Communication from the ASGE Standards of Practice Committee

GUIDELINE

ASGE American Society for Gastrointestinal Endoscopy

American Society for Gastrointestinal Endoscopy guideline on the diagnosis and management of GERD: summary and recommendations

Prepared by: THE ASGE STANDARDS OF PRACTICE COMMITTEE

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This document was reviewed and approved by the Governing Board of the American Society for Gastrointestinal Endoscopy.

This clinical practice guideline from the American Society for Gastrointestinal Endoscopy (ASGE) provides an evidence-based approach for strategies to diagnose and manage GERD. This document was developed using the Grading of Recommendations Assessment, Development, and Evaluation framework and serves as an update to the 2014 ASGE guideline on the role of endoscopy in the management of GERD. This updated guideline addresses the indications for endoscopy in patients with GERD as well as in the emerging population of patients who develop GERD after sleeve gastrectomy or peroral endoscopic myotomy. It also discusses how to endoscopically evaluate gastroesophageal junctional integrity in a comprehensive and uniform manner. Importantly, this guideline also discusses management strategies for GERD including the role of lifestyle interventions, proton pump inhibitors (PPIs), and endoscopic antireflux therapy (including transoral incisionless fundoplication [TIF], radiofrequency energy, and combined hiatal hernia repair and TIF [cTIF]) in the management of GERD. The ASGE suggests upper endoscopy for the evaluation of GERD in patients with alarm symptoms, with multiple risk factors for Barrett's esophagus, and with a history of sleeve gastrectomy. The ASGE recommends careful endoscopic evaluation, reporting, and photo-documentation of objective GERD findings with attention to gastroesophageal junction landmarks and integrity in patients who undergo upper endoscopy to improve care. In patients with GERD symptoms, the ASGE recommends lifestyle modifications. In patients with symptomatic and confirmed GERD with predominant heartburn symptoms, the ASGE recommends medical management including PPIs at the lowest dose for the shortest duration possible while initiating discussion about long-term management options. In patients with confirmed GERD with small hiatal hernias ($\leq$2 cm) and Hill grade I or II who meet specific criteria, the ASGE suggests evaluation for TIF as an alternative to chronic medical management. In patients with persistent GERD with large hiatal hernias (> 2cm) and Hill grade III or IV, the ASGE suggests either cTIF or surgical therapy based on multidisciplinary review. This document summarizes the methods, analyses, and decision processes used to reach the final recommendations and represents the official ASGE recommendations on the above topics. (Gastrointest Endosc 2024;■:1-18.)

This guideline document was prepared by the Standards of Practice Committee of the American Society for Gastrointestinal Endoscopy using the best available scientific evidence and considering a multitude of variables including but not limited to adverse events, patient values, and cost implications. The purpose of these

guidelines is to provide the best practice recommendations that may help standardize patient care, improve patient outcomes, and reduce variability in practice. We recognize that clinical decision-making is complex. Guidelines, therefore, are not a substitute for a clinician's judgment. Such judgments may at times seem contradictory to our guidance because of many factors that are impossible to fully consider by guideline developers. Any clinical decisions should be based on the clinician's experience, local expertise, resource availability, and patient values and preferences. This document is not a rule and should not be construed as establishing a legal standard of care or as encouraging, advocating for, mandating, or discouraging any particular treatment. Our guidelines should not be used in support of medical complaints, legal proceedings, and/or litigation as they were not designed for this purpose.

GERD, defined as troublesome heartburn and/or regurgitation, is the most prevalent GI disorder, affecting one-third of the adult population in the United States.[1-4] GERD can also be present in the pediatric population but may be difficult to establish because of patients' limitations in describing these symptoms.[5] Chronic uncontrolled acid reflux could lead to several adverse events including erosive esophagitis, peptic stricture, Barrett's esophagus (BE), and esophageal adenocarcinoma. The incidence of GERD and GERD-related consequences appears to be increasing in parallel with global prevalence of obesity.[6] In addition, GERD can result in poor quality of life and increased healthcare costs to individuals and the healthcare system because of frequent physician visits, endoscopies, and treatment of GERD-related consequences.[7,8]

Since the publication of the previous American Society for Gastrointestinal Endoscopy (ASGE) guideline on GERD,[9] there have been several endoscopic advancements that can affect the diagnosis and management of GERD. These include evolving indications for endoscopy among patients after sleeve gastrectomy (SG) and peroral endoscopic myotomy (POEM) in addition to updated guidance regarding endoscopic antireflux therapies. Therefore, the ASGE aimed to develop an updated and revised evidence-based guideline on the diagnosis and management of GERD.

METHODS

This document was prepared by the Standards of Practice Committee of the ASGE and was conceptualized and conducted according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework.[10] The recommendations in this summary document were carefully crafted and informed by the best available evidence. Evidence profiles were created by GRADE methodologists. Evidence was presented to a panel of experts representing various stakeholders in a meeting held in the IT&T center, Chicago, Illinois, USA on March 10, 2023. All panel members were required to disclose potential financial and intellectual conflicts of interests, which were addressed according to ASGE policies. Panelists and primary methodologists with conflicts of interest were excluded from voting on final recommendations.

In developing these recommendations, we took into consideration the certainty of the evidence, benefits and harms of different management options, feasibility, patient values and preferences, resource utilization, cost-effectiveness, and health equity, wherever possible. Final approval of each recommendation was based on a simple majority among the panel members. The final wording of the recommendations including direction and strength were approved by all members of the panel. The final wording of our recommendations was approved by all members of the panel and the ASGE Governing Board. Stronger recommendations are represented using statements such as "we recommend…," whereas weaker recommendations are represented by statements such as "we suggest…." This document, subtitled "Summary and Recommendations," provides our final recommendations as well as a high-level summary of the evidence-based guideline process that was followed by the ASGE in preparing this document. Further details on methodology and evidence synthesis process are provided separately including details of our literature search, data analyses, pooled-effects estimates, evidence profiles, forest plots, and panel deliberation for each outcome in the accompanying methodology and technical review document.

This guideline addressed the following clinical domains in the following categories using the GRADE format: endoscopy in specific patient populations to evaluate for GERD (questions 1a, 1b, and 1c), performance of a high-quality endoscopy (question 2), lifestyle interventions for management of GERD (question 3), use of proton pump inhibitors (PPIs) in GERD (question 4), and endoscopic management of GERD (questions 5 and 6). Relevant clinical outcomes included symptom remission, adverse events, objective improvement of GERD, durable response, and PPI discontinuation.

External review

The guideline was reviewed by the *Gastrointestinal Endoscopy* Editorial Board and ASGE Governing Board and made available for public comment on the ASGE website for 30 days between March 1 and April 1, 2024.

RESULTS AND SUMMARY OF RECOMMENDATIONS

A summary of our final recommendations for management of patients with GERD is listed in Table 1. A management algorithm for patients with GERD is provided in Figure 1.

Question 1a: In patients with GERD symptoms, when should upper endoscopy be performed compared with no endoscopy?

Recommendation 1a:

I. In patients with GERD symptoms, the ASGE recommends upper endoscopy in those with
   - Alarm symptoms (dysphagia, odynophagia, weight loss, GI bleeding, persistent vomiting, or unexplained iron deficiency anemia).

(Strong recommendation, moderate-quality evidence)

II. In patients with GERD symptoms but no alarm symptoms, the ASGE suggests endoscopic evaluation in those with
   - BE risk factors (family history of BE or esophageal adenocarcinoma; GERD plus another risk factor [≥50 years, male sex, white race, smoking, or obesity]).
   - Infants and children with suggestive symptoms (poor weight gain, unexplained anemia, concern for GI bleeding, recurrent pneumonia, regurgitation and/or vomiting).

(Conditional recommendation, low-quality evidence)

Summary of the evidence

For this outcome, we used existing consensus from our previous guidelines.[9,11] A clinical diagnosis of GERD can be made based on symptoms and confirmed by a favorable symptomatic response to antisecretory medical therapy. If the patient's symptoms are consistent with typical or uncomplicated GERD, an initial trial of empirical medical therapy is appropriate before consideration of endoscopy in most patients without alarm symptoms. However, endoscopy at presentation should be considered in patients who have symptoms suggestive of advanced pathology or adverse events of GERD (ie, stricture). Endoscopy is therefore recommended for patients with alarm symptoms including dysphagia, odynophagia, weight loss, GI bleeding, and anemia.

The panel discussed that a high-quality EGD should be performed when alarm symptoms have occurred after a recent endoscopic evaluation in the absence of such symptoms. EGD may be necessary to detect erosive esophagitis, peptic stricture, esophageal cancer, gastric or esophageal outlet obstruction, and other potentially significant upper GI tract findings. Previous ASGE guidelines suggest screening endoscopy in at-risk patients, which is defined as individuals with a family history of BE or esophageal adenocarcinoma or patients with GERD plus at least 1 other risk factor.[9] The panel recognized recent guidelines suggesting screening for patients with multiple risk factors (without necessarily having GERD as a prerequisite)[11] because many patients with GERD and BE are asymptomatic.[12] Additionally, EGD should be considered as part of the preoperative evaluation of patients being considered for antireflux surgery or for the placement of wireless esophageal pH monitoring devices and is an inherent part of various endoscopic antireflux procedures. The panel supported these established recommendations, and these were incorporated into the existing indications for endoscopy for GERD.

Question 1b: In patients who had SG, should endoscopy be performed to screen for BE compared with no endoscopy?

Recommendation 1b:

- In patients who had SG and with reflux symptoms, the ASGE suggests endoscopic evaluation.
- In patients who had SG and are asymptomatic, the ASGE suggests endoscopic screening for 3 years after SG and then every 5 years.
- If BE is detected in this population, the ASGE recommends follow-up per existing BE surveillance guidelines.

(Conditional recommendation, very-low-quality evidence)

Summary of the evidence

We found no prospective studies examining the utility of a screening EGD after SG for BE in terms of survival (or other events) or cost-effectiveness of screening in this population. We identified a systematic review by Qumseya et al[13] that assessed the rate of de novo BE after SG. Among 10 observational studies where 680 patients did not have BE before undergoing SG, 11.4% (54/680) developed BE after SG (7.7%-16.6%, $P < .001$, $I^2 = 28.7\%$) at follow-up ranging from 6 months to 10 years. In 5 studies with long-term follow-up, the relative increase in the rate of esophagitis was 86% (64%-109%, $P < .001$, $I^2 = 47\%$).[14-19] Meta-regression showed that the risk of esophagitis increased by 8% each year. We did not find any relevant data on patient values and preferences.

The panel noted that this risk of BE crosses the 10% threshold set by previous guidelines and thus suggested

TABLE 1. Summary of recommendations

Recommendation	Best practice advice	Strength of recommendation	Quality of the evidence
In patients with GERD symptoms, the ASGE recommends upper endoscopy in those with alarm symptoms (dysphagia, odynophagia, weight loss, GI bleeding, persistent vomiting, or unexplained iron deficiency anemia).		Strong	Moderate
In patients with GERD symptoms with no alarm symptoms, the ASGE suggests endoscopic evaluation in • Those with Barrett's esophagus risk factors (family history of Barrett's esophagus or esophageal adenocarcinoma; GERD plus another risk factor [>50 y, male sex, white race, smoking, and obesity]). • Infants and children with suggestive symptoms (poor weight gain, unexplained anemia, concern for GI bleeding, recurrent pneumonia, regurgitation, and/or vomiting).		Conditional	Low
In patients after sleeve gastrectomy with reflux symptoms, the ASGE suggests endoscopic evaluation. In patients after sleeve gastrectomy who are asymptomatic, the ASGE suggests endoscopic screening 3 y after sleeve gastrectomy and then every 5 y. If Barrett's esophagus is detected in this population, the ASGE recommends follow-up per existing Barrett's esophagus surveillance guidelines.		Conditional	Very low
In patients after peroral endoscopic myotomy who have symptomatic GERD, the ASGE suggests endoscopic evaluation.	In patients after peroral endoscopic myotomy, endoscopists should be aware of the high rate of GERD after peroral endoscopic myotomy and should consider periodic endoscopic evaluation in asymptomatic patients.	Conditional	Very low
In patients undergoing endoscopic evaluation for GERD symptoms, the ASGE recommends careful endoscopic evaluation, reporting, and photodocumentation of the following to improve patient care and outcomes: • Objective GERD findings, when present: o Erosive esophagitis (using Los Angeles grading system) o Barrett's esophagus (using Prague classification) o Peptic stricture • Gastroesophageal junction landmarks and integrity o Hiatal hernia dimensions using Hill grading or America Foregut Society grading in forward view and retroflexion o Location of top of gastric folds, Z line, diaphragmatic impression o Existing fundoplication description (if present)		Strong	Very low
In patients with GERD symptoms, the ASGE recommends lifestyle modifications: • Weight loss for patients who are overweight or obese • Smoking cessation • Elevation of head of bed • Avoiding meals within 3 h of bedtime		Strong	Low
In patients with symptomatic and confirmed GERD with predominant heartburn symptoms, the ASGE recommends medical management with PPIs at the lowest possible dose for the shortest possible period of time while initiating discussion about long-term management options.	1. Patients who have been on chronic PPI therapy (>6 mo) should be considered for optimization and de-escalation of medical management. 2. Providers should carefully consider the risks, benefits, and alternatives of PPI use with the patient with GERD. 3. Providers prescribing PPI therapy should be aware that adverse events from PPIs in prospective data have been limited to increased risk of enteric infections; however, long-term robust data are needed to prove or disprove any other putative adverse events.	Strong	Moderate

(*continued on the next page*)

TABLE 1. Continued

Recommendation	Best practice advice	Strength of recommendation	Quality of the evidence
In patients with suboptimal clinical response to PPI therapy, the ASGE suggests testing for *CYP2C19* polymorphism and adjusting PPI dosage and selection accordingly.		Conditional	Very low
In patients with confirmed GERD with a small hiatal hernia (≤2 cm) and Hill grade I or II who meet any of the following criteria, the ASGE suggests evaluation for transoral incisionless fundoplication as an alternative to chronic medical management: • Chronic GERD (at least 6 months) • Chronic PPI use (≥6 mo) for management for GERD symptoms • Refractory GERD • Regurgitation-predominant GERD • Patient prefers to avoid long-term PPI use		Conditional	Low
In patients with confirmed GERD with a large hiatal hernia (>2 cm) and Hill grade III or IV, the ASGE suggests evaluation for combined hiatal hernia repair and transoral incisionless fundoplication in a multidisciplinary review.	In patients with confirmed GERD and small hiatal hernias (<2 cm) and Hill grade I or II, Stretta can be considered when other alternatives (endoscopic/surgical fundoplication) are not available or feasible.	Conditional	Very low

ASGE, American Society for Gastrointestinal Endoscopy; *PPI*, proton pump inhibitor.

screening in this patient population.[11,20] Screening is suggested to start at 3 years, regardless of the presence of GERD symptoms, and should continue every 5 years thereafter. If BE is found, then surveillance should follow the recommendations of the previous ASGE guidance.[11]

Question 1c: In patients who had POEM and have reflux symptoms, should endoscopy be performed compared with no endoscopy?

Recommendation 1c: In patients who had POEM and have symptomatic GERD, the ASGE suggests endoscopic evaluation.

(Conditional recommendation, very-low-quality evidence)

Best practice advice: In patients who had POEM, endoscopists should be aware of the high rate of GERD after POEM and should consider periodic endoscopic evaluation in asymptomatic patients.

Summary of the evidence

For this question, we performed a systematic review of studies examining the incidence of de novo GERD after POEM. Outcomes of interest were GERD, erosive esophagitis, and BE. We identified 3 existing systematic reviews and meta-analyses[21-23] and 2 randomized controlled trials (RCTs).[24,25] In a meta-analysis of 17 observational studies (follow-up, 2-30 months), the rate of post-POEM de novo GERD was 19% (245/1275; 15.7%-22.8%, $I^2 = 43.3\%$, $P = .024$).[21] The pooled rate of esophagitis was 29.4% (449/1056; 18.5%-43.3%, $I^2 = 93\%$, $P < .01$). In a meta-analysis of 11 studies encompassing 2342 patients that examined GERD after POEM with a median follow-up of 48 months (2017-2021), the pooled rate of symptomatic reflux was 22.0% (95% confidence interval [CI], 14.4-29.5; $I^2 = 73.1\%$, $P < .01$), with 3 cases of peptic strictures and 1 case of BE identified.[23] We did not identify other long-term data reporting a high rate of BE after POEM. We did not identify studies reporting patient values, cost-effectiveness, mortality, or benefits from surveillance or equity.

Overall, the evidence was noted to be of very low quality. The panel acknowledged that there was a high rate of GERD in initial studies after POEM; however, the POEM technique has also improved over time, correlating with decreased GERD rates after POEM. In addition, some studies have not examined rates of acid exposure before and after the intervention. Data on severity of esophagitis after POEM are also not consistently reported. The panel expressed concern regarding disruption of the antireflux barrier irrespective of POEM technique and acknowledged the risk of GERD after POEM. The panel also discussed the varying sensitivity for symptoms related to reflux and a higher incidence of esophagitis compared with reported symptoms among this population. Squamous cell cancer

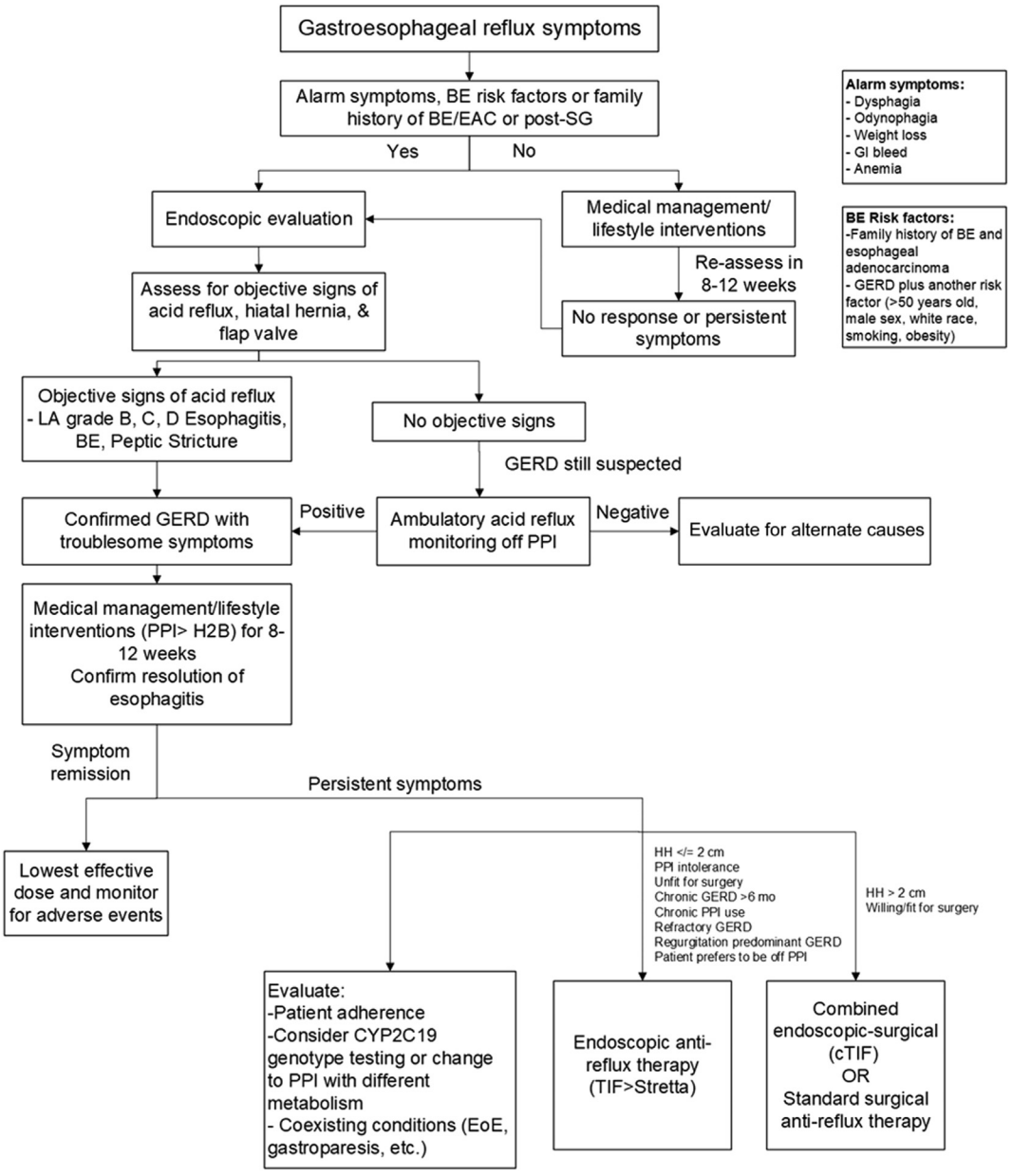


Figure 1. GERD management algorithm. *BE*, Barrett's esophagus; *EAC,* esophageal adenocarcinoma; *SG*, sleeve gastrectomy; *LA*, Los Angeles classification; *PPI*, proton pump inhibitor; *H2B*, histamine-2 receptor antagonists/blockers; *HH*, hiatal hernia; *TIF*, transoral incisionless fundoplication; *cTIF*, combined TIF and hiatal hernia surgery; *EoE*, eosinophilic esophagitis.

of the esophagus is associated with long-term achalasia, and esophageal adenocarcinoma is associated with long-standing acid reflux. Therefore, the panel acknowledged the utility of endoscopy in achalasia patients after POEM; however, the evidence in favor of EGD for all these patients is insufficient. The panel did make a conditional recommendation for EGD for further evaluation only in symptomatic patients after POEM.

Question 2: In patients with GERD undergoing upper endoscopy, what are the criteria for a high-quality endoscopy procedure and reporting?

Recommendation 2: In patients undergoing endoscopic evaluation for GERD symptoms, the ASGE recommends careful endoscopic evaluation, reporting, and photo-documentation of the following to improve patient care and outcomes:

- Objective GERD findings, when present:
  - o Erosive esophagitis (using the Los Angeles grading system)
  - o BE (using the Prague classification)
  - o Peptic stricture
- Gastroesophageal junction landmarks and integrity:
  - o Hiatal hernia dimensions using Hill grading or American Foregut Society grading in forward view and retroflexion
  - o Location of top of gastric folds, Z line, diaphragmatic impression
  - o Existing fundoplication description (if present)

(Strong recommendation, very-low-quality evidence)

Summary of the evidence

This was an important question to address for our guideline panel, especially given recent advancements in the endoscopic management of GERD. This is not a comparative question and thus did not follow the PICO (population, intervention, comparator, outcome) format. We performed a literature search for studies reporting the use of endoscopic evaluation modalities for GERD. Limited data describe the standardization of procedural documentation of upper endoscopies including documentation of the gastroesophageal junction. A study demonstrated that endoscopists are inconsistent in their reporting of upper endoscopies.[26] Specifically, esophagitis was documented in only one-third of patients and was graded in 42%. Furthermore, a hiatal hernia was noted in 61% of patients but only measured in 51% and further classified in 26%.

The panel agreed on the need to standardize endoscopy procedural documentation in patients with GERD because there can be negative consequences with failure to do so, including the need for a repeat endoscopy to characterize hiatal hernias and to document landmarks including the gastroesophageal junction before endoscopic or surgical therapy. This could subsequently delay therapeutic management and increase costs and risks associated with additional endoscopy.[27] The panel unanimously agreed that reporting objective findings of GERD is important, such as the presence of erosive esophagitis (Fig. 2A), BE (Prague classification) (Fig. 2B),[28] and peptic strictures. Los Angeles grading should be used to assess the severity of esophagitis.[29] The panel also agreed that reporting gastroesophageal junction landmarks and integrity is important. These include descriptions of hiatal hernia size, presence or absence of a flap valve using the forward endoscopic view and retroflexion in fundus, and use of Hill grading[30] or American Foregut Society classification (Fig. 2C) for gastroesophageal junction integrity and hiatus.[31] The panel also discussed the importance of adequate mucosal inspection and cleanliness (including use of existing scales, ie, Barcelona scale[32] and Toronto Upper Gastrointestinal Cleaning Score[33]) to ensure detection of any precancerous lesions before making definitive management decisions and emphasized achieving a high-quality inspection during the standard EGD.

Question 3: In patients with GERD, should lifestyle interventions be recommended to reduce GERD symptoms?

Recommendation 3: In patients with GERD symptoms, the ASGE recommends lifestyle modifications:

- Weight loss for patients who are overweight or obese
- Smoking cessation
- Elevating the head of the bed
- Avoiding meals within 3 hours of bedtime

(Strong recommendation, low-quality evidence)

Summary of the evidence

For this question, we performed a systematic literature search to evaluate the role of different lifestyle modifications (eg, weight loss, smoking cessation, head of bed elevation, late evening meals) on reduction of GERD symptoms. Weight loss was associated with a decrease in GERD symptoms and acid exposure time (3 RCTs[34-36]) and improvement in reflux disease questionnaire scores (1 RCT[37]). Large population-based studies showed a linear relationship between body mass index and GERD symptoms.[38,39] Smoking cessation was associated with decreased reflux symptoms.[40,41] Elevating the head of the bed was linked to lower reflux episodes[42] and decreased acid exposure.[43] A late evening meal was associated with increased reflux.[44] On the other hand, we did not identify any data to demonstrate that alcohol cessation improves GERD symptoms to make a recommendation.

Other lifestyle interventions were assessed including decreased ingestion of various beverages and foods, but the data were not conclusive for improvement of GERD symptoms with these lifestyle modifications. We did not identify data on cost-effectiveness, equity, or patient preferences of these interventions. We relied on our patient advocate who opted in for conservative measures over medications or surgery if they help with symptom reduction or remission.

Overall, the certainty of evidence was low. Given the low cost of these interventions as well as the potential additional health benefits of these lifestyle interventions,

the panel agreed that these lifestyle modifications should be recommended to decrease GERD symptoms based on the evidence available.

Question 4: In patients with GERD, do PPIs compared with placebo reduce symptoms?

Recommendation 4

- In patients with symptomatic and confirmed GERD with predominant heartburn symptoms, the ASGE recommends medical management with PPIs at the lowest possible dose for the shortest possible period of time while initiating discussion about long-term management options.

(Strong recommendation, moderate-quality evidence)

- In patients with suboptimal clinical response to PPI therapy, the ASGE suggests testing *CYP2C19* polymorphism and adjusting PPI dosage and/or selection accordingly.

(Conditional recommendation, very-low-quality evidence)

Best practice advice:

- Patients who have been on chronic PPI therapy (>6 months) should be considered for optimization and de-escalation of medical management.
- Providers should carefully consider the risks, benefits, and alternatives of PPI use for patients with GERD.
- Providers prescribing PPI therapy should be aware that adverse events from PPIs in prospective data have been limited to a modest increased risk of enteric infections; however, there is need for robust long-term data to prove or disprove any other putative adverse events.

Summary of the evidence

We performed a systematic review to examine the outcomes of PPIs versus placebo on GERD symptoms. Outcomes examined were GERD symptom remission, healing of esophagitis, and adverse events from PPIs.

For outcomes of symptom remission and resolution of esophagitis, our search identified 22 RCTs and a network meta-analysis.[45] Patients with GERD taking PPIs were more likely to have symptom relief (pooled odds ratio [OR], 4.2; 95% CI, 3.25-5.48; $P < .01$) and healing of erosive esophagitis compared with those not taking a PPI (OR, 11.4; 95% CI, 8.17-16.3; $P < .01$). This network meta-analysis did not assess for heterogeneity (I^2) for these outcomes.

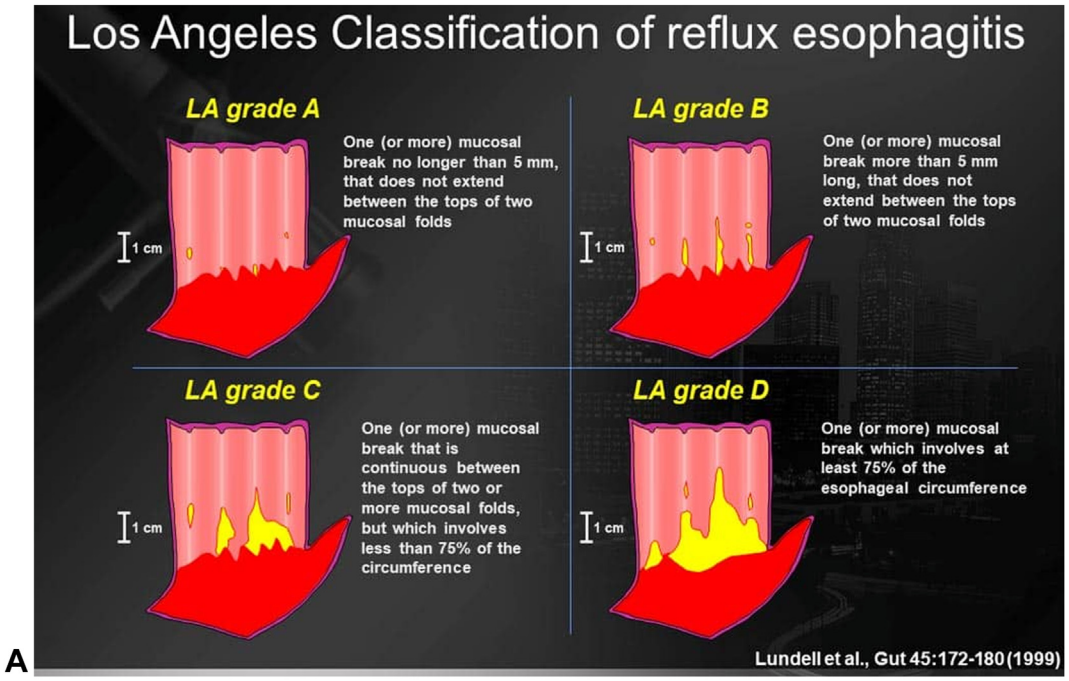
For adverse events, the best evidence came from a large RCT that found no significant difference in most adverse events at a mean follow-up of 3 years among PPI users (n = 8791) compared with nonusers (n = 8807).[46] Specifically, no significant difference was found in all-cause mortality (hazard ratio [HR], 1.03; 95% CI, .92-1.15); cardiovascular events including myocardial infarction, stroke, and death (hazard ratio, 1.04; 95% CI, .93-1.15); chronic kidney disease (OR, 1.17; 95% CI, .94-1.45); *Clostridium difficile* infection (OR, 2.26; 95% CI, .7-7.34); pneumonia (OR, 1.02; 95% CI, .87-1.19); fractures (OR, .96; 95% CI, .79-1.17); and dementia (OR, 1.2; 95% CI, .81-1.78).[46] In this RCT, patients on PPIs were at a higher risk of other enteric infections compared with nonusers (OR, 1.33; 95% CI, 1.01-1.75; $P = .04$).

PPIs were more effective in relieving heartburn in comparison with ranitidine; however, the use of PPIs in managing heartburn in patients with long-term consumption of nonsteroidal anti-inflammatory drugs was found to have higher cost compared with H2 blockers.[47] For patient values and preferences, we identified a review of 12 eligible studies (7 surveys, 4 qualitative studies, and 1 RCT) examining patient values and preferences.[48] These studies suggested that PPI de-escalation is a preference-sensitive decision; therefore, patient attitudes should be elicited and incorporated into the decision-making process.

PPI metabolism is affected by the genotypical variability of *CYP2C19*, which encodes the CYP450 isoenzyme. Although it has not largely been implemented in practice, there may be a role for assessment of *CYP2C19* polymorphism and adjusting PPI therapy in patients who have GERD refractory to PPI therapy. Our literature search found a meta-analysis of 19 studies showing a role of assessing *CYP2C19* polymorphism and its impact on GERD symptoms.[49] In this meta-analysis, analysis of 8 studies showed that rapid metabolizers with reflux esophagitis have an increased risk of being refractory to PPI therapy compared with poor metabolizers (OR, 1.66; 95% CI, 1.02-2.66; $P = .04$). Thus, for patients who are rapid or ultrarapid metabolizers, the PPI dosage should be increased to 3 times daily or switched to a different PPI, such as rabeprazole, which is less reliant on this metabolic pathway than other PPIs.

Overall, the certainty of the evidence supporting the use of PPI therapy was moderate. Although PPI efficacy has been well established by high-quality studies in GERD, previous retrospective studies[50-57] reported various associations of PPI use with adverse events, raising questions for patients and providers regarding possible long-term consequences of PPI use. Furthermore, long-term PPI users may only be partially responsive, intolerant, or searching for better options than a PPI; therefore, PPI de-escalation and stewardship was discussed by the panel.

The panel recommended medical management, including PPIs at the lowest dose for the shortest period, while initiating discussions about long-term management options in patients with objectively confirmed GERD. The panel also provided best practice advice on the use of PPIs including discussion of risks and benefits before starting therapy, and consideration of de-escalation or dose optimization when symptoms are well controlled after PPIs have been used for >6 months. The panel discussed the lack of robust clinical evidence on *CYP2C19*; however, they also acknowledged the importance of



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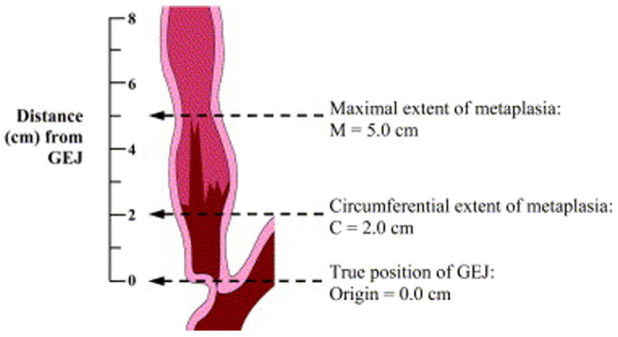

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Figure 2. Classifications for quality reporting. **A,** LA grading for erosive esophagitis. (Used with permission from Lundell L, et al. Gut 1999;45:172-80.) **B,** Prague classification for Barrett's esophagus. (Used with permission from Sharma P, et al. Gastroenterology 2006;131:1392-9.) **C,** AFS classification for integrity of the antireflux barrier. (Used with permission from Nguyen N, et al. Foregut 2022;2:339-48.) *LA*, Los Angeles; *C*, circumferential; *M*, maximal; *AFS*, American Foregut Society; *GEJ*, gastroesophageal junction; *LDF*, hiatal axial length, cm (L), hiatal aperture, cm (D), flap valve (F).

CYP2C19 genotype data to guide PPI therapy. This incorporates patients who are not responding optimally to PPI therapy and who may benefit from a higher dose, in addition to those who benefit from changing to a PPI with an alternative metabolic pathway. Therefore, the panel agreed to a best practice advice suggesting assessment of *CYP2C19* genotype and tailoring PPI therapy accordingly in patients with persistent and confirmed GERD who have failed to respond to standard medical therapy. The panel acknowledged existing H2 receptor blockers and their over-the-counter availability. Because the reviewed evidence demonstrated superiority of PPIs over H2 receptor blockers for GERD therapy, PPIs are favored for patients with erosive esophagitis and uncontrolled GERD with confirmed objective acid reflux study. At the same time, the panel agreed on the use of H2 receptor blockers as an adjunct, as-needed therapy and when faster onset of action might be required on a case-by-case basis.

The panel also discussed the newer potassium channel competitive acid blockers and their positioning in the GERD management. These agents were not readily available in North America at the time of evidence review and panel meeting. A recent RCT demonstrated effectiveness of vonoprazan over lansoprazole for healing and maintenance of healing of erosive esophagitis.[58] A recent systematic review and meta-analysis (19 studies, 7023 subjects) also showed that vonoprazan is superior to PPIs in first-line *Helicobacter pylori* eradication and erosive esophagitis but noninferior in other gastric acid-related diseases.[59] The panel agreed unanimously that existing data do not show superiority of potassium channel competitive acid blockers over PPIs overall for GERD but likely that potassium channel competitive acid blockers are more potent for erosive esophagitis and that their long-term adverse event data are not available. The panel, however, also agreed that with evolving data,

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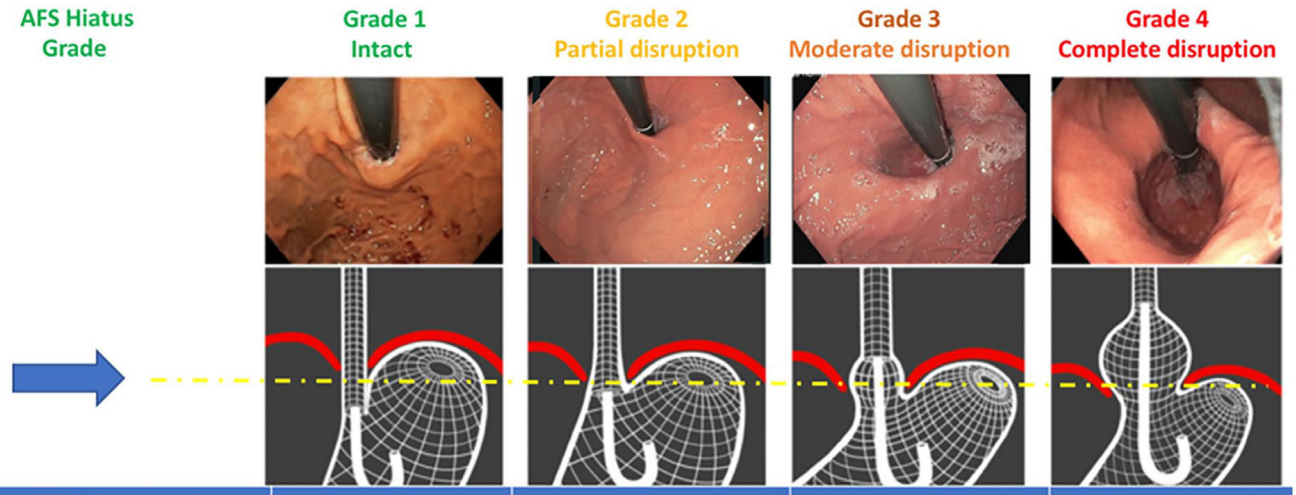

AFS Hiatus Grade	1	2	3	4
Hiatal axial Length, cm (L)	None (0 cm)	None (0 cm)	0-2 cm	>2 cm
Hiatal aperture, cm (D)	Snug to scope 1 cm	Loose 1-2 cm	Open 2-3 cm	Wide open >3 cm
Flap valve (F)	Present, full lip with Omega shape (F+)	Absent, thinning & flattening valve lip (F-)	Absent (F-)	Absent (F-)
LDF components	L0, D1, F+	L0, D1-2, F-	L0-2, D2-3, F-	L>2, D>3, F-

Figure 2. Continued.

potassium channel competitive acid blockers likely will be used for confirmed GERD patients with discussion of existing data and risks and benefits.

Question 5a: In patients with persistent GERD, how does transoral incisionless fundoplication compare with standard medical therapy?

Recommendation 5a: In patients with confirmed GERD and a small hiatal hernia (≤2 cm) and Hill grade 1 or 2 who meet *any* of the following criteria, the ASGE suggests evaluation for transoral incisionless fundoplication (TIF) as an alternative to chronic medical management:

- Chronic GERD (≥6 months)
- Chronic PPI use (≥6 months) for management for GERD symptoms
- Refractory GERD
- Regurgitation-predominant GERD
- Patient preference for avoidance of long-term PPI use

(Conditional recommendation, low-quality evidence)

Summary of the evidence

We performed a systematic review of studies examining efficacy and safety of TIF compared with medical therapy with PPIs (and/or sham intervention) among patients with chronic GERD. Our results were limited to available therapies (existing TIF 2.0 [Esophyx 2.0, EndoGastric Solutions, Redmond, WA]) because prior versions are out of date. Our literature search identified 4 RCTs, 18 cohort studies, and 4 existing meta-analyses.[60-85]

When compared with medical therapy with PPIs (and/or sham intervention), patients undergoing TIF 2.0 were more likely to stop their PPIs (77.6% vs 6.3%, 3 RCTs[60,62,63]; pooled risk ratio [RR], 12.7; 95% CI, 1.15-140.3; I^2 = 74%, P = .04). Among 14 cohort studies[68,69,71-75,77,79,80,82-85], only 28% of patients were taking PPIs at a mean follow-up of 19.1 months after TIF 2.0 compared with baseline (98.8%; pooled RR, 2.93; 95% CI, 2.06-4.15; I^2 = 90%, P < .01). Additionally, one-third of patients were completely off PPIs at long-term follow-up of 8 to 10 years (2 observational studies,[75,123] 34.4% [37/107]).

When compared with a sham intervention, acid exposure time was significantly lower among patients undergoing TIF 2.0 (2 RCTs; mean difference [MD], –2.38; 95% CI, –4.54 to –.22; I^2 = 37%, P = .03). Normalization of acid exposure time was nonsignificantly higher among patients undergoing TIF 2.0 compared with medical therapy and/or sham intervention (2 RCTs; RR, 1.62; 95% CI, .3-8.62; I^2 = 90%, P = .57).

Patients undergoing TIF 2.0 compared with medical therapy and/or sham intervention had a higher rate of GERD symptom resolution after TIF 2.0 compared with the PPI-sham group at a mean 6 months of follow-up (4

RCTs, 68.2% vs 32.4%; pooled RR, 2.12; 95% CI, 1.27-3.54; $I^2 = 57\%$, $P < .01$). However, the definition of success varied between studies.

When evaluating the overall adverse event rate from the existing RCTs, the rate was higher after TIF 2.0 compared with medical therapy (and/or sham) (4 RCTs, 37.8% vs 14.3%; pooled RR, 2.56; 95% CI, 1.36-4.81; $I^2 = 0\%$, $P < .01$). However, the rate of significant and serious adverse events was not statistically significantly different between TIF 2.0 and medical therapy (and/or sham) (4 RCTs, 8% for TIF vs 1.9% for medical therapy; pooled RR, 2.94; 95% CI, .94-9.19; $I^2 = 0\%$, $P < .01$). We also reviewed postmarketing surveillance data from the U.S. Food and Drug Administration Manufacturer and User Facility Device Experience on TIF reporting 95 events and 131 patient adverse events of which perforation (19.8%), pleural effusion (9.2%), and bleeding (9.2%) were the most common among reported adverse events. Most of these adverse events were managed endoscopically.[86]

When evaluating the severe adverse event rate from RCTs and prospective studies combined, the rate was even lower at 2.4% for TIF (4 RCTs and 12 prospective studies, 19/781). Furthermore, the rate of perforation was .9% (7/781), of post-TIF bleeding was .65% (5/781), and of pneumothorax was .5% (4/781). There was 1 death among 781 TIF 2.0 procedures, which occurred 20 months later from an unrelated cause. When evaluating post-TIF dysphagia, the pooled rate was 3.6% among 9 cohort studies (95% CI, 1.4-8.8; $I^2 = 58\%$, $P = .05$).

Regarding cost-analysis, TIF 2.0 ($13,978.63) had lower direct costs compared with laparoscopic Nissen fundoplication ($17,658.47) but more than PPIs (omeprazole 20 mg twice daily, $10,931.49).[87] Compared with the PPI strategy, TIF was cost-effective, with an incremental cost of $3047 and incremental effectiveness of .29 quality-adjusted life-years. In a subgroup of patients with resource utilization in the top quartile (ie, PPI-refractory GERD), the average cost of care over 2 years was much lower with TIF 2.0 compared with laparoscopic Nissen fundoplication ($66,000 vs $124,000).

When assessing patient values, there were no available data. Our patient advocate acknowledged that having a minimally invasive option is preferable to patients.

Overall, the certainty in the evidence was moderate to very low. The panel acknowledged that available evidence has varying patient populations and varying definitions of outcomes among these studies. However, overall TIF 2.0 showed short-term improvement with durable symptom remission up to 5 years with relatively low serious adverse event rates. The panel discussed the role of TIF 2.0 for a subset of the population, which included patients with chronic GERD symptoms for at least 6 months, those with refractory GERD (defined as the presence of persistent troublesome GERD symptoms despite PPI optimization [double-dose PPI therapy over ≥8 weeks] in the setting of ongoing documented pathologic reflux[88]), those with regurgitation-predominant symptoms,[60] those with PPI intolerance or wanting to stop taking PPIs, and patients with Hill grades I or II and hiatal hernia <2 cm.

Question 5b: In patients with confirmed GERD and a large hiatal hernia, how does hiatal hernia repair combined with TIF compare with standard medical therapy for GERD management?

Recommendation 5b: In patients with confirmed GERD and a large hiatal hernia (>2 cm) and Hill grade III or IV, the ASGE suggests evaluation for combined hiatal hernia repair and TIF (cTIF) in a multidisciplinary review.

(Conditional recommendation, very-low-quality evidence)

Summary of the evidence

We performed a systematic review of studies examining efficacy and safety of cTIF compared with medical therapy with PPIs (and/or sham intervention) among patients with chronic GERD with a large hiatal hernia. Outcomes of interest were PPI discontinuation, reduction in acid exposure time (% time pH < 4), normalization of esophageal acid exposure time (per patient), symptom resolution (per patient), durable symptom resolution, GERD score improvement (GERD health-related quality of life scores or similar scales), and adverse events (including severe adverse events and post-TIF dysphagia).

Seven cohort studies met selection criteria for inclusion.[84,89-94] Our literature search also identified an ongoing multicenter RCT (clinical trials identifier: NCT04795934). On meta-analysis, cTIF was associated with a lower use of PPIs compared with use before the procedure (37.5% vs 94.6%; pooled OR, .71; 95% CI, .48-.93, $I^2 = 94\%$, $P < .01$). cTIF was also associated with better symptom resolution compared with preintervention values (pooled MD, 21.87; 95% CI, 12.91-29.83; $I^2 = 100\%$, $P < .01$). Among 358 patients undergoing cTIF, only 2 (.01%) had serious adverse events. The rate of dysphagia was also low at .06% (7/125) after cTIF per 1 cohort study.[90] Objective outcomes for GERD assessment were inconsistently reported by available studies, and therefore a pooled analysis was not performed. No studies reported long-term symptom resolution, patient values and preferences, or cost-effectiveness data.

Overall, the certainty of the evidence was very low. The panel considered the evidence as important but inadequate because of initial data with small-size studies. The panel also discussed that cTIF could serve as an alternative to existing surgical therapies or as an additional treatment option. Evidence for surgical therapies have been established and whether cTIF is comparable is not yet established with high-quality data. The panel made a conditional recommendation suggesting cTIF or other surgical intervention based on multidisciplinary review for patients

with confirmed GERD and a large hiatal hernia (>2 cm) and Hill grade III/IV.

Question 6: In patients with persistent GERD, how does radiofrequency energy to the lower esophageal sphincter compare with standard medical therapy for GERD management?

Best practice advice: In patients with confirmed GERD, a small hiatal hernia (<2 cm), and Hill grade I or II, radiofrequency energy to the lower esophageal sphincter can be considered when other alternatives (endoscopic/surgical fundoplication) are not available or feasible.

Summary of the evidence

We performed a systematic review of studies examining efficacy and safety of radiofrequency energy to the lower esophageal sphincter (Stretta, Restech Reflux Solutions, Houston, TX) compared with medical therapy with PPIs (and/or sham intervention) among patients with chronic GERD. Our literature search identified 5 eligible RCTs and 1 existing meta-analysis.[95-100]

When compared with medical therapy with PPI (and/or sham intervention), patients undergoing Stretta were able to stop the PPI therapy at a higher rate (28.7% vs 12.7%), but the difference was not statistically significant (4 RCTs; pooled RR, 3.93; 95% CI, .8-19.38; $I^2 = 44$, $P = .09$).[96-99] When data from 23 cohort studies were examined, half of the patients were able to stop the PPI after Stretta compared with baseline (PPI use decreased from 97.1% to 47.4%; pooled RR, .49; 95% CI, .4-.6; $I^2 = 95\%$, $P < .01$).[100]

When compared with medical therapy with PPIs (and/or sham intervention), symptom resolution (defined as GERD symptoms <3 per week and GERD health-related quality of life score ≤11 at 12 months) was not significantly different after Stretta (40.6% Stretta vs 30.8% PPI; 2 RCTs; pooled RR, 1.35; 95% CI, .3-6.06; $I^2 = 14\%$, $P = .69$). When compared with medical therapy with PPIs (and/or sham intervention), GERD health-related quality of life scores were lower after Stretta in observational studies, but the results were not significant when evaluating RCTs only (2 RCTs; pooled MD, –3.99; 95% CI, –17.11 to 9.13; $I^2 = 91\%$, $P = .55$) and 11 observational studies[100] (pooled MD, –14.6; 95% CI, –12.73 to –16.48; $I^2 = 82\%$, $P < .01$).

Acid exposure time was not significantly different after Stretta compared with the PPI-sham group among 3 RCTs (pooled MD, –.22; 95% CI, –2.52 to 2.07; $I^2 = 41\%$, $P = .85$). However, acid exposure time was significantly lower after Stretta compared with baseline values among the same patients in 14 cohort studies (pooled MD, –3.01; 95% CI, –3.72 to –2.3; $I^2 = 35\%$, $P < .01$).[100] Normalization of esophageal acid exposure was not significantly different among patients undergoing Stretta compared with PPIs and/or sham (17.1% vs 10.7%; pooled RR, 1.84; 95% CI, .02-144.06; $I^2 = 81\%$, $P = .78$). Among 8 cohort studies, 30% of patients (43/144) had normalization of acid exposure time after Stretta compared with baseline.[100]

When compared with medical therapy with PPIs (and/or sham intervention), the adverse event rate was higher among the Stretta group (4 RCTs, 42% vs 11.1%; pooled RR, 3.06; 95% CI, 1.09-8.6; $I^2 = 5\%$, $P < .01$). However, when data on overall adverse events were examined from cohort studies and RCTs (n = 26), the adverse event rate was .9% (23/2468) after Stretta compared with 1.4% after PPIs and/or sham treatment (1/72 [*P* value not available]).[100] When compared with medical therapy with PPIs (and/or sham intervention), the serious or severe adverse event rate was not significantly different after Stretta versus PPIs (3.7% vs 1.4%; pooled RR, 1.9; 95% CI, .26-14.06; $I^2 = 0\%$, $P = .53$). When severe or serious adverse events were examined from RCTs and cohort studies (n = 26), it was .3% (7/2468) after Stretta compared with 1.9% after PPIs and/or sham intervention (1/52 [*P* value not available]).[100]

No direct cost-effectiveness study was found. When examining patient values, we relied on our patient advocate, who preferred having a minimally invasive option for durable symptom relief compared with lifelong medical therapy with potential side effects.

Overall, the certainty in the evidence was low to very low. The panel acknowledged that evidence on Stretta has been affected by differing results from RCTs and cohort studies and existing challenges including lack of durable benefit, no effect on PPIs, no effect on acid exposure, higher adverse events, better available treatments, and reimbursement concerns. Stretta is only applicable for GERD patients with small hiatal hernias (≤2 cm) and Hill grade I or II.

OTHER CONSIDERATIONS

Endoscopic therapies in pediatric patients

A literature search was performed to evaluate the current use of endoscopic antireflux therapies in pediatric patients. Four case series with a small number of patients were found.[101-104] Two studies[101,102] reported the use of TIF, and 2[102,103] examined Stretta for pediatric patients. These small studies demonstrate that Stretta can be used in pediatric patients. TIF seemed to demonstrate improved results in children, with 10 of 11 patients in 1 study having resolution of GERD[101] and 8 of 10 patients in another study[102] able to discontinue PPIs.

The pediatrics population has a wide age range, and the size of the scope with the device could pose a significant challenge and adverse events. Therefore, endoscopic antireflux therapies should currently only be performed in pediatric patients in the setting of a well-designed research study.

Novel GERD therapies

We performed a systematic review of studies comparing emerging and novel antireflux endoscopic interventions with medical therapy and/or sham interventions among adult (age ≥18 years) patients with chronic GERD. The novel and/or emerging interventions in this field include EMR (using band ligation or other forms of resection with or without plication), endoscopic mucosal ablation (using hybrid argon plasma coagulation or similar), an ultrasonic surgical endostapler device (MUSE; Medigus, Omer, Israel), and plication-based therapies including GERDx (G-SURG GmbH, Seeon-Seebruck, Germany). We also excluded interventions if the technology was out of date, not available, or has not been examined as a part of a clinical trial.

Our systematic review identified 1 RCT[105] and 1 prospective cohort study[106] examining endoscopic full-thickness fundoplication using a novel GERDx device, 7 prospective cohort noncomparative studies of the MUSE device,[107-113] 1 meta-analysis examining 10 noncontrolled cohort studies of antireflux mucosectomy,[114] 1 nonrandomized comparative study for clip-band ligation antireflux therapy,[115] 1 comparative trial of band ligation alone,[116] 3 noncontrolled cohort studies of the resection and plication method,[117-119] and 1 meta-analysis examining 3 nonrandomized studies of antireflux mucosal ablation[120-122] as an antireflux intervention among patients with chronic GERD. We also found an RCT examining antireflux mucosectomy (clinical trials identifier: NCT04194723) and 2 RCTs examining antireflux mucosal ablation (clinical trials identifier: NCT04711655 and NCT05570448) that are underway.

Overall, short-term follow-up among these studies demonstrated improvement in GERD symptoms or related scores with a minimal adverse event profile. Similar to TIF 2.0, these strategies are primarily used for patients with chronic objectively confirmed GERD with small hiatal hernias. Robust data demonstrating a durable benefit of any 1 of these compared with standard medical therapy are lacking. We did not find any of these technologies being compared with TIF 2.0 in an RCT design. The panel recognized the promise of these emerging technologies that may become more prevalent as more data become available.

FUTURE DIRECTIONS

This guideline and literature review highlighted several areas in need of more data to guide decision-making for managing chronic GERD. Future studies should address the following:

1. *Long-term benefit:* Existing medical, endoscopic, and surgical therapies, despite a large body of evidence, do not have established evidence for long-term (>10 years) benefit. Previous studies of endoscopic antireflux therapies have demonstrated short-term benefit for a subset of patients. Future studies should examine long-term outcomes from endoscopic antireflux therapies including subjective and objective improvement in GERD with cessation of long-term PPI use. Similarly, these therapies need to be examined in comparison with medication adjustment and surgical therapies for best outcomes. Development of better endoscopic therapies that provide durable alteration of the antireflux barrier without need for surgery is required.
2. *Objective improvement in GERD:* A large body of data on endoscopic antireflux therapies report subjective improvement in GERD; however, they lack consistent reporting of improvement in objective parameters of GERD including acid exposure time. Because of this, reliability and repeatability of these interventions remain a concern. Future studies should incorporate and examine objective improvements in GERD in addition to reliance on patient-reported outcomes, which could be subjective.
3. *Atypical GERD:* Data on the benefit of medical therapy for atypical GERD symptoms are not robust. Improvement of atypical GERD symptoms (cough, reflux laryngitis, sore throat, asthma, throat clearing) should also be assessed in endoscopic antireflux therapies in a well-defined cohort. Additionally, existing therapies need to be examined for special populations where options are limited (ie, after SG, after POEM, scleroderma patients, etc).
4. *Incidence of GERD after POEM:* Varying rates and evolving techniques have been reported over the years, making a precise assessment difficult. Recent studies report a low incidence of severe persistent esophagitis after POEM.[23] It is unclear if there is an increased or decreased risk of BE and related esophageal cancer after POEM (ie, squamous cell and adenocarcinoma). Further studies are needed to better quantify these trends.

WHAT IS NEW

These guidelines highlight data suggesting that upper endoscopy should be performed among patients with a history of SG to screen for BE and to evaluate for objective signs of GERD. These guidelines also suggest endoscopic therapy as an alternative for management of patients with chronic confirmed GERD. We have also provided a GERD management algorithm based on evidence and guidance from this document (Fig. 1).

GUIDELINE UPDATE

ASGE guidelines are reviewed for updates approximately every 5 years or in the event that new data may influence a recommendation. Updates follow the same ASGE guideline development process.

DISCLOSURE

The following authors disclosed financial relationships: N. C. Thosani: Consultant for Pentax of America, Inc, Boston Scientific Corporation, and Ambu Inc; travel compensation and food and beverage compensation from Pentax of America, Inc, Boston Scientific Corporation, and AbbVie Inc; speaker for AbbVie Inc. A. Saeed: Consultant for Endogastric Solutions, Medtronic, Boston Scientific Corporation, and Olympus. B. Abu Dayyeh: Consultant for Endogenex, Endo-TAGSS, Metamodix, BFKW, USGI, Apollo Endosurgery, Spatz Medical, Aspire Bariatrics, and Boston Scientific; research support from USGI, Apollo Endosurgery, Spatz Medical, Aspire Bariatrics, Boston Scientific, Medtronic, Endogastric Solutions, and Erbe Medical; speaker for Olympus, Johnson and Johnson, Medtronic, and Endogastric Solutions. M. I. Canto: Research support from Endogastric Solutions and Pentax Medical Corporation; consultant for Cernostics and ClearNote Health; scientific advisory board for Cernostics; royalties from UpToDate. W. Abidi: Consultant for Ambu Inc, Apollo Endosurgery US Inc, and Conmed Corporation; food and beverage compensation from Ambu Inc, Apollo Endosurgery US Inc, Conmed Corporation, Olympus America Inc, AbbVie Inc, Boston Scientific Corporation, RedHill Biopharma Inc, and Salix Pharmaceuticals; research support from GI Dynamics. S. K. Amateau: Consultant for Boston Scientific Corporation, Merit Medical, Olympus Corporation of the Americas, MTEndoscopy, US Endoscopy, Heraeus Medical Components, LLC, and Cook Medical LLC; travel compensation from Boston Scientific Corporation; food and beverage compensation from Boston Scientific Corporation, Olympus Corporation of the Americas, and Cook Medical LLC; advisory board for Merit Medical. N. Cosgrove: Consultant for Olympus Corporation of the Americas and Boston Scientific Corporation; food and beverage compensation from Boston Scientific Corporation and Ambu Inc. S. E. Elhanafi: Food and beverage compensation from Medtronic, Inc, Nestle HealthCare Nutrition Inc, Ambu Inc, Salix Pharmaceuticals, Takeda Pharmaceuticals USA, Inc, and Merit Medical Systems Inc. N. Forbes: Consultant for Boston Scientific Corporation and Pentax of America, Inc; speaker for Pentax of America, Inc and Boston Scientific Corporation; research support from Pentax of America, Inc. D. R. Kohli: Consultant for Olympus Corporation of the Americas; research support from Olympus Corporation of the Americas. L. L. Fujii-Lau: Consultant for Boston Scientific Corporation; food and beverage compensation from Pfizer Inc and AbbVie Inc. J. D. Machicado: Consultant for Mauna Kea Technologies, Inc; food and beverage compensation from Mauna Kea Technologies, Inc and Boston Scientific Corporation. N. B. Marya: Consultant for Boston Scientific Corporation; food and beverage compensation from Boston Scientific Corporation and Apollo Endosurgery US Inc. S. Ngamruengphong: Consultant for Boston Scientific Corporation, Olympus, and Neptune Medical; food and beverage compensation from Medtronic, Inc, Boston Scientific Corporation, Pentax of America, Inc, and Ambu Inc. S. Pawa: Consultant for Boston Scientific Corporation. N. R. Thiruvengadam: Research support from Boston Scientific Corporation. B. J. Qumseya: Consultant for Medtronic, Inc and Assertio Management, LLC; food and beverage compensation from Medtronic, Inc, Fujifilm Healthcare Americas Corporation, and Boston Scientific Corporation; speaker for Castle Biosciences. All other authors disclosed no financial relationships.

ACKNOWLEDGMENTS

We are grateful to Philip Daiza, a patient representative from the International Foundation for Gastrointestinal Disorders, for participating in our panel and to Robyn Rosasco (librarian) for assistance with searching for articles. We also thank Drs Luis Lara, Dennis Jensen, and Nalini Guda on behalf of the *GIE* Editorial Board and ASGE Governing Board for their review of the guidelines. This guideline was funded exclusively by the ASGE; no outside funding was received to support the development of this guideline.

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Abbreviations: ASGE, American Society for Gastrointestinal Endoscopy; BE, Barrett's esophagus; CI, confidence interval; cTIF, combined hiatal hernia repair and transoral incisionless fundoplication; GRADE, Grading of Recommendations, Assessment, Development, and Evaluation; MD, mean difference; OR, odds ratio; POEM, peroral endoscopic myotomy; PPI, proton pump inhibitor; RCT, randomized controlled trial; SG, sleeve gastrectomy; TIF, transoral incisionless fundoplication.

0016-5107/$36.00
https://doi.org/10.1016/j.gie.2024.10.008
Received October 2, 2024. Accepted October 5, 2024.

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