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UEG and EAES rapid guideline: Update systematic review, network meta-analysis, CINeMA and GRADE assessment, and evidence-informed European recommendations on surgical management of GERD

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Abstract

Background: There are several options for the surgical management of GERD in adults. Previous guidelines and systematic reviews have compared the effects of

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total fundoplication versus pooled effects of different techniques of partial fundoplication.

Objective: To develop evidence-informed, trustworthy, pertinent recommendations on the use of total, posterior partial and anterior partial fundoplications for the management of GERD in adults.

Methods: We performed an update systematic review, network meta-analysis, and evidence appraisal using the GRADE and the Confidence in Network Meta-Analysis methodologies. An international, multidisciplinary panel of surgeons, gastroenterologists, and a patient representative reached unanimous consensus through an evidence-to-decision framework to select among multiple interventions, and a Delphi process to formulate the recommendation. The project was developed in an online authoring and publication platform (MAGICapp), and was overseen by an external auditor.

Results: We suggest posterior partial fundoplication over total posterior or anterior 90° fundoplication in adult patients with GERD. We suggest anterior >90° fundoplication as an alternative, although relevant comparative evidence is limited (weak recommendation). The guideline, with recommendations, evidence summaries and decision aids in user friendly formats can also be accessed in MAGICapp: https://app.magicapp.org/#/guideline/j20X4n.

Conclusion: This rapid guideline was developed in line with highest methodological standards and provides evidence-informed recommendations on the surgical management of GERD. It provides user-friendly decision aids to inform healthcare professionals' and patients' decision making.

KEYWORDS
AGREE-S, fundoplication, GERD, guideline, Nissen, Toupét

INTRODUCTION

Gastroesophageal reflux disease (GERD) affects a substantial proportion of the general population.[1,2] Laparoscopic antireflux surgery has been established as an effective treatment for patients who do not wish to receive medication, and patients with persistent symptoms despite medication.[3]

Laparoscopic Nissen procedure has become the most established antireflux operation, however it is associated with dysphagia in about 13% of patients beyond 1 year after surgery.[4] Partial fundoplications have been proposed as alternatives, however concerns have been raised about their long-term effectiveness with regard to reflux control.[5]

Evidence on several partial antireflux procedures has been pooled in previous clinical practice guidelines.[6,7] Different partial fundoplications, such as Toupét, Dor, and anterior fundoplications may have distinct effect on reflux control and postoperative dysphagia. Summarizing the effect of these procedures may not provide the best information for clinical decision making.

In light of this gap in evidence and informed by an annual survey of members of the European Association for Endoscopic Surgery (EAES),[8] we decided to develop a rapid guideline on the surgical management of GERD.

The aim of this rapid guideline is to assist surgeons, patients, and other healthcare professionals in selecting the most appropriate surgical option(s) for the management of GERD. The objective is to reduce the long-term side effects and improve the quality of life and experience of patients undergoing antireflux surgery.

Key summary

- Various surgical options exist for the management of GERD in adults.
- We summarized evidence through network meta-analysis of interventions.
- We suggest partial posterior fundoplication over total posterior or anterior 90° fundoplication.
- We suggest anterior >90 degrees may be an alternative.

METHODS

This rapid guideline follows AGREE-S, GRADE, Institute of Medicine, Guidelines International Network (GIN) and Cochrane Rapid Reviews Methods Group development and reporting standards.[9–13] An AGREE-S reporting checklist is provided in Supplementary file 2. GRADE guidance published in a series of articles in the Journal of Clinical Epidemiology was consulted for up-to-date information. Importantly, the development of this guideline was informed by the GRADE methodology to appraise the certainty of the evidence from a network meta-analysis, the Confidence in Network Meta-Analysis (CINeMA) methodology, and the GRADE evidence-to-decision framework to choose from multiple interventions.[14–17] This process was facilitated by the use of MAGICapp, an online authoring and publication platform.

Steering group

The steering group consisted of two general surgeons who perform laparoscopic antireflux surgery (SAA, SM). A member of the steering group is a certified guideline methodologist with vast experience in evidence outreach, synthesis, assessment and guideline development (SAA). The guideline methodologist was the senior author of a network meta-analysis comparing different antireflux procedures,[18] which may be considered an indirect conflict. The other member of the steering group (SM) was the content coordinator of this project and disclosed no direct nor indirect conflict.[19] We therefore consider that a potential indirect conflict has not affected the content of this guideline. An external auditor, lead of the AGREE Collaboration, was overseeing the project from the outset (IDF), receiving all email communications of the steering group and the guideline development group, and participated in the consensus meeting.

Guideline panel

The guideline panel consisted of 3 general surgeons, 2 gastroenterologists, and a patient representative. The patient representative (AM) is a lead member of Action Against Heartburn, a not-for-profit organization raising awareness on GERD and upper gastrointestinal cancer. He was regular member of the guideline panel, with equal contribution and voting rights from the start of the guideline development process. Panel members watched a short video tutorial outlining the guideline development methodology. The composition of panel members aimed to be representative of different parts of Europe and different age groups. The majority of panel members disclosed no direct nor indirect conflicts.[19] A panel member disclosed being author in studies comparing antireflux surgery and LINX®, however we found no relevant evidence based on randomized controlled trials comparing LINX® with other antireflux surgical procedures with the predefined panel-set minimum follow-up for critical outcomes (see Study selection and Results). We identified no further relevant conflicts. We invited key opinion leaders as external advisors, who are authors in studies that expressed an opinion on the effectiveness of an intervention, or are performing research on a topic that could be affected by a recommendation of this guideline. These members were not involved in the decisions on the strength, the direction or the wording of the recommendations, but they were consulted in the development of the evidence-to-decision framework, as per GRADE and GIN guidance. The composition of the guideline development group and each member's role are available in the online appendix.[19]

Health question

Which procedure should be used among of 360°, 270°, 300°, anterior 180°, posterior 180°, anterior 120°, anterior 90° fundoplications, Hill and LINX® for adult patients with GERD? This guideline applies to patients with documented GERD without or with a small hiatal hernia (<2 cm), and no significant esophageal body hypomotility (ineffective esophageal motility—more than 70% of weak contractions or 50% failed swallows, and esophageal scleroderma) undergoing laparoscopic surgery.

Terminology

We used the term 'total posterior' to denote a 360° wrap, Nissen procedure; 'partial posterior' to denote a 180°—300° wrap, including Toupét fundoplication; anterior 90° to denote a partial anterior wrap, approximately 90°; and anterior >90° to denote an anterior wrap of >90°, including Dor procedure. The terms used are summarized in Table 1 and Figure 1.

Protocol

A protocol was developed a priori by the steering group.[20] The protocol draft was made publicly available through the EAES website and EAES members were invited through email to comment on the content. The guideline question and outcomes of interest were refined in collaboration with the panel members. Amendments to the protocol with justifications are provided below.

TABLE 1 Terminology used in this report

Term	Explanation
Total posterior	360° wrap, Nissen
Partial posterior	180°—300° wrap, including oupét fundoplication
Anterior 90°	Partial anterior wrap, approximately 90°
Anterior >90°	Anterior wrap of >90°, including Dor

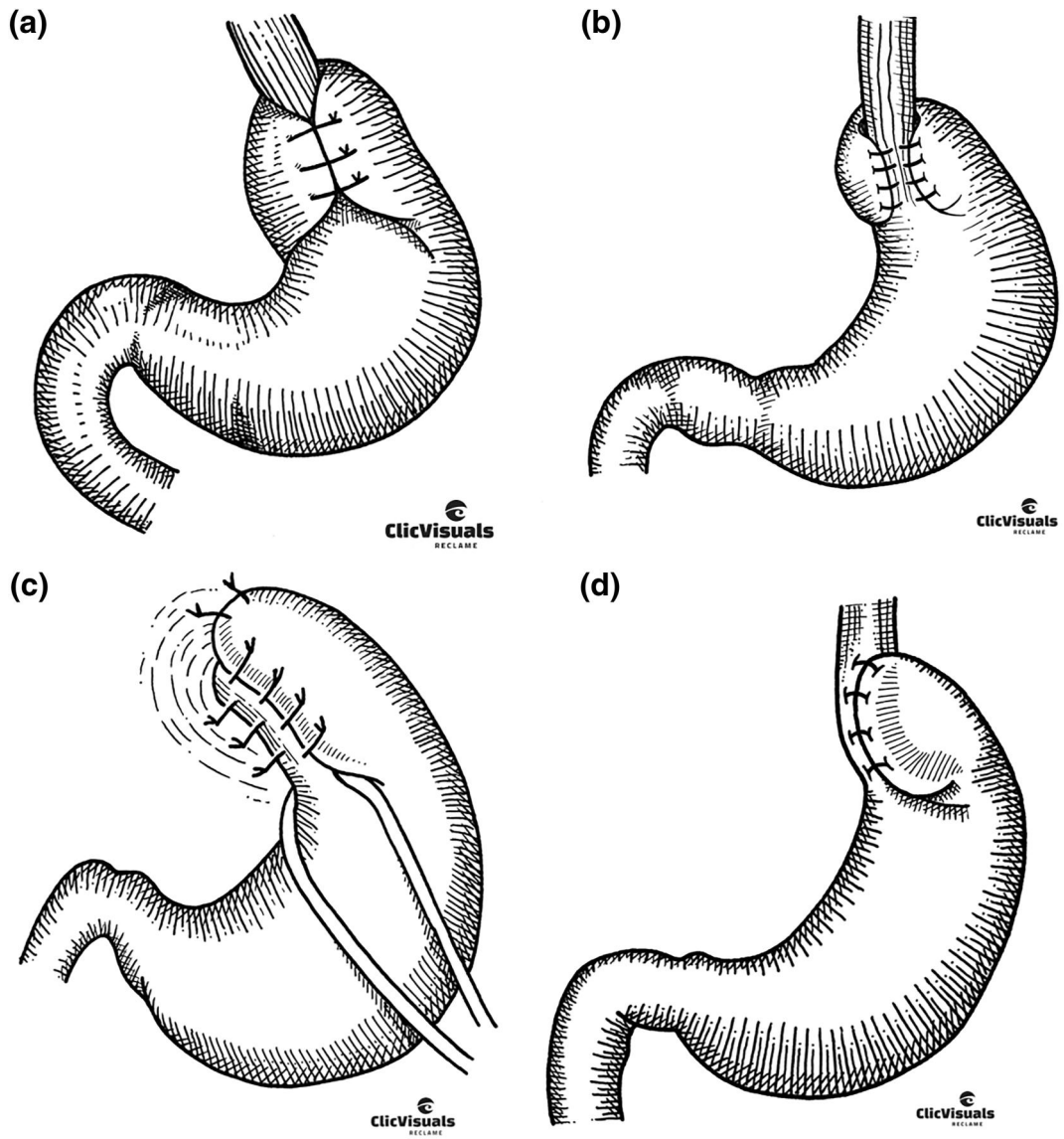

FIGURE 1 (a) total posterior; (b) partial posterior; (c) anterior 90°; (d) anterior >90°

Rating the importance of outcomes

The importance of outcomes was rated by panel members using the GRADE scale.[21] The classification of outcomes into each of the three categories (not important, important, critical) was made by the steering group under consideration of panel members' ratings available online.[19]

We considered the importance of outcomes as follows:

1. 30-day complications Clavien-Dindo ≥3: critical
2. 30-day complications Clavien-Dindo ≤2: important
3. Dysphagia beyond 6 months: important
4. Symptom recurrence beyond 5 years: important
5. Quality of life: critical
6. Reoperation: critical (set post hoc)
7. Use of antacids: important (set post hoc)

The two latter outcomes were prioritized by members of the panel and external advisors. They also nominated a number of outcomes, which were not prioritized: irritable bowel syndrome (irritable bowel syndrome, dumping syndrome, Barrett's esophagus, adenocarcinoma (rare and rarely reported outcomes); ability to perform activities/work without any symptoms, and patient satisfaction (rarely reported outcome and/or quality of life was used as surrogate). We considered heartburn, regurgitation and gas bloat as surrogates for symptom recurrence.

Setting minimal important differences

The evidence-to-decision framework was set within a fully contextualized approach.[22] An anonymous web-based survey of panel

members was performed to define minimal important differences. The results of the survey are available online.[19]

Under consideration of panel's responses, the following minimal important differences were set:

1. 30-day complications Clavien-Dindo ≥3: 10 per 1000
2. 30-day complications Clavien-Dindo ≤2: 50 per 1000
3. Dysphagia: 25 per 1000 Heartburn: 25 per 1000
4. Regurgitation: 25 per 1000
5. Gas bloat: 25 per 1000
6. Quality of life: 0.2/0.5 standard deviations (small/moderate difference)
7. Reoperation: 10 per 1000 (set post hoc)
8. Use of antacids: 100 per 1000 (set post hoc)

The outcome quality of life was reported with different scales (Gastrointestinal Quality of Life Index, Short Form 36), we therefore calculated standardized mean differences. Although no universal cutoff can be applied,[23] we considered the above differences in standard deviation units as important based on expert guidance (INGUIDE certification program).

Search strategy

We updated a previous systematic review on the surgical management of GERD.[18] We used the same search syntax with publication date limits from date of the previous search up to 9 November 2021. In the context of this rapid guideline, we searched PubMed only. After discussion among the guideline development group, the present guideline considered additionally the Hill procedure and LINX®, therefore two additional separate search strategies were developed and PubMed was searched with no date restrictions. The search strategies were developed by the guideline methodologist. Information on the search of the previous systematic review is provided elsewhere.[18] The search syntax, date limits, and summary search results are provided in the online appendix.[19]

Study selection

Study selection was performed by an ad hoc evidence outreach team (BH, AA) using the platform Rayyan.[24] Both reviewers were blinded to each other's judgement and, after unblinding, disagreements were resolved through arbitration by the senior author. We considered randomized controlled trials only, comparing either laparoscopic antireflux surgery, or a modification, with each other or with antacid medication. Antacid medication was used as a common comparator in the context of network meta-analysis. Overarching inclusion criteria were adult patients with symptoms of GERD and no hiatal hernia, or a hiatal hernia with size smaller than 2 cm documented in cross sectional imaging, barium studies, or esophagogastroscopy. We only included studies in the quantitative analysis which reported on outcomes with a more than 1 year of follow-up. Panel members and external advisors were provided with the list of included articles and they were asked whether they are aware of any other trials addressing the clinical question. A member of the advisory group pointed out another 2 available randomized controlled trials that were missed from the evidence search.[25,26]

Data extraction

Outcome data were extracted by one reviewer (BO), and cross-checked in detail by the senior author. Data from the previous systematic review were cross checked by one of the reviewers (BH). The data extraction spreadsheet and detailed risk of bias assessments per outcome or group of outcomes with justifications are available online also for third-party use under the Creative Commons license, after approval by the senior author.[19]

Particular care was taken to avoid double-counting of data from different reports of the same trial, by cross checking the trial registration number, country and institution, the authors' names, years of patient recruitment, sample size, and other information. The senior author of several randomized trials was an external advisor, and was consulted in case it was unclear whether there was an overlap of patient populations in different reports (DIW).

We used PlotDigitizer (http://plotdigitizer.sourceforge.net) to retrieve data from graphs, when absolute values were not provided in the study reports.

Risk of bias assessment

We performed de novo risk of bias assessments using RoB-2.[27] Risk of bias assessments were performed by one of the reviewers (BH) and cross checked by the senior author in detail (SAA). For the purposes of outcome-specific risk of bias assessment, outcomes were grouped as follows: 30-day complications Clavien-Dindo; dysphagia, heartburn, regurgitation, gas bloat; quality of life; reoperation; use of antacids. We considered longest-term follow-up data, with a minimum follow-up of 12 months (except for perioperative complications). Risk of bias assessment and visual summarization were performed with the RoB-2 tool and the respective Excel application.[28]

Statistical analysis

Network meta-analysis is a popular statistical method that synthesizes direct and indirect evidence, and as a result, allows estimation of the relative effectiveness between any pair of interventions within a network of treatments with increased precision.[29,30] Moreover, network meta-analysis can rank all the available treatments in the network. By the term network, we refer to a plot consisting of nodes and edges. Nodes represent treatments and edges represent direct

evidence; studies directly comparing the treatments (nodes) connected by the edge. The size of the nodes is proportional to the number of studies that include the specific treatment, and the thickness of the edges is proportional to the inverse of the variance of each comparison.

We conducted a frequentist fixed and random effects network meta-analysis using the graph theory[31] approach for each outcome in *R* (version 4.0.6) with 'netmeta' package.[32] We estimated the summary odds ratio for all dichotomous outcomes with 95% confidence intervals. There was only one continuous outcome, quality of life, for which we reported the standardized mean difference, with its 95% confidence interval. We chose standardized mean difference as an effect size because there were various different scales used across studies. All the relative effects estimates and their corresponding 95% confidence intervals are summarized on the lower diagonal of a league table. On the upper diagonal, we reported all direct estimates. We also provided the 95% prediction intervals for all outcomes. We ranked all the available treatments in each outcome, from best to worst, using P-scores.[33] A value close to 1 means that the intervention is very efficacious, whereas a value close to 0 means the opposite. Network meta-analysis makes two significant assumptions, transitivity, and consistency.[29] The transitivity assumption suggests that all effect modifiers have a similar distribution across all studies in each outcome and is evaluated clinically by inspecting differences in effect modifiers across trials and comparisons. The statistical manifestation of transitivity is the consistency assumption. This assumption refers to the agreement of direct and indirect evidence for those comparisons that have both sources of evidence. We evaluated the consistency assumption globally using the design by treatment model[34] and locally using the node-splitting method.[35] In addition, we assessed for potential reporting bias using the comparison-adjusted funnel plot, which is an extension of the funnel plot in pairwise meta-analysis.[36]

We performed a sensitivity analysis of studies with a follow-up over the 3 years.

Assessment of the certainty of evidence

We constructed GRADE evidence profiles of certainty for each pairwise comparison separately and for each outcome using MAGIC-App. The certainty of evidence is determined by the risk of bias across studies, incoherence, indirectness, imprecision, publication bias and other parameters.[37] To inform calculations of absolute effect differences, we performed proportion meta-analyses of frequencies of baseline risks/effects provided by the source studies; these are available in the online appendix.[19]

We used the CINeMA software to summarize risk of bias according to the contribution of each study to the network for the respective outcome.[14,38] The overall risk of (within study) bias was based upon the highest proportion of risk of bias contributed to the network, as per CINeMA methodology.[38] Judgements on publication (reporting) bias were based on comparison-adjusted funnel plots. Judgements on indirectness were based on conceptual differences between the study populations, settings and interventions (which was judged as low risk across outcomes), and the presence of direct evidence; if only indirect evidence was present (which does not allow for assessment of inconsistency), we downgraded the evidence certainty by one level. Heterogeneity judgements were based upon statistical calculations of heterogeneity and consistency. If substantial heterogeneity or inconsistency were found, we downgraded the certainty in the evidence by one or two levels. Judgements on imprecision were based upon minimal important differences that were set by majority voting of the guideline panel in advance, according to principles of a fully contextualized approach (minimal important differences for each outcome were based upon the assumption that each outcome is the only outcome of interest).[22]

For each outcome, we stratified interventions by certainty (moderate-to-high or low-to-very low). We then grouped interventions within each stratum into 3 groups according to their statistical ranking: among the best, inferior to the best/better than the worst, and among the worst. The classified rankings were considered by panel members as complementary to the GRADE evidence tables. This process facilitates assessment of both the certainty of the evidence on each intervention along with their ranking.[39]

Evidence-to-decision framework and development of recommendations

The guideline panel reviewed the evidence tables and the stratified rankings. In an in-person consensus meeting, panel members provided their judgements on:

- the magnitude of benefit of each intervention
- the magnitude of harm of each intervention
- the certainty of the evidence for each intervention
- any variability in patients' values and preferences
- costs or savings related to each intervention
- effect of each intervention on equity
- acceptability of each intervention
- feasibility of each intervention

Panel members then participated in an online Delphi process to formulate the recommendation. A draft of the recommendation was developed by the steering group, and panel members were invited to anonymously propose modifications.

Amendments to the protocol

Following panel members' and advisors' input, we considered 12 month follow-up rather than 6 month follow-up for important outcomes. Furthermore, following panel's and advisors' majority voting, we decided to group total anterior with partial anterior repair. However, sensitivity analyses assuming different effects for anterior 90° and anterior >90° repairs suggested substantial differences, and

therefore we retained the network which considers anterior 90° and anterior >90° repairs separately.

RESULTS

We included 43 reports from the original review,[40–81] and we identified additionally 8 reports in the update search,[25,26,82–87] which included LINX® and Hill procedures. No randomized trials on Hill were identified, and 2 reports of the same trial on LINX®, that reported on 6- and 12 month follow-up; these were excluded from the analysis due to insufficient follow-up.[86,87]

Overall, we included 49 reports of 31 randomized trials. Several studies reported on multiple randomized trials.[25,41,57,82] In a scoping search of trial registries (see Validity period), we identified 1 unpublished trial and 1 trial published only in abstract form[88,89]; we did not consider that this introduced publication bias. Detailed reasons for exclusion can be found online.[19]

Patient inclusion and exclusion criteria, surgical procedures, and outcome assessment were similar or similarly distributed within the network, therefore we considered that the condition of transitivity is met. Detailed data are available online.[19]

Network plots and risk of bias contribution charts per outcome or group of outcomes are available in the Appendix. Node size is proportional to the number of studies; node color corresponds to the proportion of risk of bias; edge width is proportional to the inverse variance; and edge color corresponds to the average risk of bias. A classified rankings table is available in the Appendix.

There was unanimous consensus on the direction, the strength, and the wording of the recommendations.[19]

Table 2 summarizes the evidence on the comparison between partial posterior and total posterior fundoplication. Evidence tables for other comparisons are provided in the Appendix.

Table 3 summarizes the evidence-to-decision considerations.

Recommendation

We suggest posterior partial fundoplication over total posterior or anterior 90° fundoplication in adult patients with gastroesophageal reflux disease. Anterior >90° fundoplication is suggested as an alternative, although relevant comparative evidence is limited (weak recommendation).

DISCUSSION

Implications for policy makers

Summary evidence and cost-related considerations suggest that posterior partial fundoplication may perform better compared to total fundoplication with regards to dysphagia, however with similar effects on reflux control in the long term. Total fundoplication may be currently the most frequently performed antireflux surgery in Europe. Centers offering antireflux surgery may need to include posterior partial fundoplication in their services, and training centers in the field of antireflux surgery may need to incorporate partial fundoplications in their future surgical curriculums. Centralization of antireflux surgeries has been suggested by registry analyses.

Implications for healthcare professionals

Surgeons performing antireflux surgery are advised to perform partial posterior fundoplication for gastroesophageal reflux disease, as it is likely associated with lower risk of short-term complications and long-term dysphagia, and may be associated with a lower risk of major complications and reoperation, compared to the most frequently performed total posterior fundoplication. Transition to partial fundoplication is unlikely to pose substantial technical difficulties for experienced surgeons performing antireflux surgery.

Implications for patients

Patients with gastroesophageal reflux disease wishing to receive antireflux surgery can be informed that total posterior and partial posterior fundoplications are surrounded by low to moderate certainty evidence for most outcomes, and that partial posterior fundoplication appears to confer similar antireflux control compared to total fundoplication, with a lower risk of short and long-term adverse effects and reoperation.

Implications for researchers

Researchers in the field of antireflux surgery are advised to collect and report a minimum of critical and important outcomes, including major and minor complications, ideally graded using the Clavien-Dindo classification; heartburn; regurgitation; dysphagia; gas-bloat; ability to belch; reoperation; use of antacids; and, importantly, quality of life. Development of a core outcome set for antireflux surgery is recommended.

The majority of evidence refers to total posterior and partial posterior fundoplications. Anterior >90° fundoplication, for example, Dor, may be at least as effective and safe as other antireflux procedures, however it is supported by limited evidence. RCTs addressing the comparative effects of partial posterior and anterior >90° fundoplication are desired. A minimum of 5 year follow-up is data is considered informative to guide clinical decision making. Further research on LINX® with longer-term follow-up is desired.

TABLE 2 Evidence table for the comparison partial posterior versus total posterior fundoplication

Outcome Timeframe	Study results and measurements	Absolute effect estimates Partial posterior fundoplication	 Total posterior fundoplication	Certainty of the evidence (quality of evidence)	Plain language summary
Major complications (Clavien-Dindo ≥3) 30 days or in-hospital	Odds ratio: 1.92 (CI 95% 0.76–4.76) Based on data from 890 participants in 11 studies Follow up 30 days	40 per 1000 Difference: 34 more per 1000 (CI 95% 9 fewer—126 more)	74 per 1000	Low Due to serious imprecision, due to serious risk of bias[a]	Total posterior fundoplication may increase major complications (Clavien-Dindo ≥3)
Minor complications (Clavien-Dindo <3) 30 days or in-hospital	Odds ratio: 1.22 (CI 95% 0.35–4.35) Based on data from 690 participants in 9 studies Follow up 30 days	58 per 1000 Difference: 12 more per 1000 (CI 95% 37 fewer—153 more)	70 per 1000	Moderate Due to serious imprecision[b]	Total posterior fundoplication probably increases minor complications (Clavien-Dindo <3)
Dysphagia Longest follow-up (>1 year)	Odds ratio: 3.45 (CI 95% 2.08–5.56) Based on data from 2304 participants in 19 studies Follow up 1–12 years (median, 3 years)	80 per 1000 Difference: 151 more per 1000 (CI 95% 73 more—246 more)	231 per 1000	Moderate Due to serious risk of bias[c]	Total posterior fundoplication probably increases dysphagia
Gas-bloat Longest follow-up (>1 year)	Odds ratio: 1.35 (CI 95% 0.78–2.38) Based on data from 1403 participants in 12 studies	186 per 1000	236 per 1000	Very low Due to very serious imprecision, due to serious publication bias, due to serious inconsistency, due to serious risk of bias[d]	We are uncertain whether total posterior fundoplication increases \or decreases gas-bloat

TABLE 2 (Continued)

Outcome Timeframe	Study results and measurements	Absolute effect estimates Partial posterior fundoplication	 Total posterior fundoplication	Certainty of the evidence (quality of evidence)	Plain language summary
	Follow up 1–12 years (median, 1.3 years)	Difference: 50 more per 1000 (CI 95% 35 fewer—166 more)			
Heartburn Longest follow-up (>1 year)	Odds ratio: 1.18 (CI 95% 0.69–2.0) Based on data from 1548 participants in 15 studies	159 per 1000	182 per 1000	Very low	We are uncertain whether total posterior fundoplication increases or decreases heartburn
	Follow up 1–12 years (median 4.3 years)	Difference: 23 more per 1000 (CI 95% 44 fewer—115 more)		Due to very serious imprecision, due to serious risk of bias[e]	
Regurgitation Longest follow-up (>1 year)	Odds ratio: 1.02 (CI 95% 0.48–2.17) Based on data from 1047 participants in 10 studies	133 per 1000	135 per 1000	Very low	We are uncertain whether total posterior fundoplication increases or decreases regurgitation
	Follow up 1–12 years (median, 1 year)	Difference: 2 more per 1000 (CI 95% 64 fewer—117 more)		Due to very serious imprecision, due to serious risk of bias[f]	
Reoperation Longest follow-up (>1 year)	Odds ratio: 1.85 (CI 95% 0.91–3.7) Based on data from 1886 participants in 15 studies	42 per 1000	75 per 1000	Low	Total posterior fundoplication may increase reoperation
	Follow up 1–20 years (median, 2 years)	Difference: 33 more per 1000 (CI 95% 4 fewer—98 more)		Due to serious imprecision, due to serious risk of bias[g]	

(Continues)

TABLE 2 (Continued)

Outcome Timeframe	Study results and measurements	Absolute effect estimates Partial posterior fundoplication	 Total posterior fundoplication	Certainty of the evidence (quality of evidence)	Plain language summary
Use of antacids Longest follow-up (>1 year)	Odds ratio: 0.84 (CI 95% 0.4–1.75) Based on data from 1756 participants in 12 studies Follow up 1–20 years (median, 5 years)	129 per 1000 Difference: 18 fewer per 1000 (CI 95% 73 fewer—77 more)	111 per 1000	Low Due to very serious risk of bias[h]	Total posterior fundoplication may have little or no difference on use of antacids
Quality of life Longest follow-up (>1 year)	Measured by: various Scale: High better Based on data from 442 participants in 4 studies Follow up 1–10 years (median, 2 years)	SD Mean	SD Mean	Very low Due to very serious risk of bias, due to very serious imprecision[i]	We are uncertain whether total posterior fundoplication improves or worsens quality of life

Abbreviations: CI, confidence interval; SD, standard deviation.

[a]Risk of Bias: serious. Imprecision: serious; wide confidence intervals.

[b]Imprecision: serious; wide confidence intervals.

[c]Risk of Bias: serious.

[d]Risk of Bias: serious. Inconsistency: serious; inconsistency between direct and indirect evidence. Imprecision: very serious; very wide confidence intervals. Publication bias: serious; asymmetrical funnel plot.

[e]Risk of Bias: serious. Imprecision: very serious; very wide confidence intervals.

[f]Risk of Bias: serious. Imprecision: very serious; very wide confidence intervals.

[g]Risk of Bias: serious. Imprecision: serious; wide confidence intervals.

[h]Risk of Bias: very serious.

[i]Risk of Bias: very serious. Imprecision: very serious; wide confidence intervals, low number of patients.

TABLE 3 Evidence to decision considerations

Benefits and harms	Benefits referred to effective antireflux control, which appeared to be similar among the competing interventions. Harms were related to major postoperative complications (partly due to intractable early postoperative dysphagia), long-term postoperative dysphagia, insufficient reflux control, and risk of reoperation, where total posterior fundoplication conferred inferior outcomes compared to posterior partial fundoplication. Anterior >90° had similar outcomes compared to partial posterior fundoplication, however the latter had a better profile of effects in the network of interventions. Summary Partial posterior fundoplication appeared to confer moderate benefits with trivial or no harms. Total posterior and anterior >90° fundoplication was associated with small benefits and trivial (>90° fundoplication) or moderate harms (total posterior fundoplication).	Substantial net benefits of the suggested alternative
Certainty of the evidence	Certainty of the evidence for each intervention was very low to low. This was due to the lack of evidence on critical outcomes, such as quality of life, and due to low/very low certainty evidence owing to imprecision (wide confidence intervals, because of sparse network comparisons for some interventions—especially anterior 90° and to a lesser extent anterior >90°), or risk of bias, which was, however, fair overall. Summary Overall certainty of evidence was judged to be low for partial posterior and anterior >90°, and very low for anterior 90°. It was considered to be low for total posterior fundoplication, although no unanimus consensus was reached (low vs. very low).	Low
Preferences and values	No relevant research in the form of patient interviews, surveys, or focus groups was found in a scoping search. In the lack of relevant research, the panel, with particular input from the patient representative, suggested that substantial variability is expected with regards to patients' preferences and values (e.g., use of antacid medication or particular symptoms). Summary In the lack of relevant research, the panel suggested that there may be substantial variability in patients' values and preferences.	Substantial variability is expected
Resources	We found no relevant evidence in a scoping search for cost-effectiveness studies within the last 10 years. A healthcare utilization analysis focusing on a 3-month period following surgery for GERD and paraesophageal hernia found that patients who are readmitted accrue costs that almost double the overall cost of care compared to the initial hospitalization[a]. Summary The panel considered that readmissions for management of adverse effects, including dilatations and revision surgery may result in substantial healthcare cost and resources utilization. In these terms, total posterior fundoplication and anterior 90° fundoplication may confer moderate relative cost, whereas partial posterior fundoplication may result in moderate savings.	No important issues with the recommended alternative
Equity	The panel did not identify any parameters related to different interventions that may affect equity in the access of healthcare or in the use of healthcare resources.	Important issues
Acceptability	Empirical and published evidence suggests that posterior total fundoplication is the antireflux surgery of choice for most surgeons. Summary The panel considered that, in view of limited evidence and low penetration, anterior 90° fundoplication might not be acceptable by many surgeons. Considering that total posterior fundoplication is the most frequently performed antireflux surgery, it was considered to be most acceptable.	No important issues with the recommended alternative

(Continues)

TABLE 3 (Continued)

	Changing practice to posterior partial or anterior >90° fundoplication may be a challenge. Detailed review of the evidence presented herein, auditing the first 10–15 cases and comparing the outcome to local historical controls and visiting centers where posterior partial fundoplication is the procedure of choice might facilitate implementation of the recommendation.	
Feasibility	The panel did not identify any issxxues related to the feasibility of the various alternatives.	No important issues with the recommended alternative

[a]Kleppe KL, Xu Y, Funk LM, Wang X, Havlena JA, Greenberg JA, Lidor AO. Healthcare spending and utilization following antireflux surgery: examining costs and reasons for readmission. Surgical Endoscopy 2020; 34 (1):240–248.

Monitoring

Use of the guideline by EAES members will be monitored through an online survey 2 years after publication. Feedback from target users in the form of email communication, letters to the editor, and comments in social media will be documented to be addressed in future versions of this guideline.

Validity period

A scoping search of ClinicalTrials.gov, the EU Clinical Trials Register, the WHO International Clinical Trials Registry Platform, EORTC and the ISRCTN registry for clinical trials on patients >18 years of age registered within the last 5 years identified 2 studies; 1 study with anticipated completion date in 2011 published in abstract form, and another which is not published and with no information about its current status, with anticipated completion date in 2014.[88,89] Under consideration that a median of 2.5 reports of RCTs (range, 2–6) were published annually over the past 10 years, substantial new evidence that could pragmatically change the direction of the recommendation or the magnitude of effects is expected after 6 years. The validity of the present version of this rapid guideline is set until 2028. Please read the Disclosure for further information regarding validity.

Update

An update of this rapid guideline is planned to take place in 2028. It will address LINX® if additional evidence with longer-term follow-up will be available. The EAES Research Committee/Guidelines Subcommittee will keep monitoring new evidence and update this document if new data become published.

CONCLUSION

This rapid guideline was developed with strict methodological criteria, network meta-analysis of RCTs and a structured evidence-to-decision framework, and provides a weak recommendation in favor of partial posterior fundoplication over other alternatives.

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CONFLICT OF INTEREST

The authors declare no direct conflicts of interest related to this work. Indirect conflicts of external advisors were documented and managed as per Guidelines International Network Standards. Detailed conflict of interest statements of all contributors can be found in http://osf.io/xwdyj. A patient version of this guideline is available in Supplementary file 1.

DATA AVAILABILITY STATEMENT

Data derived from public domain resources.

UEG DISCLAIMER

These guidelines have been developed with reasonable care and with the best of knowledge available to the authors at the time of preparation. They are intended to assist healthcare professionals and allied healthcare professionals as an educational tool to provide information that may support them in providing care to patients. Patients or other community members using these guidelines shall do so only after consultation with a health professional and shall not mistake these guidelines as professional medical advice. These guidelines must not substitute seeking professional medical and health advice from a health professional.

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This clinical practice guideline has been developed under the auspice of the European Association for Endoscopic Surgery (EAES). It is intended to be used primarily by health professionals (e.g., surgeons, anaesthetists, physicians) and to assist in making informed clinical decisions on diagnostic measures and therapeutic management. It is also intended to inform individual practice of allied health professionals (e.g., surgical nurses, dieticians, physical rehabilitation therapists, psychologists); to inform strategic planning and resource management by health care authorities (e.g., regional and national authorities, health care institutions, hospital administration authorities); and to inform patients wishing to obtain an overview of the condition of interest and its management.

The use of recommendations contained herein must be informed by supporting evidence accompanying each recommendation and by research evidence that might not have been published by the time of writing the present document. Users must thus base their actions informed by newly published evidence at any given point in time.

The information in the guideline should not be relied upon as being complete or accurate, nor should it be considered as inclusive of all proper treatments or methods of care or as a statement of the standard of care. With the rapid development of scientific knowledge, new evidence may emerge between the time the guideline is developed and when it is published or read. The guideline is not continually updated and may not reflect the most recent evidence. The guideline addresses only the topics specifically identified therein and is not applicable to other interventions, diseases, or stages of diseases. This guideline does not mandate any particular course of medical care. Further, the guideline is not intended to substitute the independent professional judgment of the treating provider, as the guideline does not necessarily account for individual variation among patients.

Even if evidence on a topic suggests a specific diagnostic and/or treatment action, users and especially health professionals may need to decide against the suggested or recommended action in view of circumstances related to patient values, preferences, co-morbidities and disease characteristics; available human, monetary and material resources; and healthcare infrastructures.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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