

## Review

# Endoscopic Dilation for Fibrostenotic Complications in Eosinophilic Esophagitis—A Narrative Review

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**Abstract:** Esophageal fibrotic remodeling is a major complication of chronic inflammation in eosinophilic esophagitis (EoE) and represents one of the main determinants of symptoms in adult patients with EoE, with a remarkable impact on patients' quality of life and the healthcare system. Esophageal fibrotic remodeling is diagnosed through upper gastrointestinal endoscopy, radiological studies, and a functional luminal imaging probe. However, diagnostic underestimation of esophageal strictures and suboptimal adherence to EoE guidelines still represent limitations of current clinical practice. Combined with medical therapy and/or elimination diets, endoscopic dilation remains the cornerstone treatment for esophageal strictures and rings, offering a safe and effective option for managing obstructive symptoms. Different modalities are available for esophageal endoscopic dilation of EoE, including mechanical and balloon dilators. Mechanical dilators provide tactile feedback during the procedure and exert longitudinal and radial forces. In contrast, balloon dilators apply a purely radial force and enable direct visualization of the esophageal mucosa during the procedure. Both mechanical and balloon dilators are safe and effective, with no single modality demonstrating clear superiority. Consequently, the choice of dilation technique is guided by stricture characteristics, the expertise of the endoscopist, and considerations related to the financial and environmental sustainability of the devices. This review aims to summarize the most relevant evidence on the endoscopic evaluation and dilation of fibrostenotic complications in EoE, also providing practical guidance for clinicians to optimize the endoscopic management of these patients.

**Keywords:** dilation in eosinophilic esophagitis; dilation in EoE; endoscopic treatment of fibrosis in eosinophilic esophagitis; esophageal fibrosis in EoE; how to perform dilation in EoE



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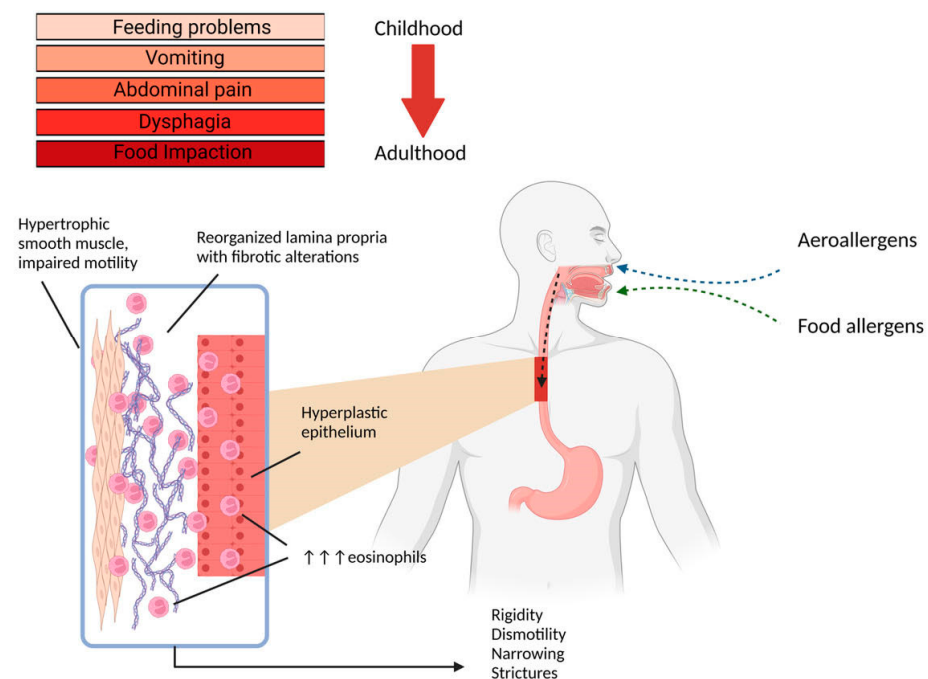
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## 1. Introduction

Esophageal fibrotic remodeling is a major complication of chronic inflammation in eosinophilic esophagitis (EoE), with a prevalence of approximately 50% among adult pa-

tients [1–4]. Fibrosis in EoE results from a dynamic tissue remodeling process involving epithelial hyperplasia, subepithelial fibrosis, angiogenesis, hypertrophy of the smooth muscle, and epithelial-to-mesenchymal transition [5]. The transformation of epithelial cells into myofibroblasts leads to excessive extracellular matrix production and tissue stiffening, while prolonged myofibroblast activation exacerbates fibrosis [6]. These anatomical changes lead to esophageal fibrotic remodeling, stiffness, and dysmotility, contributing to progressive dysphagia, food impaction, and, ultimately, stricture formation characteristic of EoE (Figure 1) [7,8].



**Figure 1.** Pathophysiology of fibrostenotic complications of eosinophilic esophagitis.

The presence of fibrosis, not reflected by mucosal inflammatory activity assessed through biopsies, contributes to the dissociation between clinical and histological disease activity in EoE [9]. Indeed, esophageal biopsies, which primarily assess the esophageal epithelium, are insufficient for evaluating the transmural esophageal impairment due to eosinophilic-driven inflammation, while methods for determining subepithelial disease activity in EoE remain limited and/or underutilized, therefore representing a critical unmet clinical need [10].

The main risk factors for esophageal fibrosis in EoE include patients' age and the disease duration, with fibrostenotic features and associated obstructive symptoms (i.e., dysphagia and food impaction) being less frequent in pediatric compared to adult populations [11,12]. In a study by Schoepfer et al., the endoscopic prevalence of fibrotic features of EoE increased from 46.5% in patients diagnosed within 2 years of symptom onset to 87.5% in those with a diagnostic delay exceeding 20 years [13]. Due to its high prevalence, EoE is the leading cause of esophageal food impaction in patients presenting to the emergency departments, with this presentation often leading to the diagnosis [14,15]. Despite growing awareness of the clinical and endoscopic features of EoE, significant diagnostic delay persists, contributing to prolonged inflammation and fibrostenotic progression [11,16]. To facilitate early diagnosis, international guidelines recommend obtaining esophageal biopsies during index endoscopy in patients presenting with food impaction [17,18], and artificial intelligence algorithms have been proposed [19]. However, suboptimal adherence

to these guidelines [20,21] may partly explain the substantial diagnostic delay and loss to follow-up in secondary care after esophageal food impaction [11,22].

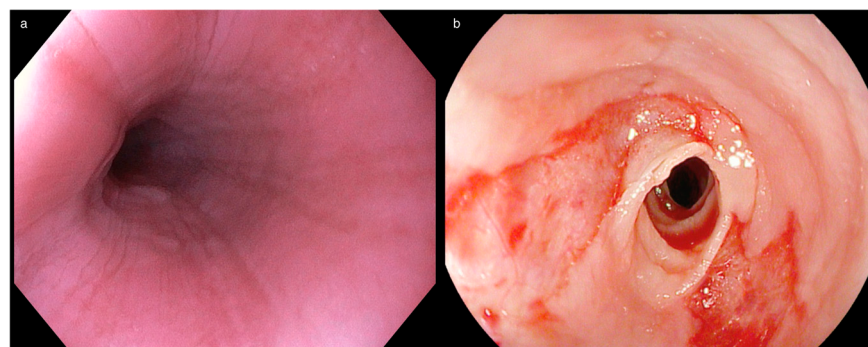
Endoscopy is critical for the diagnosis, monitoring, and treatment of esophageal fibrotic complications in EoE. Compared with control individuals, endoscopic ultrasound studies in patients with EoE have shown thickening of the esophageal mucosa, submucosa, and muscularis propria [23,24]. This esophageal wall thickening in the context of EoE is likely due to a combination of inflammation and fibrosis, explaining the potential symptomatic improvement, increase in esophageal caliber, and need for dilation following medical therapy [25,26]. Therefore, combined with medical therapy and/or elimination diets, endoscopic dilation is the cornerstone treatment for esophageal strictures and rings, offering a safe and effective option for managing symptoms related to esophageal fibrosis [27].

This review aims to summarize the most relevant evidence on the endoscopic evaluation and dilation of fibrostenotic complications in EoE, providing practical guidance for clinicians to optimize the endoscopic management of these patients.

## 2. Evaluation of Esophageal Fibrostenotic Complications in Eosinophilic Esophagitis

### 2.1. Endoscopic Features of Inflammation and Fibrosis in Eosinophilic Esophagitis

Endoscopic features typically associated with EoE include white exudates, linear furrows, edema, rings, and strictures. In particular, some of these features differentiate inflammatory and fibrostenotic EoE phenotypes. Endoscopic inflammatory features of EoE include white exudates, linear furrows, and edema (e.g., pallor due to loss of vascular pattern). In contrast, esophageal rings (fixed concentric mucosal ridges) and strictures (a discrete, nonnegotiable esophageal narrowing) are characteristic features of fibrotic esophageal remodeling and can also be observed in patients with esophageal involvement of lichen planus. In a meta-analysis by Kim et al., including 4678 patients with EoE, the overall pooled prevalence for white exudates was 27%, 48% for linear furrows, 41% for edema, 44% for rings, and 21% for strictures [1]. In addition, patients with EoE may present fragile esophageal mucosa that easily tears under minimal trauma (also known as “crepe paper mucosa”) and a diffusely stenotic esophagus described as a narrow-caliber or small-caliber esophagus (arbitrarily defined as an esophageal lumen <18 mm involving greater than 50% of the esophageal length) [28]. The latter represents a treatment-resistant subphenotype characterized by longer symptom duration and requires multiple dilations (Figure 2).



**Figure 2.** (a) Patient with inflammatory features (edema, vertical furrows) of eosinophilic esophagitis but without fibrostenotic features. (b) Patient with fibrostenotic features of eosinophilic esophagitis. A complex stricture is seen in a narrow-caliber esophagus, with two longitudinal mucosal lacerations visible following the passage of the gastroscop.

The EoE endoscopic reference score (EREFS), introduced in 2013 by Hirano et al. [29], is a pivotal classification system for diagnosing and monitoring disease activity in EoE. The EREFS score quantifies the endoscopic activity of EoE while standardizing the definition of its key endoscopic features. It is based on the evaluation and quantification of five endoscopic findings: edema, rings, exudates, furrows, and strictures, with disease activity scored according to the most affected esophageal area. Serving as a practical checklist for endoscopists, the EREFS score may enhance the detection of the endoscopic features of EoE. Different versions of the EREFS score exist, allowing for the grading of endoscopic severity on a scale ranging from 0 to 9, with higher scores reflecting greater disease activity. Validation studies conducted in both the United States and Europe have confirmed the inter- and intra-observer reliability of this scoring system, with reported sensitivity and specificity rates of 90% in both pediatric and adult populations [30,31]. Recent international guidelines [32], along with a consensus by the American Society for Gastrointestinal Endoscopy, and a clinical practice update on high-quality upper endoscopy from the American Gastroenterological Association, recommend the routine use of the EREFS score for assessing disease activity and monitoring patients with EoE [33,34]. However, a recent European study showed that only 42% of physicians (82.5% of EoE experts vs. 33% of non-experts; [ $p < 0.0001$  and 55% of academics vs. 29.1% non-academics;  $p < 0.0001$ ]) routinely used the EREFS score in their clinical practice [20].

## 2.2. Association Between Obstructive Symptoms and Quality of Life

As the primary determinant of symptoms in adult patients with EoE, fibrotic remodeling and its associated symptoms significantly contribute to the worsening of quality of life in these patients [35]. A prospective cohort study involving 67 patients demonstrated a significant correlation between overall quality of life, assessed using a self-report questionnaire designed for EoE patients (EoE-QOL-A), and symptoms [36]. Dysphagia frequency, intensity, and severity ( $p < 0.001$ ), as well as experiencing a food impaction within 30 days, were significantly associated with worse overall quality of life ( $p = 0.009$ ) [36]. A prospective cross-sectional observational study comparing EoE patients with healthy controls found that higher dysphagia scores adversely affected both physical and mental quality of life [37]. These results are further supported by a systematic review and meta-analysis showing impaired health-related quality of life in EoE patients compared to controls, primarily driven by symptom severity and disease duration [38].

## 2.3. Definition and Grading of Esophageal Rings and Strictures

Diagnosing and accurately characterizing esophageal rings and strictures can be challenging. Esophageal rings are concentric bands of tissue, typically 2 to 5 mm thick, that protrude into the esophageal lumen. Given that EoE can involve the whole esophagus but more frequently affects the distal segment [2], esophageal rings are predominantly found in this region. According to the EREFS score, esophageal ring severity can be graded as mild (grade 1—subtle circumferential ridges), moderate (grade 2—distinct rings that do not impair the passage of a standard diagnostic adult endoscope of outer diameter 8–9.5 mm), or severe (grade 3—distinct rings that do not permit passage of a diagnostic endoscope) based on endoscopic imaging. Fixed rings, which can lead to food impaction and are frequently associated with EoE, are well-suited targets for endoscopic dilation. In a study by Chen et al. involving 72 EoE patients who underwent esophagogastroduodenoscopy (EGD) with biopsies and functional luminal imaging probe (FLIP), a significant correlation was observed between higher ring scores and lower esophageal distensibility plateau ( $r_s = -0.46$ ;  $p < 0.0001$ ) [39]. The authors suggested that endoscopic assessment of ring

severity could serve as a marker of esophageal remodeling and may aid in stratifying the risk of food impaction in EoE patients [39].

Esophageal strictures in EoE are structural abnormalities characterized by narrowing of the esophageal lumen resulting from chronic, immune-mediated eosinophilic inflammation and subepithelial fibrosis, leading to dysmotility, reduced esophageal distensibility and impaired bolus transit. When applying the EREFS score, esophageal strictures in EoE are graded as absent (grade 0) or present (grade 1). As summarized in Table 1, esophageal strictures can also be classified as simple or complex based on their etiology, diameter, length, and location. Simple strictures are typically short (<2 cm), focal, straight, and allow the passage of a standard gastroscope, whereas complex strictures are longer ( $\geq 2$  cm), angulated, irregular, and severely narrowed. Dilation is generally effective for most simple benign strictures; however, complex strictures (e.g., narrow-caliber esophagus) tend to be more resistant to medical and endoscopic therapy, often leading to treatment failure or rapid symptom recurrence [40]. A retrospective cohort study evaluated differences in treatment response between narrow-caliber and regular-caliber esophagus [41]. Dilation was significantly more common in patients with narrow-caliber esophagus (69% vs. 17%;  $p < 0.01$ ), with a median of three dilations required per patient. Additionally, patients with narrow-caliber esophagus were more refractory to steroid treatment, demonstrating lower clinical (56% vs. 85%), endoscopic (52% vs. 76%), and histologic (33% vs. 63%) response rates ( $p < 0.01$  for all).

**Table 1.** Classification of esophageal strictures.

|                                              | Simple Strictures                                                 | Complex Strictures *                                                                     |
|----------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Allows for passage of a standard gastroscope | Yes                                                               | No (typically)                                                                           |
| Length                                       | Short (<2 cm)                                                     | Long (>2 cm)                                                                             |
| Focal                                        | Yes                                                               | No                                                                                       |
| Angulation/Irregularity                      | Straight                                                          | Angulated and irregular                                                                  |
| Degree of narrowing                          | Less severe                                                       | Severe                                                                                   |
| Etiology                                     | Peptic, Eosinophilic esophagitis, Schatzki's ring, esophageal web | Post-ESD, Eosinophilic esophagitis, anastomotic, caustic ingestion, radiotherapy-induced |
| Association with fibrosis                    | Minimal                                                           | Significant                                                                              |
| Fluoroscopy                                  | Optional                                                          | Recommended                                                                              |
| Refractoriness to treatment                  | Less common                                                       | More common                                                                              |
| Response to medical therapy                  | Often effective                                                   | Limited effectiveness                                                                    |

\* The presence of at least one of these characteristics is sufficient to classify the stricture as complex.

## 2.4. Methods to Assess Fibrostenotic Complications of EoE

### 2.4.1. Endoscopy and Radiology

Despite the significant and frequent occurrence of fibrostenotic progression in EoE, endoscopists may underestimate the presence of rings and strictures. Studies comparing endoscopic and radiologic assessments of esophageal narrowing in pediatric and adult EoE populations have yielded conflicting results. While some studies suggest that radiologic assessment is more sensitive, others indicate that both methods demonstrate comparable accuracy. EGD is typically the primary diagnostic test for suspected EoE, as it allows for the identification and grading of endoscopic features of EoE, biopsy obtainment, treatment of food impaction, and exclusion of alternative diagnoses. Esophageal strictures are generally diagnosed when the passage of a standard gastroscope (8–9.5 mm in diameter) is either impossible or occurs with resistance. However, given that the normal adult esophageal caliber

is approximately 20–25 mm [42], any reduction in diameter could technically be considered a stricture. This discrepancy often contributes to the underestimation of esophageal narrowing during endoscopy. Moreover, most reductions in esophageal caliber are not visible unless the esophageal walls are stretched by insufflation. Additionally, mucosal ring-like strictures that disappear upon insufflation may be mistakenly classified as rings. There are strategies to improve the assessment of esophageal fibrostenotic complications [43]. For an accurate assessment of esophageal narrowing, strictures, rings, or webs, the esophagus should be fully insufflated to reveal subtle strictures that are not immediately evident [44]. When a benign stricture is detected, it is important to correctly estimate its diameter to plan subsequent dilatations. A practical method involves comparing the size of the stenosis to an open biopsy forceps or, if available, to the endoscope cap, both of which can serve as visual references to guide the selection of an appropriate dilation strategy. Endoscopic dilation, using either bougie or balloon dilators, serves as the cornerstone of initial management for EoE patients with fibrostenotic complications, with the optimal approach varying based on the characteristics of the stricture and the patient [45].

A barium esophagram is a cheap and traditional test for evaluating the esophageal anatomical structure and function. Lee et al., evaluating barium swallow examinations in EoE patients and controls, demonstrated that the esophageal diameter is a reproducible parameter that is frequently decreased in EoE patients [42]. Studies have shown that endoscopic evaluation of esophageal narrowing in pediatric and adult EoE is significantly inaccurate compared to radiologic assessment. A retrospective study on adult EoE patients demonstrated that endoscopy under-recognized symptomatic esophageal narrowing identified using a barium esophagram in EoE patients [46]. In this study, endoscopy demonstrated a sensitivity of 14.7% for detecting an abnormal maximal esophageal diameter of  $\leq 20$  mm and 33% for a diameter of  $\leq 13$  mm. Another study comparing endoscopy and barium esophagram showed no significant differences in fibrostenotic changes observed on endoscopy (84%) versus radiology (73%) [47]. Data from a pediatric cohort suggested a potential superiority of the barium esophagram over endoscopy to diagnose esophageal strictures in some children with EoE [48]. Therefore, whereas upper gastrointestinal endoscopy and the barium esophagram may identify fibrostenotic changes in EoE patients, a barium esophagram represents a valuable option in the diagnostic algorithm for fibrostenotic EoE complications, particularly in patients with high symptomatic burden and normal EGD.

#### 2.4.2. Functional Luminal Imaging Probe (FLIP)

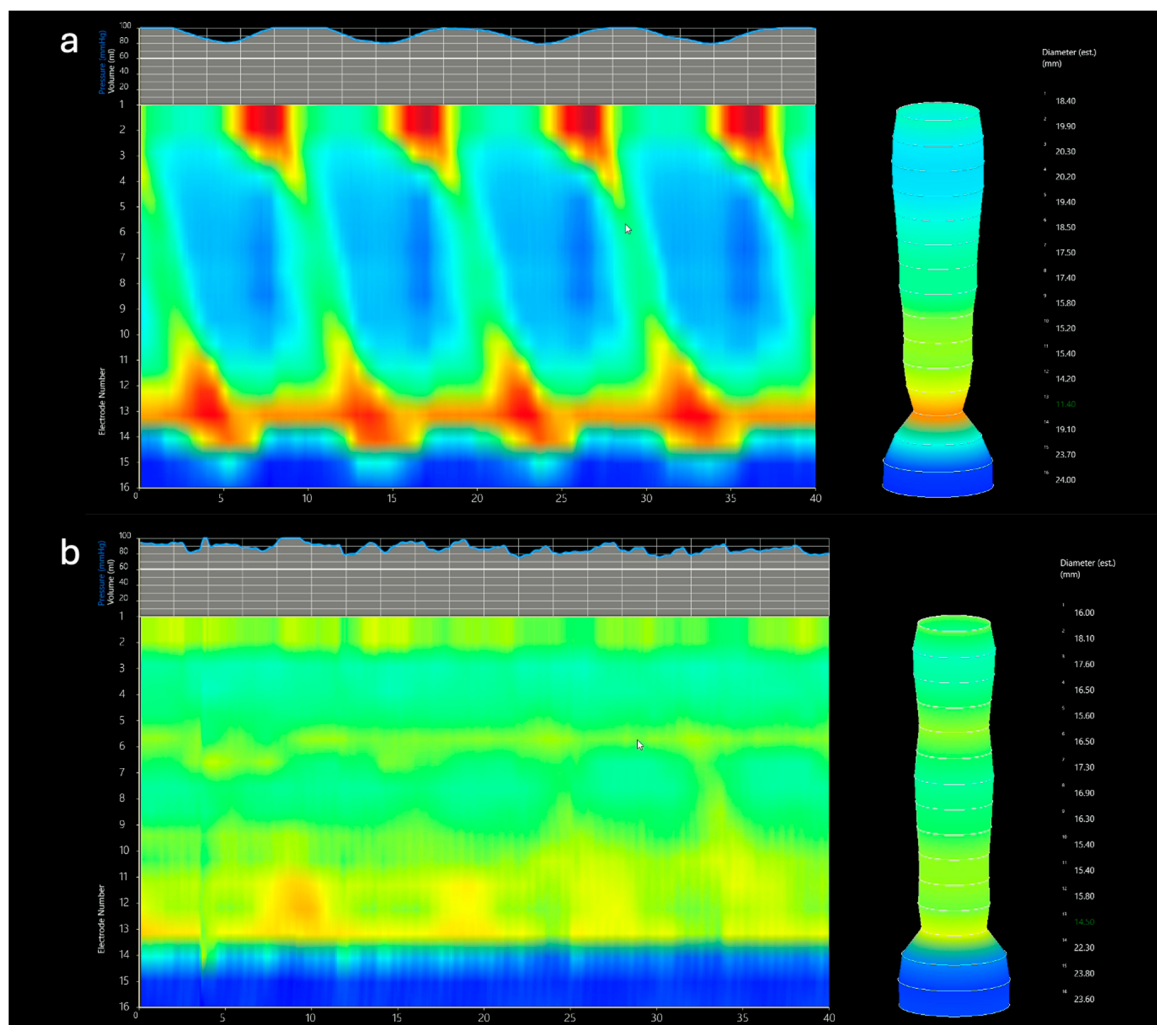
FLIP panometry is a technique for evaluating the mechanical properties of the esophageal wall and the opening dynamics of the esophagogastric junction. Utilizing step-wise volumetric fluid distention of a balloon and high-resolution impedance planimetry, it measures the diameter, the luminal cross-sectional area, and the esophageal pressure, generating a three-dimensional image of the esophageal lumen [49]. Furthermore, the FLIP allows for the assessment of esophageal wall and sphincter distensibility, quantified by the distensibility index, defined as the ratio of esophagogastric junction cross-sectional area to the corresponding intraballoon pressure [50].

FLIP is under investigation for assessment of fibrostenotic complications of EoE, with growing evidence supporting its role in the management of EoE [51]. In cases of esophageal fibrostenotic progression, an increase in balloon volume and pressure does not result in a proportional increase in cross-sectional area, indicating reduced tissue compliance and luminal rigidity (distensibility plateau) [52].

A retrospective study by Chen et al. examined the association between endoscopic severity of EoE, as assessed using the EREFS score, and esophageal distensibility. The study

found a significant inverse correlation between higher ring scores and a lower distensibility plateau, whereas no association was observed with mucosal eosinophil density. In a prospective study of 70 EoE adult patients, Nicodeme et al. demonstrated that reduced esophageal distensibility on FLIP was a predictor of food impaction risk and the need for endoscopic dilation [53]. Additionally, a recent cross-sectional study including 171 EoE patients analyzed the distensibility plateau of the esophageal body [54]. They found that symptom duration and diagnostic delay were negatively correlated with the distensibility plateau, indicating that decreased esophageal distensibility is associated with prolonged diagnostic delay in EoE [54].

These data suggest that FLIP could serve as a valuable, complementary tool in the diagnosis and management of EoE-related esophageal strictures, with potential applications in severity assessment and therapeutic monitoring (Figure 3). Despite these promising results, further research is needed to evaluate the cost-effectiveness of FLIP in EoE, particularly considering that this examination is not currently reimbursed in most countries. Furthermore, standardization of study settings is advocated given the variability in FLIP anesthesia protocols across existing studies, which have been conducted with patients under unsedated conditions, moderate sedation, or general anesthesia, potentially influencing the reported results.



**Figure 3.** (a) FLIP panometry of an EoE patient with inflammatory features (furrows and exudates). Normal distensibility of the esophageal body and normal secondary contractility response. (b) FLIP panometry of an EoE patient with fibrotic features (narrow-caliber esophagus). Lower distensibility in the upper esophagus and diminished secondary contractile response.

### 3. Endoscopic Dilation of Fibrostenotic Complications in Eosinophilic Esophagitis

#### 3.1. Role of Endoscopic Dilation in Eosinophilic Esophagitis

The management goals for adult EoE patients include achieving both clinical and histologic remission as well as maintaining an esophageal diameter that relieves dysphagia and food impaction (typically  $\geq 16$  mm) [33]. Current international guidelines recommend endoscopic dilation as an adjunct to medical therapy for all symptomatic EoE patients with known esophageal strictures [3,4,17,18,32,55].

Expert consensus supports the use of dilation in EoE patients meeting appropriate clinical criteria, regardless of active inflammatory disease or ongoing EoE-specific treatment [33]. While anti-inflammatory therapy is often initiated before dilation to improve mucosal integrity, dilation may also be performed as a first-line option at diagnosis in patients with high-grade or symptomatic strictures unlikely to respond to medical therapy alone. Interestingly, the clinical outcomes of dilation, including symptom relief and complication rates, are favorable in patients both with and without active esophageal inflammation [56]. Healing after dilation also appears to be unaffected by the presence of active disease, provided the procedure is performed cautiously by experienced endoscopists [33]. Since esophageal dilation does not address the esophageal inflammation associated with EoE, it should be combined with the most appropriate medical or dietary therapy to achieve clinical and histologic remission [57].

Given the low sensitivity of endoscopy in detecting fibrostenotic complications, empirical use of dilation has also been suggested when dysphagia persists despite histological remission on medical therapy and no appreciable stricture is detected [33,55,58], eventually after excluding major motility disorders by high-resolution esophageal manometry [4].

Patients with fibrostenotic evolution often require multiple dilations, as it has been shown that fewer than 50% of EoE patients can achieve an improvement of 2 mm in esophageal diameter with medical or dietary therapy alone [59]. Although initial case reports reported an increased rate of complications in patients undergoing esophageal dilation [60,61], it is now considered a highly effective and safe procedure [62]. A meta-analysis by Rank et al. [63] reported a symptomatic improvement in 87% of patients following esophageal dilation with no reported mortality. The pooled perforation rate was 0.4%, hospitalization occurred in 1.2% of cases, and significant gastrointestinal hemorrhage was reported in 0.1% of dilations. Data from another meta-analysis demonstrated that endoscopic dilation in both adults and children led to improvement in 95% of EoE patients, with a major complication rate and need for hospitalization of less than 1% [64]. A systematic review reported that perforations in EoE mostly occurred in the presence of active inflammation due to undiagnosed or untreated EoE, with endoscopic treatment of food impaction being a more common cause of perforation than dilation [65]. Furthermore, to the best of our knowledge, no cases of death from perforation in patients with EoE have been reported.

Endoscopic dilation has also been shown to be effective in patients with severe ( $\leq 10$  mm) strictures. A retrospective study on a cohort of 1091 patients found that 89% achieved an esophageal diameter  $\geq 13$  mm, and 65% reached  $\geq 15$  mm with available dilation techniques and medical therapy [66]. Given the effectiveness and safety of endoscopic dilation, repeated dilations can also be considered a long-term strategy for symptom control [67]. It must be noted, however, that esophageal dilations impacts the dissociation between symptoms and histological disease activity [68].

### 3.2. Practical Considerations for Esophageal Dilation

There is currently limited evidence to establish an optimal target esophageal diameter, though a diameter  $\geq 16$  mm is often used as a therapeutic goal [33]. A retrospective study by Schoepfer et al. involving 207 EoE patients undergoing dilation reported a significant improvement in dysphagia symptoms following an increase in esophageal diameter from  $11 \pm 3$  mm (range 4–15 mm) to  $16 \pm 2$  mm (range 11–20 mm) [69].

Endoscopic dilation often results in esophageal tears without causing transmural damage. However, the absence of visible blood on the dilator after withdrawal is not a reliable indicator that mucosal disruption has not occurred. If adequate mucosal disruption is observed before reaching the target dilation size, the dilation session should be terminated to minimize the risk of perforation [70]. In fact, the immediate endpoint is either the achievement of the target luminal diameter or the appearance of a mucosal disruption [33].

Serial dilations, along with a careful selection of the initial dilator size, guided by repeated endoscopic inspections to look for tears are deemed to be safe practice methods. When multiple dilations are required to reach the target esophageal diameter of 16–18 mm, not exceeding an incremental increase of  $>3$  mm per session is common practice (rule of three) [33]. The “rule of three” is often followed to minimize the risk of complications, although there is no direct evidence demonstrating its safety or efficacy [71].

### 3.3. Informed Consent, Setting and Dilation Methods

#### 3.3.1. Informed Consent

EoE patients with indication for esophageal dilation should be thoroughly counseled about the potential benefits and risks of endoscopic dilatation based on the stricture characteristics (e.g., location, length, and diameter) and the individual patient’s risk profile [72]. Then, informed consent should be obtained and documented. The potential need for multiple sessions to achieve symptom resolution should be explained, particularly in patients with complex strictures or diffusely stenotic esophagus [41].

Patients should be informed about potential odynophagia, bleeding, and chest discomfort/pain after dilation and advised to monitor for symptoms of perforation. Patients should provide informed consent to an endoscopic dilation in a private, unrushed, and non-coercive environment [72].

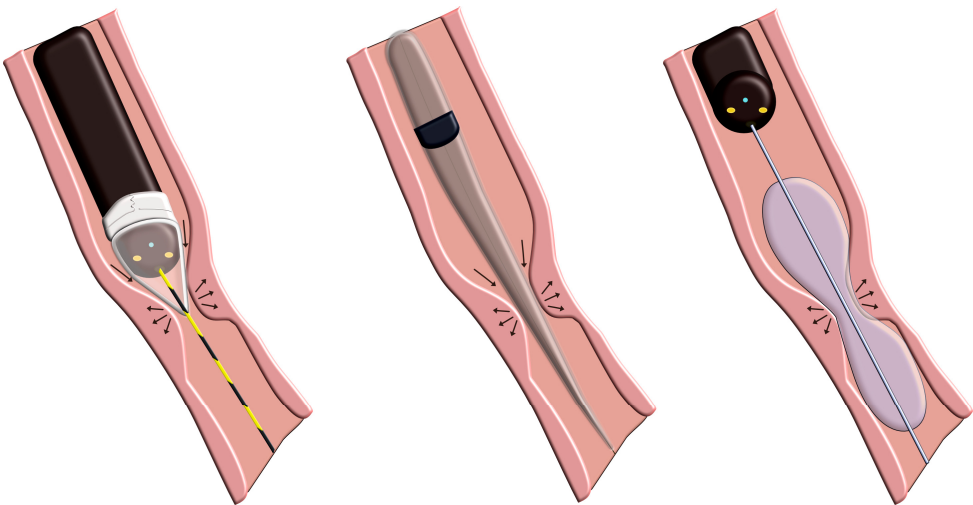
#### 3.3.2. Setting (Fluoroscopy and Anesthesia)

The use of fluoroscopy may be optional for the dilation of simple esophageal strictures, especially if the endoscope can be advanced through the stenosis to guide the dilation. However, fluoroscopic guidance with radiopaque, water-soluble contrast agents is essential for managing complex strictures, aiding in both stricture evaluation and the detection of contrast leakage outside the esophageal lumen after dilation. Fluoroscopy allows for the identification of the guidewire when used to dilate narrow strictures. The use of the guidewire ensures the correct passage of the dilator through the stricture, preventing misplacement into a diverticulum or the wall of a hiatal hernia. Additionally, fluoroscopy should be readily available to rule out perforation in cases where deep lacerations occur during dilation.

Endoscopic dilations can be performed under deep sedation/analgesia. However, the complexity of the stricture directly correlates with increased procedural duration and difficulty. Consequently, general anesthesia should be considered for the treatment of complex strictures to enhance patient comfort and reduce the risk of movement during the intervention.

3.4. Endoscopic Dilators for Eosinophilic Esophagitis

Esophageal dilators can be broadly categorized into two main groups: mechanical dilators, including bougie dilators, and balloon dilators (Figure 4). Mechanical dilators are available in different diameters, provide tactile feedback during the procedure to help identify resistance, and apply longitudinal and radial forces. They progress from orally to anally along the esophageal lumen, enabling dilation of the entire esophagus, making them particularly useful for larger or more diffuse strictures. In contrast, balloon dilators deliver a purely radial force, evenly distributed across the stricture, and are typically preferred for simple strictures. Additionally, balloon dilators allow direct visualization of mucosal disruption during the procedure, aiding in procedural assessment and safety. The characteristics of the main dilators for esophageal strictures in eosinophilic esophagitis are summarized in Figure 4 and Table 2.



**Figure 4.** Graphical representation of endoscopic dilation techniques for esophageal strictures using the BougieCap, Savary–Gillard dilator, and balloon dilator. The BougieCap and Savary–Gillard dilators exert both longitudinal and radial forces on the stenosis, whereas the balloon dilator applies exclusively radial force.

Currently, no definitive evidence indicates the superiority of any particular dilation technique or device over others. Consequently, the selection of a dilation device should be guided by the endoscopist’s preference, the financial and environmental sustainability [73] of the devices, and the specific anatomical characteristics of the stricture.

**Table 2.** Characteristics of the main dilators for esophageal strictures in eosinophilic esophagitis.

| Sizes            |         | Main Advantages                                                 | Main Disadvantages                               |
|------------------|---------|-----------------------------------------------------------------|--------------------------------------------------|
| Savary–Gilliard® | 5–20 mm | - Tactile feedback of resistance to the dilation                | - No direct visualization of the dilation effect |
|                  |         | - Applies both longitudinal and radial forces                   |                                                  |
|                  |         | - Easier to dilate multiple strictures and rings simultaneously |                                                  |
|                  |         | - Reusable                                                      |                                                  |
|                  |         |                                                                 | - A stiff guidewire is needed                    |

Table 2. Cont.

|                  | Sizes   | Main Advantages                                                                                                                                                                                                                                     | Main Disadvantages                                                                                                                                                                                                              |
|------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Balloon dilators | 6–20 mm | <ul style="list-style-type: none"> <li>- Direct visualization of the dilation effect</li> <li>- Multiple sizes often available with one device</li> </ul>                                                                                           | <ul style="list-style-type: none"> <li>- Applies only radial force</li> <li>- Sequential inflations and time are needed to dilate multiple strictures and rings simultaneously</li> <li>- Single-use</li> <li>- Cost</li> </ul> |
| BougieCap        | 7–18 mm | <ul style="list-style-type: none"> <li>- Tactile feedback of resistance to the dilation</li> <li>- Direct visualization of the dilation effect</li> <li>- Applies both longitudinal and radial forces</li> <li>- Two sizes in one device</li> </ul> | <ul style="list-style-type: none"> <li>- Cumbersome to use for long strictures</li> <li>- Single-use</li> </ul>                                                                                                                 |

### 3.5. Mechanical Dilators (Savary–Gilliard Bougie, BougieCap)

Mechanical dilators apply radial and longitudinal forces, thereby adding a shearing effect when pushed through a stenosis compared to balloon dilators, which apply only radial force. They are classified as fixed-diameter push-type dilators and include the Savary–Gilliard bougie (Cook Medical, Winston-Salem, NC, USA), BougieCap (Ovesco Endoscopy AG, Tübingen, Germany), and Maloney dilators (Medovations, Milwaukee, Wisc, Teleflex Medical, Research Triangle Park, NC, USA). Dilations with mechanical bougies provide the endoscopist with tactile feedback of resistance during the dilation.

Maloney dilators are flexible and can be used without a guidewire. Their internal component is enriched with tungsten to enhance gravitational force when the patient is upright. Maloney dilators were also used for self-dilatation [74]. While they were considered safe for symmetrical stenosis, their use in complex stenosis was associated with a higher risk of perforation when compared to wire-guided dilation [75]. As a result, they are now rarely used in clinical practice.

The Savary–Gilliard dilators were the first wire-guided bougie dilators (Figure 4). They are characterized by a long-tapered tip and a radiopaque marker at the maximum caliber point. Available in multiple diameters (5–20 mm), these dilators are reusable if the device integrity is intact. This type of mechanical dilation is performed using a stiff guidewire to ensure the correct positioning of the device without direct endoscopic visualization. Savary–Gilliard dilators are highly effective and relatively safe in adult and pediatric populations with EoE [69,76]. Their extensive use made them the most frequently used mechanical dilators. The detailed technique for Savary–Gilliard bougie esophageal dilation is outlined in Table 3.

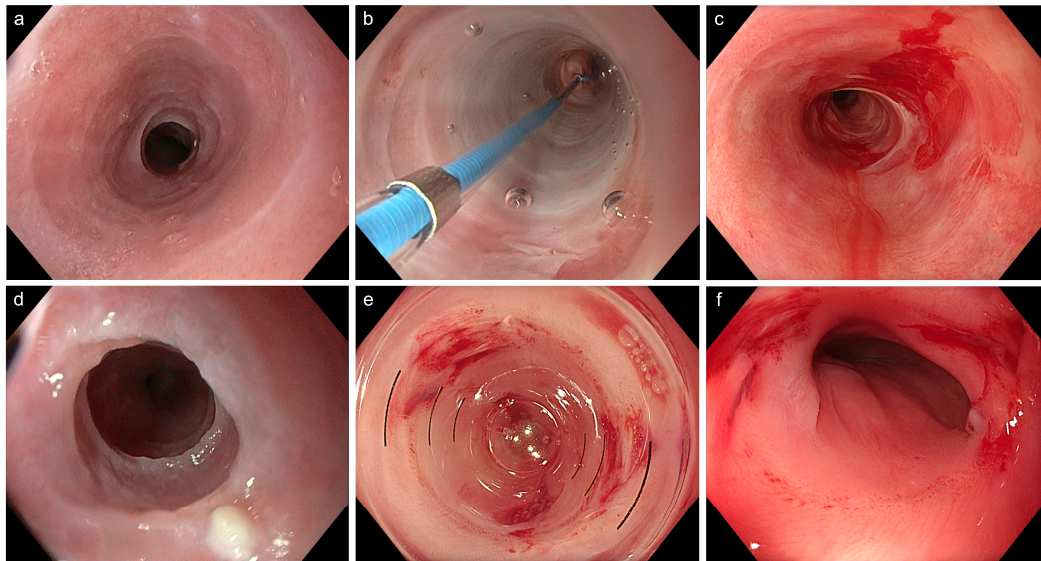
The BougieCap (Ovesco Endoscopy AG, Tübingen, Germany) is a novel type of mechanical dilator made by a cone-shaped transparent plastic cap with a two-stage design attached to the tip of the endoscope (Figures 4 and 5b). Each BougieCap features two dilation diameters, which are easily identifiable by black markings on its surface. Available in multiple diameters ranging from 7 to 18 mm, the device offers the added advantage of ensuring both optical and tactile feedback during dilation. At the tip of the cap, there is an orifice for guidewire positioning and two additional openings that enable suction.

**Table 3.** Practical steps of bougie dilation for esophageal stenosis.

| Step                                              | Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Stricture assessment and guidewire positioning | <ul style="list-style-type: none"> <li>- Evaluate the location, length, and luminal diameter of the stricture (fluoroscopy for complex strictures).</li> <li>- Advance a guidewire into the antrum (use fluoroscopy if a standard gastroscope does not pass the stricture).</li> </ul>                                                                                                                                                                                                                                                                                    |
| 2. Gastroscope removal                            | <ul style="list-style-type: none"> <li>- Remove the gastroscope.</li> <li>- Verify guidewire placement using fluoroscopy or by measuring the length of the guidewire outside the patient. If distance markers are available, ensure the 60 cm mark aligns with the incisors.</li> </ul>                                                                                                                                                                                                                                                                                   |
| 3. Bougie size selection                          | <ul style="list-style-type: none"> <li>- Choose a bougie size suitable for initial dilation of the stenosis, ensuring it passes relatively smoothly through the narrowed segment.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                              |
| 4. Bougie insertion                               | <ul style="list-style-type: none"> <li>- Lubricate the bougie tip.</li> <li>- Insert the guidewire into the bougie.</li> <li>- Have the assistant maintain tension on the guidewire, then gently slide the bougie over the guidewire through the stenosis.</li> <li>- Remove the bougie while keeping the guidewire positioned into the stomach.</li> <li>- Assess the bougie for the presence of blood after each dilation. Discontinue the bougienage if excessive resistance is encountered during bougie insertion or if blood is observed on the dilator.</li> </ul> |
| 5. Gradual dilation                               | <ul style="list-style-type: none"> <li>- Perform sequential dilations, gradually increasing the bougie diameter.</li> <li>- Verify guidewire positioning after each dilation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                  |
| 6. Post-dilation endoscopy check                  | <ul style="list-style-type: none"> <li>- Remove bougies and guidewire.</li> <li>- Perform endoscopic examination to check for mucosal tears and ensure there is no muscle injury.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                              |

Schopfer et al. conducted a cohort study involving 50 EoE patients who underwent dilation with BougieCap [77]. The study reported 100% technical success without major adverse events, although there was one case where the dilation device detached from the tip of the endoscope in the patient's pharynx. Subsequently, the new version of the BougieCap device (version 2.0) was released and implemented with a stronger adhesive tape and the ability to achieve gradual dilation in 2 mm increments per cap.

Given the patchy and frequently diffuse distribution of esophageal inflammation in EoE [2], the use of Savary–Gilliard or BougieCap offers the advantage of treating the entire esophagus simultaneously in a single passage, unlike balloon dilators. This approach may allow for the dilation of undiagnosed strictures that were not identified during the previous endoscopy, potentially resulting in greater symptomatic benefit for the patient.



**Figure 5.** (a) Endoscopic appearance of eosinophilic esophagitis characterized by edema, rings, and stenosis of the esophagus. (b) Endoscopic dilation performed with a multisize dilation balloon, utilizing water to enhance visualization. (c) Esophageal mucosal tears indicating the effectiveness of the dilation. (d) Endoscopic appearance of eosinophilic esophagitis characterized by esophageal edema and rings restricting the esophageal lumen, forming a simple stricture (short [ $<2$  cm], focal, straight, and allowing the passage of a standard gastroscope). (e) Endoscopic dilation using a BougieCap, with black markings on the cap's lateral sides denoting its two different dilation sizes. (f) Esophageal mucosal tears indicating the effectiveness of the dilation.

### 3.6. Balloon Dilation

Through-the-scope (TTS) dilation balloons have been used since the mid-1980s [78] with the advantage of homogeneous and simultaneous dilation force transmission over the entire surface of the stenosis. In contrast, mechanical dilators primarily transmit axial force near their distal end. A key advantage of TTS dilation balloons is the ability to visualize the stenosis in real time, enabling immediate assessment of the dilation effect. Additionally, they do not typically require fluoroscopic guidance. Despite these theoretical advantages, a meta-analysis by Dougherty et al. showed no statistically significant difference in perforation rates between bougies 0.022% and balloon dilators 0.059% [62].

Dilation balloons vary in size, ranging from 3 to 8 cm in length and 6 to 40 mm in diameter, with some featuring a multi-diameter design that expands with increasing pressure within a single balloon catheter (Figure 4). This design offers the advantage of reducing procedural time by minimizing the need for device exchanges and lowering costs associated with multiple dilation devices. Moreover, most dilation balloon models also incorporate a guidewire and two radiopaque markers to facilitate balloon placement using fluoroscopy. Additionally, the dilation diameters and corresponding dilation forces are highly reproducible and comparable to those of conventional dilation balloons [79]. The technique of esophageal dilation using TTS dilation balloons is outlined in Table 4.

While some esophageal strictures in EoE are short, medium-length balloons (approximately 5 cm) are often preferred, as they are less likely to become dislodged during dilation compared to shorter balloons (Figure 5). In patients with multiple EoE-related rings and strictures, the use of balloon dilators necessitates sequential inflations and deflations to ensure adequate and controlled dilation.

**Table 4.** Practical steps of balloon dilation for esophageal stenosis.

| Step                                                    | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Stricture assessment and guidewire positioning       | <ul style="list-style-type: none"> <li>- Evaluate the location, length, and luminal diameter of the stricture (fluoroscopy for complex strictures).</li> <li>- If uncertain, compare the size of the lumen using a reference such as biopsy forceps.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2a. Guidewire and balloon placement (simple strictures) | <ul style="list-style-type: none"> <li>- Gently pass the guidewire and balloon through the stenosis under direct vision.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2b. Guidewire placement (complex strictures)            | <ul style="list-style-type: none"> <li>- Pass the guidewire through the stenosis under direct vision and position in the gastric antrum under fluoroscopic guidance.</li> <li>- Confirm the guidewire position fluoroscopically or by checking the length of the wire outside the patient (60 cm mark at the incisors).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3. Balloon inflation                                    | <ul style="list-style-type: none"> <li>- Partially distend the balloon with water or a contrast agent to identify the ideal position, stabilize it, and minimize sliding at full distention.</li> <li>- Monitor the translucent balloon surface endoscopically for the position of the “waist” (an imprint of stenosis on the balloon) to assess dilation.</li> <li>- Press the endoscope against the balloon to observe the effect of the dilation in real time through the balloon. Water can be used to enhance imaging during dilation in intubated patients.</li> <li>- Inflate the balloon to the manufacturer’s recommended pressures. Maintain inflation conventionally for 1–2 min, though as little as 30 s may be sufficient.</li> </ul> |
| 4. Post-dilation examination                            | <ul style="list-style-type: none"> <li>- Assess the stricture surface, confirming dilation success and excluding complications.</li> <li>- Do not rely on the appearance through the inflated balloon to assess the degree of endoscopic dilation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

#### EsoFLIP (Functional Luminal Imaging Probe)

The EsoFLIP (Medtronic Inc., Shoreview, MN, USA) is a dilation catheter similar to the diagnostic EndoFLIP (Medtronic Inc., Shoreview, MN, USA). It utilizes high-resolution impedance planimetry to dynamically measure luminal diameters along the length of the balloon during dilation, allowing for real-time assessment of stricture anatomy and procedural effectiveness. EsoFLIP allows for dilations up to 30 mm in diameter.

The primary advantage of EsoFLIP is its ability to provide a graphical representation of the esophageal lumen and stricture in real time during dilation. This feature can contribute to a reduction in fluoroscopy time, as demonstrated by Hoskins et al. in a pediatric population, where esophageal dilation with EsoFLIP was significantly faster than balloon dilation combined with EndoFLIP. The study reported a shorter fluoroscopy time with EsoFLIP (0.16 min [IQR 0–0.30 min]) compared to EndoFLIP +balloon dilation (0.30 min [IQR 0.23–0.55];  $p = 0.003$ ) [80].

Although real-time monitoring of the esophageal diameter may be beneficial, EsoFLIP has several limitations. The balloon catheter cannot be passed through the endoscope, restricting maneuverability during the procedure. Additionally, it lacks an optional external pressure monitoring device, limiting precise pressure control. Another drawback is the lack

of robust data supporting its effectiveness in clinical practice. Furthermore, EsoFLIP is not reimbursed in most countries, which may limit its widespread adoption.

### 3.7. Post-Dilation Clinical Management

Patients should remain fasting and under observation for at least one hour following the endoscopic dilation. Timely suspicion and prompt recognition of perforation are crucial for successful management, and all patient complaints should be thoroughly evaluated. Post-dilation chest pain is a common occurrence, as evidenced by a study in which 74% of patients reported it via questionnaire, while a retrospective chart review documented it in only 7%, suggesting significant underreporting of this dilation-associated outcome [69]. However, progressive intense thoracic pain, fever, dyspnea, and subcutaneous emphysema occurring after endoscopic dilation are clinically suggestive of esophageal perforation and should prompt the performance of computer tomography (CT) with a water-soluble contrast swallow as recommended by international guidelines [81]. Utilizing X-ray imaging with oral contrast in this context is not recommended, as it may fail to detect subtle perforations, potentially leading to diagnostic delays and worsened patient outcomes [81]. CT scan offers superior sensitivity and specificity over conventional radiography in identifying small amounts of free gas and fluids in the mediastinum, thereby facilitating timely and appropriate management.

In case of a favorable clinical outcome after dilation, clear liquids can be introduced, and the patient can be discharged with instructions to follow a soft diet overnight. Patients should also be provided with a plan for managing potential adverse events after discharge and a follow-up schedule.

### 3.8. Management of Esophageal Complications After Dilation

Though esophageal perforation is a rare event in EoE when dilation is performed carefully, esophageal dilation should be performed only in centers equipped to promptly diagnose and manage potential complications. This necessitates a multidisciplinary team, including surgeons with expertise in esophageal surgery, to ensure patient safety. The most relevant complications of esophageal dilation, namely esophageal bleeding, and perforation, can be effectively managed endoscopically in most cases in tertiary interventional endoscopy centers if promptly diagnosed.

Acute iatrogenic esophageal perforation is defined as the recognition of gas or luminal fluids outside the gastrointestinal tract or the endoscopic identification of a definitive sign of perforation [81]. If a perforation occurs during dilation, a detailed endoscopic report, including size and location details as well as photo/video documentation of the perforation site, is crucial for decision-making and medicolegal purposes. Early diagnosis of perforation facilitates timely endoscopic or surgical intervention, minimizing mediastinal contamination and improving post-perforation outcomes [82]. The therapy of iatrogenic esophageal perforation depends on several factors, including the timing of diagnosis (intra- or post-procedural), the presence of extraluminal contents in the mediastinum, the size and location of the perforation, the patient's general status, the expertise of the endoscopist, and the availability of closure devices. Small perforations may be managed conservatively with fasting and the administration of antibiotics targeting oral bacteria. However, multiple effective methods for endoscopic closure of perforations have been developed and are often preferred in addition to fasting and antibiotic therapy. When managing perforations endoscopically, carbon dioxide insufflation should be used to minimize the risk of complications. The first step should include aspiration of the digestive luminal contents and decompression of any tension pneumoperitoneum or pneumothorax if present. Endoscopic clip closure, either through-the-scope or over-the-scope, can be

attempted but is often less effective in EoE due to the presence of fibrosis. The placement of a fully covered self-expandable metal stent to seal the perforation is a valuable option, particularly for larger perforations. Endoscopic suturing, using either over-the-scope or through-the-scope suturing devices, is another effective approach. In case of mediastinal contamination with fluid or debris, surgical management and/or endoscopic vacuum therapy may be necessary to achieve optimal outcomes.

#### 4. Conclusions

Endoscopy is essential for diagnosing and managing EoE, as it allows for the measurement of endoscopic and histologic disease activity, and the management of fibrostenotic complications. However, diagnostic underestimation of esophageal strictures and suboptimal adherence to EoE guidelines still represent limitations of current clinical practice. Esophageal dilation is a safe and effective treatment for strictures and rings, with low perforation rates and significant improvements in dysphagia and thoracic pain when combined with medical and dietary interventions. Both balloon and bougie dilation techniques demonstrate comparable safety profiles, and the decline in perforation rates in recent years suggests improved techniques and greater awareness of EoE complications among digestive endoscopists. Among the newer dilation methods, the BougieCap stands out as a technically feasible option with the benefits of direct visualization and tactile feedback during the dilation. Future research should focus on combining anti-inflammatory therapies with optimized dilation strategies to improve safety, efficacy, and patient's quality of life.

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## Abbreviations

The following abbreviations are used in this manuscript:

|       |                                  |
|-------|----------------------------------|
| CT    | Computer tomography              |
| EGD   | Esophagogastroduodenoscopy       |
| EoE   | eosinophilic esophagitis         |
| EREFS | EoE Endoscopic Reference Score   |
| FLIP  | Functional luminal imaging probe |
| TTS   | through-the-scope                |

## References

- Kim, H.P.; Vance, R.B.; Shaheen, N.J.; Dellon, E.S. The prevalence and diagnostic utility of endoscopic features of eosinophilic esophagitis: A meta-analysis. *Clin. Gastroenterol. Hepatol.* **2012**, *10*, 988–996.e5. [\[CrossRef\]](#) [\[PubMed\]](#)
- Sorge, A.; Aldinio, G.; Marinoni, B.; Visaggi, P.; Penagini, R.; Maniero, D.; Ghisa, M.; Marabotto, E.; de Bortoli, N.; Pasta, A.; et al. Distribution of esophageal inflammation in patients with eosinophilic esophagitis and its impact on diagnosis and outcome. *Dig. Liver Dis.* **2025**, *57*, 260–265. [\[CrossRef\]](#) [\[PubMed\]](#)
- de Bortoli, N.; Visaggi, P.; Penagini, R.; Annibale, B.; Baiano Svizzero, F.; Barbara, G.; Bartolo, O.; Battaglia, E.; Di Sabatino, A.; De Angelis, P.; et al. The 1st EoETALY Consensus on the Diagnosis and Management of Eosinophilic Esophagitis—Definition, Clinical Presentation and Diagnosis. *Dig. Liver Dis.* **2024**, *56*, 951–963. [\[CrossRef\]](#) [\[PubMed\]](#)
- de Bortoli, N.; Visaggi, P.; Penagini, R.; Annibale, B.; Baiano Svizzero, F.; Barbara, G.; Bartolo, O.; Battaglia, E.; Di Sabatino, A.; De Angelis, P.; et al. The 1st EoETALY Consensus on the Diagnosis and Management of Eosinophilic Esophagitis—Current Treatment and Monitoring. *Dig. Liver Dis.* **2024**, *56*, 1173–1184. [\[CrossRef\]](#)
- Kalluri, R.; Neilson, E.G. Epithelial-mesenchymal transition and its implications for fibrosis. *J. Clin. Invest.* **2003**, *112*, 1776–1784. [\[CrossRef\]](#)
- Arias-González, L.; Rodríguez-Alcolado, L.; Laserna-Mendieta, E.J.; Navarro, P.; Lucendo, A.J.; Grueso-Navarro, E. Fibrous Remodeling in Eosinophilic Esophagitis: Clinical Facts and Pathophysiological Uncertainties. *Int. J. Mol. Sci.* **2024**, *25*, 927. [\[CrossRef\]](#)
- Colizzo, J.M.; Clayton, S.B.; Richter, J.E. Intrabolar pressure on high-resolution manometry distinguishes fibrostenotic and inflammatory phenotypes of eosinophilic esophagitis. *Dis. Esophagus* **2016**, *29*, 551–557. [\[CrossRef\]](#)
- Visaggi, P.; Ghisa, M.; Marabotto, E.; Venturini, A.; Stefani Donati, D.; Bellini, M.; Savarino, V.; de Bortoli, N.; Savarino, E. Esophageal dysmotility in patients with eosinophilic esophagitis: Pathogenesis, assessment tools, manometric characteristics, and clinical implications. *Esophagus* **2023**, *20*, 29–38. [\[CrossRef\]](#)
- Visaggi, P.; Del Corso, G.; Solinas, I.; Ovidi, F.; Adamo, G.; Dulmin, I.; Svizzero, F.B.; Bellini, M.; Savarino, E.V.; de Bortoli, N. Adaptive Behaviors, Esophageal Anxiety and Hypervigilance Modify the Association Between Dysphagia Perception and Histological Disease Activity in Eosinophilic Esophagitis. *Am. J. Gastroenterol.* **2024**. [\[CrossRef\]](#)
- Visaggi, P.; Ghisa, M.; Vespa, E.; Barchi, A.; Mari, A.; Pasta, A.; Marabotto, E.; de Bortoli, N.; Savarino, E.V. Optimal Assessment, Treatment, and Monitoring of Adults with Eosinophilic Esophagitis: Strategies to Improve Outcomes. *Immunotargets Ther.* **2024**, *13*, 367–383. [\[CrossRef\]](#)
- Laserna-Mendieta, E.J.; Navarro, P.; Casabona-Francés, S.; Savarino, E.V.; Pérez-Martínez, I.; Guagnozzi, D.; Barrio, J.; Perello, A.; Guardiola-Arévalo, A.; Betoré-Glaria, M.E.; et al. Differences between childhood- and adulthood-onset eosinophilic esophagitis: An analysis from the EoE connect registry. *Dig. Liver Dis.* **2023**, *55*, 350–359. [\[CrossRef\]](#) [\[PubMed\]](#)
- Visaggi, P.; Savarino, E.; Sciume, G.; Chio, T.D.; Bronzini, F.; Tolone, S.; Frazzoni, M.; Pugno, C.; Ghisa, M.; Bertani, L.; et al. Eosinophilic esophagitis: Clinical, endoscopic, histologic and therapeutic differences and similarities between children and adults. *Ther. Adv. Gastroenterol.* **2021**, *14*, 1756284820980860. [\[CrossRef\]](#) [\[PubMed\]](#)
- Schoepfer, A.M.; Safroneeva, E.; Bussmann, C.; Kuchen, T.; Portmann, S.; Simon, H.U.; Straumann, A. Delay in diagnosis of eosinophilic esophagitis increases risk for stricture formation in a time-dependent manner. *Gastroenterology* **2013**, *145*, 1230–1236.e2. [\[CrossRef\]](#) [\[PubMed\]](#)
- Sengupta, N.; Tapper, E.B.; Corban, C.; Sommers, T.; Leffler, D.A.; Lembo, A.J. The clinical predictors of aetiology and complications among 173 patients presenting to the Emergency Department with oesophageal food bolus impaction from 2004–2014. *Aliment. Pharmacol. Ther.* **2015**, *42*, 91–98. [\[CrossRef\]](#)
- Sperry, S.L.; Crockett, S.D.; Miller, C.B.; Shaheen, N.J.; Dellon, E.S. Esophageal foreign-body impactions: Epidemiology, time trends, and the impact of the increasing prevalence of eosinophilic esophagitis. *Gastrointest. Endosc.* **2011**, *74*, 985–991. [\[CrossRef\]](#)
- Lenti, M.V.; Savarino, E.; Mauro, A.; Penagini, R.; Racca, F.; Ghisa, M.; Laserra, G.; Merli, S.; Arsiè, E.; Longoni, V.; et al. Diagnostic delay and misdiagnosis in eosinophilic oesophagitis. *Dig. Liver Dis.* **2021**, *53*, 1632–1639. [\[CrossRef\]](#)

17. Lucendo, A.J.; Molina-Infante, J.; Arias, Á.; von Arnim, U.; Bredenoord, A.J.; Bussmann, C.; Amil Dias, J.; Bove, M.; González-Cervera, J.; Larsson, H.; et al. Guidelines on eosinophilic esophagitis: Evidence-based statements and recommendations for diagnosis and management in children and adults. *United Eur. Gastroenterol. J.* **2017**, *5*, 335–358. [\[CrossRef\]](#)
18. Dhar, A.; Haboubi, H.N.; Attwood, S.E.; Auth, M.K.H.; Dunn, J.M.; Sweis, R.; Morris, D.; Epstein, J.; Novelli, M.R.; Hunter, H.; et al. British Society of Gastroenterology (BSG) and British Society of Paediatric Gastroenterology, Hepatology and Nutrition (BSPGHAN) joint consensus guidelines on the diagnosis and management of eosinophilic oesophagitis in children and adults. *Gut* **2022**, *71*, 1459–1487. [\[CrossRef\]](#)
19. Visaggi, P.; Del Corso, G.; Baiano Svizzero, F.; Ghisa, M.; Bardelli, S.; Venturini, A.; Stefani Donati, D.; Barberio, B.; Marciano, E.; Bellini, M.; et al. Artificial Intelligence Tools for the Diagnosis of Eosinophilic Esophagitis in Adults Reporting Dysphagia: Development, External Validation, and Software Creation for Point-of-Care Use. *J. Allergy Clin. Immunol. Pract.* **2024**, *12*, 1008–1016.e1. [\[CrossRef\]](#)
20. Sorge, A.; Coletta, M.; Elli, L.; Bredenoord, A.J. Clinical practices and adherence to guidelines for eosinophilic esophagitis: A European survey. *Dig. Liver Dis.* **2024**, *56*, 1196–1203. [\[CrossRef\]](#)
21. Schreiner, P.; Safroneeva, E.; Schoepfer, A.; Greuter, T.; Biedermann, L.; Schlag, C.; Labenz, J.; Auth, M.K.H.; Bredenoord, A.J.; Chang, J.W.; et al. Management of eosinophilic esophagitis associated food impaction in Europe and the United States. *Dis. Esophagus* **2022**, *35*, doac003. [\[CrossRef\]](#) [\[PubMed\]](#)
22. Chang, J.W.; Olson, S.; Kim, J.Y.; Dolan, R.; Greenson, J.; Sanders, G.; Rubenstein, J.H. Loss to follow-up after food impaction among patients with and without eosinophilic esophagitis. *Dis. Esophagus* **2019**, *32*, doz056. [\[CrossRef\]](#) [\[PubMed\]](#)
23. Suzuki, Y.; Ochiai, Y.; Hosoi, A.; Okamura, T.; Hayasaka, J.; Mitsunaga, Y.; Tanaka, M.; Odagiri, H.; Nomura, K.; Yamashita, S.; et al. Mucosal and Submucosal Thickening of Esophageal Wall Is a Promising Factor in the Development of Symptoms in Eosinophilic Esophagitis. *Gut Liver* **2024**, *18*, 50–59. [\[CrossRef\]](#) [\[PubMed\]](#)
24. Straumann, A.; Conus, S.; Degen, L.; Frei, C.; Bussmann, C.; Beglinger, C.; Schoepfer, A.; Simon, H.U. Long-term budesonide maintenance treatment is partially effective for patients with eosinophilic esophagitis. *Clin. Gastroenterol. Hepatol.* **2011**, *9*, 400–409.e1. [\[CrossRef\]](#)
25. Schoepfer, A.M.; Simko, A.; Bussmann, C.; Safroneeva, E.; Zwahlen, M.; Greuter, T.; Biedermann, L.; Vavricka, S.; Godat, S.; Reinhard, A.; et al. Eosinophilic Esophagitis: Relationship of Subepithelial Eosinophilic Inflammation With Epithelial Histology, Endoscopy, Blood Eosinophils, and Symptoms. *Am. J. Gastroenterol.* **2018**, *113*, 348–357. [\[CrossRef\]](#)
26. Hirano, I. Clinical relevance of esophageal subepithelial activity in eosinophilic esophagitis. *J. Gastroenterol.* **2020**, *55*, 249–260. [\[CrossRef\]](#)
27. Moawad, F.J.; Cheatham, J.G.; DeZee, K.J. Meta-analysis: The safety and efficacy of dilation in eosinophilic oesophagitis. *Aliment. Pharmacol. Ther.* **2013**, *38*, 713–720. [\[CrossRef\]](#)
28. Carlson, D.A.; Hirano, I. Narrow-caliber esophagus of eosinophilic esophagitis: Difficult to define, resistant to remedy. *Gastrointest. Endosc.* **2016**, *83*, 1149–1150. [\[CrossRef\]](#)
29. Hirano, I.; Moy, N.; Heckman, M.G.; Thomas, C.S.; Gonsalves, N.; Achem, S.R. Endoscopic assessment of the oesophageal features of eosinophilic oesophagitis: Validation of a novel classification and grading system. *Gut* **2013**, *62*, 489–495. [\[CrossRef\]](#)
30. Wechsler, J.B.; Bolton, S.M.; Amsden, K.; Wershil, B.K.; Hirano, I.; Kagalwalla, A.F. Eosinophilic Esophagitis Reference Score Accurately Identifies Disease Activity and Treatment Effects in Children. *Clin. Gastroenterol. Hepatol.* **2018**, *16*, 1056–1063. [\[CrossRef\]](#)
31. Dellon, E.S.; Cotton, C.C.; Gebhart, J.H.; Higgins, L.L.; Beitia, R.; Woosley, J.T.; Shaheen, N.J. Accuracy of the Eosinophilic Esophagitis Endoscopic Reference Score in Diagnosis and Determining Response to Treatment. *Clin. Gastroenterol. Hepatol.* **2016**, *14*, 31–39. [\[CrossRef\]](#) [\[PubMed\]](#)
32. Dellon, E.S.; Muir, A.B.; Katzka, D.A.; Shah, S.C.; Sauer, B.G.; Aceves, S.S.; Furuta, G.T.; Gonsalves, N.; Hirano, I. ACG Clinical Guideline: Diagnosis and Management of Eosinophilic Esophagitis. *Am. J. Gastroenterol.* **2025**, *120*, 31–59. [\[CrossRef\]](#) [\[PubMed\]](#)
33. Aceves, S.S.; Alexander, J.A.; Baron, T.H.; Bredenoord, A.J.; Day, L.; Dellon, E.S.; Falk, G.W.; Furuta, G.T.; Gonsalves, N.; Hirano, I.; et al. Endoscopic approach to eosinophilic esophagitis: American Society for Gastrointestinal Endoscopy Consensus Conference. *Gastrointest. Endosc.* **2022**, *96*, 576–592.e1. [\[CrossRef\]](#) [\[PubMed\]](#)
34. Nagula, S.; Parasa, S.; Laine, L.; Shah, S.C. AGA Clinical Practice Update on High-Quality Upper Endoscopy: Expert Review. *Clin. Gastroenterol. Hepatol.* **2024**, *22*, 933–943. [\[CrossRef\]](#)
35. Mukkada, V.; Falk, G.W.; Eichinger, C.S.; King, D.; Todorova, L.; Shaheen, N.J. Health-Related Quality of Life and Costs Associated With Eosinophilic Esophagitis: A Systematic Review. *Clin. Gastroenterol. Hepatol.* **2018**, *16*, 495–503.e8. [\[CrossRef\]](#)
36. Stern, E.; Taft, T.; Zalewski, A.; Gonsalves, N.; Hirano, I. Prospective assessment of disease-specific quality of life in adults with eosinophilic esophagitis. *Dis. Esophagus* **2018**, *31*, dox128. [\[CrossRef\]](#)
37. Hewett, R.; Alexakis, C.; Farmer, A.D.; Ainley, J.; Chhaya, V.; Hayat, J.O.; Poullis, A.; Kang, J.Y. Effects of eosinophilic oesophagitis on quality of life in an adult UK population: A case control study. *Dis. Esophagus* **2017**, *30*, 1–7. [\[CrossRef\]](#)

38. Lucendo, A.J.; Arias-González, L.; Molina-Infante, J.; Arias, Á. Systematic review: Health-related quality of life in children and adults with eosinophilic oesophagitis-instruments for measurement and determinant factors. *Aliment. Pharmacol. Ther.* **2017**, *46*, 401–409. [\[CrossRef\]](#)
39. Chen, J.W.; Pandolfino, J.E.; Lin, Z.; Ciolino, J.D.; Gonsalves, N.; Kahrilas, P.J.; Hirano, I. Severity of endoscopically identified esophageal rings correlates with reduced esophageal distensibility in eosinophilic esophagitis. *Endoscopy* **2016**, *48*, 794–801. [\[CrossRef\]](#)
40. Siersema, P.D. How to Approach a Patient With Refractory or Recurrent Benign Esophageal Stricture. *Gastroenterology* **2019**, *156*, 7–10. [\[CrossRef\]](#)
41. Eluri, S.; Runge, T.M.; Cotton, C.C.; Burk, C.M.; Wolf, W.A.; Woosley, J.T.; Shaheen, N.J.; Dellon, E.S. The extremely narrow-caliber esophagus is a treatment-resistant subphenotype of eosinophilic esophagitis. *Gastrointest. Endosc.* **2016**, *83*, 1142–1148. [\[CrossRef\]](#) [\[PubMed\]](#)
42. Lee, J.; Huprich, J.; Kujath, C.; Ravi, K.; Enders, F.; Smyrk, T.C.; Katzka, D.A.; Talley, N.J.; Alexander, J.A. Esophageal diameter is decreased in some patients with eosinophilic esophagitis and might increase with topical corticosteroid therapy. *Clin. Gastroenterol. Hepatol.* **2012**, *10*, 481–486. [\[CrossRef\]](#) [\[PubMed\]](#)
43. Visaggi, P.; Dellon, E.S. The Esophageal Mucosa: Clues to Underlying Pathology. *Gastrointest. Endosc. Clin. N. Am.* **2025**; in press, corrected proof. [\[CrossRef\]](#)
44. Sorge, A.; Masclee, G.M.C.; Bredenoord, A.J. Endoscopic Diagnosis and Response Evaluation in Patients with Eosinophilic Esophagitis. *Curr. Treat. Options Gastroenterol.* **2023**, *21*, 256–271. [\[CrossRef\]](#)
45. Fugazza, A.; Repici, A. Endoscopic Management of Refractory Benign Esophageal Strictures. *Dysphagia* **2021**, *36*, 504–516. [\[CrossRef\]](#)
46. Gentile, N.; Katzka, D.; Ravi, K.; Trenkner, S.; Enders, F.; Killian, J.; Kryzer, L.; Talley, N.J.; Alexander, J. Oesophageal narrowing is common and frequently under-appreciated at endoscopy in patients with oesophageal eosinophilia. *Aliment. Pharmacol. Ther.* **2014**, *40*, 1333–1340. [\[CrossRef\]](#)
47. Nelson, M.J.; Miller, F.H.; Moy, N.; Zalewski, A.; Gonsalves, N.; Gregory, D.L.; Hirano, I. Comparison of endoscopy and radiographic imaging for detection of esophageal inflammation and remodeling in adults with eosinophilic esophagitis. *Gastrointest. Endosc.* **2018**, *87*, 962–968. [\[CrossRef\]](#)
48. Menard-Katcher, C.; Swerdlow, M.P.; Mehta, P.; Furuta, G.T.; Fenton, L.Z. Contribution of Esophagram to the Evaluation of Complicated Pediatric Eosinophilic Esophagitis. *J. Pediatr. Gastroenterol. Nutr.* **2015**, *61*, 541–546. [\[CrossRef\]](#)
49. Donnan, E.N.; Pandolfino, J.E. EndoFLIP in the Esophagus: Assessing Sphincter Function, Wall Stiffness, and Motility to Guide Treatment. *Gastroenterol. Clin. North Am.* **2020**, *49*, 427–435. [\[CrossRef\]](#)
50. Savarino, E.; di Pietro, M.; Bredenoord, A.J.; Carlson, D.A.; Clarke, J.O.; Khan, A.; Vela, M.F.; Yadlapati, R.; Pohl, D.; Pandolfino, J.E.; et al. Use of the Functional Lumen Imaging Probe in Clinical Esophagology. *Am. J. Gastroenterol.* **2020**, *115*, 1786–1796. [\[CrossRef\]](#)
51. Desprez, C.; Roman, S.; Leroi, A.M.; Gourcerol, G. The use of impedance planimetry (Endoscopic Functional Lumen Imaging Probe, EndoFLIP®) in the gastrointestinal tract: A systematic review. *Neurogastroenterol. Motil.* **2020**, *32*, e13980. [\[CrossRef\]](#)
52. Carlson, D.A.; Kou, W.; Lin, Z.; Hinchcliff, M.; Thakrar, A.; Falmagne, S.; Prescott, J.; Dorian, E.; Kahrilas, P.J.; Pandolfino, J.E. Normal Values of Esophageal Distensibility and Distension-Induced Contractility Measured by Functional Luminal Imaging Probe Panometry. *Clin. Gastroenterol. Hepatol.* **2019**, *17*, 674–681.e1. [\[CrossRef\]](#) [\[PubMed\]](#)
53. Nicodème, F.; Hirano, I.; Chen, J.; Robinson, K.; Lin, Z.; Xiao, Y.; Gonsalves, N.; Kwasny, M.J.; Kahrilas, P.J.; Pandolfino, J.E. Esophageal distensibility as a measure of disease severity in patients with eosinophilic esophagitis. *Clin. Gastroenterol. Hepatol.* **2013**, *11*, 1101–1107.e1. [\[CrossRef\]](#) [\[PubMed\]](#)
54. Araujo, I.K.; Shehata, C.; Hirano, I.; Gonsalves, N.; Kahrilas, P.J.; Tetreault, M.P.; Schauer, J.M.; Farina, D.; Peterson, S.; Kou, W.; et al. The Severity of Reduced Esophageal Distensibility Parallels Eosinophilic Esophagitis Disease Duration. *Clin. Gastroenterol. Hepatol.* **2024**, *22*, 513–522.e1. [\[CrossRef\]](#) [\[PubMed\]](#)
55. Amil-Dias, J.; Oliva, S.; Papadopoulou, A.; Thomson, M.; Gutiérrez-Junquera, C.; Kalach, N.; Orel, R.; Auth, M.K.; Nijenhuis-Hendriks, D.; Strisciuglio, C.; et al. Diagnosis and management of eosinophilic esophagitis in children: An update from the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN). *J. Pediatr. Gastroenterol. Nutr.* **2024**, *79*, 394–437. [\[CrossRef\]](#)
56. Runge, T.M.; Eluri, S.; Cotton, C.C.; Burk, C.M.; Woosley, J.T.; Shaheen, N.J.; Dellon, E.S. Outcomes of Esophageal Dilation in Eosinophilic Esophagitis: Safety, Efficacy, and Persistence of the Fibrostenotic Phenotype. *Am. J. Gastroenterol.* **2016**, *111*, 206–213. [\[CrossRef\]](#)
57. Visaggi, P.; Barberio, B.; Del Corso, G.; de Bortoli, N.; Black, C.J.; Ford, A.C.; Savarino, E. Comparison of drugs for active eosinophilic oesophagitis: Systematic review and network meta-analysis. *Gut* **2023**, *72*, 2019–2030. [\[CrossRef\]](#)
58. Cini, L.; Marinoni, B.; Coletta, M. Persistent dysphagia in stricture-free eosinophilic esophagitis in histological remission: Effectiveness of empirical dilation. *United Eur. Gastroenterol. J.* **2024**, *12*, 708.

59. Carlson, D.A.; Hirano, I.; Zalewski, A.; Gonsalves, N.; Lin, Z.; Pandolfino, J.E. Improvement in Esophageal Distensibility in Response to Medical and Diet Therapy in Eosinophilic Esophagitis. *Clin. Transl. Gastroenterol.* **2017**, *8*, e119. [\[CrossRef\]](#)
60. Kaplan, M.; Mutlu, E.A.; Jakate, S.; Bruninga, K.; Losurdo, J.; Losurdo, J.; Keshavarzian, A. Endoscopy in eosinophilic esophagitis: “feline” esophagus and perforation risk. *Clin. Gastroenterol. Hepatol.* **2003**, *1*, 433–437. [\[CrossRef\]](#)
61. Lucendo, A.J.; De Rezende, L. Endoscopic dilation in eosinophilic esophagitis: A treatment strategy associated with a high risk of perforation. *Endoscopy* **2007**, *39*, 376, author reply 377. [\[CrossRef\]](#)
62. Dougherty, M.; Runge, T.M.; Eluri, S.; Dellon, E.S. Esophageal dilation with either bougie or balloon technique as a treatment for eosinophilic esophagitis: A systematic review and meta-analysis. *Gastrointest. Endosc.* **2017**, *86*, 581–591.e3. [\[CrossRef\]](#) [\[PubMed\]](#)
63. Rank, M.A.; Sharaf, R.N.; Furuta, G.T.; Aceves, S.S.; Greenhawt, M.; Spergel, J.M.; Falck-Ytter, Y.T.; Dellon, E.S. Technical review on the management of eosinophilic esophagitis: A report from the AGA institute and the joint task force on allergy-immunology practice parameters. *Ann. Allergy Asthma Immunol.* **2020**, *124*, 424–440.e17. [\[CrossRef\]](#) [\[PubMed\]](#)
64. Moawad, F.J.; Molina-Infante, J.; Lucendo, A.J.; Cantrell, S.E.; Tmanova, L.; Douglas, K.M. Systematic review with meta-analysis: Endoscopic dilation is highly effective and safe in children and adults with eosinophilic oesophagitis. *Aliment. Pharmacol. Ther.* **2017**, *46*, 96–105. [\[CrossRef\]](#) [\[PubMed\]](#)
65. Arias-González, L.; Rey-Iborra, E.; Ruiz-Ponce, M.; Laserna-Mendieta, E.J.; Arias, Á.; Lucendo, A.J. Esophageal perforation in eosinophilic esophagitis: A systematic review on clinical presentation, management and outcomes. *Dig. Liver Dis.* **2020**, *52*, 245–252. [\[CrossRef\]](#)
66. Kim, J.P.; Weingart, G.; Hiramoto, B.; Gregory, D.L.; Gonsalves, N.; Hirano, I. Clinical outcomes of adults with eosinophilic esophagitis with severe stricture. *Gastrointest. Endosc.* **2020**, *92*, 44–53. [\[CrossRef\]](#)
67. Greenberg, S.; Chang, N.C.; Corder, S.R.; Reed, C.C.; Eluri, S.; Dellon, E.S. Dilation-predominant approach versus routine care in patients with difficult-to-treat eosinophilic esophagitis: A retrospective comparison. *Endoscopy* **2022**, *54*, 243–250. [\[CrossRef\]](#)
68. Safroneeva, E.; Pan, Z.; King, E.; Martin, L.J.; Collins, M.H.; Yang, G.Y.; Capocelli, K.E.; Arva, N.C.; Abonia, J.P.; Atkins, D.; et al. Long-Lasting Dissociation of Esophageal Eosinophilia and Symptoms After Dilation in Adults With Eosinophilic Esophagitis. *Clin. Gastroenterol. Hepatol.* **2022**, *20*, 766–775.e4. [\[CrossRef\]](#)
69. Schoepfer, A.M.; Gonsalves, N.; Bussmann, C.; Conus, S.; Simon, H.U.; Straumann, A.; Hirano, I. Esophageal dilation in eosinophilic esophagitis: Effectiveness, safety, and impact on the underlying inflammation. *Am. J. Gastroenterol.* **2010**, *105*, 1062–1070. [\[CrossRef\]](#)
70. Hirano, I. How to Approach a Patient With Eosinophilic Esophagitis. *Gastroenterology* **2018**, *155*, 601–606. [\[CrossRef\]](#)
71. Richter, J.E. Eosinophilic Esophagitis Dilation in the Community—Try It—You will Like It—But Start Low and Go Slow. *Am. J. Gastroenterol.* **2016**, *111*, 214–216. [\[CrossRef\]](#)
72. Everett, S.M.; Triantafyllou, K.; Hassan, C.; Mergener, K.; Tham, T.C.; Almeida, N.; Antonelli, G.; Axon, A.; Bisschops, R.; Bretthauer, M.; et al. Informed consent for endoscopic procedures: European Society of Gastrointestinal Endoscopy (ESGE) Position Statement. *Endoscopy* **2023**, *55*, 952–966. [\[CrossRef\]](#) [\[PubMed\]](#)
73. Bortoluzzi, F.; Sorge, A.; Vassallo, R.; Montalbano, L.M.; Monica, F.; La Mura, S.; Canova, D.; Checchin, D.; Fedeli, P.; Marmo, R.; et al. Sustainability in gastroenterology and digestive endoscopy: Position Paper from the Italian Association of Hospital Gastroenterologists and Digestive Endoscopists (AIGO). *Dig. Liver Dis.* **2022**, *54*, 1623–1629. [\[CrossRef\]](#) [\[PubMed\]](#)
74. Siddiqui, U.D.; Banerjee, S.; Barth, B.; Chauhan, S.S.; Gottlieb, K.T.; Konda, V.; Maple, J.T.; Murad, F.M.; Pfau, P.R.; Pleskow, D.K.; et al. Tools for endoscopic stricture dilation. *Gastrointest. Endosc.* **2013**, *78*, 391–404. [\[CrossRef\]](#) [\[PubMed\]](#)
75. Hernandez, L.V.; Jacobson, J.W.; Harris, M.S. Comparison among the perforation rates of Maloney, balloon, and Savary dilation of esophageal strictures. *Gastrointest. Endosc.* **2000**, *51*, 460–462. [\[CrossRef\]](#)
76. Al-Hussaini, A. Savary Dilation Is Safe and Effective Treatment for Esophageal Narrowing Related to Pediatric Eosinophilic Esophagitis. *J. Pediatr. Gastroenterol. Nutr.* **2016**, *63*, 474–480. [\[CrossRef\]](#)
77. Schoepfer, A.M.; Henchoz, S.; Biedermann, L.; Schreiner, P.; Greuter, T.; Reinhard, A.; Senn, J.; Franke, A.; Burri, E.; Juillerat, P.; et al. Technical feasibility, clinical effectiveness, and safety of esophageal stricture dilation using a novel endoscopic attachment cap in adults with eosinophilic esophagitis. *Gastrointest. Endosc.* **2021**, *94*, 912–919.e2. [\[CrossRef\]](#)
78. Graham, D.Y.; Tabibian, N.; Schwartz, J.T.; Smith, J.L. Evaluation of the effectiveness of through-the-scope balloons as dilators of benign and malignant gastrointestinal strictures. *Gastrointest. Endosc.* **1987**, *33*, 432–435. [\[CrossRef\]](#)
79. Goldstein, J.A.; Barkin, J.S. Comparison of the diameter consistency and dilating force of the controlled radial expansion balloon catheter to the conventional balloon dilators. *Am. J. Gastroenterol.* **2000**, *95*, 3423–3427. [\[CrossRef\]](#)
80. Hoskins, B.; Almazan, E.; Hohl, B.; Ng, K. Esophageal dilation with EsoFLIP is faster than CRE balloon dilation combined with EndoFLIP in children. *Surg. Endosc.* **2023**, *37*, 6308–6314. [\[CrossRef\]](#)

81. Paspatis, G.A.; Arvanitakis, M.; Dumonceau, J.M.; Barthet, M.; Saunders, B.; Turino, S.Y.; Dhillon, A.; Fragaki, M.; Gonzalez, J.M.; Repici, A.; et al. Diagnosis and management of iatrogenic endoscopic perforations: European Society of Gastrointestinal Endoscopy (ESGE) Position Statement—Update 2020. *Endoscopy* **2020**, *52*, 792–810. [[CrossRef](#)]
82. Sdralis, E.I.K.; Petousis, S.; Rashid, F.; Lorenzi, B.; Charalabopoulos, A. Epidemiology, diagnosis, and management of esophageal perforations: Systematic review. *Dis. Esophagus* **2017**, *30*, 1–6. [[CrossRef](#)]

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