RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2026.2025-125
Cyprus J Med Sci 2026;11(2):144-153

Anal Fissure Research Across Four Decades: Global Trends and Emerging Directions

Mehmet Berksun Tutan[1], Veysel Barış Turhan[2]

[1]Clinic of General Surgery, Alaca State Hospital, Çorum, Türkiye
[2]Department of General Surgery, Hitit University Faculty of Medicine, Çorum, Türkiye

Abstract

BACKGROUND/AIMS: Anal fissure is a common and painful anorectal disorder that substantially impairs quality of life. While therapeutic strategies have evolved from pharmacological sphincter relaxation and botulinum toxin injections to sphincter-preserving surgical and regenerative approaches, the global research landscape has not previously been assessed through bibliometric methods.

MATERIALS AND METHODS: A bibliometric analysis was conducted using the Web of Science Core Collection, covering the period 1980-2025. Publications were retrieved with the keywords "anal fissure*," "fissure-in-ano," "fissura ani," and "anorectal fissure*". Only articles and reviews were included. Network visualization was performed with VOSviewer, geographical mapping with Tableau, and statistical analyses with SPSS. Linear regression was applied to predict future publication trends.

RESULTS: A total of 1,504 records were identified, of which 1,241 were included (articles and reviews). The corpus accrued 23,277 citations across 8,572 publications, with an h-index of 71. Annual publications increased steadily, with a projected 78 papers in 2040 (R^2=0.864, $p<0.001$). The United States, Italy, and the United Kingdom were the most productive countries, while Türkiye, India, Pakistan, and Egypt demonstrated emerging but peripheral contributions. Collaboration mapping revealed five international clusters, with the United States acting as a global hub. The New England Journal of Medicine and Diseases of the Colon & Rectum were among the most cited journals. Keyword analysis showed a thematic transition from pharmacological therapies (glyceryl trinitrate, diltiazem, nifedipine) to botulinum toxin and sphincter-preserving surgery, with a recent emphasis on wound healing, recurrence, quality of life, and systematic reviews.

CONCLUSION: This first bibliometric analysis of anal fissure research highlights a sustained increase in global output and a shift toward patient-centered outcomes and minimally invasive strategies. While high-income countries dominate, emerging economies are contributing more actively. Future research should prioritize multicenter randomized trials, long-term quality-of-life and cost-effectiveness studies, and mechanistic investigations of ischemia, microbiota, and systemic factors in fissure chronicity.

Keywords: Anal fissure, benign anorectal disorders, bibliometrics, citation analysis, general surgery

INTRODUCTION

An anal fissure is a common and painful anorectal disorder characterized by a longitudinal tear in the anoderm, most commonly located at the posterior midline of the anal canal.[1,2] It presents with sharp anal pain, bleeding, and sphincter spasm, leading to a significant reduction in patients' quality of life.[2,3] Although acute fissures often heal spontaneously with conservative measures, chronic anal fissures are maintained by internal anal sphincter hypertonia and local ischemia, making spontaneous healing unlikely and necessitating medical or surgical intervention.[1,4,5]

To cite this article: Tutan MB, Turhan VB. Anal fissure research across four decades: global trends and emerging directions. Cyprus J Med Sci. 2026;11(2):144-153

ORCID IDs of the authors: M.B.T. 0000-0003-1834-7355; V.B.T. 0000-0001-5093-4993.

Corresponding author: Mehmet Berksun Tutan
E-mail: mbtutan@gmail.com
ORCID ID: orcid.org/0000-0003-1834-7355

Received: 27.10.2025
Accepted: 19.02.2026
Publication Date: 22.04.2026

The lifetime prevalence of anal fissure is estimated at 7-8% in the general population; it affects both men and women and often occurs in young, otherwise healthy adults.[4] Despite its benign nature, chronic anal fissure can severely affect bowel habits, induce fear of defecation, and perpetuate constipation, creating a vicious cycle of pain and recurrence.[6] Furthermore, fissures may occasionally be associated with systemic diseases such as Crohn's disease, or with obstetric trauma, adding complexity to management.[6,7]

Therapeutic strategies have evolved considerably over the last three decades.[2,3] Lateral internal sphincterotomy (LIS) has long been considered the gold standard, achieving healing rates exceeding 90%, but it carries a risk of permanent fecal incontinence in a subset of patients.[8,9] To avoid this complication, non-surgical alternatives have been investigated extensively.[2] Randomized controlled trials demonstrated that topical nitric oxide donors, such as glyceryl trinitrate, reduce anal resting pressure and achieve healing in up to two-thirds of patients, though recurrence and adverse effects, such as headache, limit their long-term utility.[10-13] Calcium channel blockers, such as diltiazem and nifedipine, offer similar efficacy with fewer side effects and are preferred in recent guidelines.[6,13]

The advent of botulinum toxin injection into the internal sphincter represented a significant milestone.[14] Seminal studies in the late 1990's reported healing rates exceeding 80% with minimal risk of incontinence[15] and subsequent long-term follow-up studies have confirmed durable healing in carefully selected patients, especially in those without long-standing constipation.[16] Recent research has explored sphincter-preserving surgical options such as fissurectomy with or without anoplasty, demonstrating promising results with high healing rates and minimal impairment of continence.[17] At the same time, novel approaches including regenerative therapies (platelet-rich plasma, adipose-derived stem cells), topical methylene blue formulations, and snake venom-derived peptides highlight the dynamic and innovative research environment surrounding anal fissure management.[1,18]

Beyond treatment efficacy, research has increasingly focused on patient-centered outcomes such as recurrence, long-term continence, and quality of life.[8,17] Studies indicate that, while LIS achieves the highest cure rates, even mild incontinence significantly affects patient satisfaction and underscores the growing need for individualized treatment algorithms.[2,8] Psychological and lifestyle factors, such as obsessive-compulsive tendencies, smoking, and diet, have also been linked to fissure chronicity, emphasizing the multifactorial nature of the disease.[19]

Despite the abundance of clinical trials, narrative reviews, and evolving therapeutic strategies, no comprehensive bibliometric analysis of the anal fissure literature has been published to date.[5,20] Bibliometric methods allow for the systematic evaluation of global research output, citation impact, and international collaboration, providing insights into the historical trajectory and emerging trends of a field.[21,22] By applying bibliometric and statistical techniques to the global literature on anal fissure from 1980 to 2025, the present study aims to identify the most influential articles, journals, authors, institutions, and countries, to evaluate collaborative networks, and to uncover historical and emerging research hotspots. We aimed not only to contextualize the current state of anal fissure research but also to provide direction for future investigations and clinical practice.

MATERIALS AND METHODS

Formal approval from an ethics committee was not required, as this was a bibliometric analysis. The study was carried out in accordance with the ethical principles of the World Medical Association's Declaration of Helsinki.

Data were collected exclusively from the Web of Science (WoS) Core Collection database provided by Clarivate Analytics. WoS was selected because it offers standardized citation indexing, comprehensive reference metadata, and robust tools for citation and co-citation analyses, which are essential for mapping intellectual structures and collaboration networks in bibliometric research. Although databases such as Scopus and PubMed contain relevant biomedical literature, these databases were excluded from the analysis because PubMed does not provide citation linkage data suitable for co-citation analysis, and Scopus employs different citation coverage and indexing criteria that may introduce heterogeneity in longitudinal citation-based analyses. To ensure methodological consistency, reproducibility, and comparability with prior bibliometric studies, a single well-established citation database was used.

Search Details

Relevant studies were identified by searching the topic field using the keywords "anal fissure*," "fissure-in-ano," "fissure ani," and "anorectal fissure*". All records meeting these criteria in the title or abstract were included. The search covered the period from 1980 to 2025, and data were accessed on August 27, 2025. For reproducibility, the search strategy was as follows: [TS = ("anal fissure*" OR "fissure-in-ano" OR "fissura ani" OR "anorectal fissure*")], with the timespan 1980-2025, across the WoS Core Collection [science citation index-expanded, social sciences citation index, arts & humanities citation index, conference proceedings citation index-science (CPCI-S), CPCI-social science & humanities (CPCI-SSH), book citation index-science (BKCI-S), BKCI-SSH, emerging sources citation index] indexes. No language filters were used in the analysis.

Statistical Analysis

Bibliometric network visualization was conducted using VOSviewer (version 1.6.20, Leiden University, Center for Science and Technology Studies). In VOSviewer, synonymous keywords, spelling errors, and country names were standardized using the thesaurus option. For keyword analysis, the "all keywords" option was selected, and full counting was used in the main analyses. A world map illustrating the distribution of publications was generated using Tableau Software for Windows (version 2019.4.1, Tableau Software Inc., Seattle, WA). Statistical analyses were performed using IBM SPSS Statistics for Windows (version 27; IBM Corp., Armonk, NY). The Shapiro-Wilk test was employed to assess the normality of data distribution. A linear regression analysis was conducted to estimate overall publication trends and to explore future trajectories. The R^2 value was used to assess the model's performance in predicting publication trends. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 1504 publications on anal fissure were identified between January 1980 and August 2025. Of these publications, 1077 (71.61%) were articles, 164 (10.90%) were reviews, 109 (7.25%) were proceedings papers, 89 (5.92%) were meeting abstracts, and 65 (4.32%) were other

types of publications (editorial materials, letters, etc.). To strengthen the homogeneity of the analysis, only articles and reviews were included (1241 publications in total). Online-first articles were included in the analysis, but early-access articles without peer review were excluded (Figure 1).

The majority of the publications were in English (1125, 90.65%); 51 (4.11%) were in German, 19 (1.53%) were in French, 17 (1.37%) were in Spanish, 14 (1.13%) were in Russian, and 15 (1.21%) were in other languages. In total, anal fissure-related publications were cited,[23] 277 times by 8,572 publications, of which 7,600 citations were not self-citations. The mean citation rate per article was 18.76, while 237 of the 1241 papers (19.1%) had not been cited at all. Overall, the field demonstrated an h-index of 71.

Active Research Areas and Future Trend Analysis

The leading subject areas contributing to anal fissure research were identified as Surgery (616 publications, 49.64%), Gastroenterology (452 publications, 36.42%), and Internal Medicine (215 publications, 17.32%). Since many articles are indexed under more than one category, the total proportion exceeds 100%. Annual publication trends are illustrated in Figure 2, which also presents the results of a linear regression model used to project future output. The model demonstrated a strong fit with the observed data (R^2=0.864, p<0.001), explaining 86.4% of the variance. Based on this analysis, the projected numbers of publications were 58 in 2025 [95% confidence interval (CI): 43-73], 64 in 2030 (95% CI: 49-80), and 78 in 2040 (95% CI: 62-94). At the time of analysis, 35 of the 58 publications projected for 2025 had already been released.

Active Countries

Seventy-nine countries contributed to research on anal fissure. The twelve countries with the most publications on anal fissure were the United States (US) of America (193, 15.55%), Italy (134, 10.80%), England (128, 10.31%), India (94, 7.57%), Germany (71, 5.72%), Türkiye (67, 5.39%), Pakistan (64, 5.16%), Spain (48, 3.87%), Australia (39, 3.14%), Egypt (37, 2.98%), France (37, 2.98%), and Iran (37, 2.98). A total of 39 countries had 5 or more publications on anal fissure, while 6 had not collaborated with any other country. Total link strength scores of 33 nations that contributed at least 5 articles about anal fissure, had a minimum link strength of 1, and had international collaboration among their authors were measured and mapped (Figure 3). The analysis revealed five distinct clusters (Figure 4): Cluster 1: Germany, Canada, Sweden, Greece, Spain, Switzerland, Austria, Belgium, Portugal; Cluster 2: Italy, Israel, India, France, Bulgaria, Russia, Singapore, South Korea; Cluster 3: England, Pakistan, Egypt, Saudi Arabia, Scotland, Poland; Cluster 4: United States of America, Netherlands, Mexico, Brazil, Taiwan, China; Cluster 5: Australia, Türkiye, Ireland, Iran.

Active Authors and Institutions

A total of 4,573 authors contributed to research on anal fissure in publications indexed in WoS. The authors that contributed to the field with 10 or more publications were Brisinda G (23, 1.85%), Maria G (21, 1.69%), Scholefield JH (14, 1.13%), Albanese A (1.05%), Bentivoglio AR (13, 1.05%), Di Vita G (12, 0.97%), Gallo G (12, 0.97%), Altomare DF (11, 0.89%), Gupta PJ (11, 0.89%) and Jones OM (10, 0.81). A total of 1849 institutions contributed to the knowledge base on anal fissure, and the Egyptian Knowledge Bank (EKB) emerged as the leading contributor among them. The top ten institutions were EKB (37, 2.98%), Catholic University of the Sacred Heart (30, 2.42%), IRCCS Policlinico Gemelli (30, 2.42%), Sapienza University of Rome (23, 1.85%), Cleveland Clinic Foundation (19, 1.53%), Imperial College London (18, 1.45%), Mansoura University (15, 1.21%), University of Nottingham (15, 1.21%), University of Palermo (15, 1.21%), and University of London (14, 1.13%). After the removal of platform aggregators (EKB) from institutional rankings, the 10th-ranked institution by publications was the University of Oxford (14, 1.13%).

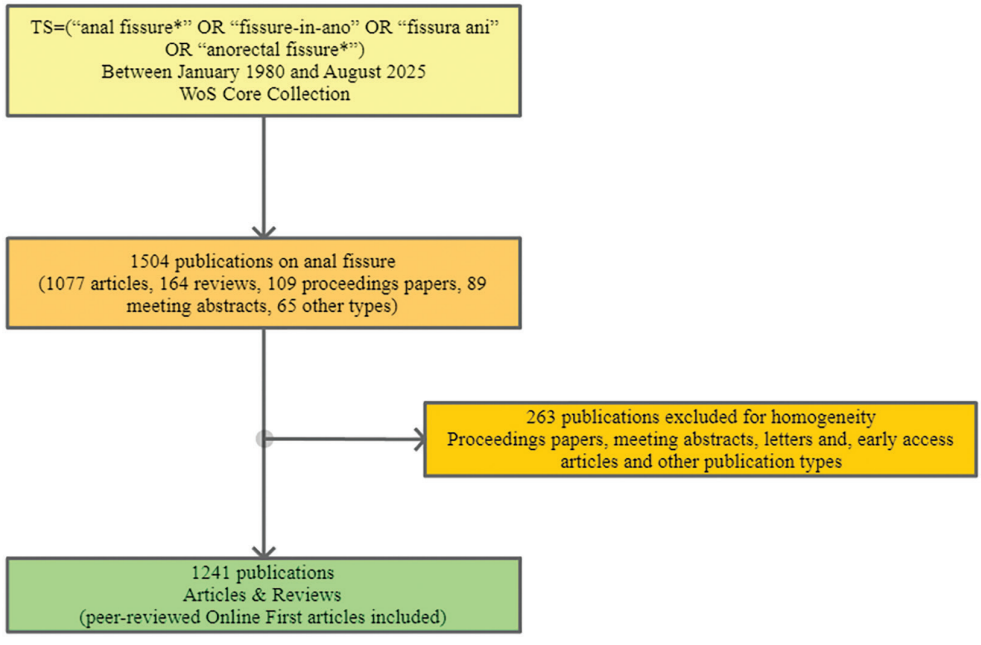

Figure 1. Flowchart diagram of publication selection.

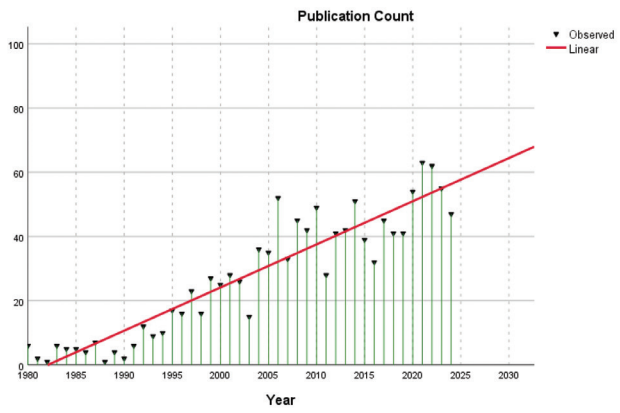

Figure 2. Distribution of anal fissure publications by year and projection of articles over the coming years using the linear model.

Active Journals

A total of 421 journals contributed to the field of anal fissure; the three journals contributing the most were Diseases of the Colon & Rectum (10.15%), International Journal of Colorectal Disease (3.55%), and Colorectal Disease (3.30%). The Top 11 journals are listed in Table 1, with each journal's total citation count and the average citation count per article.

Citation and Co-Citation Analysis

Of the 1,241 articles published between 1980 and 2025, the 10 most-cited papers on anal fissure are shown in Table 2. The study titled "A comparison of injections of botulinum toxin and topical nitroglycerin ointment for the treatment of chronic anal fissure" by Brisinda et al.,[23] published in New England Journal of Medicine in 1999, was the most cited article on anal fissure. The publications most frequently co-cited with other studies, serving as knowledge-base articles, were: Brisinda et al.[23] (link strength (LS): 286), Maria et al.[15] (LS: 276), Lund and Scholefield[11] (LS: 247), Schouten et al.[24] (LS: 220), and Lund and Scholefield[2] (NC: 183).[24]

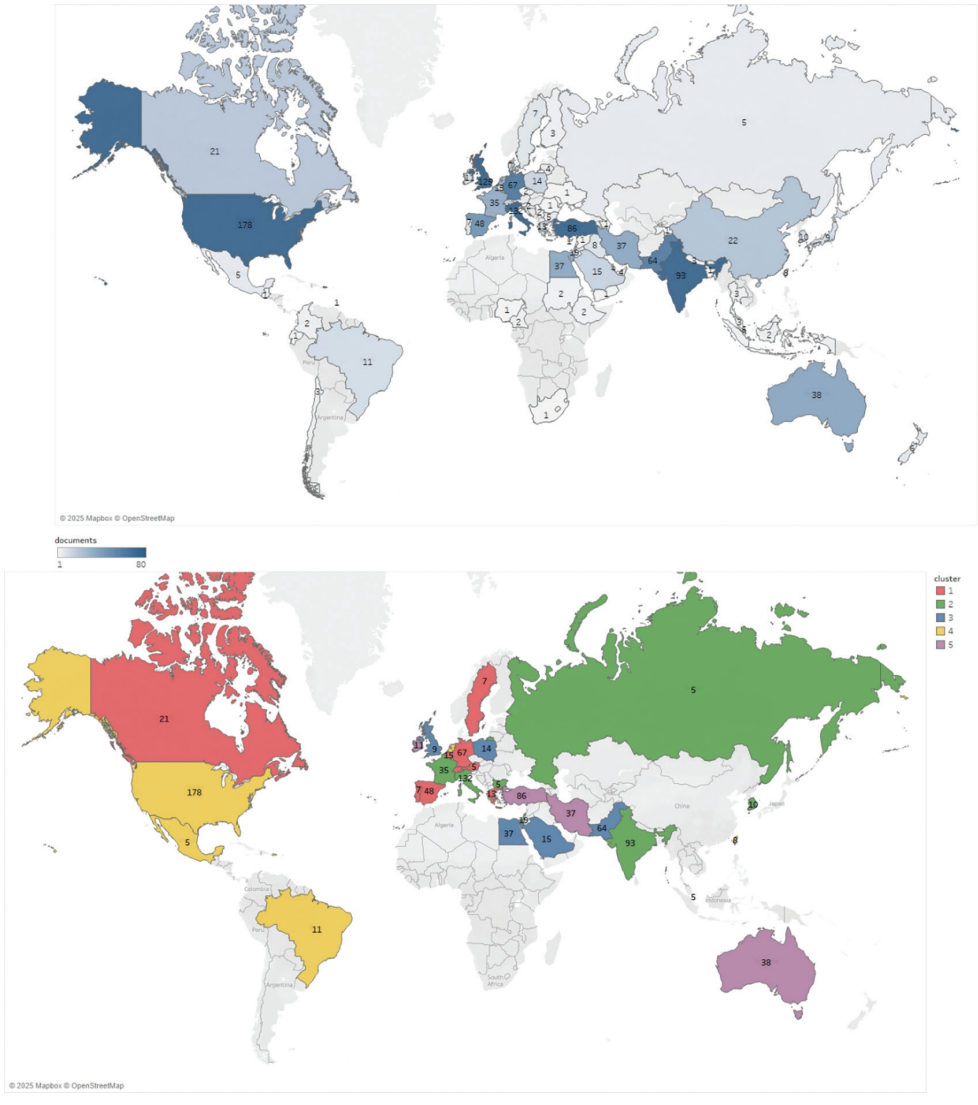

Figure 3. Global distribution of publications on anal fissure and color chart according to collaboration clusters.

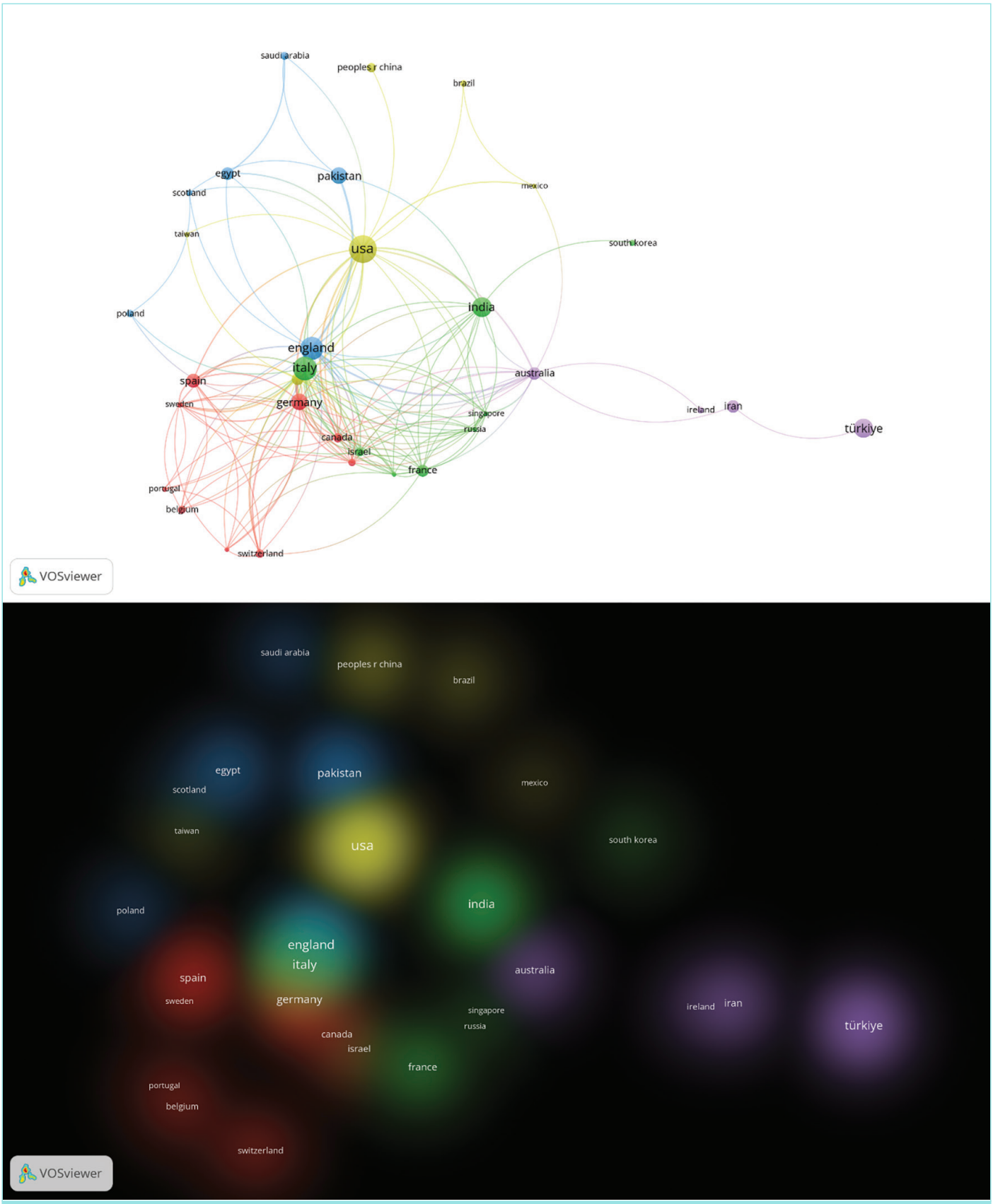

Figure 4. Network visualization map of cluster analysis and density map on worldwide cooperation on anal fissure.

Table 1. The top 11 most active journals with articles on anal fissure

No	Journal	TP	TC	ACPY	TSpIF
1	Diseases of the Colon & Rectum	**126**	**6033**	**260,99**	2,07
2	British Journal of Surgery	25	**1704**	61,65	2,47
3	International Journal of Colorectal Disease	**44**	**1006**	**68,22**	1,55
3	Colorectal Disease	**41**	915	**76,42**	1,86
4	New England Journal of Medicine	3	735	26,6	**8,87**
5	Gut	6	501	19,09	3,18
6	Techniques in Coloproctology	35	466	48,9	1,40
7	American Journal of Gastroenterology	7	455	41,06	**5,87**
8	Alimentary Pharmacology & Therapeutics	9	359	16,46	1,83
9	World Journal of Surgery	13	328	21,04	1,62
10	Journal of Gastrointestinal Surgery	15	276	15,79	1,05
11	Lancet	1	258	8,9	**8,90**

TP: Total publications, TC: Total citations, ACPY: Average citations per year, SpIF: Topic Specific Impact Factor.

Table 2. The top 10 most cited articles on anal fissure according to total citations

Title	Authors journal	PY	TC	ACpY
A comparison of injections of botulinum toxin and topical nitroglycerin ointment for the treatment of chronic anal fissure	Brisinda et al.[23] New England Journal of Medicine	1999	269	9,96
A randomised, prospective, double-blind, placebo-controlled trial of glyceryl trinitrate ointment in treatment of anal fissure	Lund et al.[11] The Lancet	1997	258	8,90
A comparison of botulinum toxin and saline for the treatment of chronic anal fissure	Maria et al.[15] New England Journal of Medicine	1998	240	8,57
Botulinum toxin type A injections: adverse events reported to the US food and drug administration in therapeutic and cosmetic cases	Coté et al.[25] Journal of the American Academy of Dermatology	2005	233	11,10
Intolerance of cow's milk and chronic constipation in children	Iacono et al.[26] New England Journal of Medicine	1998	226	8,07
Safety of botulinum toxin type A: a systematic review and meta-analysis	Naumann et al.[27] Current Medical Research and Opinion	2004	214	9,73
Anal cancer ıncidence - genital warts, anal-fissure or fistula, hemorrhoids, and smoking	Holly et al.[28] JNCI Journal of the National Cancer Institute	1989	212	5,73
ACG Clinical Guideline: management of benign anorectal disorders	Wald et al.[21] American Journal of Gastroenterology	2014	200	16,67
Long-term results of lateral internal sphincterotomy for chronic anal fissure with particular reference to incidence of fecal incontinence	Nyam and Pemberton[9] Diseases of the Colon & Rectum	1999	192	7,11
Aetiology and treatment of anal fissure	Lund and Scholefield[2] British Journal of Surgery	1996	191	6,37

PY: Publication year, TC: Total citations, ACpY: Average citations per year.

Trending Topics

Across all publications on anal fissure, 1,738 keywords were used. Figure 5 shows visualizations of 117 keywords that occurred in at least ten publications, displayed as cluster networks, trend analyses, and citation visualizations. The ten most frequently used keywords excluding anal fissure and fissure in ano, were botulinum toxin, chronic anal fissure, sphincterotomy, LIS, hemorrhoids, glyceryl trinitrate, diltiazem, fissurectomy, fecal incontinence, and constipation. Among treatment-related keywords, LIS (75 occurrences), botulinum toxin (119 occurrences), and fissurectomy (46 occurrences) were the most prominent, indicating both established and emerging approaches. Pharmacological agents such as glyceryl trinitrate (57 occurrences), diltiazem (49 occurrences), and nifedipine (24 occurrences) also appeared frequently. Reconstructive techniques, including anoplasty (14 occurrences), and terms related to wound repair, such as wound healing (19 occurrences), were observed to have later average publication years (2018 onwards). Symptom- and outcome-related keywords were also notable, with anal pain (19 occurrences), constipation (35 occurrences), recurrence (24 occurrences), and quality of life (18 occurrences) reflecting patient-centered aspects of research. Keywords such as meta-analysis and rectal bleeding showed relatively high citation averages, while botulinum toxin and anoplasty demonstrated more recent upward trends.

DISCUSSION

To our knowledge, this bibliometric analysis provides the first comprehensive overview of global research activity on anal fissure. By

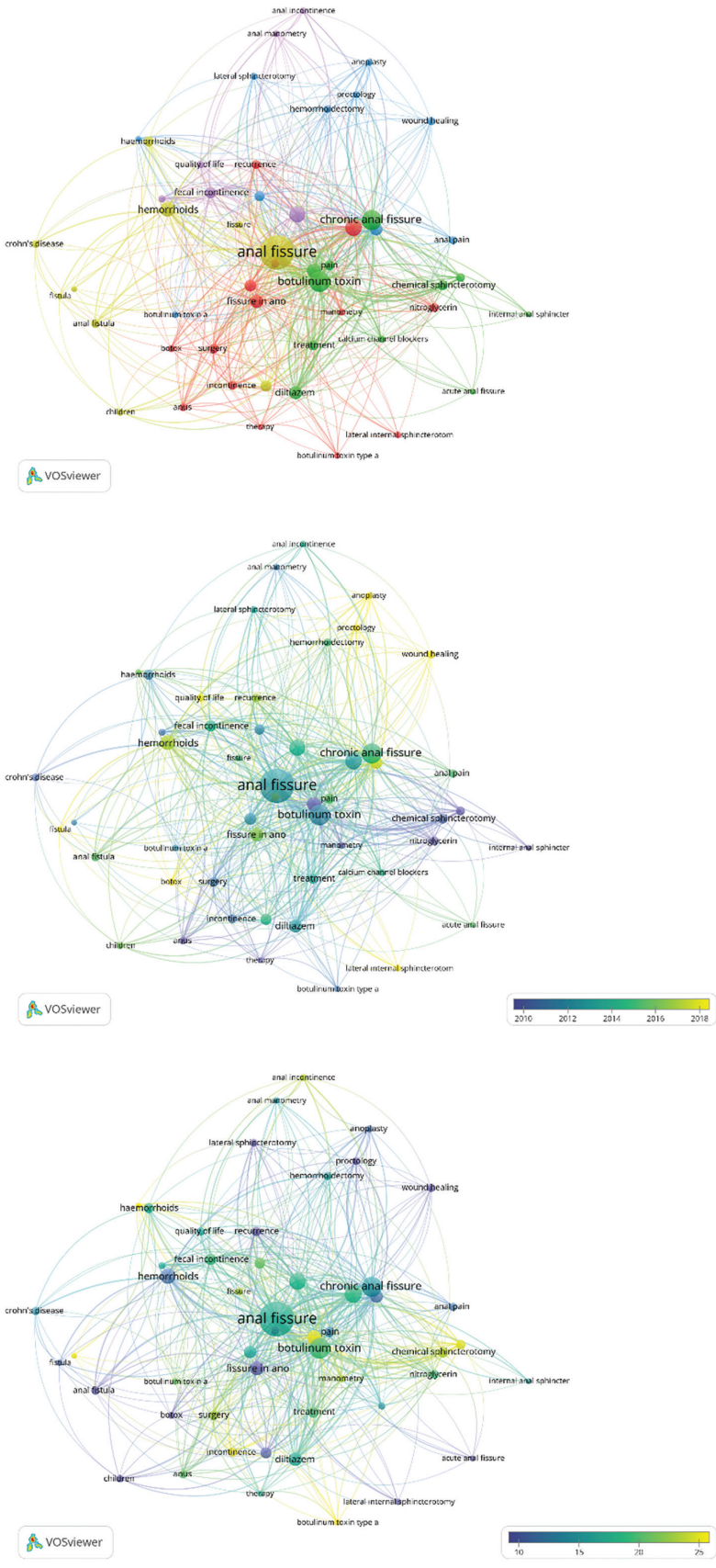

Figure 5. Keyword cluster analysis, keyword trend, and citation network visualization map of anal fissure.

relying on the WoS Core Collection, which offers standardized citation indexing and longitudinal coverage, the analysis enables consistent mapping of publication trends and collaboration patterns over time. By systematically evaluating 1,241 articles and reviews published between 1980 and 2025, we identified influential authors, institutions, and journals; mapped international collaboration networks; and characterized the thematic evolution of research in this field.

Our results demonstrate a steady growth of publications over the last four decades, with the annual output projected to reach approximately 78 articles by 2040. The rising trajectory underscores an enduring clinical and academic interest in anal fissure, reflecting both the high prevalence of the condition and the persistent challenges in achieving optimal management.[4,5,20] While most research originated in high-income countries such as the US, Italy, and the United Kingdom, significant contributions were also observed from Türkiye, India, Pakistan, and Egypt, reflecting increasing scholarly activity in emerging economies. Notably, the EKB was identified as the leading institution; however, this finding largely reflects WoSindexing practices, in which publications from multiple Egyptian universities and hospitals (e.g., Cairo University, Ain Shams University, Assiut University) are aggregated under the EKB label. This approach inflates the apparent contribution of the platform while obscuring institution-level outputs. Accordingly, the prominence of the EKB should be interpreted as a database-related artifact rather than a true institutional concentration.

Our co-citation analysis confirmed that seminal randomized trials of medical and surgical therapies-particularly the works of Brisinda et al.,[23] Maria et al.,[15] Lund and Schouten et al.[24] -constitute the intellectual foundation of the field.[2] The most cited article was the 1999 trial by Brisinda et al.,[23] published in the New England Journal of Medicine, which established botulinum toxin as a minimally invasive alternative to surgical sphincterotomy and nitroglycerin injections. Consistently, Diseases of the Colon & Rectum, the International Journal of Colorectal Disease, and Colorectal Disease emerged as the most prolific specialty journals, whereas high-impact generalist journals such as NEJM and The Lancet published fewer landmark studies that shaped clinical practice.[8,11,23] This pattern illustrates the dual dissemination of anal fissure research: detailed methodological and surgical advances appear primarily in subspecialty outlets, while paradigm-shifting trials achieve broader visibility in general medical journals.

Collaboration mapping revealed five distinct international clusters. The Americas-Asia Power Cluster, led by the US and including China, Taiwan, Brazil, Mexico, and the Netherlands, may reflect the US's role as a global hub with extensive research capacity and transcontinental collaborations. The UK-Middle East Nexus Cluster, centered in England, with partners including Egypt, Pakistan, Saudi Arabia, and Poland, could be influenced by historical academic ties and fellowship training pathways. The Mediterranean-Asia Bridge Cluster, anchored by Italy and France, and extending to India, Israel, Singapore, and South Korea, may be explained by the influence of Mediterranean surgical schools and by established exchange programs with Asian centers. The Western and Central Europe Core Cluster, comprising Germany, Spain, Switzerland, Belgium, Austria, among others, may reflect cohesion fostered by EU-funded research networks and geographic proximity. Finally, the Emerging Peripheral Cluster, including Türkiye, Iran, Australia, and Ireland, may suggest growing research contributions from these regions but limited integration into established hubs, possibly due to funding disparities, geographic distance, or language barriers. Taken together, these patterns may indicate that international collaboration in anal fissure research is shaped not only by scientific priorities but also by historical, cultural, and structural factors.

From a regional perspective, the collaboration map also offers insight into the positioning of countries with substantial clinical engagement but variable international visibility. As researchers from Türkiye, we find it striking that our country is placed in a peripheral cluster on the collaboration map, despite the high prevalence of anal fissure in the population and the active contributions of Turkish surgeons to its treatment and study.[16,19] We expected Türkiye to align more closely with the Western & Central Europe Core, given its geographical proximity, strong surgical tradition and contributions to the area of anal fissure (5th country in publication count). This peripheral positioning, however, may be explained by several factors. Many Turkish studies have historically been published in regional journals with limited indexing in international databases, which reduces their visibility and citation linkages. Cross-citations with global centers remain weak, as domestic research is more frequently referenced within local networks than by international counterparts. Opportunities for large-scale collaborative trials with major European or US institutions have also been limited, restricting Türkiye's integration into established hubs. In addition, structural barriers such as funding constraints may have reduced participation in high-profile projects. Finally, much of Türkiye's publication growth has occurred only in the past decade, after dominant bibliometric networks had already formed, a factor that may have further delayed Türkiye's central integration. Taken together, these considerations suggest that Türkiye's peripheral placement reflects structural, historical, and visibility-related factors rather than a lack of clinical engagement.

Keyword analysis illustrated the shifting focus in anal fissure research. In earlier decades, emphasis was placed on pharmacological sphincter relaxation using agents such as glyceryl trinitrate, diltiazem, and nifedipine, reflecting the search for non-surgical alternatives to sphincterotomy.[3,11] Subsequently, botulinum toxin emerged as a major research hotspot, supported by randomized trials demonstrating efficacy with minimal risk of incontinence.[15,23] More recently, sphincter-preserving surgical options have gained attention, often in response to concerns regarding postoperative continence impairment associated with LIS.[17] Additionally, newer topics, including wound healing, quality of life, and recurrence, reflect a broader shift toward patient-centered outcomes.[3,19,29] The increasing use of terms such as meta-analysis and systematic review indicates growing efforts to synthesize evidence and to guide evidence-based practice.[20,21,27]

Taken together, these findings mirror the clinical trajectory of anal fissure management: from the dominance of LIS to the rise of pharmacological therapies to the ongoing refinement of minimally invasive and reconstructive techniques.[8,11,17] At the same time, the literature reveals persistent controversies, including the optimal balance between efficacy and continence preservation, the durability of botulinum toxin compared with surgery, and the role of novel biologic and regenerative therapies.[8,15,23,30] Our analysis suggests that future research should prioritize multicenter randomized trials comparing sphincter-preserving surgery with established treatments; long-term studies of quality-of-life outcomes and economic evaluations; and mechanistic studies addressing the role of ischemia, microbiota, and systemic factors in fissure chronicity.

Study Limitations

This study has limitations inherent in bibliometric analyses that should be considered when interpreting the findings. First, data were obtained exclusively from the WoS Core Collection, which provides standardized citation indexing and comprehensive reference metadata but may exclude relevant publications indexed only in other databases such as Scopus or PubMed. Second, citation-based indicators were primarily derived from raw citation counts, although average publication year and normalized citation measures were considered, cumulative citation effects may still favor older publications, which is a recognized characteristic of bibliometric datasets. Third, publication trends were summarized using linear regression to describe long-term growth patterns. In bibliometric research, such trend analyses are exploratory in nature and are not intended to capture complex nonlinear dynamics or to serve as validated predictive models; therefore, extrapolated projections should be interpreted cautiously. Fourth, co-authorship and country collaboration networks were constructed as visual representations of structural relationships in the literature. Quantitative cluster validation metrics are not intrinsic to visualization-driven bibliometric mapping and were not central to the analytical framework of this study. While bibliometric approaches effectively quantify research productivity and influence, they cannot fully assess the methodological quality or the evidentiary strength of individual studies.

CONCLUSION

This bibliometric analysis of 1,241 articles and reviews on anal fissure published between 1980 and 2025 demonstrated a steady growth in publications and anticipates continued growth in the coming decades. The US, Italy, and the United Kingdom were the leading contributors, with the US acting as the primary global hub and the United Kingdom and Italy serving as regional bridges; countries such as Türkiye, India, Pakistan, and Egypt showed emerging but peripheral roles. Influential works were concentrated in high-impact journals, such as the New England Journal of Medicine, and specialty outlets including Diseases of the Colon & Rectum and Colorectal Disease; Brisinda et al.'s 1999 randomized trial was the most cited article. Keyword analysis revealed a thematic evolution from pharmacological therapies toward botulinum toxin injections, fissurectomy, and anoplasty, alongside an increasing emphasis on recurrence, quality of life, and patient-centered outcomes. These findings provide a comprehensive overview of the intellectual structure, collaboration patterns, and emerging research directions in anal fissure research, offering a framework to guide future investigations.

MAIN POINTS

- This study provides the first comprehensive bibliometric analysis of anal fissure research spanning 1980-2025, including 1,241 articles and reviews indexed in the Web of Science Core Collection.
- Publication output has steadily increased over four decades, with projections suggesting continued growth toward 2040, which indicates sustained global academic interest in anal fissure management. The United States, Italy, and the United Kingdom emerged as leading contributors, with distinct international collaboration clusters shaping the intellectual structure of the field.
- Citation and co-citation analyses identified seminal randomized trials on botulinum toxin and pharmacologic sphincter relaxation as the foundational knowledge base of contemporary management strategies.
- Analysis of keyword trends demonstrated a thematic evolution from pharmacological therapies (glyceryl trinitrate, diltiazem, nifedipine) to botulinum toxin, sphincter-preserving surgery, wound healing, recurrence, and quality-of-life outcomes.
- Despite growing global output, research remains concentrated in high-income countries, highlighting the need for broader international collaboration and multicenter randomized trials focusing on long-term outcomes and patient-centered measures.

ETHICS

Ethics Committee Approval: Not required because the study analyzed publicly available bibliographic data and did not involve human participants or identifiable patient information.

Informed Consent: Not applicable.

Footnotes

Authorship Contributions

Surgical and Medical Practices: M.B.T., V.B.T., Concept: M.B.T., V.B.T., Design: M.B.T., V.B.T., Data Collection and/or Processing: M.B.T., V.B.T., Analysis and/or Interpretation: M.B.T., V.B.T., Literature Search: M.B.T., V.B.T., Writing: M.B.T., V.B.T.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Domínguez-Muñoz M, Balla A, Gómez-Rosado JC, Morales-Conde S. Current evidence and new trends in anal fissure treatment. Minerva Surg. 2025; 80(3): 258-65.
2. Lund JN, Scholefield JH. Aetiology and treatment of anal fissure. Br J Surg. 1996; 83(10): 1335-44.
3. Realis Luc A, Di Vittori A, Salvatore A, Gravante G, De Simone V, Micarelli A, et al. Long-term incontinence rates after traditional lateral internal sphincterotomy: a 5-year retrospective analysis from a high-volume tertiary referral center for proctologic disorders. Tech Coloproctol. 2025; 29(1): 149.
4. Kutluk F, Ergün S, Mihmanli İ, Demiryas S, Hamid R, Perek A. The effect of sphincter pressure and anal length on surgical decision in chronic anal fissure. J Clin Med. 2025; 14(11): 3805.
5. Oad S, Qadir MU, Alam F, Jawed I, Jabeen S, Javaid M, et al. Efficacy of botulinum toxin in the treatment of chronic anal fissure: a comprehensive systematic review. Ann Med Surg (Lond). 2025; 87(8): 5142-52.
6. Schmuck RB, Roblick M. Incidence, diagnosis, and management of proctological conditions during pregnancy. Visc Med. 2025.
7. Hardin BI, Singer AAM, Mar SJ, Zacur GM, Eder SJ, French KR, et al. Reliability of patient-reported pain and discharge for predicting perianal lesions in pediatric Crohn's disease. J Pediatr Gastroenterol Nutr. 2025; 81(1): 69-73.
8. Garcia-Aguilar J, Belmonte C, Wong WD, Lowry AC, Madoff RD. Open vs. closed sphincterotomy for chronic anal fissure: long-term results. Dis Colon Rectum. 1996; 39(4): 440-3.

9. Nyam DC, Pemberton JH. Long-term results of lateral internal sphincterotomy for chronic anal fissure with particular reference to incidence of fecal incontinence. Dis Colon Rectum. 1999; 42(10): 1306-10.

10. Kennedy ML, Sowter S, Nguyen H, Lubowski DZ. Glyceryl trinitrate ointment for the treatment of chronic anal fissure: results of a placebo-controlled trial and long-term follow-up. Dis Colon Rectum. 1999; 42(8): 1000-6.

11. Lund JN, Scholefield JH. A randomised, prospective, double-blind, placebo-controlled trial of glyceryl trinitrate ointment in treatment of anal fissure. Lancet. 1997; 349(9044): 11-4.

12. Carapeti EA, Kamm MA, McDonald PJ, Chadwick SJ, Melville D, Phillips RK. Randomised controlled trial shows that glyceryl trinitrate heals anal fissures, higher doses are not more effective, and there is a high recurrence rate. Gut. 1999; 44(5): 727-30.

13. Altomare DF, Rinaldi M, Milito G, Arcanà F, Spinelli F, Nardelli N, et al. Glyceryl trinitrate for chronic anal fissure--healing or headache? Results of a multicenter, randomized, placebo-controled, double-blind trial. Dis Colon Rectum. 2000; 43(2): 174-9; discussion 179-81.

14. Chen X. Advancements in the application of botulinum toxin type a in the treatment of anorectal disorders. Toxicon. 2025; 260: 108346.

15. Maria G, Cassetta E, Gui D, Brisinda G, Bentivoglio AR, Albanese A. A comparison of botulinum toxin and saline for the treatment of chronic anal fissure. N Engl J Med. 1998; 338(4): 217-20.

16. Arslan C, Yildirim Y, Kocak M, Bisgin T, Bayraktar IE, Bayraktar O. The 5-year outcomes and predictors of healing in chronic anal fissure treated with botulinum toxin: a retrospective analysis of 199 cases. Tech Coloproctol. 2025; 29(1): 122.

17. Gallo G, Micarelli A, De Simone V, Tierno S, Tomassini F, Goglia M, et al. Fissurectomy with or without anoplasty for chronic anal fissures is a valid alternative to lateral internal sphincterotomy: a retrospective cohort study of 475 patients. Tech Coloproctol. 2025; 29(1): 104.

18. Ciszkowicz E, Miłoś A, Łyskowski A, Buczkowicz J, Nieczaj A, Lecka-Szlachta K, et al. AMPEC4: naja ashei venom-derived peptide as a stimulator of fibroblast migration with antibacterial activity. Molecules. 2025; 30(10): 2167.

19. Büyükdereli Atadağ Y, Şanli AN, Esen U. Benign anorectal diseases and obsessive symptoms: a holistic analysis of psychological and lifestyle factors - a prospective case-control study. Psychol Health Med. 2025: 1-11.

20. Thippeswamy KM, Gruber M, Abdelaziz H, Abdel-Dayem M. Efficacy and safety of botulinum toxin injection in the management of chronic symptomatic anal fissure: a systematic review and meta-analysis of randomized controlled trials. Tech Coloproctol. 2025; 29(1): 44.

21. Wald A, Bharucha AE, Cosman BC, Whitehead WE. ACG clinical guideline: management of benign anorectal disorders. Am J Gastroenterol. 2014; 109(8): 1141-57; (Quiz) 1058.

22. Demir E, Doğan G, Kiraz M, Akdağli Ekici A, Kayir S, Ekici M, et al. Current trends in pain management: a bibliometric analysis for the 1980-to-2023 period. Medicine (Baltimore). 2025; 104(3): e41319.

23. Brisinda G, Maria G, Bentivoglio AR, Cassetta E, Gui D, Albanese A. A comparison of injections of botulinum toxin and topical nitroglycerin ointment for the treatment of chronic anal fissure. N Engl J Med. 1999; 341(2): 65-9.

24. Schouten WR, Briel JW, Auwerda JJ. Relationship between anal pressure and anodermal blood flow. The vascular pathogenesis of anal fissures. Dis Colon Rectum. 1994; 37(7): 664-9.

25. Coté TR, Mohan AK, Polder JA, Walton MK, Braun MM. Botulinum toxin type a injections: adverse events reported to the US food and drug administration in therapeutic and cosmetic cases. J Am Acad Dermatol. 2005; 53(3): 407-15.

26. Iacono G, Cavataio F, Montalto G, Florena A, Tumminello M, Soresi M, et al. Intolerance of cow's milk and chronic constipation in children. N Engl J Med. 1998; 339(16): 1100-4.

27. Naumann M, Jankovic J. Safety of botulinum toxin type A: a systematic review and meta-analysis. Curr Med Res Opin. 2004; 20(7): 981-90.

28. Holly EA, Whittemore AS, Aston DA, Ahn DK, Nickoloff BJ, Kristiansen JJ. Anal cancer incidence: genital warts, anal fissure or fistula, hemorrhoids, and smoking. J Natl Cancer Inst. 1989; 81(22): 1726-31.

29. Patel S, Patel A, Chandarana C, Patel B, Patel M, Shah U, et al. Critical insights into analytical methodologies for lidocaine hydrochloride and diltiazem hydrochloride: a comparative review. Futur J Pharm Sci. 2025; 11(95): 34.

30. Rijcken E. Analfissuren bei chronisch entzündlichen Darmerkrankungen. Coloproctology. 2025; 47: 261-8.