from meta-analyses abstracts are limited, at best. Additionally, authors and reviewers should evaluate the significance and limitations of systematic reviews and meta-analyses. Despite presenting the best available evidence, a meta-analysis based on low-quality studies might be misleading and must be interpreted with caution [5]. To this end, assessing the quality of studies is also limited within an abstract format; thus, a full-length manuscript is needed.

Conference abstracts are not a substitute for full-length manuscripts. A consensus statement from the PRISMA for Abstracts Group noted that abstracts should be robust enough in presenting a clear and truthful account of the intended research [6]. More attention should be paid by authors and society abstract reviewers to the quality of systematic reviews and meta-analyses, given their central role in providing robust evidence-based medicine in the field of gastroenterology.

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Nuances in diagnosis and management of acute esophageal necrosis

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Dr. Dias *et al* present a comprehensive review on black esophagus (BE) [1], a rare but important entity in gastroenterology. The clinical significance of BE, with its striking endoscopic appearance of necrotic mucosa preferably affecting the distal esophagus with a sharp transition at the gastrointestinal junction, has notably risen over the last decade, with advances in gastrointestinal endoscopy and its increased recognition in the medical literature [2]. It is therefore important to acknowledge Dr. Dias' work while commenting on some of the important aspects of acute esophageal necrosis (AEN) mentioned therein.

First, the role of vasoconstrictive agents for achieving mean arterial blood pressure control in sepsis may come at the expense of splanchnic blood flow, possibly resulting in a decrease in distal esophageal tissue perfusion. It is the secondary effect of such agents—namely, maintaining vital organ circulation in sepsis, an underlying critical condition—that may lead to decreased mortality in AEN. An interesting correlate would be to evaluate the potential delay in the time to esophageal mucosal healing and the risk of stricture formation in patients who have received vasoconstrictive agents. This could certainly be addressed in future studies.

Second, there have been a number of case reports linking the use of various drugs to the development of BE. While it is well known that the vasoconstrictive effects of cocaine produce a decrease in tissue perfusion, the causative relationship between some prescription medications and AEN described in the literature so far was often purely observational. The lack of scientific proof makes such a hypothesis likely to be coincidental. For example, bisphosphonates are known to cause a chemical injury-type tissue ulceration in the mid esophagus, typically due to the known anatomic impression from the aortic arch—an entity called "pill esophagitis"—but would not cause diffuse circumferential black-appearing tissue necrosis spanning the entire esophagus. Such reports of AEN are likely to be related to underlying or transient hemodynamic compromise in a vasculopathic patient and massive reflux of gastric contents in the setting of associated duodenal ulcer disease [3].

Third, management of AEN is aimed at correcting underlying medical conditions, hemodynamic support, nil-per-os restriction, and administration of high-dose proton pump inhibitor therapy. Surgical intervention is reserved for cases of esophageal perforation with mediastinitis and abscess formation [4]. Similar to left-sided ischemic colitis, AEN seems to correct on its own. Red blood cell transfusion may be indicated to correct gastrointestinal blood loss, but endoscopic therapy with submucosal injection of a racemic mixture of epinephrine seems dubious and potentially detrimental. Local tissue epinephrine therapy is a good tool in

our endoscopic armament for direct lesional hemostasis, through its tamponade effect and vasoconstriction, precisely what one would want to avoid in ischemic organ injury. The risk of perforation is also highest in the esophagus, which notably lacks serosa, an additional layer of protection common to the rest of the gastrointestinal tract. It is for this reason that epinephrine injection should be avoided and, importantly, stent placement should not be performed. Indeed, there have been reports of perforated BE in the setting of stent use [5].

Finally, in asymptomatic patients, repeat endoscopy may be helpful in verifying the normalization of the mucosal lining and excluding occult pathology that could have been masked by diffuse BE on initial presentation. This may be performed a few weeks past therapy and should not delay the patient's discharge from the hospital once stable. Stricture or stenosis formation in AEN, which occurs in over 10% of cases during Stage 2 and 3 of the disease, may have an association with concurrent duodenal pathology [2] and seems to be inversely related to the state of immune compromise in affected patients with diabetes mellitus, malnutrition and malignancy [6]. Stricture or stenosis could be managed with outpatient endoscopic dilatation and antacid therapy, but repeat sessions may be necessary.

In the past decade, AEN has continued to ascend the differential diagnosis ladder in hospitalized patients presenting with upper gastrointestinal hemorrhage, largely because of the increased use of endoscopic procedures. Its prompt recognition and proper management will remain important for decreasing mortality and improving the patient's outcome.

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Authors' reply

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We read Dr. Gurvits' comments on our article [1] with great interest and we would like to thank him for his contribution. In fact, our article was inspired by a case we reported in 2019 of an elderly male with multiple comorbidities who presented with acute esophageal necrosis in association with acute cholecystitis [2]. At this point, the review articles by Gurvits *et al*, which provided the first descriptions of acute esophageal necrosis as a complex disease approximately one decade ago [3,4], were very useful in getting a clear view of this widely unknown but potentially serious disease, allowing us to provide adequate management and, fortunately, the patient evolved favorably. Interestingly, we noticed that more than 100 cases of acute esophageal necrosis in association with diverse etiologies (diseases, procedures, drugs, etc.) have been reported during the last decade since the publication of those articles, providing important information regarding novel aspects of its complex pathophysiology and tips to improve its management. Therefore, our article was an attempt to provide an updated and comprehensive review regarding the pathophysiology, etiology, diagnosis and management of acute esophageal necrosis. Gurvits *et al* made some interesting comments on our review article that deserve some discussion.

The association of some drugs with acute esophageal necrosis is interesting and raises the question whether there is actually a causal relationship or the association is co-incidental. In fact, whereas some drugs could result in acute esophageal necrosis, because their mechanism of action could possibly result in esophageal ischemia or direct esophageal mucosal injury, others apparently could not have such effects and an eventual relation with esophageal necrosis has no biological plausibility.

Despite red blood cell transfusion being an appropriate measure to maintain stable hemoglobin levels, when a patient presents with active esophageal bleeding, it may be necessary to perform hemostatic maneuvers. There are cases where submucosal adrenaline injection or placement of a self-expandable metallic stent were effective, suggesting that these measures could be adequate in this scenario [5-7]. However, this is based on case reports and small case series and therefore the level of evidence is not very high. It is actually possible that adrenaline injection could aggravate esophageal necrosis, given its vasoconstrictive effects, and placement of a stent could result in perforation, as suggested by Gurvits *et al*. Although there is no evidence, perhaps hemospray could be equally effective, but safer. Larger studies would help understand which measures would be the safest and most effective in this scenario.

In conclusion, it appears that acute esophageal necrosis is attracting attention in the medical literature and multiple case reports and small case series have been published in recent years. In fact, since the publication of our review, approximately