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A Systematic Review of the Risk of Perforation During Esophageal Dilation for Patients with Eosinophilic Esophagitis

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Abstract

Background—Eosinophilic esophagitis (EoE) is associated with tissue remodeling that can result in esophageal mucosal fragility, and esophageal dilation for patients with EoE is known to cause painful mucosal lacerations. Clinicians have been admonished that patients with EoE may be exceptionally predisposed to perforation with esophageal dilation, a notion supported primarily by case reports. We have conducted a systematic review of literature on esophageal dilation in EoE in an attempt to better define the risk of perforation.

Methods—We searched PubMed and abstracts presented at the annual scientific meetings of the American Gastroenterological Association and the American College of Gastroenterology to identify reports on esophageal dilation in EoE. We analyzed reports meeting the following criteria: (1) the diagnosis was established from esophageal biopsy specimens revealing ≥ 15 eosinophils/hpf, (2) esophageal dilation was described, (3) esophageal perforations described were the result of esophageal dilation.

Results—We identified 18 reports for inclusion in our systematic review. The studies comprised 468 patients who underwent a total of 671 endoscopic dilations. Esophageal mucosal tears were described in most cases, but there was only one perforation among the 671 dilations (0.1%).

Conclusions—Our systematic review does not reveal an inordinate frequency of esophageal perforation from dilation in patients with EoE, and it is not clear that dilation is any more hazardous for patients with EoE than for patients with other causes of esophageal stricture. Although esophageal dilation must be performed with caution in all patients, the risk of perforation in EoE appears to have been exaggerated.

Keywords

Eosinophilic esophagitis; Esophageal dilation; Systematic review

Introduction

Eosinophilic esophagitis (EoE) appears to be a manifestation of food allergy in which eosinophils infiltrate the esophageal epithelium, where they cause symptoms and tissue remodeling mediated by the release of cytokines [1]. The disorder affects men predominantly [2], and patients with EoE often have a history of other allergic conditions such as rhinitis, asthma, atopic dermatitis and eczema [3]. EoE appears to be a modern disorder whose incidence has increased profoundly over the past two decades [4]. One recent study found that the prevalence of EoE in the outpatient endoscopy unit of a military hospital was as high as 6.5% [5].

The tissue remodeling that characterizes EoE can include the development of subepithelial fibrosis with the formation of esophageal rings and strictures. With such remodeling, it is not surprising that adult patients with EoE usually complain of dysphagia, and EoE has become a common cause of food impactions in adults. A recent metaanalysis found that dysphagia was a presenting complaint in 93% of patients with EoE, and that 62% presented with food impactions [2].

Dysphagia in EoE usually responds to medical treatment that can include proton pump inhibitors, dietary restrictions and swallowed steroid preparations, even in patients who have what appear to be fixed esophageal stenoses [6, 7]. However, some patients may require esophageal dilation for the relief of dysphagia. Unfortunately, the esophageal remodeling that accompanies EoE can cause mucosal fragility that might predispose to serious complications from dilation. It is well established that esophageal dilation can cause extensive esophageal mucosal tears that can be very painful [8], and there are a number of reports describing spontaneous esophageal perforations and perforations caused by instrumentation of the esophagus in patients with EoE [9–13]. As early as 1993, Langdon encouraged endoscopists to exercise extreme caution when dilating the “corrugated ring esophagus” that we now recognize as characteristic of EoE [14, 15].

Reports of esophageal perforations in patients with EoE comprise case reports and small series predominantly. Based on such data, it is difficult to formulate a meaningful estimate of the risk of esophageal dilation for patients with EoE. We have conducted a systematic review of the literature in an attempt to better define that risk.

Methods

We searched PubMed to identify English-language articles published between January 1978 and November 2009 that contained the terms “eosinophilic esophagitis” and “esophageal dilation.” We also reviewed pertinent articles for additional citations and abstracts presented at the annual scientific meetings of the American Gastroenterological Association and the American College of Gastroenterology from 2005 to 2009. We included only those reports and abstracts that met the following criteria: (1) the diagnosis of EoE was established from esophageal biopsy specimens, taken at the time of dilation or earlier, revealing ≥ 15 eosinophils/hpf, (2) the report stated that patients underwent esophageal dilation therapy, (3) if the report described an esophageal perforation, it had to be the result of an esophageal dilation and not a spontaneous esophageal perforation (Boerhaave's syndrome) or a perforation caused by esophageal instrumentation other than dilation. Abstracts were excluded if it was clear that the patients described were included in a subsequent, peer-reviewed publication. Reviews, non-English language articles, studies that did not provide details regarding the histological criteria for the diagnosis of EoE, and reports that did not describe the presence or absence of complications of esophageal dilation therapy were excluded.

From each report that fulfilled our inclusion criteria, we extracted the number of patients in each study, the total number of esophageal dilations performed, the number of eosinophils/hpf and the number of esophageal perforations. When possible, we also extracted the mean age, male to female ratio, and the percentage of mucosal tears. Two reviewers (J.J. and S.S.) independently checked each study to determine that it was appropriate for inclusion.

Results

Our systematic review revealed 17 reports [11, 16–31], including four abstracts [27, 29–31], that clearly met our inclusion criteria for analysis. We also included one report that described patients “with a previously confirmed diagnosis of eosinophilic esophagitis,” but that did not specifically meet our criterion of stating that esophageal biopsy specimens revealed ≥ 15 eosinophils/hpf [32]. We felt that it would be inappropriate to exclude this report because it described by far the largest series on esophageal dilation in EoE performed by investigators who are widely recognized as among the leading experts in the field.

The results of the 18 reports included in our systematic review are summarized in Table 1. The 18 studies comprise a total of 468 patients, most of whom were men between the ages of 20 and 50. The 468 patients underwent a total of approximately 671 endoscopic dilations. For two reports [17, 31], the total number of dilations listed was estimated as a minimum total number based on the statements that “four patients underwent multiple dilations” and one patient had “periodic dilations.” For two reports [18, 19], the total number of dilations was extrapolated from the “average number” of dilations reported per patient.

Eleven of the 18 reports provided information on esophageal mucosal tears caused by dilation. Such tears occurred in the majority of cases, with two reports describing only “impressive” tears [17] or tears occurring in “a few” [19] patients, without providing a percentage. Among the 671 unique endoscopic dilations, we found only one description of a perforation clearly caused by the dilation itself [25].

Discussion

Our systematic review reveals that esophageal dilation in patients with EoE usually causes esophageal mucosal tears, perhaps as a consequence of the mucosal fragility that results from eosinophil-induced esophageal remodeling. When prescribing esophageal dilation for patients with EoE, therefore, it is important that they be advised of the strong possibility that dilation will result in an esophageal tear that can cause considerable chest pain and odynophagia that may persist for days.

Despite the great frequency of esophageal mucosal tears that accompany esophageal dilations in patients with EoE, our review does not reveal an inordinate frequency of esophageal perforation from dilation in those patients. Indeed, among 18 reports describing 671 unique endoscopic dilations, we found only one description of a perforation clearly caused by the dilation itself (i.e. an overall complication rate of 0.1%). For patients who have esophageal dilation for strictures due to conditions other than EoE, it has been estimated that serious complications can be expected in approximately 0.5% of all dilation procedures [33]. Thus, it is not clear that esophageal dilation is any more hazardous for patients with EoE than for patients with other causes of esophageal stricture.

A number of authorities have admonished physicians to exercise special caution when performing esophageal dilation for patients with EoE [14–17, 21]. Some of the concern regarding esophageal dilation in this condition undoubtedly has been fueled by a number of well publicized case reports describing esophageal perforations during esophageal instrumentation in patients with EoE. We have found reports describing seven such

perforations, including the one mentioned above. Kaplan et al. [11] described one patient who suffered a perforation during passage of an endoscope. Straumann et al. [12] reported two patients who suffered perforations during rigid endoscopy performed to treat food impactions. Cohen et al. [13] reported three patients who suffered esophageal perforations associated with instrumentation of the esophagus, but the report does not provide details of those incidents, and it is not clear whether the perforations occurred during esophageal dilation. Another three reports also comment on patients who relayed a history of esophageal perforations but, again, no details were provided [13, 26, 27].

There are a number of limitations to the conclusions that can be drawn from this systematic review. All but one [32] of the patient series reviewed were small, and all the data were collected retrospectively. Five reports included in this review share some of the same authors, and it is not clear from a review of the methods sections whether some of the same patients were included in more than one series [17, 20, 27, 28, 32]. Of note, two other studies share a common author [16, 21], but the methods section makes it clear that the articles describe unique patients.

Unfortunately, there are no published, controlled trials of dilation therapy to guide the clinician in precisely when and how to perform esophageal dilation for patients with EoE. There is also no consensus regarding how long medical therapy should be administered before resorting to esophageal dilation, nor is it clear what diet, medications or combinations of medications and diets should be tried before a patient is deemed a failure of medical treatment. Although our review suggests that the risks of esophageal dilation for patients with EoE may have been exaggerated, we still recommend that clinicians exercise caution in performing the procedure.

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Table 1
Results of studies on esophageal dilation for patients with eosinophilic esophagitis

Study	Number of patients	Total dilations	Dilated patients	Gender ratio (M:F)		Eosinophils per hpf	Reported tears	Perforations
				Mean age				
Vasilopoulos et al. [16]	4	4	25	4:0	30	100%	0	0
Kaplan et al. [11]	3	3	29	2:1	>25	NR	0	0
Straumann et al. [17]	11	11 ^a	NR	NR	>24	Impressive	0	0
Croese et al. [18]	17	58 ^b	NR	NR	>30	87%	0	0
Arora et al. [19]	21	42 ^c	40	17:4	>20	A Few	0	0
Straumann et al. [20]	5	5	38	5:0	65	100%	0	0
Potter et al. [21]	13	13	NR	NR	>15	77%	0	0
Meyer [22]	2	2	66	1:1	>40	NR	0	0
Roberts-Thomson [23]	1	1	34	1:0	>50	100%	0	0
Cantu et al. [24]	2	3	34	2:0	>30	50%	0	0
Eisenbach et al. [25]	1	1	17	0:1	>100	100%	1	1
Pasha et al. [26]	18	36	44	NR	>20	NR	0	0
Gonsalves et al. [27]	81	152	NR	NR	>20	NR	0	0
Schoepfer et al. [28]	10	27	41	9:1	>24	100%	0	0
Dellon et al. [29]	36	70	40	NR	>15	6%	0	0
Shepherd et al. [30]	35	35	NR	NR	>15	NR	0	0
Kumar et al. [31]	1	1 ^d	NR	NR	>15	NR	0	0
Schoepfer et al. [32]	207	207	NR	166:41	NR ^e	NR	0	0
All studies	468	671					1	1

M male, F female, NR not reported

^a At least 11 dilations. Seven patients underwent one dilation, and four patients underwent multiple dilations

^b Average 3.4 dilations/patient

^c Average 2 dilations/patient

^d One patient underwent periodic dilations

^e This report was included at the authors' discretion even though it did not meet our criterion of specifically stating that esophageal biopsy specimens revealed ≥ 15 eosinophils/hpf