Annals of Gastroenterology (2026) **39,** 1-9

Functional and long-term outcomes of ileorectal versus ileal pouch–anal anastomosis for familial adenomatous polyposis: a systematic review and meta-analysis

Umar Hayat[a], Amna Iqbal[b], Daniyal Raza[c], Iqra Arshad[c], Naeem Ijaz[d], Aamir Saeed[e], Aman Ali[f], Ali A. Siddiqui[g], Douglas G. Adler[h]

Geisinger Wyoming Valley Medical Center, Wilkes-Barre, PA, USA; University of Toledo, Ohio, USA; Saint Louis University Hospital, Missouri, USA; UHS Health, New York, USA; Vanderbilt University Hospitals, Nashville, Tennessee, USA; Wilkes-Barre General Hosptial, Wilkes-Barre, USA; Inova Fairfax Hospital, VA, USA; Porter Adventist Hospital, Denver, CO, USA

Abstract

Background Colectomy with ileorectal anastomosis (IRA) or proctocolectomy with ileal pouch–anal anastomosis (IPAA) are the 2 standard prophylactic surgical options for patients with familial adenomatous polyposis (FAP). We aimed to compare the functional and long-term outcomes of IRA and IPAA among FAP patients.

Methods We searched large databases to identify studies evaluating the functional outcomes of prophylactic surgical modalities for FAP. The primary outcomes of interest were the functional outcomes of IRA with IPAA, including fecal incontinence, fecal urgency, use of pads for defecation, and use of antidiarrheal drugs. Secondary outcomes included the social outcomes of the 2 procedural modalities, early postoperative adverse events, and long-term adverse events.

Results Compared with IPAA, FAP patients who underwent IRA had a lower frequency of fecal incontinence (odds ratio [OR] 0.56, 95% confidence interval [CI] 0.41-0.76; P<0.001), but were more likely to have fecal urgency (OR 1.53, 95%CI 1.08-2.15; P=0.02). There was no difference in the use of pads and antidiarrheals between the 2 groups (OR 0.55, 95%CI 0.27-1.11; P=0.09; and OR 0.83, 95%CI 0.57-1.22; P=0.35, respectively). Moreover, there was no difference in social outcomes or perioperative adverse events (OR 1.19, 95%CI 0.53-2.68; P=0.68; and OR 0.73, 95%CI 0.50-1.06; P=0.10, respectively). Lastly, IRA had lower long-term complications than IPAA (OR 0.78, 95%CI 0.63-0.97; P=0.03).

Conclusion IRA has better functional outcomes regarding fecal incontinence, a better prophylactic intervention profile, and fewer long-term complications.

Keywords Familial adenomatous polyposis, *adenomatous polyposis coli* gene, ileorectal anastomosis, ileal pouch–anal anastomosis, meta-analysis

Ann Gastroenterol 2026; 39 (X): 1-9

Introduction

Familial adenomatous polyposis (FAP) is a hereditary disorder caused by mutations in the *adenomatous polyposis coli (APC)* gene, leading to the development of numerous colorectal adenomas and a nearly certain lifetime risk of colorectal cancer if untreated [1]. Epidemiological data estimate FAP's prevalence at approximately 1 in 13,528 individuals, with near-100 % penetrance by age 40, underscoring the urgency of timely surgical interventions to mitigate the risk of malignancy [1]. Surgical management remains the cornerstone of treatment for FAP, aiming to balance the goals of cancer prevention and quality-of-life preservation. Among the available surgical

Conflict of Interest: Douglas G. Adler, MD, is a consultant to Boston Scientific. All other authors declare no conflict of interest

Correspondence to: Douglas G. Adler, MD, Center for Advanced Therapeutic Endoscopy, Porter Adventist Hospital, Denver, CO, USA, e-mail: dougraham2001@gmail.com

Received 14 November 2025; accepted 5 April 2026; published online 26 June 2026

DOI: https://doi.org/10.20524/aog.2026.1087

options, ileorectal anastomosis (IRA) and ileal pouch–anal anastomosis (IPAA) are the 2 most widely adopted [2]. IRA preserves the rectum, offering superior immediate bowel function, while IPAA eliminates the rectal stump, providing more comprehensive cancer prevention [3].

Recent studies have demonstrated the efficacy of both IRA and IPAA in reducing colorectal cancer mortality in FAP patients, noting that, while IRA entails a residual risk of rectal cancer, it is associated with fewer adverse events and earlier recovery compared to IPAA [4]. The long-term risk of rectal cancer following IRA, reported to be as high as 25% at 20 years post-surgery, highlights the critical need for tailored follow-up strategies and vigilant rectal surveillance [5]. Patient-specific factors, including cancer risk, lifestyle priorities, the feasibility of long-term surveillance, influence the choice between these 2 different approaches.

Although prior studies have provided variable insights into the functional and oncological outcomes of IRA and IPAA, advances in surgical techniques, perioperative care, genetic profiling, and surveillance protocols have since emerged, necessitating an updated synthesis of evidence to reflect contemporary practices.

This study aimed to systematically review and analyze the functional and long-term outcomes of IRA and IPAA in FAP management. In addition, our study aimed to provide evidence-based guidance for individualized surgical decision-making, to optimize cancer-prevention strategies, and enhance patient-centered care for individuals with FAP.

Methods and materials

Literature search and study selection

This systematic review and meta-analysis were conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 Statement guidelines [6]. Covidence software (Covidence systematic review software; Veritas Health Innovation: Melbourne, Australia) was used to assess the eligibility of articles for inclusion. We comprehensively searched central databases, including Medline, Embase, Web of Science, and Cochrane Central Registry via Wiley, LILACS, and CINAHL via EBSCOhost, from inception to September 2024. The following mesh search strategies were used for the study screening process: "Adenomatous Polyposis Coli/surgery/FAP Anastomosis". "Surgical, Colonic Pouches," "Postoperative Complications/etiology", "Proctocolectomy", "Restorative/methods", "Treatment Outcomes", "ileorectal anastomosis vs. ileal pouch-anal anastomosis", "Proctocolectomy", "Ileectomy", "Ileorectal pouch", "ileoanal anastomosis". All studies that met the eligibility criteria, with no language or publication-year restrictions, were identified and included in the initial screening. The studies' references were manually searched for relevant articles. We contacted authors/researchers to seek data from published studies, unpublished abstracts (presented at major academic meetings), and clinical trials registered at ClinicalTrials.gov (https://ClinicalTrials.gov).

[a]Department of Internal Medicine, Geisinger Wyoming Valley Medical Center, Wilkes-Barre, PA, USA (Umar Hayat); [b]Department of Medicine, University of Toledo, Ohio, USA (Amna Iqbal); [c]Department of Medicine, Saint Louis University Hospital, Missouri, USA (Daniyal Raza, Iqra Arshad); [d]Department of Internal Medicine, UHS Health, New York, USA (Naeem Ijaz); [e]Department of Medicine, Vanderbilt University Hospitals, Nashville, Tennessee, USA (Aamir Saeed); [f]Department of Gastroenterology, Wilkes-Barre General Hospital, Wilkes-Barre, USA (Aman Ali); [g]Department of Gastroenterology, Inova Fairfax Hospital, VA, USA (Ali A. Siddiqui); [h]Center for Advanced Therapeutic Endoscopy, Porter Adventist Hospital, Denver, CO, USA (Douglas G. Adler)

Inclusion and exclusion criteria

This systematic review and meta-analysis included all observational studies that compared the functional and long-term outcomes of IPAA and IRA. The following inclusion criteria were used for studies of interest to patients: (a) pediatric patients and older than 18 years; (b) diagnosed with FAP; and (c) have undergone an IRA vs. an IPAA procedure for FAP.

Exclusion criteria were: (a) pregnant patients, unfit for either strategy, or lacking informed consent; (b) studies involving animal experiments, case reports, and studies that did not report original data, including reviews, editorials, or opinions; and (c) incomplete literature data.

Data extraction (selection and coding)

Two authors (UH and IA) independently conducted the title and abstract screening process, in accordance with the previously defined inclusion and exclusion criteria, using Covidence software. Following the initial title and abstract screening, relevant full-length articles were evaluated based on the outcomes of interest. Any potential conflicts during screening or selection were resolved through discussion, or, if consensus could not be achieved, by involving a third screener. Reasons for exclusion were documented and presented in a PRISMA flow chart (Fig. 1). One author developed data extraction forms, which were piloted by both authors and revised accordingly.

Data points of interest included key study characteristics, such as study design, study setting, number of clinical sites, and primary outcomes. Information about participants was also collected, including demographic characteristics, the number of participants, the number with missing outcome data, and adverse events and long-term outcomes of IPAA and IRA. The data were systematically gathered from absolute numbers directly provided or inferred from the information reported in the selected manuscript or abstract. The meta-analysis included studies that provided sufficient information for at least 1 analysis.

Study outcomes

The primary outcomes of interest were functional outcomes, such as fecal incontinence, day and nighttime fecal

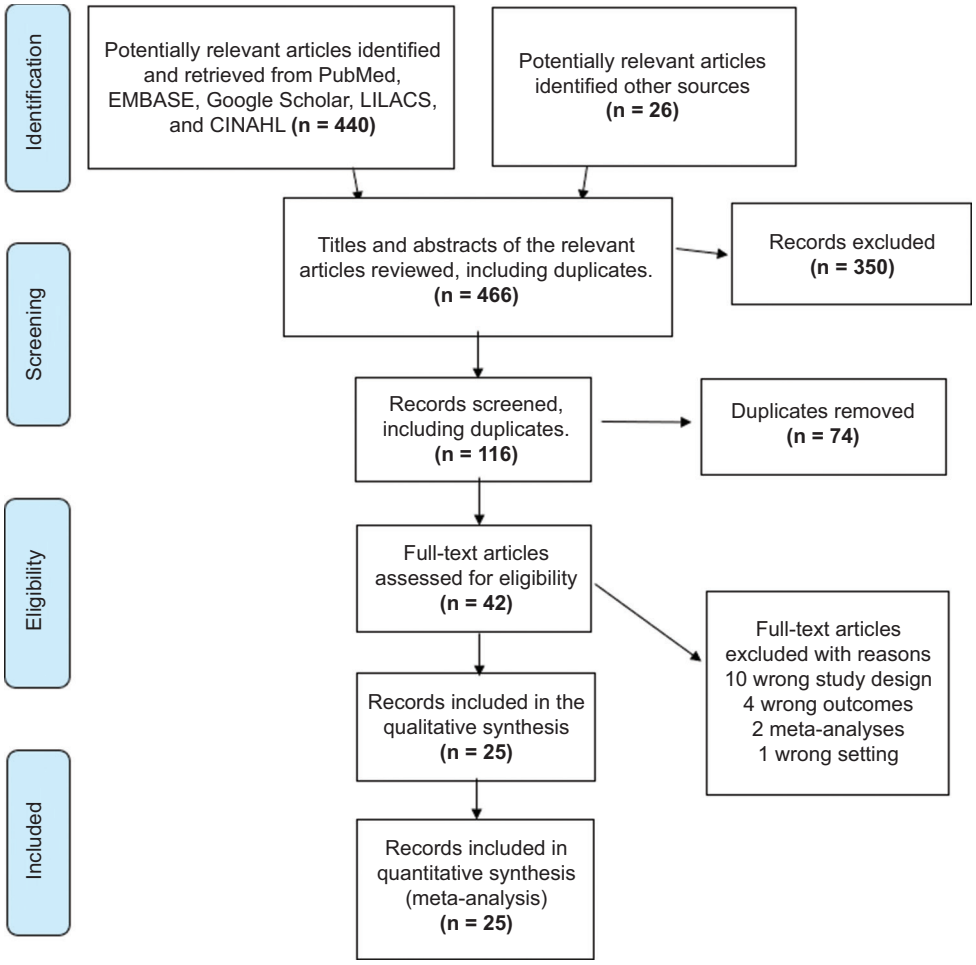


Figure 1 PRISMA flow chart

urgency, use of pads for defecation, and use of antidiarrheal drugs, compared between the 2 procedures (IRA and IPAA) for FAP. Secondary outcomes were early postoperative adverse events, such as bowel obstruction, bleeding, intra-abdominal sepsis, anastomotic separation, wound infection, and reoperation within 30 days; social outcomes, such as dietary and social restriction; and male and female sexual dysfunction (dyspareunia). Long-term adverse events were perianal irritation, anastomotic stricture, desmoid formation, cancer in the pouch or rectum, and the need for further operation on the pouch (IPAA) or rectum (IRA).

Statistical analysis

The study's statistical analysis was performed using Stata 17.0 (StataCorp, College Station, Texas, USA). Using a random-effects model, we calculated pooled odds ratios (ORs) with 95% confidence intervals (CIs) for all outcomes in the IPAA group compared with the IRA group. A P-value of <0.05 was considered statistically significant for the pooled effect estimates. Forest plots for all outcomes of interest were used to present the study results. We used the I^2 and X^2 statistics from the Cochran Q test to assess heterogeneity across studies. According to Cochran's handbook, an I^2 value of 0-25% was interpreted as "might not be important," 25-50% as "moderate," 50-75% as substantial, and 75-100% as considerable heterogeneity [6].

Risk of bias and quality assessment

The modified Newcastle-Ottawa Quality Assessment Scale was used to assess the quality of all the observational studies included in this meta-analysis [7]. Studies with a significant score of 5 or more out of 8 items (study selection, comparability, and study outcomes) were considered high quality and included in the final analysis. (Supplementary Table 1) They were encompassed in the final pooled analysis. Two authors (UH and AI) conducted the quality assessment and resolved ambiguities by consensus. Egger's regression test was performed to assess the risk of bias, and funnel plots were

drawn to assess potential bias in study selection. The uniform symmetry of the funnel plots indicates a likely absence of significant publication bias.

Results

Study characteristics

The initial search screening strategy identified 466 articles. After removal of irrelevant records (n=350) and duplicates (n=70), 42 full-length articles were assessed for possible eligibility in this systematic review and meta-analysis (Fig. 1). After a thorough full-text evaluation, 25 articles with 2687 patients were selected for inclusion in the final analysis. All were observational studies [5,8-15,18-31]. Most studies were single-center, and 3 were multicenter. All studies included in the final analysis compared at least 1 outcome of interest. Table 1 describes the salient features of individual studies.

Functional outcomes

Eleven studies compared the rate of fecal incontinence between IRA and IPAA [8,10,11,18,20,25,27,29,30,32,33]. The pooled OR was 0.56 (95%CI 0.41-0.76; P<0.001), indicating a lower frequency of fecal incontinence among FAP patients undergoing IRA compared with IPAA (Fig. 2). However, IRA patients were more likely to have fecal urgency (both day and nighttime) than the IPAA group, with a pooled OR of 1.53 (95%CI 1.08-2.15; P=0.02) (Fig. 3). There was no difference in the use of pads at day and night, or the use of antidiarrheals between the 2 groups (OR 0.55, 95%CI 0.27-1.11; P=0.09 and OR 0.83, 95%CI 0.57-1.22; P=0.35, respectively) (Fig. 4,5).

Social outcomes

Six studies [9,15,18,19,21,22] compared the social outcomes of IRA with IPAA for FAP, and there was no statistically

Table 1: Salient features of individual studies

Study [ref.]	Design	Region	Total population (n)	Mean age (years)	M/F Ratio
Mozafar *et al*., 2014 [10]	Retrospective cohort	Iran	27	37.15 (21-50 years)	3.5
Bülow *et al*., 2013 [9]	Retrospective cohort	Denmark	84	28 (16-40 years)	0.58
Mira *et al*., 2022 [30]	Prospective cohort	Sweden	71	NA	NA
Pasquer *et al*., 2021 [11]	Retrospective cohort	France	289	24.3 (9.6)	0.17
Vitellaro *et al*., 2011 [12]	Prospective cohort	Italy	55	28 (15-68 years)	NA
Konishi *et al*., 2016 [5]	Retrospective cohort	Japan	256	33 (12-68 years)	NA
Von Roon *et al*., 2008 [14]	Retrospective cohort	UK	185	NA	0.45
Kartheuser *et al*., 1996 [15]	Prospective cohort	France	171	30 (10-67 years)	NA
Campos *et al*., 2009 [16]	Retrospective cohort	Brazil	88	NA	NA
Stevanato *et al*., 2015 [17]	Retrospective cohort	Brazil	86	NA	NA
van Duijvendijk *et al*., 1999 [18]	Retrospective cohort	Netherlands	279	37+-12	NA
Liu *et al*., 2011 [20]	Prospective cohort	China	22	29 (18-45 years)	NA
Tonelli *et al*., 1997 [8]	Prospective cohort	Italy	38	22.9 (11-43 years)	NA
Nagy *et al*., 1996 [25]	Prospective cohort	Hungary	13	NA	NA
Campos *et al*., 2011 [13]	Prospective cohort	Brazil	49	29.2 (11-69 years)	NA
Hassan *et al*., 2005 [19]	Prospective cohort	USA	94	27 (9)	0.71
Soravia *et al*., 1999 [21]	Retrospective cohort	Canada	20	38.1	NA
Bjork *et al*., 2001 [22]	Prospective cohort	Sweden	NA	26 (10-40 years)	NA
Ambroze Jr *et al*., 1992 [24]	Prospective cohort	USA	NA	28 +_ 10	NA
Sommovilla *et al*., 2021 [23]	Prospective cohort	USA	20	NA	NA
Ziv *et al*., 1995 [26]	Retrospective cohort	USA	40	31 years	NA
Gunther *et al*., 2003 [31]	Retrospective cohort	Germany	151	35 years	1.29
Madden *et al*., 1991 [27]	Retrospective cohort	UK	86	NA	NA
Penna *et al*., 1993 [41]	Retrospective cohort	France	240	NA	NA
Rodriguez *et al*., 1992 [29]	Retrospective cohort	Spain	224	32.5	NA
Ko *et al.,* 1999 [32]	Retrospective cohort	USA	68	45+12	NA

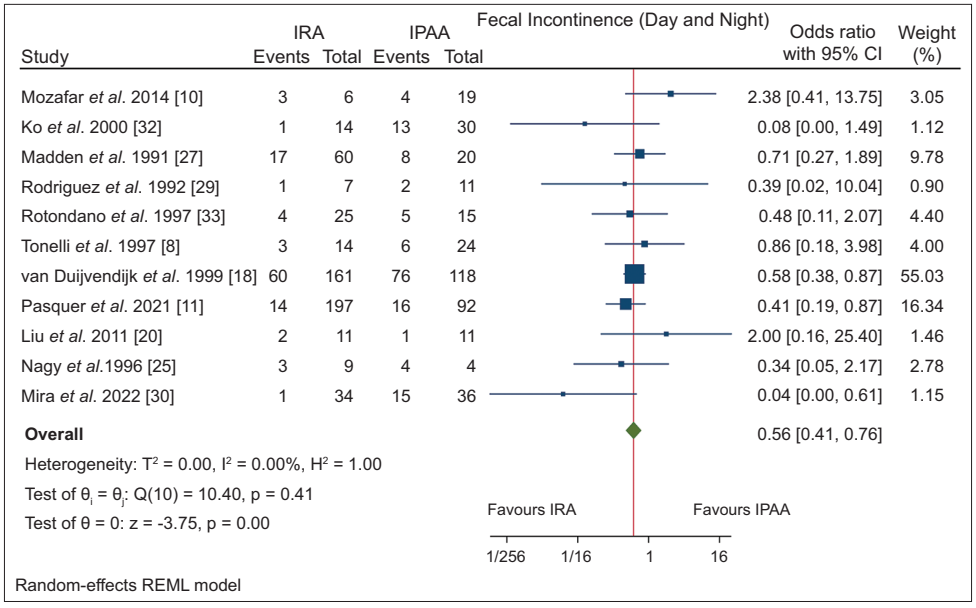


Figure 2: The pooled odds ratio of fecal incontinence compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval

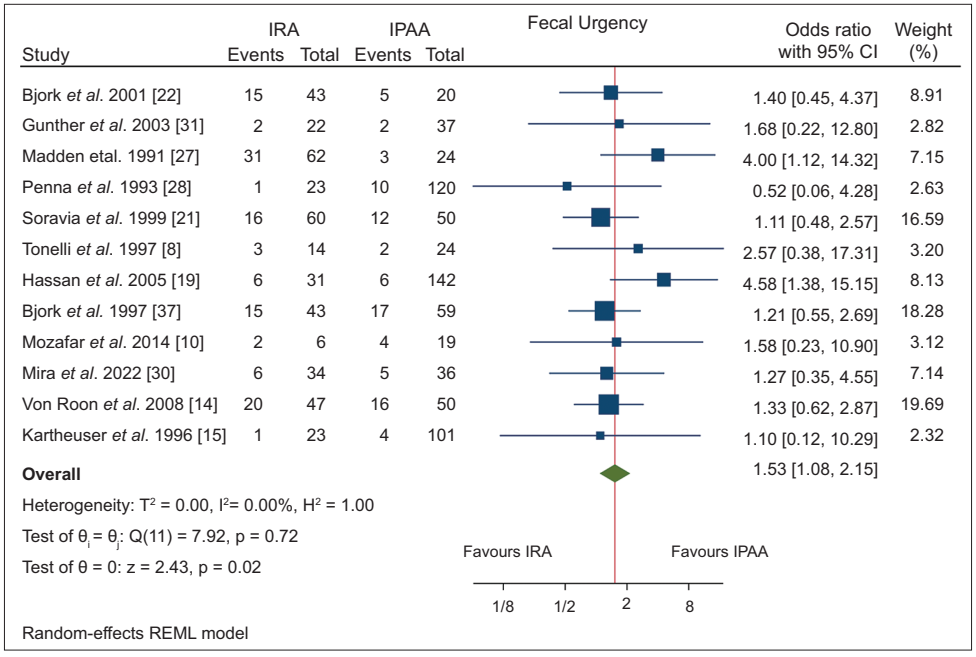


Figure 3 The pooled odds ratio of fecal urgency compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval

significant difference between the 2 groups (OR 1.19, 95%CI 0.53-2.68; P=0.68) (Fig. 6).

Perioperative adverse events

Fourteen studies compared the perioperative adverse events of IRA with IPAA procedures done for FAP [5,8-12,14,17,18,21,22,26,30,32]. There was no statistically significant difference between the 2 interventions in perioperative adverse events (OR 0.73, 95%CI 0.50-1.06; P=0.10) (Supplementary Fig. 1).

Long-term adverse events and anastomotic leakage

Fifteen studies [5,8,9,11-13,16-18,21,22,24,26,30,37] compared long-term adverse events associated with IRA and

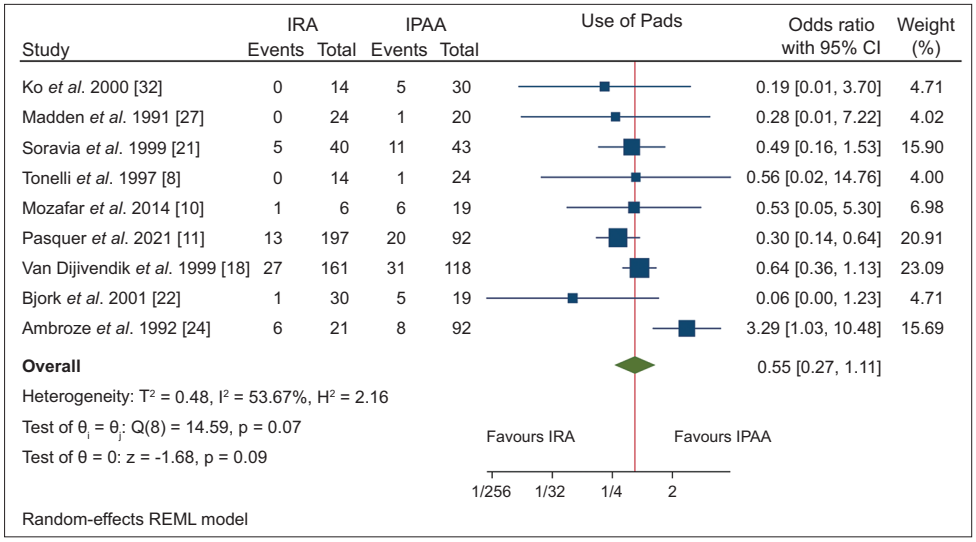


Figure 4 The pooled odds ratio of pads used during the day, and night compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval

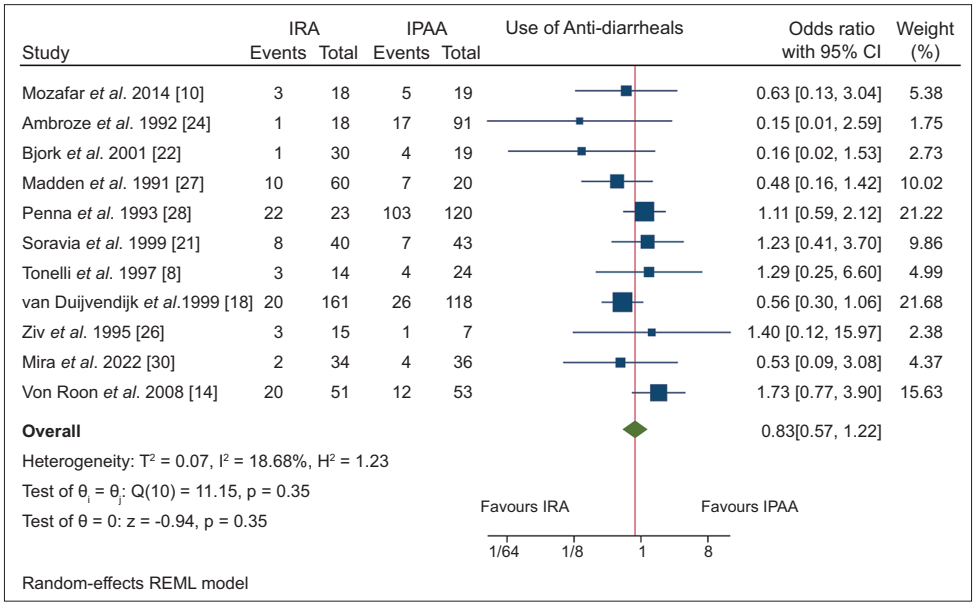


Figure 5 The pooled odds ratio of the use of antidiarrheals compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval

IPAA. IRA was found to be a better prophylactic intervention among FAP patients, with fewer long-term adverse events compared to IPAA (pooled OR 0.78, 95% CI 0.63-0.97; P=0.03) (Supplementary Figs. 2 and 3). However, the 2 groups showed no difference in anastomotic leakage (OR 0.62, 95%CI 0.19-2.02; P=0.42) (Supplementary Fig. 4).

Discussion

The findings of our study indicate that functional outcomes are generally better with IRA than with IPAA in patients with FAP. Specifically, IRA is associated with a significantly lower risk of fecal incontinence during both day and night, probably due to the retention of functional rectal tissue, which contributes to improved bowel control. However, IRA patients experienced more fecal urgency than those undergoing IPAA, though differences in pad use and anti-diarrheal medication use were not statistically significant. These findings suggest that both procedures may offer comparable outcomes for patients aiming to minimize social disruptions, with some trade-offs (Table 2).

While IPAA may offer certain advantages by reducing bowel urgency, the decision between IRA and IPAA requires individualized consideration of factors such as age, risk

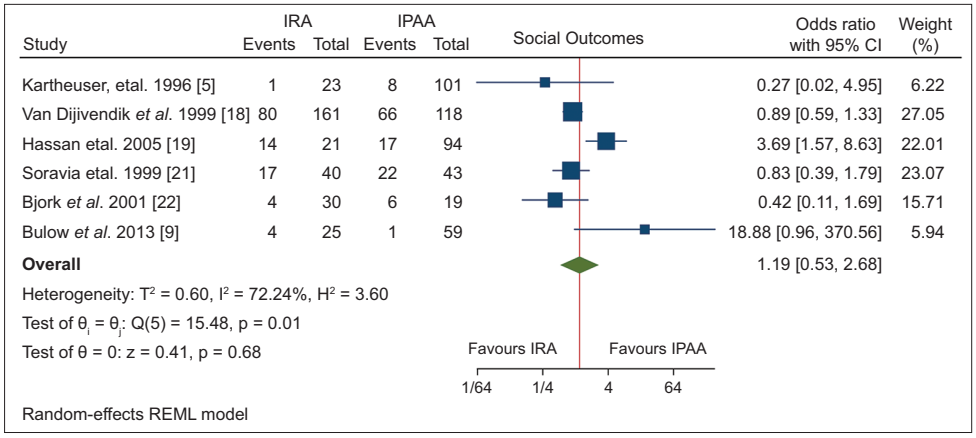


Figure 6 The pooled odds ratio of social outcomes compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval

Table 2 Comparison of outcomes between IRA and IPAA in FAP patients

Outcome	Pooled Odds Ratio (OR)	Confidence Interval (CI)	P-value	Interpretation	References
Fecal Incontinence (day and night)	0.56	0.41-0.76	<0.001	Lower frequency of fecal incontinence with IRA compared to IPAA	[8,10,11,18-20,25,27, 29,30,32,33]
Fecal Urgency (day and night)	1.53	1.08-2.15	0.02	Higher likelihood of fecal urgency with IRA than IPAA	[8,10,11,18,19,20,25, 27,29,30,32,33]
Use of Pads (Day & Night)	0.55	0.27-1.11	0.09	No significant difference	[8,10,11,18,19,20,25, 27,29,30,32,33]
Use of Antidiarrheals	0.83	0.57-1.22	0.35	No significant difference	[8,10,11,18,19,20,25, 27,29,30,32,33]
Social Outcomes	1.19	0.53-2.68	0.68	No statistically significant difference between IRA and IPAA	[9,15,18,19,21,22]
Perioperative Adverse Events	0.73	0.50-1.06	0.10	No statistically significant difference between the 2 interventions for perioperative events	[5,8,9,10,11,12,14,17, 18,21,22,26,30,32]
Long-term Adverse Events	0.78	0.63-0.97	0.03	IRA had lower long-term complications compared to IPAA	[5,8,9,11,12,16,17,18, 21,22,24,26,30]
Anastomotic Leakage	0.62	0.19-2.02	0.42	No statistically significant difference in anastomotic leakage between IRA and IPAA	[5,8,9,11,12,16,17,18, 21,22,24,26,30]

IRA, ileorectal anastomosis; IPAA ileal pouch–anal anastomosis; FAP, familial adenomatous polyposis

tolerance, surveillance requirements, and lifestyle priorities. Consistent with our findings, a Markov model-based decision analysis [34] showed that IRA yields better functional outcomes than IPAA for patients with rectal-sparing FAP. This evidence favors selecting IRA where quality of life is a key concern, particularly for patients with few rectal polyps that are manageable with endoscopy. Age, in particular, has a significant influence on functional outcomes; this has been underscored by Delaney *et al* [35], who reported that older patients often experience higher rates of incontinence and nocturnal seepage following IPAA, yet they still report high levels of satisfaction. Conversely, younger patients who prioritize minimal disruption to their lifestyle may benefit from customized decision-making that carefully balances reducing fecal urgency with other pertinent factors.

Postoperative adverse event rates and functional outcomes are similar between IRA and IPAA. However, IRA does not eliminate rectal polyps, with 61% of patients requiring further interventions for polyp removal [36,37]. Individualized surgical planning remains essential, balancing functional outcomes with the need for comprehensive cancer prevention.

However, in cases where IRA fails because of uncontrollable rectal polyps or malignancy, conversion to IPAA is an option, though it may compromise functional outcomes—particularly nighttime continence and bowel movement frequency [38]. In addition, it was reported that 8% of secondary IPAA procedures following IRA in FAP patients were unsuccessful. Functional outcomes and adverse event rates were comparable between primary and secondary IPAA, but wound infections were significantly higher in secondary IPAA (9% vs. 0.9%) [39]. These results highlight the need for careful preoperative planning when choosing IRA as the initial procedure.

Desmoid tumors, occurring in 8.9-12% of post-colectomy patients, mainly in young women, often in the mesentery,

and is associated with morbidity and mortality [39]. An IRA-associated desmoid can complicate rectal stump management or IPAA. Preoperative planning and multidisciplinary care are crucial [40,41]. While sulindac can reduce rectal polyps in IRA patients, it does not fully prevent mucosal proliferation or rectal cancer risk, which is 23% over 20 years, especially with APC mutations or previous colon cancer [42,43]. Colectomy with IRA is still viable, with 96% patient satisfaction, despite the need for secondary surgeries [44].

Our study synthesizes recent evidence to provide nuanced insights into the functional and long-term adverse events of IRA and IPAA, thereby advancing understanding of surgical strategies for FAP. However, a few limitations must be noted. First, most of the studies included were retrospective and observational. While these studies reflect real-world practice, they limit the ability to establish causality and may introduce biases. In terms of patient populations, follow-up durations, and outcome definitions, heterogeneity among the studies limits the generalizability of the pooled results. Additionally, functional outcomes, such as fecal urgency and social disruptions, were often based on patient-reported measures, introducing subjectivity and potential recall bias. Lastly, adjunctive therapies that may influence cancer risk, such as non-steroidal anti-inflammatory drugs and enhanced rectal surveillance, were not uniformly evaluated, limiting the ability to assess their role across the interventions.

In conclusion, IRA offers superior functional outcomes for FAP management, while IPAA provides enhanced cancer prevention, emphasizing the need for individualized surgical decision-making.

Summary Box

What is already known:

- Both ileorectal anastomosis (IRA) and ileal pouch–anal anastomosis (IPAA) are established surgical options for managing Familial adenomatous polyposis (FAP), balancing cancer prevention with preservation of quality of life
- IRA generally provides better bowel function but carries a persistent risk of rectal cancer, requiring lifelong endoscopic surveillance
- IPAA offers more complete cancer risk reduction by removing the rectum but may be associated with worse functional outcomes and greater postoperative morbidity

What the new findings are:

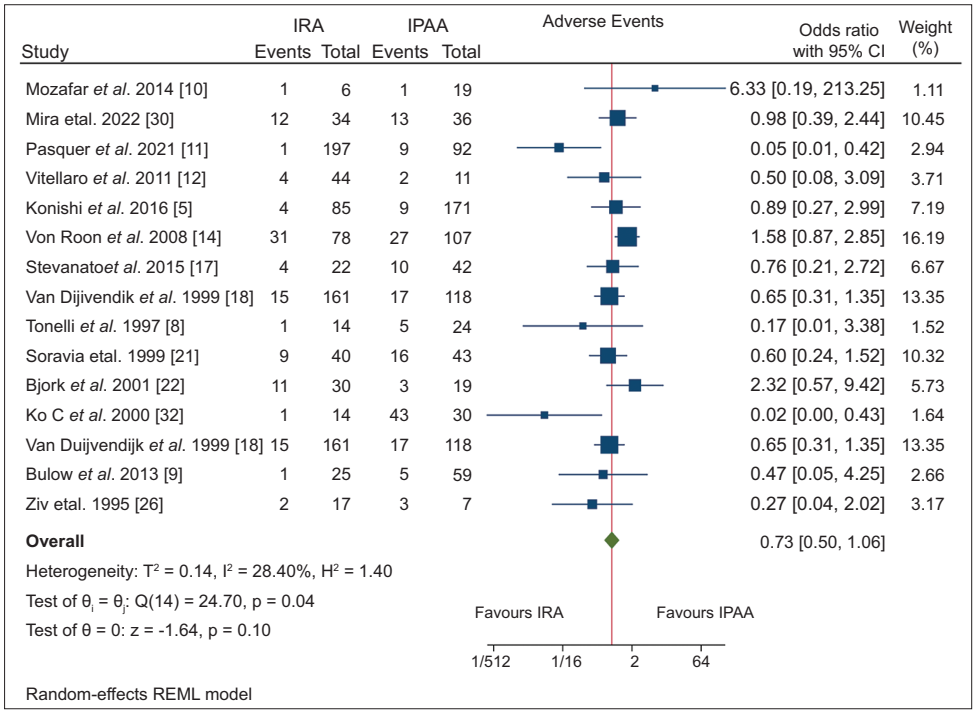
- This updated systematic review and meta-analysis demonstrates that IRA is associated with significantly lower rates of fecal incontinence and fewer long-term complications compared with IPAA
- Patients undergoing IRA experienced more fecal urgency, while rates of pad use, antidiarrheal medication use, social outcomes, perioperative adverse events, and anastomotic leakage were comparable between the two procedures
- The findings support individualized surgical decision-making, balancing the superior functional outcomes of IRA against the enhanced cancer prevention provided by IPAA

References

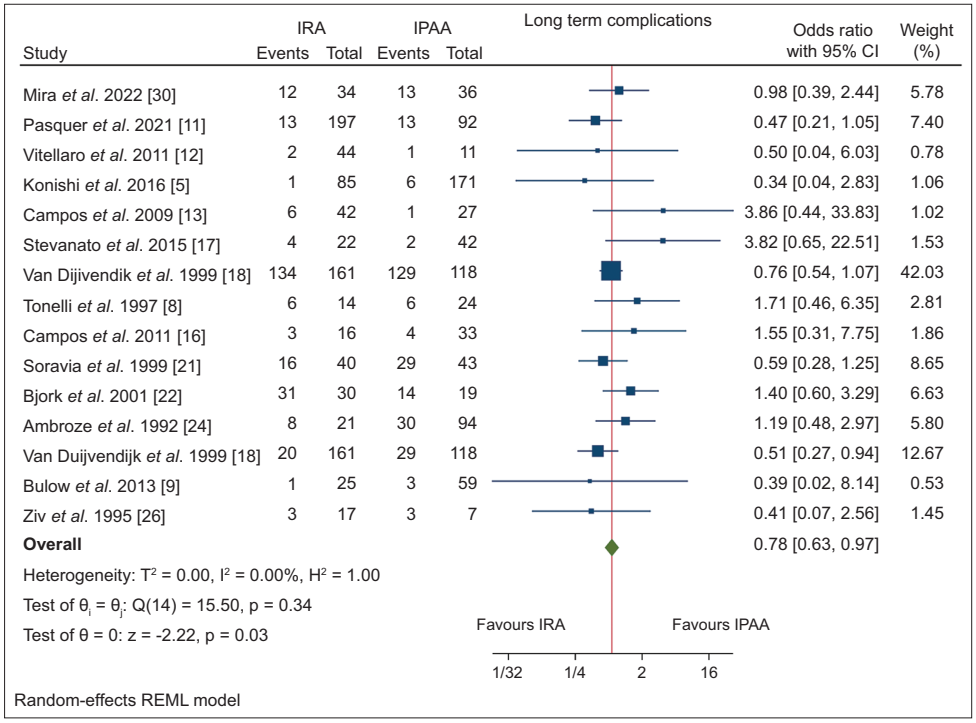
1. Bisgaard ML, Fenger K, Bülow S, Niebuhr E, Mohr J. Familial adenomatous polyposis (FAP): frequency, penetrance, and mutation rate. *Hum Mutat* 1994;**3**:121-125.
2. Phillips RKS. Familial adenomatous polyposis: the surgical treatment of the colorectum. In: *Seminars in Colon and Rectal Surgery*. WB Saunders Company, 1995;**6**:33-37.
3. Jagelman DG. Ileorectal anastomosis—familial adenomatous polyposis. *Hepatogastroenterology* 1991;**38**:535-537.
4. Church J, Burke C, McGannon E, Pastean O, Clark B. Risk of rectal cancer in patients after colectomy and ileorectal anastomosis for familial adenomatous polyposis: a function of available surgical options. *Dis Colon Rectum* 2003;**46**:1175-1181.
5. Konishi T, Ishida H, Ueno H, Kobayashi H, Hinoi T, Inoue Y, Ishida F, Kanemitsu Y, Yamaguchi T, Tomita N, Matsubara N, Watanabe T, Sugihara K. Feasibility of laparoscopic total proctocolectomy with ileal pouch-anal anastomosis and total colectomy with ileorectal anastomosis for familial adenomatous polyposis: results of a nationwide multicenter study. *Int J Clin Oncol* 2016;**21**:953-961.
6. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;**372**:n71.
7. Wells GA, Shea B, O'Connell D. Ottawa Hospital Research Institute. Available from: https://www.ohri.ca/programs/clinical_epidemiology/oxford.asp [Accessed 14 May 2026].
8. Tonelli F, Valanzano R, Monaci I, Mazzoni P, Anastasi A, Ficari F. Restorative proctocolectomy or rectum-preserving surgery in patients with familial adenomatous polyposis: results of a prospective study. *World J Surg* 1997;**21**:653-658; discussion 659.
9. Bülow S, Højen H, Buntzen S, Larsen KL, Preisler L, Qvist N. Primary and secondary restorative proctocolectomy for familial adenomatous polyposis: complications and long-term bowel function. *Colorectal Dis* 2013;**15**:436-441.
10. Mozafar M, Shateri K, Tabatabaey A, Lotfollahzadeh S, Atqiaee K. Familial adenomatous polyposis: ileo-anal pouch versus ileo-rectal anastomosis. *Gastroenterol Hepatol Bed Bench* 2014;**7**:206-210.
11. Pasquer A, Benech N, Pioche M, Breton A, Rivory J, Vinet O, Poncet G, Saurin JC. Prophylactic colectomy and rectal preservation in FAP: systematic endoscopic follow-up and adenoma destruction changes natural history of polyposis. *Endosc Int Open* 2021;**9**:E1014-E1022.
12. Vitellaro M, Bonfanti G, Sala P, Poiasina E, Barisella M, Signoroni S, Mancini A, Bertario L. Laparoscopic colectomy and restorative proctocolectomy for familial adenomatous polyposis. *Surg Endosc* 2011;**25**:1866-1875.
13. Campos FG, Araújo SE, Melani AG, Pandini LC, Nahas SC, Cecconello I. Surgical outcomes of laparoscopic colorectal resections for familial adenomatous polyposis. *Surg Laparosc Endosc Percutan Tech* 2011;**21**:327-333.
14. von Roon AC, Tekkis PP, Lovegrove RE, Neale KF, Phillips RK,

Clark SK. Comparison of outcomes of ileal pouch-anal anastomosis for familial adenomatous polyposis with and without previous ileorectal anastomosis. *Br J Surg* 2008;**95**:494-498.
15. Kartheuser AH, Parc R, Penna CP, Tiret E, Frileux P, Hannoun L, Nordlinger B, Loygue J. Ileal pouch-anal anastomosis as the first choice operation in patients with familial adenomatous polyposis: a ten-year experience. *Surgery* 1996;**119**:615-623.
16. Campos FG, Perez RO, Imperiale AR, Seid VE, Nahas SC, Cecconello I. Surgical treatment of familial adenomatous polyposis: ileorectal anastomosis or restorative proctolectomy? *Arq Gastroenterol* 2009;**46**:294-299.
17. Stevanato Filho PR, Aguiar S, Ferreira FO. Surgical complications and metachronous rectal cancer risk in patients with classic familial adenomatous polyposis. *J Coloproctol* 2015;**35**:8-13.
18. van Duijvendijk P, Slors JF, Taat CW, Oosterveld P, Vasen HF. Functional outcome after colectomy and ileorectal anastomosis compared with proctocolectomy and ileal pouch-anal anastomosis in familial adenomatous polyposis. *Ann Surg* 1999;**230**:648-654.
19. Hassan I, Chua HK, Wolff BG, Donnelly SF, Dozois RR, Larson DR, Schleck CD, Nelson H. Quality of life after ileal pouch-anal anastomosis and ileorectal anastomosis in patients with familial adenomatous polyposis. *Dis Colon Rectum* 2005;**48**:2032-2037.
20. Liu LJ, Shi XH, Xu XD, Gong HF, Fu CG, Wang H. Laparoscopic-assisted ileal pouch-rectal muscle sheath anastomosis for the treatment of familial adenomatous polyposis. *Int J Colorectal Dis* 2011;**26**:1051-1057.
21. Soravia C, Klein L, Berk T, O'Connor BI, Cohen Z, McLeod RS. Comparison of ileal pouch-anal anastomosis and ileorectal anastomosis in patients with familial adenomatous polyposis. *Dis Colon Rectum* 1999;**42**:1028-1034.
22. Björk J, Akerbrant H, Iselius L, Svenberg T, Oresland T, Påhlman L, Hultcrantz R. Outcome of primary and secondary ileal pouch-anal anastomosis and ileorectal anastomosis in patients with familial adenomatous polyposis. *Dis Colon Rectum* 2001;**44**:984-992.
23. Sommovilla, Joshua; Liska, David; Jia, Xue; Kalady, Matthew F; Sklow, Bradford; Burke, Carol A; Leach, Brandie H.; Steele, Scott R.; Church, James M. IPAA is more "desmoidogenic" than ileorectal anastomosis in familial adenomatous polyposis. *Dis Colon Rectum* 2022;**65**:1351-1361.
24. Ambroze WL Jr, Dozois RR, Pemberton JH, Beart RW Jr, Ilstrup DM. Familial adenomatous polyposis: results following ileal pouch-anal anastomosis and ileorectostomy. *Dis Colon Rectum* 1992;**35**:12-15.
25. Nagy A. Comparison of the functional results of ileorectostomy and ileal pouch-anal anastomosis following total colectomy. *Surg Today* 1996;**26**:377-380.
26. Ziv Y, Church JM, Oakley JR, McGannon E, Fazio VW. Surgery for the teenager with familial adenomatous polyposis: ileo-rectal anastomosis or restorative proctocolectomy? *Int J Colorectal Dis* 1995;**10**:6-9.
27. Madden MV, Neale KF, Nicholls RJ, Landgrebe JC, Chapman PD, Bussey HJ. Comparison of morbidity and function after colectomy with ileorectal anastomosis or restorative proctocolectomy for familial adenomatous polyposis. *Br J Surg* 1991;**78**:789-792.
28. Penna C, Tiret E, Parc R, Sfairi A, Kartheuser A, Hannoun L. Secondary proctectomy and ileal pouch–anal anastomosis after ileorectal anastomosis for familial adenomatous polyposis. *Br J Surg* 1993;**80**:1621-1623.
29. Rodriguez SanJuan JC, Casanova Rituerto D, Martino Fernandez E, Fernandez Escalante JC, Gomez Fleitas JM, Herrera Norena L. Familial adenomatous polyposis: proctocolectomy with an ileal pouch *versus* rectal preservation. *Rev Esp Enferm Dig* 1992;**82**: 159-163.
30. Mira D, Björk J. Functional outcome differences between males and females who have undergone reconstructive surgery with ileorectal anastomoses (IRA) or ileal pouch-anal anastomoses (IPAA) due to familial adenomatosis polyposis-a prospective cohort study. *Fam Cancer* 2022;**21**:609.
31. Günther K, Braunrieder G, Bittorf BR, Hohenberger W, Matzel KE. Patients with familial adenomatous polyposis experience better bowel function and quality of life after ileorectal anastomosis than after ileoanal pouch. *Colorectal Dis* 2003;**5**:38-44.
32. Ko CY, Rusin LC, Schoetz DJ Jr, Moreau L, Coller JA, Murray JJ. Does better functional result equate with better quality of life? Implications for surgical treatment in familial adenomatous polyposis. *Dis Colon Rectum* 2000;**43**:829-835.
33. Rotondano G, Esposito P, Novi A, Pellecchia L, Liguori C, Romano G. Surgery for familial polyposis of the colon. A functional follow-up]. *Minerva Chir* 1997;**52**:1163-1167.
34. Melnitchouk N, Saadat LV, Bleday R, Goldberg JE. A decision analysis for rectal-sparing familial adenomatous polyposis: total colectomy with ileorectal anastomosis versus proctocolectomy with IPAA. *Dis Colon Rectum* 2019;**62**:27-32.
35. Delaney CP, Fazio VW, Remzi FH. Prospective, age-related analysis of surgical results, functional outcome, and quality of life after ileal pouch-anal anastomosis. *Ann Surg* 2003;**238**:221-228.
36. Sinha A, Tekkis PP, Rashid S, Phillips RK, Clark SK. Risk factors for secondary proctectomy in patients with familial adenomatous polyposis. *Br J Surg* 2010;**97**:1710-1715.
37. Van Duijvendijk P, Slors JF, Taat CW, Oosterveld P, Vasen HF. Quality of life after total colectomy with ileorectal anastomosis or proctocolectomy and ileal pouch-anal anastomosis for familial adenomatous polyposis. *Br J Surg* 2000;**87**:590-596.
38. Soravia C, O'Connor BI, Berk T, McLeod RS, Cohen Z. Functional outcome of conversion of ileorectal anastomosis to ileal pouch-anal anastomosis in patients with familial adenomatous polyposis and ulcerative colitis. *Dis Colon Rectum* 1999;**42**:903-908.
39. Jones IT, Jagelman DG, Fazio VW, Lavery IC, Weakley FL, McGannon E. Desmoid tumors in familial polyposis coli. *Ann Surg* 1986;**204**:94-97.
40. Nordlinger B. Operation and abdominal desmoid tumors in familial adenomatous polyposis. *Surg Gynecol Obstet* 1993;**177**:263-268.
41. Clark SK, Phillips RK. Desmoids in familial adenomatous polyposis. *Br J Surg* 1996;**83**:1494-1504.
42. Spagnesi MT, Tonelli F, Dolara P. Rectal proliferation and polyp occurrence in patients with familial adenomatous polyposis after sulindac treatment. *Gastroenterology* 1994;**106**:362-366.
43. Bertario L, Russo A, Radice P. Genotype and phenotype factors as determinants for rectal stump cancer in patients with familial adenomatous polyposis. Hereditary Colorectal Tumors Registry. *Ann Surg* 2000;**231**:538-543.
44. Slors JF, den Hartog Jager FC, Trum JW, Taat CW, Brummelkamp WH. Long-term follow-up after colectomy and ileorectal anastomosis in familial adenomatous polyposis coli. Is there still a place for the procedure? *Hepatogastroenterology* 1989;**36**:109-112.

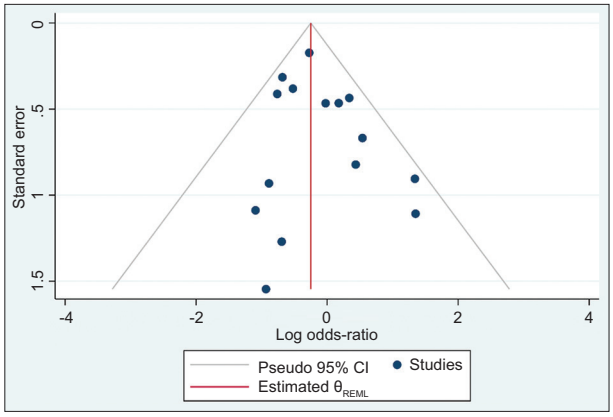
Supplementary material



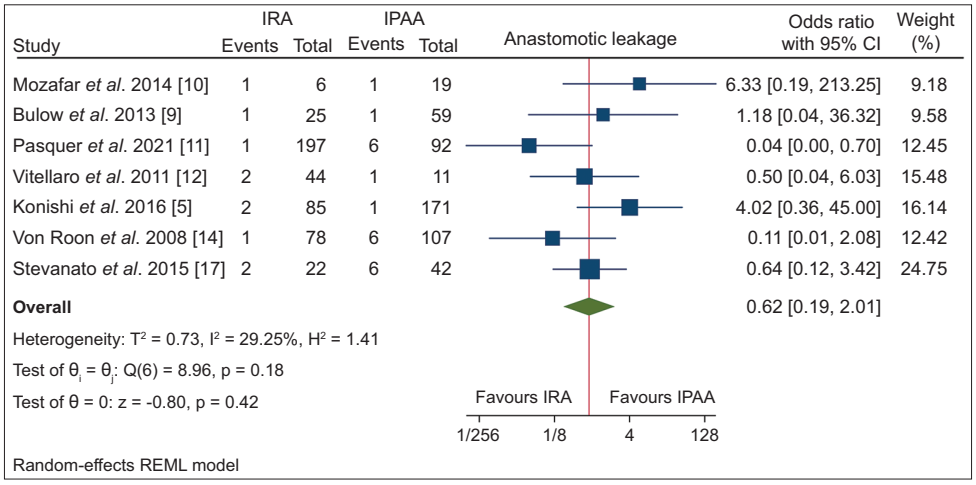
Supplementary Figure 1 The pooled odds ratio of perioperative adverse events compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval



Supplementary Figure 2 The pooled odds ratio of long-term complications compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval



Supplementary Figure 3 Funnel plot of long-term complications compared between IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval



Supplementary Figure 4 Forest plot of anastomotic leakage comparing IRA and IPAA
IRA, ileorectal anastomosis; IPAA, ileal pouch–anal anastomosis; CI, confidence interval

Supplementary Table 1 Modified Newcastle-Ottawa Scale (NOS) for quality assessment of included studies

Study characteristics			Mozafar *et al.*, 2014	Bulow *et al.*, 2013	Mira *et al.*, 2022	Pasquer *et al.*, 2021	Vitellaro *et al.*, 2011	Konishi *et al.*, 2016
Study selection	Represents community	Population-based study: 1; single center: 0; multicenter: 0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Size of cohort	Patient cohort >40 patients in study: 1; 39-20: 0.5; <20: 0	1	1	1	1	1	1
	Technical and clinical success mentioned	Clear information: 1; information derived from percentage value: 0.5; not mentioned: 0	1	1	0.5	1	1	0.5
	The outcome is not present at the start of the study	Present: 1; not present: 0	1	1	1	1	1	1
Comparability	Comparable intervention	Yes: 1; no: 0	1	1	1	1	1	1
Outcome	Type of write-up	Full manuscript: 1; abstract: 0.5	1	1	1	1	1	1
	Study follow-up time	Mentioned: 1; not mentioned: 0	1	1	1	1	1	1
	Adequacy of patients who followed up	All patients had follow up: 1; >50% followed-up: 0.5; not followed-up or<50% followed-up: 0	1	1	1	1	1	1
Overall score			7.5	7.5	7.0	7.5	7.5	7.0

Study characteristics			Von Roon *et al.*, 2008	Kartheuser *et al.*, 1996	Campos *et al.*, 2009	Stevanato *et al.*, 2015	Van Dijivendik *et al.*, 1999	Liu *et al.*, 2011
Study selection	Represents community	Population-based study: 1; single center: 0; multicenter: 0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Size of cohort	Patient cohort >40 patients in study: 1; 39-20: 0.5; <20: 0	1	1	1	1	1	1
	Technical and clinical success mentioned	Clear information: 1; information derived from percentage value: 0.5; not mentioned: 0	0.5	1	0.5	1	1	1
	The outcome is not present at the start of the study	Present: 1; not present: 0	1	1	1	1	1	1
Comparability	Comparable intervention	Yes: 1; no: 0	1	1	1	1	1	1
Outcome	Type of write-up	Full manuscript: 1; abstract: 0.5	1	1	1	1	1	1
	Study follow-up time	Mentioned: 1; not mentioned: 0	1	1	1	1	1	1
	Adequacy of patients who did follow up	All patients had follow up: 1; >50% followed-up: 0.5; not followed-up or <50% followed-up: 0	1	1	1	1	1	1
Overall score			7.0	7.5	7.0	7.5	7.5	7.5

Study characteristics			Tonelli *et al.*, 1997	Nagy *et al.*, 1996	Campos *et al.*, 2011	Hassan *et al.*, 2005	Soravia *et al.*, 1999	Bjork *et al.*, 2001
Study selection	Represents community	Population-based study: 1; single center: 0; multicenter: 0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Size of cohort	Patient cohort >40 patients in study: 1; 39-20: 0.5; <20: 0	1	1	1	1	1	1
	Technical and clinical success are mentioned	Clear information: 1; information derived from percentage value: 0.5; not mentioned: 0	1.0	0.5	0.5	1	1	1
	The outcome is not present at the start of the study	Present: 1; not present: 0	1	1	1	1	1	1
Comparability	Comparable intervention	Yes: 1; no: 0	1	1	1	1	1	1
Outcome	Type of write-up	Full manuscript: 1; abstract: 0.5	1	1	1	1	1	1
	Study follow-up time	Mentioned: 1; not mentioned: 0	1	1	1	1	1	1
	Adequacy of patients who did follow up	All patients had follow up: 1, >50% followed-up: 0.5; not followed-up or <50% followed-up: 0	1	1	1	1	1	1
Overall score			7.5	7.0	7.0	7.5	7.5	7.5

Study characteristics			Ambroze Jr *et al.*, 1992	Sommavilla *et al.*, 2021	Ziv *et al.*, 1995	Gunther *et al.*, 2003	Madden *et al.*, 1991	Penna *et al.*, 1993	Rodriguez *et al.*, 1992
Study selection	Represents community	Population-based study: 1; single center: 0; multicenter: 0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Size of cohort	Patient cohort >40 patients in study: 1; 39-20: 0.5; <20: 0	1	1	1	1	1	1	1
	Technical and clinical success mentioned	Clear information: 1; information derived from percentage value: 0.5; not mentioned: 0	1	0.5	1	1	1	0.5	1
	The outcome is not present at the start of the study	Present: 1; not present: 0	1	1	1	1	1	1	1
Comparability	Comparable intervention	Yes: 1; no: 0	1	1	1	1	1	1	1
Outcome	Type of write-up	Full manuscript: 1; abstract: 0.5	1	1	1	1	1	1	1
	Study follow-up time	Mentioned: 1; not mentioned: 0	1	1	1	1	1	1	1
	Adequacy of patients who followed up	All patients had followed up: 1, >50% followed-up: 0.5; not followed-up or <50% followed-up: 0	1	1	1	1	1	1	1
Overall score			7.5	7.0	7.5	7.5	7.5	7.0	7.5