

CURRENT CONCEPTS IN THE DIAGNOSIS AND TREATMENT OF GASTRO-OESOPHAGEAL REFLUX DISEASE

Chernets T.Yu.,
Kucher S.V.,
Ruda M.M.,
Vereshchahina N.Ya.,
Dzhyvak V.H.

I. Horbachevsky
Ternopil National
Medical University
of the Ministry of Health
of Ukraine,
Ternopil, Ukraine

- **OBJECTIVE.** To summarise the current scientific evidence regarding up-to-date approaches to the diagnosis, phenotyping and treatment of gastro-oesophageal reflux disease, taking into account modern principles of personalised medicine.
- **MATERIALS AND METHODS.** A narrative review was conducted of the current scientific literature and international clinical guidelines on the diagnosis and treatment of GERD. The literature search was conducted in the PubMed/MEDLINE, Scopus, Web of Science Core Collection and Google Scholar databases. The analysis included clinical guidelines, consensus documents, systematic reviews, meta-analyses and original studies, using comparative, analytical and summarising approaches.
- **RESULTS.** Current concepts in the diagnosis of GERD were analysed, in particular the role of endoscopic and functional investigative methods (ambulatory pH monitoring, pH-impedance monitoring, manometry) in confirming pathological reflux and determining the mechanisms underlying symptom development. Particular attention is paid to the current phenotyping of the disease, distinguishing between erosive reflux disease, non-erosive reflux disease, reflux hypersensitivity and functional heartburn. Current approaches to the treatment of GERD are described, including lifestyle modification, optimisation of proton pump inhibitor therapy, the use of potassium-competitive acid secretion blockers, alginates and interventional treatment methods. The need for an individualised choice of therapeutic strategy, depending on the disease phenotype, the mechanism underlying symptom onset and the presence of complications, is highlighted.
- **CONCLUSIONS.** The current management of patients with gastro-oesophageal reflux disease is based on a shift from a symptom-oriented model to a personalised, phenotype-oriented approach. Objective verification of pathological reflux and identification of the mechanisms underlying symptom development are key to selecting effective treatment, improving disease control and enhancing patients' quality of life.
- **KEYWORDS:** *gastro-oesophageal reflux disease, GERD, diagnosis, phenotyping, pH-impedance monitoring, proton pump inhibitors.*

СУЧАСНІ КОНЦЕПЦІЇ ДІАГНОСТИКИ ТА ЛІКУВАННЯ ГАСТРОЕЗОФАГЕАЛЬНОЇ РЕФЛЮКСНОЇ ХВОРОБИ

Чернець Т.Ю.,
Кучер С.В.,
Руда М.М.,
Верещагіна Н.Я.,
Дживак В.Г.

Тернопільський національний
медичний університет
імені І.Я. Горбачевського
Міністерство охорони
здоров'я України,
м. Тернопіль, Україна

- **МЕТА.** Узагальнити сучасні наукові дані щодо актуальних підходів до діагностики, фенотипування та лікування гастроєзофагеальної рефлюксної хвороби з урахуванням сучасних принципів персоналізованої медицини.
- **МАТЕРІАЛИ ТА МЕТОДИ.** Проведено наративний огляд сучасної наукової літератури та міжнародних клінічних рекомендацій, присвячених питанням діагностики й лікування ГЕРХ. Пошук літературних джерел здійснювали в базах даних PubMed/MEDLINE, Scopus, Web of Science Core Collection та Google Scholar. Аналіз включав клінічні настанови, консенсусні документи, систематичні огляди, метааналізи та оригінальні дослідження із застосуванням порівняльного, аналітичного та узагальнювального підходів.
- **РЕЗУЛЬТАТИ.** Проаналізовано сучасні концепції діагностики ГЕРХ, зокрема роль ендоскопічних та функціональних методів дослідження (амбулаторного рН-моніторингу, рН-імпедансного моніторингу, манометрії) у підтвердженні патологічного рефлюксу та визначенні механізмів формування симптомів. Особливу увагу приділено сучасному фенотипуванню захворювання з виділенням ерозивної рефлюксної хвороби, неерозивної рефлюксної хвороби, рефлюксної гіперчутливості та функціональної печії. Охарактеризовано сучасні підходи до лікування ГЕРХ, включаючи модифікацію способу життя, оптимізацію терапії інгібіторами протонної помпи, застосування калій-конкурентних блокаторів кислотної секреції, алгінатів та інтервенційних методів лікування. Визначено необхідність індивідуалізованого вибору терапевтичної стратегії залежно від фенотипу захворювання, механізму виникнення симптомів і наявності ускладнень.
- **ВИСНОВКИ.** Сучасне ведення пацієнтів із гастроєзофагеальною рефлюксною хворобою ґрунтується на переході від симптом-орієнтованої моделі до персоналізованого фенотип-орієнтованого підходу. Об'єктивна верифікація патологічного рефлюксу та визначення механізмів формування симптомів є ключовими для вибору ефективної терапії, покращення контролю захворювання та якості життя пацієнтів.
- **КЛЮЧОВІ СЛОВА:** *гастроєзофагеальна рефлюксна хвороба, ГЕРХ, діагностика, фенотипування, рН-імпедансний моніторинг, інгібітори протонної помпи.*

INTRODUCTION

Gastroesophageal reflux disease (GERD) is one of the most common diseases of the upper digestive tract and remains a pressing problem in modern gastroenterology due to its high prevalence, chronic course, variety of clinical manifestations, and significant impact on the quality of life of patients [1]. The disease is characterized by the development of symptoms or complications associated with the pathological reflux of gastric contents into the esophagus. The most typical manifestations of GERD are heartburn and regurgitation, but their presence does not always allow for a reliable diagnosis, since similar symptoms can be observed in other diseases of the esophagus, its motor disorders and functional disorders [2, 3].

In recent years, the concept of GERD diagnosis has undergone significant changes. While previously the clinical decision was mainly based on the assessment of characteristic symptoms and the response to empirical therapy with proton pump inhibitors (PPIs), the modern approach involves a more differentiated assessment using methods of objective verification of pathological reflux. Endoscopic examination and functional diagnostic methods, in particular ambulatory pH-monitoring and pH-impedance study, are of great importance, which allow to assess the quantitative and qualitative characteristics of reflux, acid exposure, frequency of episodes and the relationship between reflux events and the occurrence of symptoms [4–6].

The development of functional diagnostics contributed to the formation of a modern understanding of the heterogeneity of GERD and the identification of individual clinical phenotypes of the disease [7]. It has become possible to more clearly distinguish between erosive reflux disease, non-erosive reflux disease, reflux hypersensitivity and functional heartburn [8]. An important aspect is that the absence of endoscopic signs of damage to the esophageal mucosa does not exclude the presence of pathological gastroesophageal reflux, since a significant proportion of patients have a non-erosive form of the disease.

The change in the diagnostic paradigm has directly affected the principles of GERD treatment. Proton pump inhibitors remain the mainstay of drug therapy in patients with proven acid-dependent manifestations of the disease and erosive esophagitis. At the same time, the persistence of symptoms on the background of adequate PPI therapy does not always indicate insufficient inhibition of acid production or the presence of truly re-

fractory GERD. In some patients, the persistence of symptoms may be associated with non-acid reflux, increased sensitivity of the esophagus, impaired gut-brain communication, or functional disorders, which requires clarification of the mechanisms of their occurrence before changing the therapeutic strategy [9, 10].

The current approach to the management of patients with symptoms of gastroesophageal reflux disease is based on the transition from a universal acid-suppressive model to a personalized strategy that involves determining the phenotype of the disease, objective assessment of the mechanisms of symptom formation and the choice of treatment according to the data obtained. The combination of modern diagnostic methods, optimization of drug therapy, lifestyle modification and, if indicated, interventional methods is a key direction for improving the results of treatment of patients with GERD.

Objective. The objective of this article is to analyze modern ideas about the diagnosis and treatment of gastroesophageal reflux disease.

MATERIALS AND METHODS

A narrative review of the current scientific literature and international clinical guidelines on the diagnosis, phenotyping, and treatment of gastroesophageal reflux disease was conducted. The literature search was conducted in the electronic databases PubMed/MEDLINE, Scopus, Web of Science Core Collection, and Google Scholar. The analysis included mainly publications from 2020–2025.

The search strategy involved the use of keywords and their combinations: «gastroesophageal reflux disease», «GERD», «diagnosis», «ambulatory reflux monitoring», «pH monitoring», «pH-impedance monitoring», «Lyon Consensus», «non-erosive reflux disease», «reflux hypersensitivity», «functional heartburn», «proton pump inhibitors», «potassium-competitive acid blockers», «refractory GERD», «personalized treatment», «antireflux surgery».

The review included international consensus documents and clinical guidelines, systematic reviews, meta-analyses, randomized controlled trials, and the most clinically relevant original works. The methodological basis of the analysis was the principles of systematization, comparison, and synthesis of current evidence.

The main attention was paid to modern criteria for objective verification of GERD, the role of endoscopic and functional research methods, in particular outpatient reflux monitoring, differen-

tiation of the main clinical phenotypes of the disease (erosive and non-erosive reflux disease, reflux hypersensitivity, functional heartburn), as well as modern approaches to drug and interventional treatment, including the management of patients with persistent symptoms on therapy.

The work is in the nature of a narrative literature review and is based on the analysis of previously published scientific data and international clinical guidelines, without involving patients, conducting diagnostic or therapeutic interventions, and collecting personal data; approval of the local ethics committee was not required.

RESULTS AND DISCUSSION

Modern diagnostics of gastroesophageal reflux disease is based on a comprehensive assessment of clinical manifestations, structural changes in the esophageal mucosa and the results of functional research methods. In recent years, a significant transformation of the diagnostic paradigm has occurred from a predominantly symptom-oriented approach, which provided for establishing a diagnosis based on typical symptoms and empirical response to proton pump inhibitors (PPIs), to a model of objective verification of pathological reflux with the determination of a specific mechanism of symptom formation. This approach is due to the significant clinical heterogeneity of GERD and the need to differentiate patients with proven pathological reflux from individuals with reflux-associated symptoms without objective signs of the disease. The current concept considers GERD as a spectrum of reflux-associated conditions, including erosive reflux disease, non-erosive reflux disease (NERD), and distinct categories in patients with GERD-like symptoms, reflux hypersensitivity, and functional heartburn. The distinction between these conditions is of fundamental importance, as they are characterized by different pathophysiological mechanisms and require different therapeutic strategies [11, 12].

Clinical evaluation remains the first step in the diagnostic algorithm for suspected GERD. The most typical manifestations of the disease are heartburn and regurgitation, which are traditionally considered the most characteristic symptoms of gastroesophageal reflux. Heartburn is defined as a burning sensation behind the sternum that may worsen after eating, in the supine position, or with increased intra-abdominal pressure, while regurgitation is characterized by the involuntary return of gastric or gastroesophageal contents towards the oropharynx [13, 14]. At the same time,

modern studies demonstrate that the presence of typical symptoms is not an absolute confirmation of the diagnosis, since similar manifestations can be observed in other diseases of the esophagus, its motility disorders, and functional disorders. The diagnosis of patients with extraesophageal manifestations, including chronic cough, hoarseness, a feeling of a lump in the throat, sleep disturbances, or chest discomfort, remains particularly challenging, as a causal relationship between these symptoms and gastroesophageal reflux cannot always be confirmed based on clinical findings alone [15].

An important component of the initial patient evaluation is the identification of alarm symptoms that indicate the need for endoscopic examination to exclude organic pathology [16]. Such signs include dysphagia, odynophagia, gastrointestinal bleeding, iron deficiency anemia, unintentional weight loss, recurrent vomiting, and new onset of symptoms in older patients [17]. The presence of these manifestations may indicate a complicated course of GERD with the development of severe esophagitis, peptic strictures, or Barrett's esophagus, but also requires the exclusion of other pathological conditions of the upper digestive tract, including neoplastic processes. Therefore, alarm symptoms are not so much diagnostic signs of GERD as markers for the need for an in-depth examination [18].

Esophagogastroduodenoscopy remains the main method for assessing structural changes in suspected GERD and is important for detecting complicated forms of the disease [19, 20]. Endoscopic examination allows determining the presence of erosive esophagitis, assessing the degree of mucosal damage according to the Los Angeles classification, detecting peptic strictures, hiatal hernia, and performing a biopsy in case of suspected Barrett's esophagus or alternative diseases, in particular eosinophilic esophagitis [20, 21]. Of particular importance are severe endoscopic manifestations — Los Angeles grade C/D esophagitis, which, according to modern diagnostic criteria, are considered convincing evidence of the presence of GERD. At the same time, a normal endoscopic picture does not exclude the disease, since a significant proportion of patients have a non-erosive form of GERD, in which symptoms occur in the absence of visible mucosal damage.

Modern treatment of gastroesophageal reflux disease is based on the principles of personalized medicine and involves choosing a therapeutic strategy according to the clinical phenotype of

the disease, the presence of objectively confirmed pathological reflux, the severity of symptoms, the risk of complications and the impact of the disease on the patient's quality of life [22]. In contrast to the traditional model, in which the main task of treatment was considered to be the maximum suppression of acid secretion, the modern approach involves the assessment of the entire spectrum of pathophysiological mechanisms, including impaired antireflux barrier function, esophageal motor disorders, increased visceral sensitivity and impaired gut-brain interaction. That is why effective treatment of GERD is now considered not only as acidity control, but as a comprehensive strategy aimed at eliminating the specific mechanism of symptom formation in each patient [23, 24].

Treatment should be guided by the clinical phenotype of GERD. Patients with erosive esophagitis, especially severe esophagitis, are most likely to respond to acid-suppressive therapy, whereas patients with nonerosive disease, reflux hypersensitivity, or functional heartburn may have limited efficacy with acid-suppressive therapy alone. Therefore, before continuing to escalate therapy, it is important to determine whether symptoms are due to persistent pathological reflux, impaired esophageal sensory function, or functional mechanisms [25, 26].

Lifestyle modification remains an important component of comprehensive treatment for GERD, but current guidelines emphasize the need for an individualized approach and avoidance of unnecessary restrictions. The most convincing evidence of effectiveness is obtained for weight loss in patients with overweight or obesity, since an increase in abdominal fat contributes to increased intra-abdominal pressure, impaired lower esophageal sphincter function, and an increase in the frequency of reflux episodes [27, 28]. In patients with nocturnal symptoms, it is advisable to avoid eating immediately before bedtime and to elevate the head of the bed, which may reduce exposure of the esophagus to acidic contents in a horizontal position [29, 30]. At the same time, current evidence does not support a universal elimination diet for all patients with GERD, since food triggers have significant individual variability. The exclusion of individual foods should be based on a proven association between their consumption and the onset of symptoms [31, 32].

Proton pump inhibitors (PPIs) remain the mainstay of drug therapy for GERD due to their high efficacy in reducing acid exposure, healing erosive esophagitis, and controlling typical acid-related

symptoms [33, 34]. The most pronounced therapeutic effect of PPIs is observed in patients with documented erosive esophagitis and pathological acid reflux. At the same time, the current concept involves the rational use of PPIs with regular evaluation of the indications for continued treatment. Long-term maintenance therapy should be prescribed primarily for patients with a high risk of relapse or development of complications, including severe esophagitis, Barrett's esophagus, or recurrent symptoms after discontinuation of therapy [35–37]. In patients without complicated disease, it is important to find the minimum effective dose of the drug that provides symptom control. This approach avoids unjustified prolonged use of acid-suppressive therapy and is in line with the modern concept of step-down and deprescribing strategies.

Insufficient response to PPI therapy is one of the most challenging clinical situations in the management of patients with suspected GERD. It is important to emphasize that the persistence of symptoms on treatment does not always indicate the presence of truly refractory GERD. Before changing therapeutic tactics, it is necessary to assess the patient's compliance with treatment, the correct timing of drug administration, the adequacy of the dose to the clinical situation, and to exclude alternative causes of symptoms. Optimization of PPI therapy includes taking the drug 30–60 minutes before meals, adjusting the dosage regimen, and, if necessary, switching to another representative of the group [38, 39]. Further increased acid suppression without confirmation of the mechanism of symptoms is often of no clinical benefit, especially in patients with normal acid exposure and functional disorders of the esophagus.

A separate direction of development of modern pharmacotherapy of GERD is the use of potassium-competitive acid blockers (P-CAB), in particular vonoprazan [40, 41]. Unlike PPIs, which require activation of the secretory tubules of parietal cells in an acidic environment, P-CABs provide more rapid and stable inhibition of acid secretion by blocking the potassium-dependent stage of H^+/K^+ -ATPase. Clinical studies demonstrate the effectiveness of vonoprazan in the treatment of erosive esophagitis, including severe forms of the disease, as well as its potential advantage in some patients with insufficient response to traditional acid-suppressive therapy [42]. At the same time, the final determination of the place of P-CAB in the long-term management of patients with GERD requires further studies on safety and optimal strategies of use [43].

In patients with persistent symptoms despite optimized PPI therapy, the current algorithm involves re-evaluating the diagnosis using functional imaging. pH-impedance monitoring allows us to determine whether the symptoms are due to pathological reflux, mild or non-acid reflux events, reflux hypersensitivity, or functional mechanisms. This approach is of fundamental importance, since a significant proportion of patients with so-called PPI-refractory GERD do not actually have active pathological reflux, and further increase in acid suppression in such cases is of little benefit [44, 45]. Alginates are an important adjunctive therapy for symptomatic GERD, especially in patients with postprandial symptoms and regurgitation. Their mechanism of action is to form a physical barrier («raft») on the surface of gastric contents, which reduces gastroesophageal reflux and limits acid contact with the esophageal mucosa [46, 47].

Interventional treatments are considered in patients with documented GERD who are not adequately controlled by medical therapy, and in cases where there are anatomical factors that support pathological reflux [48]. The main indications for considering surgical treatment are large hiatal hernias, severe erosive esophagitis, regurgitation that is not adequately controlled by medical therapy, and the patient's desire to avoid long-term use of acid-suppressive drugs if the mechanism of the disease is confirmed. Importantly, the success of antireflux interventions depends largely on proper patient selection, as surgery should not be considered in cases where symptoms are not related to pathological reflux. Laparoscopic antireflux surgery (most commonly Nissen fundoplication or modified versions) remains the most widely studied surgical treatment for GERD [49, 50]. Its primary goal is to restore the antireflux barrier by correcting the hiatal hernia and enhancing lower esophageal sphincter function. In carefully selected patients, surgery can provide long-term control of typical symptoms, reduce the frequency of regurgitation, and reduce the need for drug therapy. However, potential limitations include the risk of postoperative dysphagia, gas-bloat syndrome, and the need for careful preoperative functional assessment, including manometry and reflux monitoring [51, 52].

Current minimally invasive alternatives include magnetic sphincter augmentation (MSA) and endoscopic treatments, such as transoral incisionless fundoplication (TIF) [53–56]. MSA involves the use of a magnetic device to enhance closure of the lower esophageal sphincter while maintaining the

physiological passage of food and regurgitation. TIF aims to endoscopically create a valve mechanism at the gastroesophageal junction. These methods have shown promising results in selected patients, but their use requires confirmation of long-term efficacy and clear selection criteria.

A special place in modern therapy of GERD is occupied by the assessment of the patient's quality of life and the impact of symptoms on daily activities [57, 58]. Although objective parameters of reflux are of key importance for establishing the diagnosis, the clinical effectiveness of treatment is determined not only by the normalization of acid exposure, but also by achieving symptom control and improving the functional status of the patient. That is why the modern model of patient management involves regular reassessment of therapeutic response and adaptation of treatment depending on changes in the clinical situation. Thus, modern therapy of gastroesophageal reflux disease is moving from a universal acid-suppressive strategy to an individualized model that takes into account the phenotype of the disease, the mechanism of symptom formation, the presence of complications and the characteristics of a particular patient. Effective management of GERD today is based on a combination of lifestyle modification, optimized pharmacotherapy, the use of new classes of acid-suppressive drugs, functional diagnostics in difficult cases and interventional methods in patients with confirmed pathological reflux [59]. Such a personalized approach allows to increase the effectiveness of treatment, avoid unjustified escalation of therapy and ensure long-term control of symptoms with an improvement in the quality of life of patients.

CONCLUSIONS

Modern approaches to the management of patients with gastroesophageal reflux disease are based on the transition from a symptom-oriented model to a personalized phenotype-oriented strategy, which involves objective verification of pathological reflux and identification of the mechanisms of symptom formation. The combination of endoscopic methods, ambulatory pH monitoring, pH impedance study and manometry allows for a more accurate differentiation of erosive and non-erosive GERD, reflux hypersensitivity and functional heartburn, which is of fundamental importance for the choice of therapeutic tactics. Treatment of GERD should be individualized and include lifestyle modification, rational use of proton pump inhibitors, the use of new acid-suppressive drugs, in particular potassium-competitive acid-secretion blockers,

as well as interventional methods in patients with confirmed pathological reflux. In cases of persistent symptoms, a re-evaluation of the diagnosis is necessary, taking into account the possibility of reflux hypersensitivity or functional disorders, since further escalation of acid suppression is not always effective. Thus, the current strategy for treating GERD is aimed not only at controlling acid exposure, but also at eliminating specific pathophysiological mechanisms of the disease and improving the quality of life of patients.

REFERENCES

1. Katz PO, Dunbar KB, Schnoll-Sussman FH, Greer KB, Yadlapati R, Spechler SJ. ACG clinical guideline for the diagnosis and management of gastroesophageal reflux disease. *Am J Gastroenterol*. 2022;117(1):27–56. doi: <https://doi.org/10.14309/ajg.0000000000001538>
2. Gyawali CP, Yadlapati R, Fass R, Katzka D, Pandolfino J, Savarino E, et al. Updates to the modern diagnosis of GERD: Lyon consensus 2.0. *Gut*. 2024; 73(2):361–71. doi: <https://doi.org/10.1136/gutjnl-2023-330616>
3. Vayal-Veettil A, Gyawali CP. Diagnosis and management of gastroesophageal reflux disease: current insights. *Clin Exp Gastroenterol*. 2025;18:149–62. doi: <https://doi.org/10.2147/CEG.S507237>
4. Ghoneim S, Wang J, El Hage Chehade N, Ganocy SJ, Chitsaz E, Fass R. Diagnostic accuracy of the proton pump inhibitor test in gastroesophageal reflux disease and noncardiac chest pain: a systematic review and meta-analysis. *J Clin Gastroenterol*. 2023;57(4):380–8. doi: <https://doi.org/10.1097/MCG.0000000000001686>
5. Simadibrata DM, Lesmana E, Fass R. A systematic review and meta-analysis of the efficacy of vonoprazan for proton pump inhibitor-resistant gastroesophageal reflux disease. *J Gastroenterol Hepatol*. 2024;39(5):796–805. doi: <https://doi.org/10.1111/jgh.16475>
6. Raijman I. Endoscopic treatment of gastroesophageal reflux disease. *Cir Cir*. 2024;92(2):276–82. doi: <https://doi.org/10.24875/CIRU.24000101>
7. Katzka DA, Kahrilas PJ. Advances in the diagnosis and management of gastroesophageal reflux disease. *BMJ*. 2020;371:m3786. doi: <https://doi.org/10.1136/bmj.m3786>
8. Patel D, Fass R, Vaezi M. Untangling nonerosive reflux disease from functional heartburn. *Clin Gastroenterol Hepatol*. 2021;19(7):1314–26. doi: <https://doi.org/10.1016/j.cgh.2020.03.057>
9. Fox M. Update motility disorders: gastro-oesophageal reflux disease — diagnostic and conservative approach. *Visc Med*. 2024;40(6):299–309. doi: <https://doi.org/10.1159/000541358>
10. Kahrilas PJ, Keefer L, Yadlapati R, Anastasiou F, Heidebaugh JJ, Howden CW, et al. Review article: individualised management of reflux-like symptoms — strategies beyond acid suppression. *Aliment Pharmacol Ther*. 2025;61(9):1437–46. doi: <https://doi.org/10.1111/apt.70115>
11. Zerbib F, Bredenoord AJ, Fass R, Kahrilas PJ, Roman S, Savarino E, et al. ESNM/ANMS consensus paper: diagnosis and management of refractory gastro-oesophageal reflux disease. *Neurogastroenterol Motil*. 2021;33(4):e14075. doi: <https://doi.org/10.1111/nmo.14075>
12. Saracco M, Savarino V, Bodini G, Saracco GM, Pellicano R. Gastroesophageal reflux disease: key messages for clinicians. *Minerva Gastroenterol* (Torino). 2021;67(4):390–403. doi: <https://doi.org/10.23736/S2724-5985.20.02783-X>
13. Fass R, Boeckxstaens GE, El-Serag H, Rosen R, Sifrim D, Vaezi MF. Gastro-oesophageal reflux disease. *Nat Rev Dis Primers*. 2021;7(1):55. doi: <https://doi.org/10.1038/s41572-021-00287-w>
14. Ang D, Lee YY, Clarke JO, Lynch K, Guillaume A, Onyimba F, et al. Diagnosis of gastroesophageal reflux: an update on current and emerging modalities. *Ann N Y Acad Sci*. 2020;1481(1):154–69. doi: <https://doi.org/10.1111/nyas.14369>
15. Barrett CM, Patel D, Vaezi MF. Laryngopharyngeal reflux and atypical gastroesophageal reflux disease. *Gastrointest Endosc Clin N Am*. 2020;30(2):361–76. doi: <https://doi.org/10.1016/j.giec.2019.12.004>
16. Kumari P, Machhan P, Sharma B, Sharma R, Bodh V, Kumar R. Dyspepsia with alarm symptoms in patients aged less than 60 years: is upper gastrointestinal endoscopy justified in Indian scenario? *Indian J Gastroenterol*. 2022;41(5):430–9. doi: <https://doi.org/10.1007/s12664-022-01275-y>
17. Odeghe EA, Adeniyi OF, Oyeleke GK, Keshinro SO. Use of alarm features in predicting significant endoscopic findings in Nigerian patients with dyspepsia. *Pan Afr Med J*. 2019;34:66. doi: <https://doi.org/10.11604/pamj.2019.34.66.18848>
18. ASGE Standards of Practice Committee, Desai M, Ruan W, Thosani NC, Amaris M, Scott JS, et al. American Society for Gastrointestinal Endoscopy guideline on the diagnosis and management of GERD: methodology and review of evidence. *VideoGIE*. 2025; 10(2):81–137. doi: <https://doi.org/10.1016/j.vgie.2024.10.001>
19. Kwak YE, Saleh A, Abdelwahed A, Sanchez M, Ma-soud A. Effectiveness of esophagogastroduodenoscopy in changing treatment outcome in refractory gastro-oesophageal reflux disease. *Scand J Gastroenterol*. 2022;57(1):124–30. doi: <https://doi.org/10.1080/00365521.2021.1988141>
20. Simadibrata DM, Lesmana E, Fass R. Role of endoscopy in gastroesophageal reflux disease. *Clin Endosc*. 2023;56(6):681–92. doi: <https://doi.org/10.5946/ce.2023.182>
21. Noh JH, Jung HY. Role of endoscopy in motility disorders of upper gastrointestinal tract. *J Neurogastroenterol Motil*. 2023;29(1):7–19. doi: <https://doi.org/10.5056/jnm22170>
22. Bucan JI, Braut T, Krsek A, Sotosek V, Baticic L. Updates in gastroesophageal reflux disease management: from proton pump inhibitors to dietary and lifestyle modifications. *Gastrointest Disord*. 2025;7(2):33. doi: <https://doi.org/10.3390/gidisord7020033>
23. Yadlapati R, Pandolfino JE. Personalized approach in the work-up and management of gastroesophageal reflux disease. *Gastrointest Endosc Clin N Am*. 2020;30(2):227–38. doi: <https://doi.org/10.1016/j.giec.2019.12.002>
24. Tanvir F, Nijjar GS, Aulakh SK, Kaur Y, Singh S, Singh K, et al. Gastroesophageal reflux disease: new insights and treatment approaches. *Cureus*. 2024;16(8):e67654. doi: <https://doi.org/10.7759/cureus.67654>
25. Fass R, Zerbib F, Gyawali CP. AGA clinical practice update on functional heartburn: expert review. *Gastroenterology*. 2020;158(8):2286–93. doi: <https://doi.org/10.1053/j.gastro.2020.01.034>
26. Marabotto E, Pasta A, Calabrese F, Ribolsi M, Mari A, Savarino V, et al. The clinical spectrum of gastro-

- esophageal reflux disease: facts and fictions. *Visc Med.* 2024;**40**(5):242–9.
doi: <https://doi.org/10.1159/000536583>
27. **Zhan J, Yuan M, Zhao Y, Zhang X, Qiao T, Ji T, et al.** Abdominal obesity increases the risk of reflux esophagitis: a systematic review and meta-analysis. *Scand J Gastroenterol.* 2022;**57**(2):131–42.
doi: <https://doi.org/10.1080/00365521.2021.1994643>
 28. **Kucher SV, Mudra UO, Tkachuk VV, Ruda MM, Chernets TY, Nikitina IM, et al.** Impact of lifestyle modification interventions on metabolic syndrome and obesity in adults. *Wiad Lek.* 2025;**78**(9):1857–65.
doi: <https://doi.org/10.36740/WLek/212515>
 29. **Schuitenmaker JM, Kuipers T, Smout AJPM, Fockens P, Bredenoord AJ.** Systematic review: clinical effectiveness of interventions for the treatment of nocturnal gastroesophageal reflux. *Neurogastroenterol Motil.* 2022;**34**(12):e14385.
doi: <https://doi.org/10.1111/nmo.14385>
 30. **Albarqouni L, Moynihan R, Clark J, Scott AM, Dugan A, Del Mar C.** Head of bed elevation to relieve gastroesophageal reflux symptoms: a systematic review. *BMC Fam Pract.* 2021;**22**(1):24.
doi: <https://doi.org/10.1186/s12875-021-01369-0>
 31. **Martin Z, Spry G, Hout J, Maimone IR, Tang X, Crichton M, et al.** What is the efficacy of dietary, nutritional, and probiotic interventions for the management of gastroesophageal reflux disease symptoms? A systematic literature review and meta-analysis. *Clin Nutr ESPEN.* 2022;**52**:340–52.
doi: <https://doi.org/10.1016/j.clnesp.2022.09.015>
 32. **Lakananurak N, Pitisuttithum P, Susantitaphong P, Patcharatrakul T, Gonlachanvit S.** The efficacy of dietary interventions in patients with gastroesophageal reflux disease: a systematic review and meta-analysis of intervention studies. *Nutrients.* 2024;**16**(3):464.
doi: <https://doi.org/10.3390/nu16030464>
 33. **Hossa K, Malecka-Wojcieszko E.** Advances in gastroesophageal reflux disease management: exploring the role of potassium-competitive acid blockers and novel therapies. *Pharmaceuticals (Basel).* 2025;**18**(5):699.
doi: <https://doi.org/10.3390/ph18050699>
 34. **Yang S, Deng W, Xie Z, Chen J.** Efficacy and safety of proton pump inhibitors versus vonoprazan in treatment of erosive esophagitis: a PRISMA-compliant systematic review and network meta-analysis. *Medicine (Baltimore).* 2022;**101**(47):e31807.
doi: <https://doi.org/10.1097/MD.00000000000031807>
 35. **Targownik LE, Fisher DA, Saini SD.** AGA clinical practice update on de-prescribing of proton pump inhibitors: expert review. *Gastroenterology.* 2022;**162**(4):1334–42.
doi: <https://doi.org/10.1053/j.gastro.2021.12.247>
 36. **Kang SJ, Jung HK, Tae CH, Kim SY, Lee KJ.** On-demand versus continuous maintenance treatment of gastroesophageal reflux disease with proton pump inhibitors: a systematic review and meta-analysis. *J Neurogastroenterol Motil.* 2022;**28**(1):5–14.
doi: <https://doi.org/10.5056/jnm21095>
 37. **Shaheen NJ, Falk GW, Iyer PG, Souza RF, Yadlapati RH, Sauer BG, et al.** Diagnosis and management of Barrett's esophagus: an updated ACG guideline. *Am J Gastroenterol.* 2022;**117**(4):559–87.
doi: <https://doi.org/10.14309/ajg.0000000000001680>
 38. **Naik RD, Meyers MH, Vaezi MF.** Treatment of refractory gastroesophageal reflux disease. *Gastroenterol Hepatol (N Y).* 2020;**16**(4):196–205.
 39. **Gyawali CP, Tutuian R, Zeribib F, Rogers BD, Frazzoni M, Roman S, et al.** Value of pH impedance monitoring while on twice-daily proton pump inhibitor therapy to identify need for escalation of reflux management. *Gastroenterology.* 2021;**161**(5):1412–22.
doi: <https://doi.org/10.1053/j.gastro.2021.07.004>
 40. **St Onge E, Phillips B.** Vonoprazan: a new potassium-competitive acid blocker. *J Pharm Technol.* 2023;**39**(3):139–46.
doi: <https://doi.org/10.1177/87551225231166531>
 41. **Cheng Y, Liu J, Tan X, Dai Y, Xie C, Li X, et al.** Direct comparison of the efficacy and safety of vonoprazan versus proton-pump inhibitors for gastroesophageal reflux disease: a systematic review and meta-analysis. *Dig Dis Sci.* 2021;**66**(1):19–28.
doi: <https://doi.org/10.1007/s10620-020-06141-5>
 42. **Laine L, DeVault K, Katz P, Mitev S, Lowe J, Hunt B, et al.** Vonoprazan versus lansoprazole for healing and maintenance of healing of erosive esophagitis: a randomized trial. *Gastroenterology.* 2023;**164**(1):61–71.
doi: <https://doi.org/10.1053/j.gastro.2022.09.041>
 43. **Uemura N, Kinoshita Y, Haruma K, Kushima R, Yao T, Akiyama J, et al.** Vonoprazan as a long-term maintenance treatment for erosive esophagitis: VISION, a 5-year, randomized, open-label study. *Clin Gastroenterol Hepatol.* 2025;**23**(5):748–57.e5.
doi: <https://doi.org/10.1016/j.cgh.2024.08.004>
 44. **Yadlapati R, Gawron AJ, Gyawali CP, Chen J, Clarke J, Fass R, et al.** Clinical role of ambulatory reflux monitoring in PPI non-responders: recommendation statements. *Aliment Pharmacol Ther.* 2022;**56**(8):1274–83.
doi: <https://doi.org/10.1111/apt.17180>
 45. **Krause A, Yadlapati R.** Reflux testing: wireless pH, impedance-pH, and mucosal impedance. *Gastrointest Endosc Clin N Am.* 2025;**35**(3):587–601.
doi: <https://doi.org/10.1016/j.giec.2024.12.007>
 46. **Deraman MA, Abdul Hafidz MI, Lawenko RM, Ma ZF, Wong MS, Coyle C, et al.** Randomised clinical trial: the effectiveness of Gaviscon Advance vs non-alginate antacid in suppression of acid pocket and post-prandial reflux in obese individuals after late-night supper. *Aliment Pharmacol Ther.* 2020;**51**(11):1014–21.
doi: <https://doi.org/10.1111/apt.15746>
 47. **Tangvoraphonkchai K, Manasirisuk W, Apichatvullop T, Srihachonjit S, Mitpracha M, Promsen P, et al.** Comparable efficacy of generic and original alginate for symptom control in PPI-refractory GERD. *Sci Rep.* 2025;**15**(1):28429.
doi: <https://doi.org/10.1038/s41598-025-13400-w>
 48. **Slater BJ, Collings A, Dirks R, Gould JC, Qureshi AP, Juza R, et al.** Multi-society consensus conference and guideline on the treatment of gastroesophageal reflux disease (GERD). *Surg Endosc.* 2023;**37**(2):781–806.
doi: <https://doi.org/10.1007/s00464-022-09817-3>
 49. **Slater BJ, Dirks RC, McKinley SK, Ansari MT, Kohn GP, Thosani N, et al.** SAGES guidelines for the surgical treatment of gastroesophageal reflux (GERD). *Surg Endosc.* 2021;**35**(9):4903–17.
doi: <https://doi.org/10.1007/s00464-021-08625-5>
 50. **Yodice M, Mignucci A, Shah V, Ashley C, Tadros M.** Preoperative physiological esophageal assessment for anti-reflux surgery: a guide for surgeons on high-resolution manometry and pH testing. *World J Gastroenterol.* 2021;**27**(16):1751–69.
doi: <https://doi.org/10.3748/wjg.v27.i16.1751>
 51. **McKinley SK, Dirks RC, Walsh D, Hollands C, Arthur LE, Rodriguez N, et al.** Surgical treatment of GERD: systematic review and meta-analysis. *Surg Endosc.* 2021;**35**(8):4095–123.
doi: <https://doi.org/10.1007/s00464-021-08358-5>
 52. **Kasugai K, Ogasawara N.** Gastroesophageal reflux disease: pathophysiology and new treatment trends. *Intern Med.* 2024;**63**(1):1–10.

- doi: <https://doi.org/10.2169/internalmedicine.1551-23>
53. Chandan S, Mohan BP, Khan SR, Jha LK, Dhaliwal AJ, Bilal M, *et al.* Clinical efficacy and safety of magnetic sphincter augmentation (MSA) and transoral incisionless fundoplication (TIF2) in refractory gastroesophageal reflux disease (GERD): a systematic review and meta-analysis. *Endosc Int Open.* 2021;9(4):E583–98.
doi: <https://doi.org/10.1055/a-1352-2944>
 54. Ferrari D, Asti E, Lazzari V, Siboni S, Bernardi D, Bonavina L. Six to 12-year outcomes of magnetic sphincter augmentation for gastroesophageal reflux disease. *Sci Rep.* 2020;10(1):13753.
doi: <https://doi.org/10.1038/s41598-020-70742-3>
 55. Fadel MG, Tarazi M, Dave M, Reddy M, Khan O, Fakh-Gomez N, *et al.* Magnetic sphincter augmentation in the management of gastro-esophageal reflux disease: a systematic review and meta-analysis. *Int J Surg.* 2024;110(10):6355–66.
doi: <https://doi.org/10.1097/JIS.0000000000001558>
 56. Testoni S, Hassan C, Mazzoleni G, Antonelli G, Fanti L, Passaretti S, *et al.* Long-term outcomes of transoral incisionless fundoplication for gastro-esophageal reflux disease: systematic review and meta-analysis. *Endosc Int Open.* 2021;9(2):E239–46.
doi: <https://doi.org/10.1055/a-1322-2209>
 57. Fuchs KH, Musial F, Eypasch E, Meining A. Gastrointestinal quality of life in gastroesophageal reflux disease: a systematic review. *Digestion.* 2022;103(4):253–60.
doi: <https://doi.org/10.1159/000524766>
 58. Velanovich V. 25 years of the GERD-HRQL symptom severity instrument: an assessment of published applications. *Surg Endosc.* 2023;37(1):255–65.
doi: <https://doi.org/10.1007/s00464-022-09463-9>
 59. Sharma P, Yadlapati R. Pathophysiology and treatment options for gastroesophageal reflux disease: looking beyond acid. *Ann N Y Acad Sci.* 2021;1486(1):3–14.
doi: <https://doi.org/10.1111/nyas.14501>

ФІНАНСУВАННЯ

Дослідження виконано без залучення зовнішнього фінансування.

КОНФЛІКТ ІНТЕРЕСІВ

Автори заявляють про відсутність конфлікту інтересів щодо публікації цієї статті.

ВИКОРИСТАННЯ ГЕНЕРАТИВНОГО ШТУЧНОГО ІНТЕЛЕКТУ

Автори заявляють, що під час підготовки рукопису використовувалися інструменти генеративного штучного інтелекту виключно для мовного редагування, покращення стилю викладу та перекладу тексту. Уся відповідальність за зміст статті, достовірність даних і висновків покладається на авторів.

ВІДОМОСТІ ПРО АВТОРІВ ТА ЇХ ВНЕСОК

ЧЕРНЕЦЬ Тетяна: концепція дослідження, методологія, аналіз даних, пошук та опрацювання літературних джерел, написання рукопису, редагування статті, наукове керівництво.
ORCID: <https://orcid.org/0000-0001-7575-8391>

КУЧЕР Світлана: концепція дослідження, збір і систематизація даних, аналіз літературних джерел, написання рукопису, редагування статті.
ORCID: <https://orcid.org/0000-0003-1026-9567>

РУДА Марія: пошук та аналіз літературних джерел, систематизація матеріалів, перевірка даних, редагування статті.
ORCID: <https://orcid.org/0000-0002-5407-3315>

ВЕРЕЩАГІНА Наталя: збір та систематизація літературних даних, аналіз матеріалів, підготовка візуальних матеріалів, редагування статті.
ORCID: <https://orcid.org/0000-0002-5569-1334>

ДЖИВАК Володимир: методологія дослідження, аналіз і верифікація даних, оцінка наукової достовірності матеріалів, редагування статті.
ORCID: <https://orcid.org/0000-0002-4885-7586>
e-mail: djyvak@tdmu.edu.ua

FUNDING

This research received no external funding.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

USE OF GENERATIVE ARTIFICIAL INTELLIGENCE

The authors declare that generative artificial intelligence tools were used solely for language editing, improving the style and clarity of the text, and/or translation during the preparation of this manuscript. The authors bear full responsibility for the content of the article, the accuracy of the data, and the validity of the conclusions.

AUTHORS INFORMATION AND CONTRIBUTIONS

CHERNETS Tetyana: research concept, methodology, data analysis, literature search and review, manuscript drafting, article editing, academic supervision.
ORCID: <https://orcid.org/0000-0001-7575-8391>

KUCHER Svitlana: research concept, data collection and organisation, analysis of literature sources, manuscript drafting, article editing.
ORCID: <https://orcid.org/0000-0003-1026-9567>

RUDA Maria: searching for and analysing literature, organising materials, verifying data, editing the article.
ORCID: <https://orcid.org/0000-0002-5407-3315>

VERESHCHAHINA Natalia: collecting and organising literature, analysing materials, preparing visual materials, editing the article.
ORCID: <https://orcid.org/0000-0002-5569-1334>

DZHYVAK Volodymyr: research methodology, data analysis and verification, assessment of the scientific validity of the materials, editing of the article.
ORCID: <https://orcid.org/0000-0002-4885-7586>
e-mail: djyvak@tdmu.edu.ua

Отримано: 14.08.2026
Прийнято до друку: 17.09.2026
Опубліковано: 30.09.2026

Received: 14.08.2026
Accepted: 17.09.2026
Published: 30.09.2026

