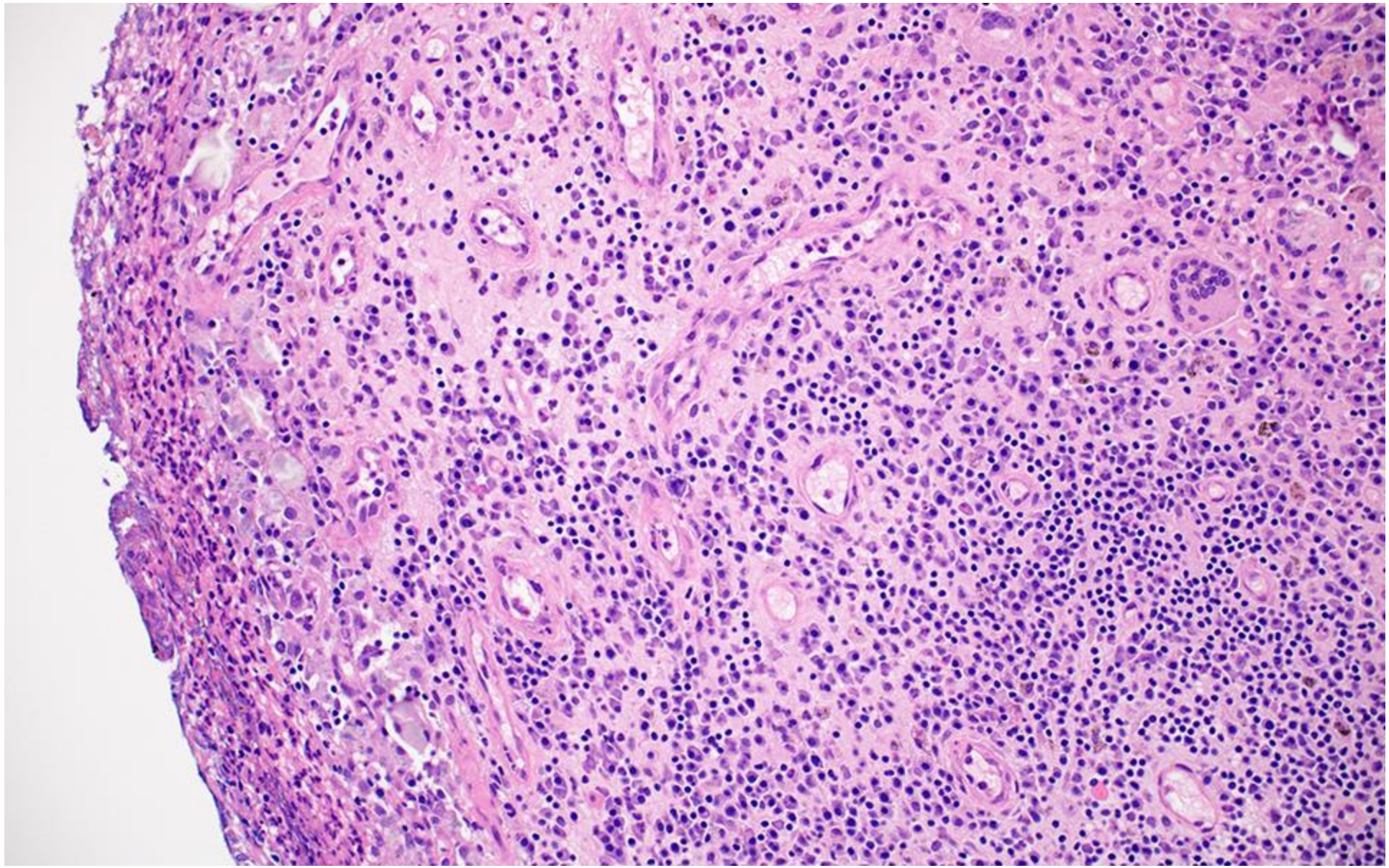
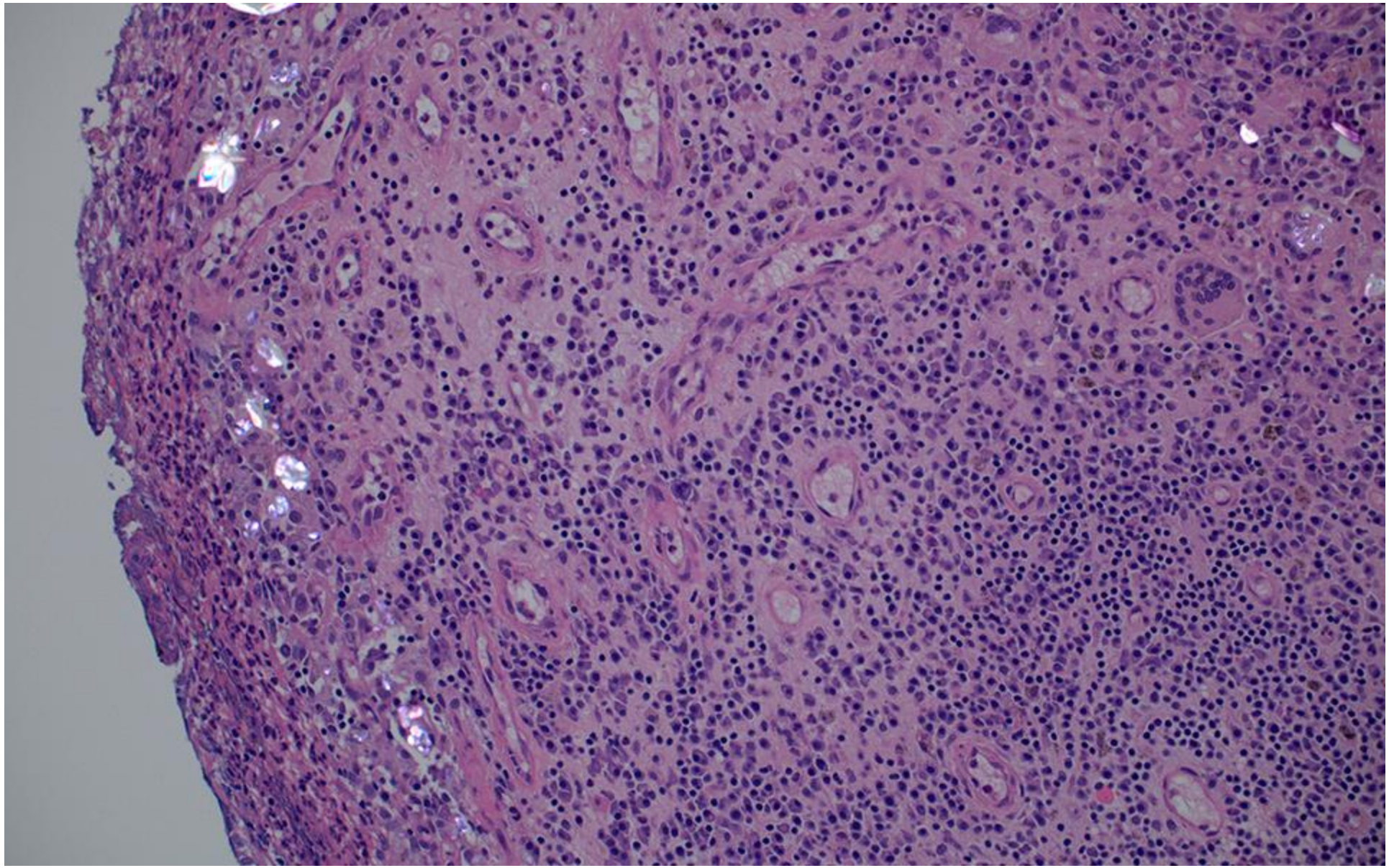
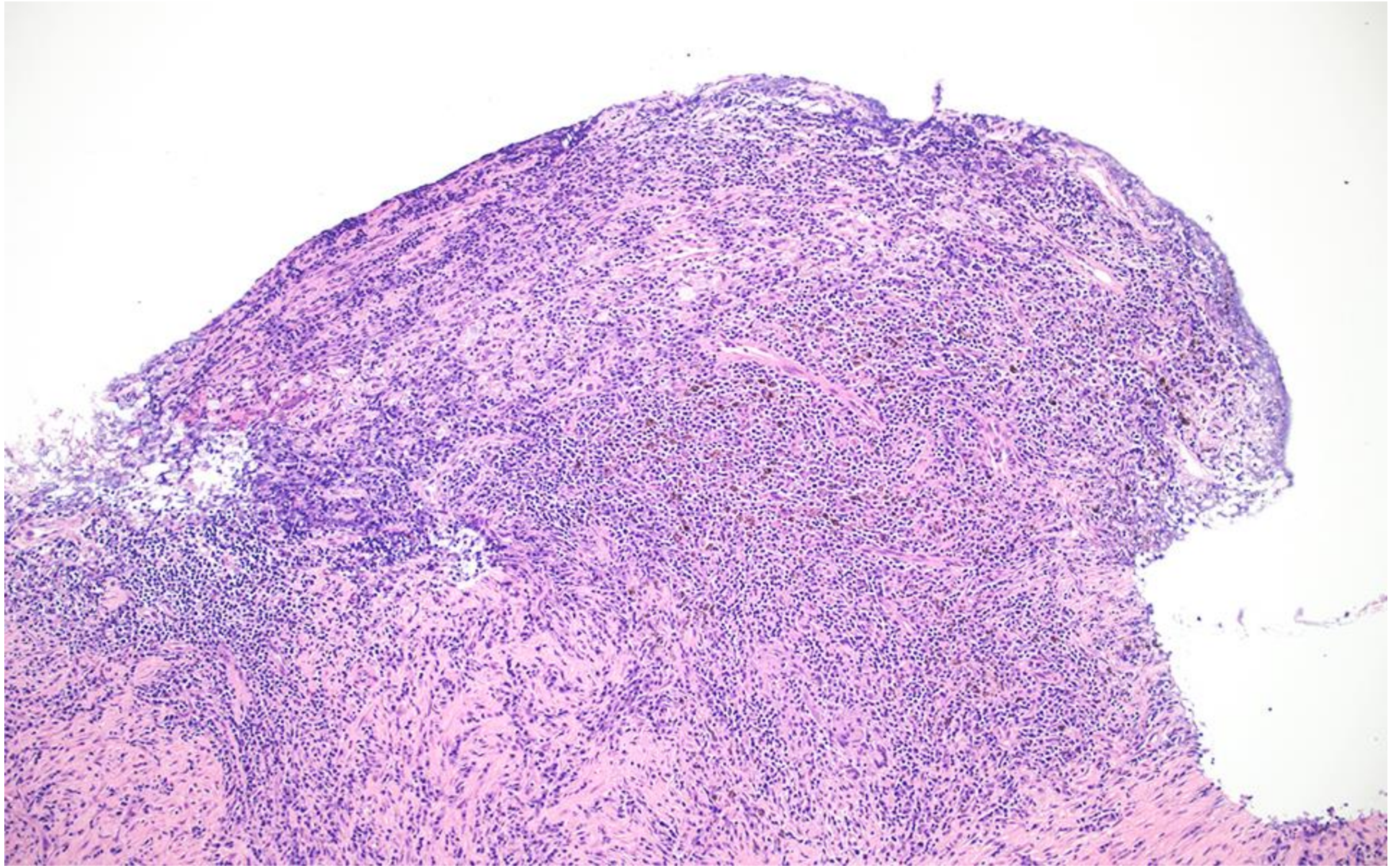






1. The decedent is a 44-year-old man with a past medical history of smoking and COPD, who was found deceased at home. He had reportedly been recently hospitalized for a fungal infection and released from the hospital about a week ago. At autopsy the lungs are consolidated, with a cavitary lesion seen on the left upper lobe.

What is the most likely explanation for the findings on the histologic sections of the lungs?

- ◯ Aspiration of crushed oral tablets
- ◯ Fungal infection
- ◯ Hypersensitivity pneumonia
- ◯ Intravenous injection of crushed oral tablets
- ◯ Parasitic infection

Answer...

B. Fungal Infection (10.55% responses)

As noted on the question stem, the decedent on this case had a history of a recent fungal infection with a cavitary lung lesion identified on autopsy. During his hospitalization, fungal cultures from the left upper lobe were positive for Aspergillus Niger.

Aspergillus niger, along with Aspergillus fumigatus, are known to produce calcium oxalate crystals through the degradation of oxaloacetate via the tricarboxylic acid cycle. These will appear as birefringent crystals, most prominent along the walls of the cavitary lesion, and can be a mimic of excipients, commonly seen in cases of aspirated of injected crushed oral drug tablets, which make them especially important to be aware of in forensic pathology. Additional histologic sections from the left lung in our case showed extensive involvement by branching septate hyphae consistent with pulmonary aspergillosis.

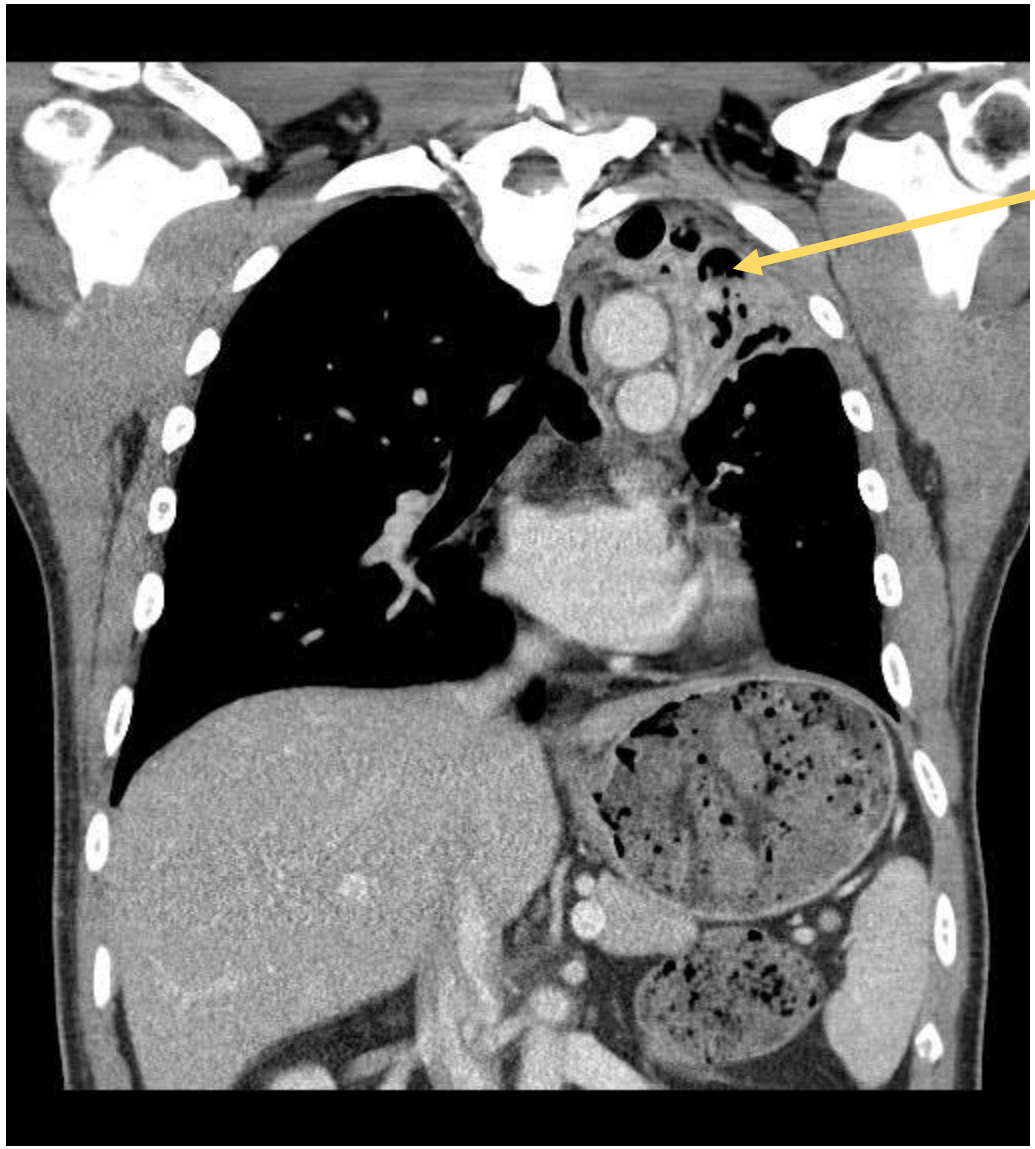
Other Responses:

A. Aspiration of crushed oral tablets (40.37% of responses)
Oral tablets contain excipients, which are insoluble particulate filler materials that bind and protect the active drug during production, as well as shape and lubricate the tablet for easy swallowing. Excipients include talc (hydrated magnesium silicate), microcrystalline cellulose, crospovidone and starch. When crushed tablets are aspirated, particles of excipients can show up as birefringent foreign bodies within the lung airways. Although the histologic findings alone would be indistinguishable from the ones in our case, when taken these findings in conjunction with the provided history and gross findings, a fungal etiology is more likely in our setting.

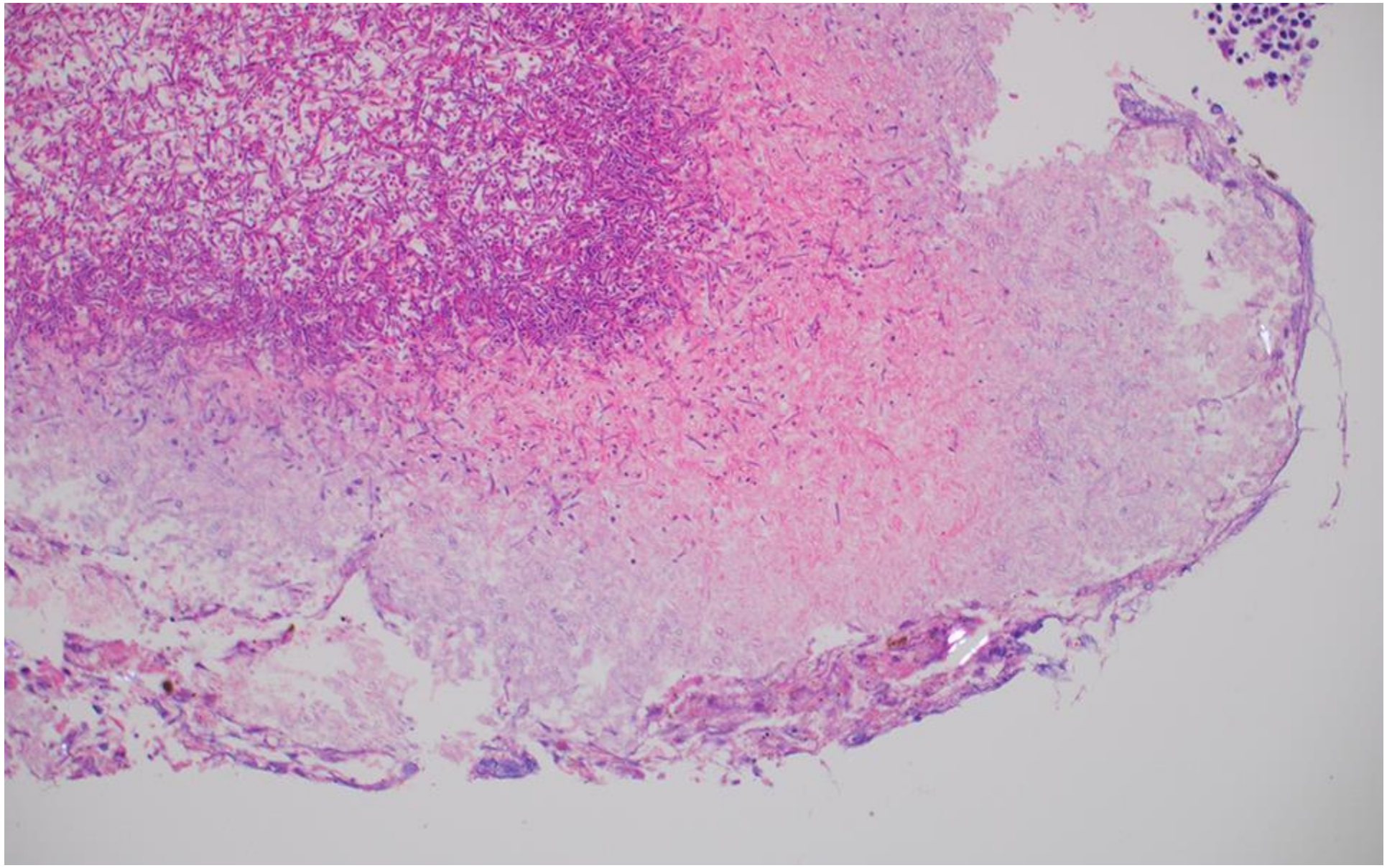
C. Hypersensitivity pneumonia (8.94% responses)
HP is a lung-limited hypersensitivity reaction to an inhaled antigen. Common etiologies include household birds and molds and farming environment. In its most commonly encountered form, subacute HP, histologic findings will generally consist of bronchovascular centered chronic inflammation and poorly formed noncaseating granulomas or scattered giant cells. Schaumann bodies, calcium and protein inclusions within granulomas, can occasionally be present and contain polarizable crystals.

D. Intravenous injection of crushed oral tablets (38.3% responses)
When oral tablets are crushed, and injected intravenously, particles of excipients can show up as birefringent foreign bodies within pulmonary arteries and periarterial interstitium. The deposits on our case do not seem to be located within the lung vasculature.

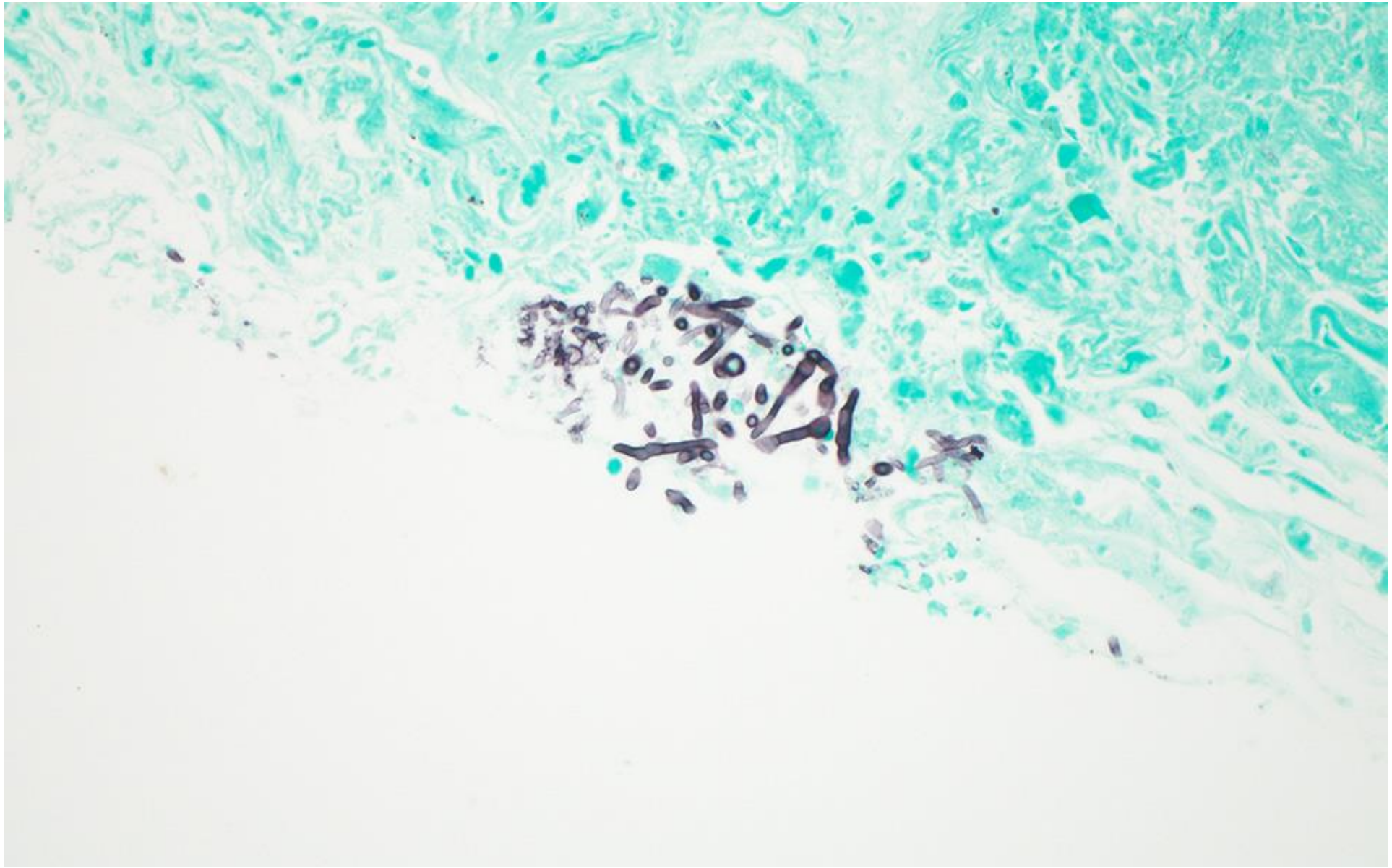
E. Parasitic infection (1.83% responses)
Parasitic pulmonary infections may be caused by a variety of organisms, most commonly protozoa or helminths (worms). Parasitic infections can cause a variety of histopathologic patterns in the lung, including eosinophilic lung disease, granulomatous inflammation, vasculitis, pleuritis, empyema, and acute lung injury patterns. Some trematode egg walls (Ex. Paragonimus sp.) are strongly birefringent. In these cases, distinct identifying anatomy such as spines and shouldered operculum would be seen, unlike our case, which shows amorphous birefringent deposits.



Left upper lobe cavitary lesion



Fungal hyphae and birefringent crystals at the margin of the specimen.



Grocott’s Methenamine Silver (GMS) stain, 400x

References:

- Boland JM, Pritt BS. Histopathology of Parasitic Infections of the Lung. Seminars in Diagnostic Pathology. 2017;34(6):550-559.
- Churg A, Muller N. Atlas of Interstitial Lung Disease Pathology. Philadelphia: Wolters Kluwer; 2014. 95-110p.
- Harigopal P, Bejarano P, Burke G, Dowdy L. Birefringent Crystals in a Lung Cavity. Clinical Infectious Diseases. 2005;40:1849-1850.
- Nguyen V, Chan E, Chou S et al. Pulmonary Effects of IV Injection of Crushed Oral Tablets: “Excipient Lung Disease”. American Journal of Roentgenology. 2014;203(5):W506-W515.