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ORIGINAL CONTRIBUTION

Textbook Outcome After Ileal Pouch–Anal Anastomosis for Ulcerative Colitis: A Nationwide Multicenter Study and Its Implications for Long-Term Quality of Life

Running head: Textbook Outcomes in Surgery for Ulcerative colitis

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S. Morita and K. Okabayashi contributed equally to this work, including study conception, design, coordination, and manuscript preparation. Y. Kitagawa provided overall supervision and critical revision of the manuscript. Collaborating investigators from the participating institutions (Y. Okita, S. Ochi, M. Inomata, A. Nomura, S. Akamoto, H. Kuwabara, and T. Naitoh) contributed to patient enrollment, data acquisition, and study coordination.

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ABSTRACT

BACKGROUND: Textbook outcome is a composite quality measure increasingly used in oncologic surgery but has not been applied to ulcerative colitis. Restorative proctocolectomy with ileal pouch–anal anastomosis is the standard surgical treatment for ulcerative colitis, yet a comprehensive assessment of surgical quality remains lacking. Pouchitis, the most common long-term complication after ileal pouch–anal anastomosis, significantly impairs quality of life and may lead to pouch failure. Linking perioperative success to long-term pouch function is therefore clinically relevant.

OBJECTIVE: To evaluate the feasibility and clinical relevance of textbook outcome as a perioperative quality measure and its association with long-term pouchitis after ileal pouch–anal anastomosis for ulcerative colitis.

DESIGN: Nationwide multicenter retrospective cohort study.

SETTING: Japan's collaborative ulcerative colitis surgery registry including high-volume academic and affiliated hospitals.

PATIENTS: A total of 1,109 patients undergoing ileal pouch–anal anastomosis for ulcerative colitis between 2005 and 2019.

MAIN OUTCOME MEASURES: Textbook outcome was defined as absence of 90-day mortality, major complications (Clavien–Dindo ≥ III), reoperation, readmission, and prolonged hospital stay. Logistic regression identified predictors of textbook outcome; Cox regression evaluated its association with pouchitis.

RESULTS: Textbook outcome was achieved in 57% of patients. In multivariable logistic regression, male sex (OR 0.74, 95% CI: 0.57–0.95), higher preoperative albumin (OR 1.22, 95% CI: 1.01–1.47), and the presence of UC-associated neoplasia (OR 1.48, 95% CI: 1.03–2.14) were

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independently associated with achieving textbook outcome. Textbook outcome achievement increased significantly over time (OR per year 1.04, 95% CI: 1.01–1.07), coinciding with greater adoption of minimally invasive surgery. Failure to achieve textbook outcome was independently associated with higher pouchitis risk (HR 1.67, 95% CI: 1.12–2.49).

LIMITATIONS: Retrospective design and registry-based data may involve unmeasured confounders.

CONCLUSIONS: Textbook outcome is a feasible and clinically meaningful quality metric in ulcerative colitis ileal pouch–anal anastomosis surgery. Its achievement, improving over time with minimally invasive techniques, correlates with reduced pouchitis risk and may serve as a benchmark for surgical quality and outcomes in ulcerative colitis. (See **Video Abstract**)

KEY WORDS: Ileal pouch anal anastomosis; Pouchitis; Textbook outcome; Ulcerative colitis.

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RESULTADO TÍPICO TRAS UNA ANASTOMOSIS ILEOANAL CON BOLSA ILEAL PARA LA COLITIS ULCEROSA: UN ESTUDIO MULTICÉNTRICO A NIVEL NACIONAL Y SUS IMPLICACIONES PARA LA CALIDAD DE VIDA A LARGO PLAZO.

ANTECEDENTES: El resultado del libro de texto es una medida de calidad compuesta que se utiliza cada vez más en la cirugía oncológica, pero que no se ha aplicado a la colitis ulcerosa. La proctocolectomía restauradora con anastomosis ileoanal es el tratamiento quirúrgico estándar para la colitis ulcerosa, pero aún no se ha realizado una evaluación exhaustiva de la calidad quirúrgica. La pouchitis, la complicación a largo plazo más común tras la anastomosis ileoanal, deteriora significativamente la calidad de vida y puede provocar el fallo de la bolsa. Por lo tanto, relacionar el éxito perioperatorio con la función a largo plazo de la bolsa es clínicamente relevante.

OBJETIVO: Evaluar la viabilidad y la relevancia clínica del resultado teórico como medida de calidad perioperatoria y su asociación con la pouchitis a largo plazo tras la anastomosis ileoanal para la colitis ulcerosa.

DISEÑO: Estudio de cohorte retrospectivo multicéntrico a nivel nacional.

ENTORNO: Registro colaborativo japonés de cirugía de colitis ulcerosa, que incluye hospitales académicos y afiliados de gran volumen.

PACIENTES: Un total de 1109 pacientes sometidos a anastomosis ileoanal por colitis ulcerosa entre 2005 y 2019.

PRINCIPALES MEDIDAS DE RESULTADO: El resultado teórico se definió como la ausencia de mortalidad a los 90 días, complicaciones graves (Clavien-Dindo ≥ III),

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reintervención, reingreso y estancia hospitalaria prolongada. La regresión logística identificó los predictores del resultado ideal; la regresión de Cox evaluó su asociación con la pouchitis.

RESULTADOS: Se logró el resultado ideal en el 57 % de los pacientes. En la regresión logística multivariable, el sexo masculino (OR 0,74, IC del 95 %: 0,57-0,95), un nivel más alto de albúmina preoperatoria (OR 1,22, IC del 95 %: 1,01-1,47) y la presencia de neoplasia asociada a la CU (OR 1,48, IC del 95 %: 1,03-2,14) se asociaron de forma independiente con el logro del resultado ideal. El logro de resultados óptimos aumentó significativamente con el tiempo (OR por año 1,04, IC del 95 %: 1,01-1,07), coincidiendo con una mayor adopción de la cirugía mínimamente invasiva. El hecho de no lograr resultados óptimos se asoció de forma independiente con un mayor riesgo de pouchitis (HR 1,67, IC del 95 %: 1,12-2,49).

LIMITACIONES: El diseño retrospectivo y los datos basados en registros pueden implicar factores de confusión no medidos.

CONCLUSIONES: El resultado ideal es una medida de calidad viable y clínicamente significativa en la cirugía de anastomosis ileoanal con bolsa ileal para la colitis ulcerosa. Su consecución, que mejora con el tiempo gracias a las técnicas mínimamente invasivas, se correlaciona con un menor riesgo de pouchitis y puede servir como referencia para la calidad quirúrgica y los resultados en la colitis ulcerosa. *(AI-generated translation)*

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INTRODUCTION

Ulcerative colitis (UC) is a chronic inflammatory condition of the colon with a rising global incidence, including in US, Europe and Asia.[1–3] Although most patients can be managed with medical therapy, surgery remains indicated for those with refractory disease, dysplasia, or neoplasia. Restorative proctocolectomy with ileal pouch–anal anastomosis (IPAA) is the standard surgical treatment, offering both disease control and continence preservation.[4,5] However, the procedure is technically complex and carries risks of short-term morbidity as well as long-term pouch-related complications.[4,5]

In oncologic surgery, textbook outcome (TO) has emerged as a composite quality indicator that consolidates endpoints such as mortality, complications, and readmission into a single benchmark.[6–8] In contrast, outcomes following surgery for UC are usually reported as isolated parameters, limiting assessment of overall care quality. Although minimally invasive surgery (MIS) is increasingly adopted in UC and has demonstrated favorable perioperative outcomes,[9,10] its broader impact—together with other perioperative factors—on comprehensive surgical quality has yet to be examined.

Long-term pouch-related complications remain a significant concern following IPAA. Among these, pouchitis is the most common late complication, capable of markedly reducing quality of life and, in some cases, leading to pouch failure.[11,12] Although several large Western and Japanese series have described short-term outcomes after IPAA,[13–15] the relationship between comprehensive perioperative success and long-term pouch health has not been clarified.

Therefore, the objectives of this study were to (i) determine the rate of TO achievement following IPAA for UC in a large nationwide multicenter cohort from Japan, (ii) identify factors

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associated with TO, and (iii) examine the clinical implications of TO achievement, with particular emphasis on pouchitis.

MATERIAL AND METHODS

Study Design and Data Source

This retrospective cohort study utilized a nationwide multicenter registry of UC surgery in Japan, which gathers perioperative and long-term outcomes from tertiary referral hospitals. Ethical approval was obtained at all participating institutions, and the need for individual consent was waived owing to the study's retrospective design.

Patients

All consecutive patients who underwent restorative proctocolectomy with IPAA for UC between 2005 and 2019 were included. Both single-stage and staged procedures were eligible. Patients who did not undergo pouch construction or had incomplete data were excluded. This cross-sectional study has been reported in line with the STROBE guidelines.

Definition of Textbook Outcome

TO was defined as the absence of all of the following adverse events: 90-day mortality, major postoperative complications (Clavien–Dindo grade ≥III), reoperation within 90 days, readmission within 90 days, and prolonged hospital stay (above the cohort's 75th percentile). This definition was adapted from oncologic surgery literature and tailored for UC.

Outcomes and Variables

The primary endpoint was TO achievement. In addition to evaluating TO as the primary endpoint, our primary analysis examined predictors of achieving TO. The secondary endpoint was the incidence of pouchitis during follow-up. Covariates included age, sex, BMI, disease duration, preoperative albumin, ASA class, surgical approach (open vs MIS), emergency status,

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and UC-associated neoplasia. Pouchitis was defined as episodes requiring hospitalization, as captured in the registry.

Statistical Analysis

Continuous variables were expressed as medians (IQR) and compared with the Wilcoxon rank-sum test; categorical variables were compared with chi-squared or Fisher's exact tests. Univariable and multivariable logistic regression identified predictors of TO. Pouchitis incidence was assessed using Kaplan–Meier and Cox regression analyses. Trends in TO over time were examined with logistic regression using surgical year as a continuous variable. A p value < 0.05 was considered significant. Analyses were conducted in R (version 4.2.0).

RESULTS

Baseline Characteristics

A total of 1,109 patients (97.4%) who underwent IPAA for ulcerative colitis between 2005 and 2019 were analyzed (Fig. 1). Median age was 42 years (IQR, 29–56), and median BMI was 19.8 kg/m^2 (IQR, 17.7–22.4). Of these, 450 (40.6%) were female and 250 (22.5%) had UC-associated neoplasia (UCAN). Preoperative albumin, ASA-PS classification, urgency, and surgical approach are summarized in Table 1. Overall, 636 patients (57.3%) achieved TO. Stratified analyses (Table 2) showed that non-TO patients were more often male, had lower albumin, and underwent emergency surgery more frequently, whereas UCAN was more common among TO achievers. In the entire cohort, prolonged hospital stay occurred in 24.0%, major complications (Clavien–Dindo ≥III) in 19.9%, readmission in 14.2%, reoperation in 6.5%, and 90-day mortality in 0.3%. Figure 2 illustrates TO determinants, with prolonged stay, complications, and mortality contributing most to TO failure. TO achievement increased significantly over time (OR, 1.04 per year; 95% CI, 1.01–1.07; $p = 0.02$; Fig. 3). MIS was associated with higher TO rates than open

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surgery, and its use rose steadily across the study period (Supplemental Figure 1A and 1B at http://links.lww.com/DCR/C600).

Predictors of Textbook Outcome

In univariate analyses, male sex, open surgery, lower preoperative albumin, emergency presentation, higher ASA-PS, and absence of UC-associated neoplasia were significantly associated with non-achievement of TO. In multivariable logistic regression, female sex (OR 0.74, 95% CI: 0.57–0.95), higher preoperative albumin (OR 1.22, 95% CI: 1.01–1.47), and the presence of UC-associated neoplasia (OR 1.48, 95% CI: 1.03–2.14) were independently associated with achieving a Textbook Outcome. Conversely, male sex, lower albumin levels, and the absence of UC-associated neoplasia were related to TO non-achievement. Surgical approach (MIS vs open) demonstrated borderline significance in multivariable analysis ($p = 0.06$; Table 3).

Association Between TO and Pouchitis

TO achievement was significantly associated with a lower incidence of pouchitis, defined as episodes requiring hospitalization (Fig. 4A). In univariate analysis, TO non-achievement ($p = 0.024$) and younger age ($p < 0.01$) emerged as significant risk factors; both remained independent predictors in multivariable analysis (Table 4). The cumulative incidence of pouchitis was higher among non-TO patients, with the greatest divergence observed in the early postoperative period (Fig. 4B; Supplemental Fig. 2 at http://links.lww.com/DCR/C601).

DISCUSSION

This nationwide multicenter study offers three key insights into surgical quality after IPAA for UC. First, it establishes the feasibility of applying TO to UC surgery—a benign but technically demanding setting where conventional oncologic benchmarks are less applicable. Second, TO achievement increased significantly over time, paralleling the adoption of MIS and reflecting

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improvements in perioperative care. Third, TO non-achievement was independently associated with a higher risk of pouchitis, linking perioperative success to long-term pouch health.

Although TO is well established in oncologic surgery,[8,16,17] its application in benign but technically complex procedures has been limited, with only a few recent reports in transplantation.[18,19] A recent NSQIP-based abstract reported TO rates for several IBD procedures using a 30-day composite definition.20 While this provides an important early benchmark for short-term perioperative quality, it did not include postoperative mortality or long-term functional outcomes such as pouchitis. In contrast, our nationwide study applied a comprehensive 90-day TO definition and demonstrated an association between perioperative quality and long-term pouch outcomes after IPAA.

Restorative proctocolectomy with IPAA, however, is a demanding operation associated with considerable perioperative morbidity, making comprehensive assessment of surgical quality equally important. With the incidence of UC continuing to rise in both Western countries and Asia, including Japan,[1,2] the surgical burden is expected to grow, reinforcing the need for robust quality metrics such as TO. This study provides the first nationwide multicenter evaluation of TO in UC IPAA, revealing that only 57% of patients achieved TO, thereby highlighting substantial opportunities for quality improvement in this high-risk procedure.

The adoption of MIS for UC has grown rapidly over the past two decades.[18,19] In our nationwide cohort, TO rates rose in parallel with MIS uptake, reflecting temporal improvements in perioperative quality. Although MIS was significantly associated with TO in univariable analysis, its effect diminished in multivariable analysis, reaching only marginal significance. This may be explained by the steep learning curve of laparoscopic IPAA,[21] institutional differences in expertise, and case selection bias, as more complex or urgent cases were often

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managed with open surgery. Nonetheless, the temporal trend strongly suggests that MIS has contributed to improved outcomes. Looking ahead, early data[22] indicate that robotic-assisted IPAA may further improve perioperative quality by reducing conversion rates and blood loss, though cost and training challenges remain.

Pouchitis is the most common long-term complication after IPAA, with significant effects on quality of life and pouch survival.[12,23] Large cohorts from Europe, North America, and Japan have reported functional outcomes and risk factors for pouch failure.24–26 In our study, pouchitis requiring hospitalization occurred in ~6% of patients and was independently linked to TO non-achievement. Although hospitalization for pouchitis may be less frequent in some healthcare systems, this stringent definition ensured consistent identification of clinically significant episodes in our cohort. Perioperative morbidity, such as pelvic sepsis or anastomotic leakage, may initiate chronic inflammation or structural damage, increasing susceptibility to later pouchitis. Prior studies have identified pelvic sepsis and anastomotic complications as strong predictors of pouch dysfunction and failure,[27,28] and large series have confirmed their detrimental impact on pouch survival.[29,30] Although this mechanism remains theoretical, our findings support the view that early comprehensive perioperative success influences long-term pouch health. Notably, the divergence in pouchitis risk between TO and non-TO patients was most pronounced in the early postoperative period, with hazards converging over time, suggesting that perioperative recovery quality may primarily influence early susceptibility rather than the long-term phenotype of chronic pouchitis. These results suggest that beyond isolated complications, the cumulative burden of perioperative events—captured by TO—affects long-term outcomes, underscoring TO's value as a holistic quality metric. Pouchitis encompasses heterogeneous clinical patterns, including early-onset and chronic forms, each of which may arise through

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distinct biological pathways. While perioperative factors are likely to exert greater influence during the early postoperative period, later or chronic pouchitis may involve mechanisms that extend beyond perioperative recovery alone. This distinction provides additional context for understanding how perioperative quality relates to the long-term risk of clinically meaningful pouchitis.

This study has limitations. Its retrospective design introduces potential unmeasured confounders, and institutional differences in surgical practice and perioperative management may have affected outcomes. The TO definition, adapted from oncologic surgery, may not fully capture quality in UC. Finally, the observed effect of MIS should be interpreted with caution, as early adoption, learning curves, and selection bias could have influenced the results.

CONCLUSIONS

TO was achieved in over half of UC IPAA patients and correlated with improved long-term pouch outcomes. Its rising rates alongside the adoption of MIS highlight TO's value as a benchmark for surgical quality. These results support TO as a comprehensive metric in UC surgery, bridging perioperative success with long-term, patient-centered outcomes.

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REFERENCES

1. Aniwan S, Santiago P, Loftus EV Jr, Park SH. The epidemiology of inflammatory bowel disease in Asia and Asian immigrants to Western countries. *United European Gastroenterol J*. 2022;10:1063–1076.
2. Yamazaki M, Chung H, Xu Y, Qiu H. Trends in the prevalence and incidence of ulcerative colitis in Japan and the US. *Int J Colorectal Dis*. 2023;38:135.
3. Ng SC, Shi HY, Hamidi N, et al. Worldwide incidence and prevalence of inflammatory bowel disease in the 21st century: a systematic review of population-based studies. *Lancet*. 2017;390:2769–2778.
4. Fazio VW, Ziv Y, Church JM, et al. Ileal pouch-anal anastomoses complications and function in 1005 patients. *Ann Surg*. 1995;222:120–127.
5. Grieco MJ, Remzi FH. Surgical management of ulcerative colitis. *Gastroenterol Clin North Am*. 2020;49:753–768.
6. Staiger RD, Rössler F, Kim MJ, et al. Benchmarks in colorectal surgery: multinational study to define quality thresholds in high and low anterior resection. *Br J Surg*. 2022;109:1274–1281.
7. Merath K, Chen Q, Bagante F, et al. A multi-institutional international analysis of textbook outcomes among patients undergoing curative-intent resection of intrahepatic cholangiocarcinoma. *JAMA Surg*. 2019;154:e190571.
8. Lucocq J, Scollay J, Patil P. Evaluation of textbook outcome as a composite quality measure of elective laparoscopic cholecystectomy. *JAMA Netw Open*. 2022;5:e2232171.

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9. Hida K, Okita Y, Fujii Y, et al; Japan Society of Laparoscopic Colorectal Surgery. Surgical trend including minimally invasive surgeries for ulcerative colitis in the COSUC study: the largest multicenter cohort study in Japan. *Surg Endosc*. 2025;39:3911–3920.
10. Singh P, Bhangu A, Nicholls RJ, Tekkis P. A systematic review and meta-analysis of laparoscopic *vs* open restorative proctocolectomy. *Colorectal Dis*. 2013;15:e340–e351.
11. Biancone L, Michetti P, Travis S, et al; European Crohn's and Colitis Organisation (ECCO). European evidence-based Consensus on the management of ulcerative colitis: special situations. *J Crohns Colitis*. 2008;2:63–92.
12. Shen B, Kochhar GS, Rubin DT, et al. Treatment of pouchitis, Crohn's disease, cuffitis, and other inflammatory disorders of the pouch: consensus guidelines from the International Ileal Pouch Consortium. *Lancet Gastroenterol Hepatol*. 2022;7:69–95.
13. Fazio VW, Tekkis PP, Remzi F, et al. Quantification of risk for pouch failure after ileal pouch anal anastomosis surgery. *Ann Surg*. 2003;238:605–614.
14. Barnes EL, Allin KH, Iversen AT, Herfarth HH, Jess T. Increasing incidence of pouchitis between 1996 and 2018: a population-based danish cohort study. *Clin Gastroenterol Hepatol*. 2023;21:192–199.e7.
15. MacDonald S, Au S, Thornton M, Macdonald A. Complications and functional outcomes after ileo-anal pouch excision-a systematic review of 14 retrospective observational studies. *Int J Colorectal Dis*. 2021;36:677–687.
16. Moazzam Z, Alaimo L, Endo Y, et al. Variations in textbook oncologic outcomes after curative-intent resection: early versus intermediate hepatocellular carcinoma based on barcelona clinic liver cancer criteria and Child-Pugh classification. *Ann Surg Oncol*. 2023;30:750–759.

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17. Augustinus S, Mackay TM, Andersson B, et al; for Global Audits on Pancreatic Surgery Group (GAPASURG). Ideal outcome after pancreatoduodenectomy: a transatlantic evaluation of a harmonized composite outcome measure. *Ann Surg*. 2023;278:740–747.

18. Schenk AD, Logan AJ, Sneddon JM, et al. Textbook outcome as a quality metric in living and deceased donor kidney transplantation. *J Am Coll Surg*. 2022;235:624–642.

19. Schenk AD, Han JL, Logan AJ, et al. Textbook outcome as a quality metric in liver transplantation. *Transplant Direct*. 2022;8:e1322.

20. Burneikis D, Liska D, Lipman J, et al. P094 Textbook outcome in inflammatory bowel disease surgery [abstract P094]. *J Crohns Colitis*. 2021;15:S192.

21. Rencuzogullari A, Stocchi L, Costedio M, Gorgun E, Kessler H, Remzi FH. Characteristics of learning curve in minimally invasive ileal pouch-anal anastomosis in a single institution. *Surg Endosc*. 2017;31:1083–1092.

22. Violante T, Ferrari D, Novelli M, et al. Evaluating the impact of robotic IPAA: a case-matched analysis from a high-volume center. *Ann Surg*. 2024. Sep 5. doi: 10.1097/SLA.0000000000006524. Epub ahead of print. PMID: 39234747.

23. Estevinho MM, Yuan Y, Rodríguez-Lago I, et al. Efficacy and safety of probiotics in IBD: an overview of systematic reviews and updated meta-analysis of randomized controlled trials. *United European Gastroenterol J*. 2024;12:960–981.

24. Michelassi F, Lee J, Rubin M, et al. Long-term functional results after ileal pouch anal restorative proctocolectomy for ulcerative colitis: a prospective observational study. *Ann Surg*. 2003;238:433–441.

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25. Shannon A, Eng K, Kay M, et al. Long-term follow up of ileal pouch anal anastomosis in a large cohort of pediatric and young adult patients with ulcerative colitis. *J Pediatr Surg*. 2016;51:1181–1186.

26. de Zeeuw S, Ahmed Ali U, Donders RART, Hueting WE, Keus F, van Laarhoven CJHM. Update of complications and functional outcome of the ileo-pouch anal anastomosis: overview of evidence and meta-analysis of 96 observational studies. *Int J Colorectal Dis*. 2012;27:843–853.

27. Barnes EL, Desai A, Hashash JG, Farraye FA, Kochhar GS. The natural history after ileal pouch-anal anastomosis for ulcerative colitis: a population-based cohort study from the United States. *Am J Gastroenterol*. 2024;119:2267–2274.

28. Sarangi Y, Kumar A, Malage S, et al. Ileal pouch-anal anastomosis for ulcerative colitis: predictors of early and late complications. *Cureus*. 2024;16:e75086.

29. Fazio VW, O'Riordain MG, Lavery IC, et al. Long-term functional outcome and quality of life after stapled restorative proctocolectomy. *Ann Surg*. 1999;230:575–584.

30. Andersson T, Lunde OC, Johnson E, Moum T, Nesbakken A. Long-term functional outcome and quality of life after restorative proctocolectomy with ileo-anal anastomosis for colitis. *Colorectal Dis*. 2011;13:431–437.

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LEGEND

1. Study flow diagram. From 2005 to 2019, 1,109 patients who underwent ileal pouch–anal anastomosis for ulcerative colitis were included after applying exclusion criteria.

2. Distribution of textbook outcome (TO) parameters. Bar graphs show the individual achievement rates for each element (90-day mortality, major complications, reoperation, readmission, and prolonged length of stay), with the overlaid line indicating cumulative achievement rates as conditions are added sequentially. The accompanying table summarizes both the *Population (%)*, defined as the proportion of patients fulfilling each element individually, and the *Conditional (%)*, defined as the cumulative proportion of patients fulfilling all elements sequentially up to that point.

3. Annual trends in textbook outcome (TO) achievement. Scatter plot with regression line demonstrating the rise in TO rates over time. Logistic regression confirmed a significant upward trend (OR, 1.04 per year (95% CI, 1.01–1.07), $p = 0.02$).

4. Association between textbook outcome (TO) and pouchitis**.** (A) Bar plot showing the ratio for pouchitis. (B) Kaplan–Meier curves of pouchitis incidence stratified by TO status, showing significantly higher pouchitis in non-TO patients.

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Table 1. Baseline characteristics of the study cohort (n = 1,109).

Variable	Level	Overall (n=1109)
Age, years BMI, kg/m² Albumin, g/dL		42 [29–56]
Disease duration, years		19.8 [17.7–22.4]
		3.4 [2.6–4.0]
		5 [1–12]
Gender	Female	450 (40.6%)
	Male	659 (59.4%)
Steroid use	No	484 (43.6%)
	Yes	625 (56.4%)
Immunosuppressive therapy	No	482 (43.6%)
	Yes	624 (56.4%)
Emergency surgery	No	805 (72.6%)
	Yes	304 (27.4%)
Surgical approach	MIS	780 (70.3%)
	Open	329 (29.7%)
ASA class	Low (0–1)	243 (21.9%)
	High (≥2)	866 (78.1%)
UC-associated neoplasia	No	859 (77.5%)
	Yes	250 (22.5%)
Surgery stage	1	79 (7.1%)
	2	806 (72.7%)
	3	224 (20.2%)
Pouchitis requiring admission	No	1041 (93.9%)
	Yes	68 (6.1%)
Ileus requiring admission	No	896 (80.8%)
	Yes	213 (19.2%)
Ileus requiring reoperation	No	158 (74.2%)
	Yes	55 (25.8%)

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Table 2. Comparison of patient characteristics stratified by TO achievement.

Variable	Level	Overall	non-TO	TO (n=636)	p value
Age, years		42.0 [29.0–56.0]	42.0 [29.0–	42.0 [30.0–	0.57
BMI, kg/m²		19.8 [17.7–22.4]	19.5 [17.4–	20.1 [17.9–	0.11
Gender	Female	450 (40.6%)	173	277	**0.02**
	Male	659 (59.4%)	300	359	
Disease duration, years		5.0 [1.0–	5.0 [1.0–	5.0 [2.0–	0.22
Albumin, g/dL		3.4 [2.6–	3.3 [2.5–	3.5 [2.7–	**<0.001**
Steroid use	No	484 (43.6%)	192	292	0.09
	Yes	625 (56.4%)	281	344	
Immunosuppressive therapy	No	482 (43.6%)	206	276	1
	Yes	624 (56.4%)	266	358	
Emergency surgery	No	805 (72.6%)	328	477	**0.04**
	Yes	304 (27.4%)	145	159	
Surgical approach	MIS	780 (70.3%)	312	468	**0.01**
	Open	329 (29.7%)	161	168	
ASA class	Low(0-1)	243 (21.9%)	86	157	**0.01**
	High(2≦)	866 (78.1%)	387	479	
UC-associated neoplasia	No	859 (77.5%)	391	468	**<0.001**
	Yes	250 (22.5%)	82	168	
Pouchitis requiring admission	No	1041	435	606	**0.03**
	Yes	68	38	30	
Ileus requiring admission	No	896 (80.8%)	373	523	0.18
	Yes	213 (19.2%)	100	113	
Surgery stage	1	79	34	45	0.06
	2	806 (72.7%)	328	478	
	3	224 (20.2%)	111	113	
Ileus requiring reoperation	No	158 (74.2%)	75	83	0.92
	Yes	55	25	30	

Values are presented as median [IQR] or frequency (proportion).

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Table 3. Univariate and multivariate logistic regression for TO achievement. (OR > 1 = protective, OR < 1 = risk)

Variable	Level /	Univariate OR [95%	p-	Multivariate	p-	Interpretation
Age (per year)	–	1.00	0.53	1.00 [0.99–	0.57	—
Male sex	Female	0.75	0.02	0.74 [0.57–	**0.02**	Risk
BMI (per kg/m²)	–	1.01	0.54	1.00 [0.96–	0.83	—
Disease duration	–	1.01	0.12	0.99 [0.97–	0.26	—
Open surgery	MIS	0.70	0.01	0.79 [0.60–	0.1	—
Albumin (per g/dL)	–	1.30	<0.001	1.22 [1.01–	**0.04**	Protective
Emergency surgery	Elective	0.75	0.04	1.13 [0.82–	0.47	—
ASA High (≥2)	Low (0–1)	0.61	0.01	0.74 [0.51–	0.11	—
UC-associated	No tumor	1.71	<0.001	1.48 [1.03–	**0.04**	Protective

Logistic Regression Analysis, Forced entry

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Table 4. Risk factors for pouchitis after IPAA by univariate and multivariate analysis.

Variable	Reference	Univariate OR [95%	p-	Multivariate OR [95%	p-
Age (per year)	—	0.97 [0.96–0.99]	<0.01	0.97 [0.96–	**<0.01**
Gender Female	Male	1.11 [0.67–1.86]	0.69	1.13 [0.68–	0.64
BMI (per kg/m²)	—	0.94 [0.88–1.01]	0.1	0.98 [0.91–	0.63
Disease duration (per	—	0.98 [0.94–1.01]	0.15	1.00 [0.96–	0.93
Surgical approach Open	MIS	1.32 [0.78–2.18]	0.3	1.09 [0.62–	0.76
Albumin (per g/dL)	—	0.89 [0.67–1.18]	0.42	0.93 [0.64–	0.71
Emergency surgery	Elective	1.29 [0.75–2.15]	0.35	1.05 [0.54–	0.88
ASA (High ≥2)	Low (0–1)	1.30 [0.63–2.44]	0.45	1.09 [0.50–	0.82
UC-associated	No tumor	0.58 [0.27–1.09]	0.11	0.92 [0.39–	0.85
TO achieved	No achieved	0.57 [0.34–0.93]	0.02	0.60 [0.36–	**0.049**

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Figure 1

Figure 1. A flow chart of the patients included

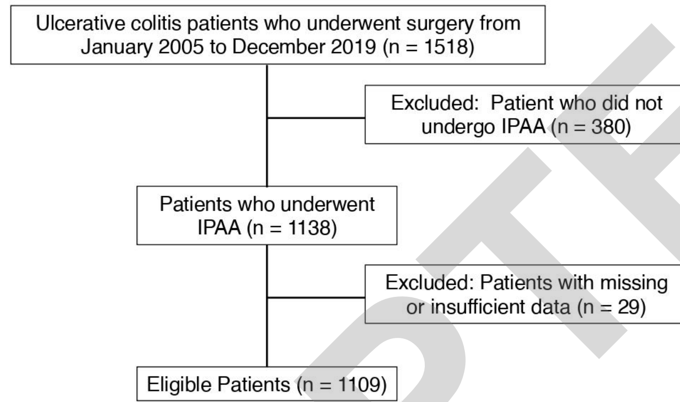

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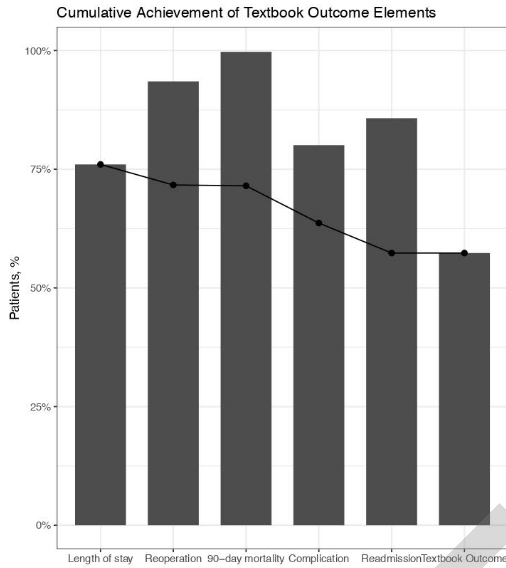
Figure 2

Figure 2. Cumulative bar plot



	Population (%)	Conditional (%)
Length of stay	76.0	76.0
Reoperation	93.5	71.7
90-day mortality	99.7	71.5
Complication	80.1	63.7
Readmission	85.8	57.3
Textbook outcome	57.3	57.3

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Figure 3

Figure 3. TO rate across years

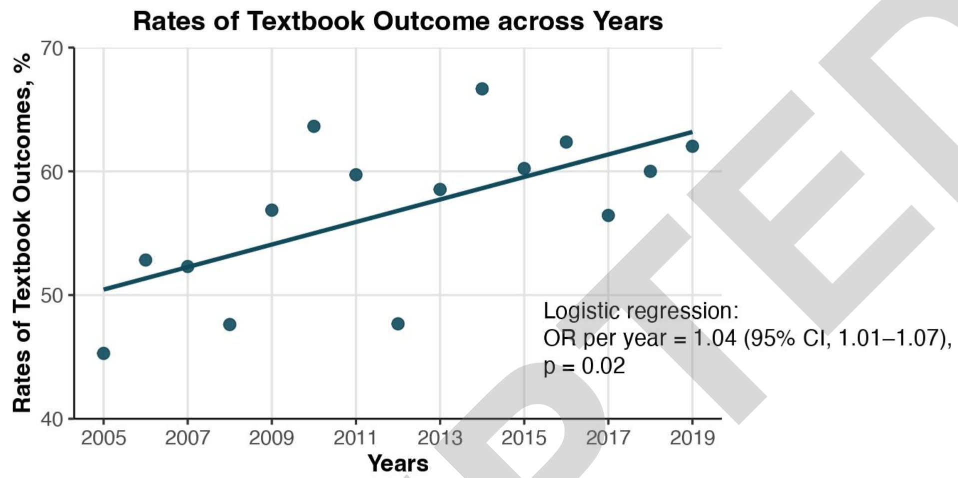

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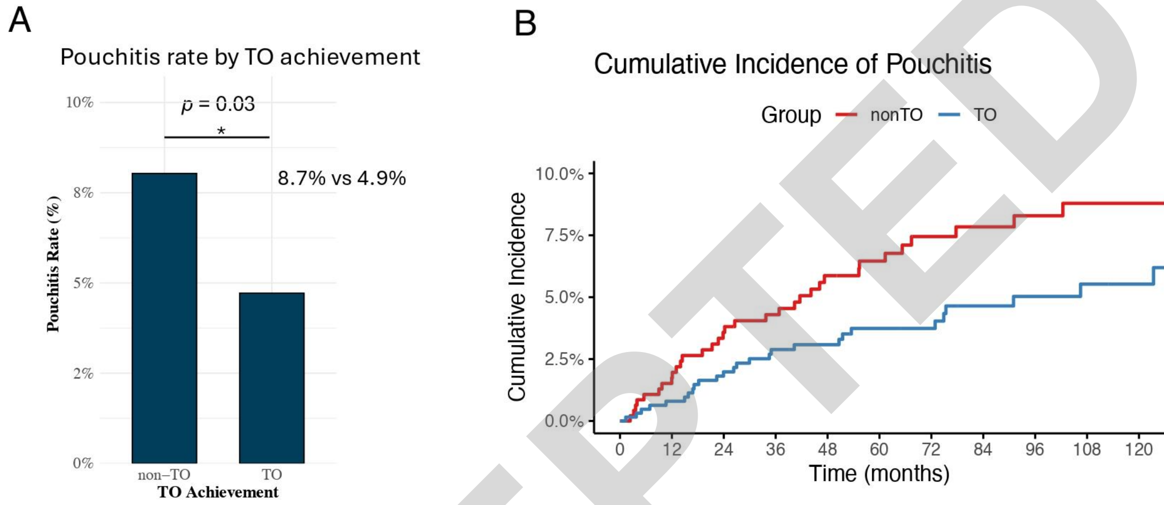
Figure 4

Figure 4.



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