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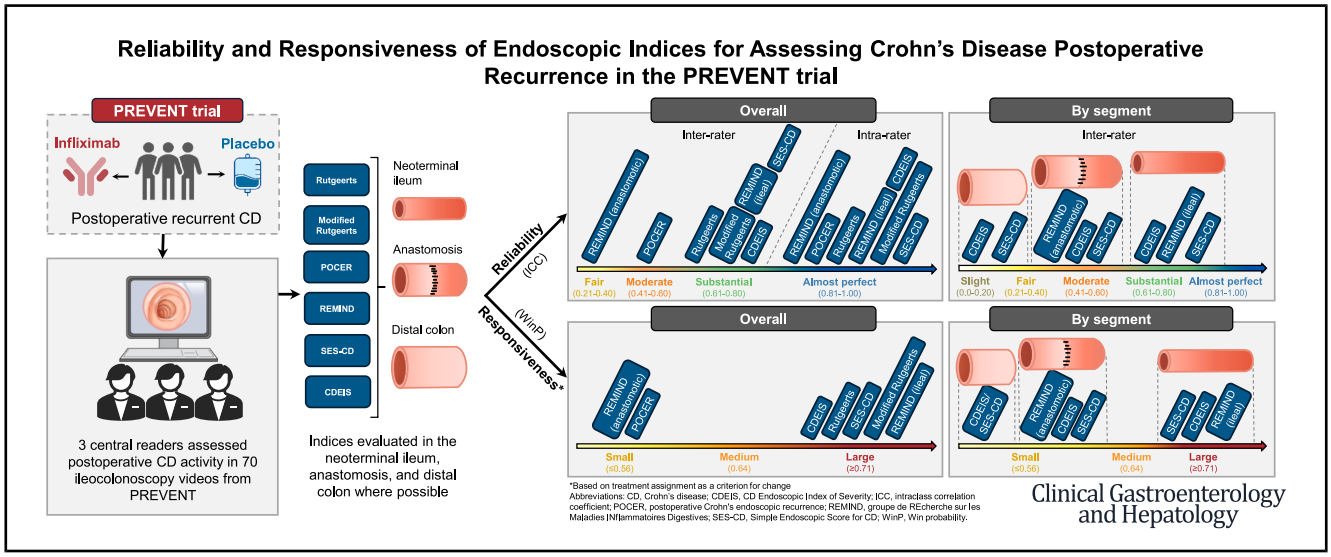
Reliability and Responsiveness of Endoscopic Indices for Assessing Crohn's Disease Postoperative Recurrence in the PREVENT Trial

Jurij Hanzel,[1,2] Sudheer K. Vuyyuru,[2,3] Brian Bressler,[4,5] Mark A. Samaan,[6] Malcolm Hogan,[2] Guangyong Zou,[2,7] Lisa M. Shackelton,[2] Julie Remillard,[2] Peter De Cruz,[8,9] Miguel Regueiro,[10] Siddharth Singh,[11,12] Ryan W. Stidham,[13,14] Marjolijn Duijvestein,[15] Geert R. D'Haens,[2,16] Laurent Peyrin-Biroulet,[17] Silvio Danese,[18] Bruce E. Sands,[19] Remo Panaccione,[20] Brian G. Feagan,[2,3,7] Vipul Jairath,[2,3,7] and Christopher Ma[2,20]

[1]Department of Gastroenterology, UMC Ljubljana, Medical Faculty, University of Ljubljana, Ljubljana, Slovenia; [2]Alimentiv, London, Ontario, Canada; [3]Department of Medicine, Division of Gastroenterology, Schulich School of Medicine, Western University, London, Ontario, Canada; [4]Department of Gastroenterology, University of British Columbia, Vancouver, British Columbia, Canada; [5]IBD Centre of British Columbia, Vancouver, British Columbia, Canada; [6]Guy's and St Thomas' NHS Foundation Trust, St Thomas' Hospital, London, United Kingdom; [7]Department of Epidemiology and Biostatistics, Western University, London, Ontario, Canada; [8]Department of Gastroenterology, Austin Health, Melbourne, Victoria, Australia; [9]Department of Medicine (Austin Health), University of Melbourne, Melbourne, Victoria, Australia; [10]Department of Gastroenterology and Hepatology, Cleveland Clinic, Cleveland, Ohio; [11]Division of Gastroenterology, Department of Medicine, University of California San Diego, La Jolla, California; [12]Division of Biomedical Informatics, Department of Medicine, University of California San Diego, La Jolla, California; [13]Division of Gastroenterology, Department of Internal Medicine, Michigan Medicine, Ann Arbor, Michigan; [14]Department of Computational Medicine and Bioinformatics, University of Michigan, Ann Arbor, Michigan; [15]Department of Gastroenterology and Hepatology, Radboudumc, Nijmegen, the Netherlands; [16]Department of Gastroenterology, Amsterdam University Medical Centres, Amsterdam, the Netherlands; [17]Department of Gastroenterology, CHRU Nancy, INSERM NGERE, Université de Lorraine, Vandœuvre-lès-Nancy, France; [18]Division of Gastroenterology and Gastrointestinal Endoscopy, IRCCS Ospedale San Raffaele, Università Vita-Salute San Raffaele, Milan, Italy; [19]Dr. Henry D Janowitz Division of Gastroenterology, Icahn School of Medicine at Mount Sinai, New York, New York; and [20]Division of Gastroenterology and Hepatology, Department of Medicine, University of Calgary, Calgary, Alberta, Canada



Abbreviations used in this paper: CD, Crohn's disease; CDEIS, CD Endoscopic Index of Severity; CI, confidence interval; ICC, intraclass correlation coefficient; SES-CD, Simple Endoscopic Score for Crohn's Disease; WinP, win probability.

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BACKGROUND & AIMS: **Assessing endoscopic activity is integral in the management of postoperative Crohn's disease (CD). We aimed to comprehensively characterize the reliability and responsiveness of different endoscopic instruments when used to assess postoperative CD activity.**

METHODS: **Ileocolonoscopy videos (n = 70) from the PREVENT (Prospective, Multicenter, Randomized, Double-Blind, Placebo-Controlled Trial Comparing REMICADE ® [infliximab] and Placebo in the Prevention of Recurrence in Crohn's Disease Patients Undergoing Surgical Resection Who Are at an Increased Risk of Recurrence) trial were reviewed by 3 blinded central readers. Disease activity was assessed using the Rutgeerts and modified Rutgeerts scores, POCER (postoperative Crohn's endoscopic recurrence) index, REMIND (groupe de REcherche sur les Maladies INflammatoires Digestives) score, Simple Endoscopic Score for Crohn's Disease (SES-CD), and the Crohn's Disease Endoscopic Index of Severity (CDEIS). Reliability was quantified by the intraclass correlation coefficient (ICC). Responsiveness was quantified using the win probability (WinP) defined as the probability that a patient in the treatment (infliximab) group had a better score than a patient in the placebo group. The neoterminal ileum, anastomosis, and distal colon were scored separately.**

RESULTS: **Interrater reliability was substantial for the Rutgeerts and modified Rutgeerts scores, ileal REMIND score, SES-CD, and CDEIS (ICC 0.74–0.80), moderate for the POCER index (ICC 0.49), and fair for the anastomotic REMIND score (ICC 0.30). A large degree of responsiveness was observed for the Rutgeerts and modified Rutgeerts scores, ileal REMIND score, SES-CD, and CDEIS (WinP 0.75–0.83). The degree of responsiveness for the POCER index and the anastomotic REMIND score was small (WinP 0.54 and 0.53, respectively). Estimates of index reliability and responsiveness were consistently lower when assessed at the anastomosis or distal colonic segment compared with the neoterminal ileum.**

CONCLUSIONS: **Existing endoscopic indices are reliable and responsive for assessing postoperative CD activity in the neoterminal ileum, although are suboptimal for evaluation in the anastomosis or distal colonic segment.**

Keywords: Inflammatory Bowel Diseases; Clinical Trials; Endoscopy; Ileocolonic Resection; Postoperative Crohn's Disease.

Accurate and timely assessment of endoscopic activity is crucial for the management of postoperative Crohn's disease (CD). Recognizing that symptomatic measures are often nonspecific after surgical bowel resection, objective endoscopic evaluation is required to determine the existence of postoperative recurrence and the efficacy of preventative strategies.[1–4] The Rutgeerts score[5] and the modified Rutgeerts score[6] are the most commonly used tools for this purpose both in clinical practice and in clinical trials.[7,8] Although used to assess postoperative endoscopic disease activity, the Rutgeerts score was originally developed as a prognostic tool in patients with an end-to-end ileocolonic anastomosis, and has not been fully validated. The modified Rutgeerts score was adapted to refine the prognostic value of the original instrument and differentiates anastomotic and ileal lesions. Uncertainty regarding the operating characteristics of the Rutgeerts score prompted the development of 2 novel instruments: the REMIND (groupe de REcherche sur les Maladies INflammatoires Digestives) score[9] and the POCER (postoperative Crohn's endoscopic recurrence) index.[10] The former contains separate ileal and anastomotic components, whereas the latter focuses solely on anastomotic lesions. Finally, there are emerging data to support the use of the Simple Endoscopic Score for Crohn's Disease (SES-CD),[11] which has prognostic value in postoperative CD when applied to the neoterminal ileum and the anastomosis.[12]

Given the increasing number of endoscopic indices, uncertainty exists regarding their relative operating properties, and it remains unclear which of these scores should be routinely used in clinical and research settings. Whereas the interrater reliability for both the original and the modified Rutgeerts score has been shown to be substantial among expert central readers,[13] the reliability estimates for the REMIND and POCER scores have only been determined during index development.[9,10] External validation of these reliability metrics is required to support their broader implementation. Additionally, responsiveness to change in disease status following effective therapeutic intervention is also a key operating characteristic of an evaluative index. However, responsiveness has not yet been explored using quantitative statistical methods for any of these endoscopic indices in the postoperative setting.

Therefore, we aimed to comprehensively evaluate the reliability and responsiveness of both historical and novel endoscopic indices when centrally assessed using

ileocolonoscopy videos from a randomized, placebo-controlled trial of infliximab vs placebo for preventing postoperative CD recurrence.[14]

What You Need to Know

Background

Research and clinical practice in postoperative Crohn's disease depend on endoscopic assessment. Multiple established and novel indices are available; there is uncertainty about how reliable and responsive they are.

Findings

The (modified) Rutgeerts score had substantial interrater reliability and large responsiveness, as did the ileal component of the REMIND (groupe de REcherche sur les Maladies INflammatoires Digestives) score. Regardless of the scoring index, reliability and responsiveness for anastomotic lesions were poor.

Implications for patient care

Existing endoscopic indices perform well in the assessment of postoperative Crohn's disease. In the absence of compelling evidence to specifically score the anastomosis, assessment should likely be focused on the neoterminal ileum.

Materials and Methods

Study Population

Clinical data and ileocolonoscopy videos were obtained from the PREVENT (Prospective, Multicenter, Randomized, Double-Blind, Placebo-Controlled Trial Comparing REMICADE ® [infliximab] and Placebo in the Prevention of Recurrence in Crohn's Disease Patients Undergoing Surgical Resection Who Are at an Increased Risk of Recurrence) trial (NCT01190839).[14] The PREVENT trial was a randomized, double-blind, placebo-controlled trial that evaluated the efficacy of infliximab for the prevention of postoperative recurrence of CD. A total of 297 participants were randomized to receive infliximab 5 mg/kg or placebo every 8 weeks for 200 weeks between November 2010 and May 2012. Trial participants underwent ileocolonoscopy when they reached week 76, experienced clinical recurrence (defined as a Crohn's Disease Activity Index score $\geq$200 with $\geq$70-point increase from baseline and evidence of endoscopic recurrence [defined by a Rutgeerts score $\geq$i2] at the anastomotic site or its equivalent elsewhere in the gastrointestinal tract, or fistula/abscess development), or at the time of discontinuation, whichever occurred first. Available ileocolonoscopy recordings from the PREVENT trial were reviewed for quality by 2 investigator authors (S.K.V., C.M.). Videos of sufficient quality were used for further analyses. No post hoc efficacy or safety analyses of the PREVENT trial were conducted in this current study.

Study Design

Selected ileocolonoscopy videos were prospectively and independently assessed by 3 experienced central readers (J.H., B.B., M.A.S.) blinded to all clinical information. Postoperative CD activity was evaluated using the Rutgeerts score (Supplementary Table 1),[5] modified Rutgeerts score (Supplementary Table 2),[6] POCER index (Supplementary Table 3),[10] REMIND score (Supplementary Table 4), SES-CD,[11] Crohn's Disease Endoscopic Index of Severity (CDEIS),[15] and a 100-mm visual analog scale ranging from 0 (no disease activity) to 100 (worst disease activity ever seen).[9] Where possible, items were scored separately for the neoterminal ileum, the anastomosis (including the blind loop of a side-to-side anastomosis), and the distal colonic segment. Global scores that required integration of all visualized segments were provided for the entire video. All central readers received study-specific training prior to starting the reading process. This included a detailed review of all the endoscopic instruments and definitions of item-level components within each score. Readers were instructed to score disease in the blind loop of a side-to-side ileocolonic anastomosis as part of the anastomosis.

To evaluate index inter and intrarater reliability, a total of 50 videos representing the full spectrum of postoperative disease activity based on the original Rutgeerts score (approximately 10 videos for Rutgeerts scores ranging from i0 to i4, selected randomly) from week 76 were independently assessed twice by 3 central readers (n = 300 total reads). All duplicate reads for measuring intrarater reliability occurred a minimum of 2 weeks apart to enhance memory extinction. To assess responsiveness, an additional 20 video reads (single reads of approximately equal videos from each of the 3 central readers) were combined with 50 randomly selected week 76 reads from the 300 reliability reads. In this study, responsiveness was defined by the prevention of CD recurrence. No baseline ileocolonoscopy was performed in the PREVENT trial immediately post-surgery. Therefore, it was assumed that all patients had all macroscopic CD activity resected by the time of enrolment and no disease activity at baseline.

Statistical Methods

Intra- and interrater reliability were assessed using the intraclass correlation coefficient (ICC).[16] The ICC is equivalent to the weighted kappa in the case of ordinal data. Point estimates of the ICC were derived using a 2-way random effects analysis of variance model with interaction between raters and videos.[17] The precision of

the reliability estimates was measured using 2-sided 95% confidence intervals (CIs) obtained using nonparametric cluster bootstrapping, with 2000 replicates resampled at the level of the video. Estimates of the ICC were interpreted according to benchmarks proposed by Landis and Koch (poor: <0.00; slight: 0.0–0.20; fair: 0.21–0.40; moderate: 0.41–0.60; substantial: 0.61–0.80; almost perfect: 0.81–1.00).[18] For sample size calculations, assessment of 50 ileocolonoscopy videos twice by 3 readers provides at least 80% power for obtaining a lower bound of the 2-sided 95% CI >0.50 (moderate reliability), when the true ICC was 0.70.[19]

Treatment assignment to a therapy of known efficacy (infliximab vs placebo) was the primary criterion to assess responsiveness. Responsiveness was quantified using the win probability (WinP),[20] defined as the probability that a patient who received infliximab had a better (ie, lower) endoscopic disease activity score compared with a patient receiving placebo at week 76. The WinP is equivalent to the area under the receiver-operating characteristic curve.[21] Corresponding 95% CIs were calculated using the log-odds transformation of the WinP.[21] In a sensitivity analysis, responsiveness was also evaluated using absence of clinical recurrence as defined in the PREVENT trial (see previous) as the criterion for change. Estimates of WinP values were interpreted using the benchmarks of 0.56, 0.64, and 0.71, corresponding to Cohen's effect sizes of small, medium, and large, respectively.[19]

Ethical Considerations

Patient and clinical trial data were de-identified. Approval to re-read the endoscopic videos was granted by Johnson & Johnson Innovative Medicine.

Results

Study Population

A total of 221 of 297 patients randomized in the PREVENT trial underwent ileocolonoscopy before or at week 76. Of these, 114 ileocolonoscopy recordings were made available by the trial sponsor. Twenty-one videos lacked information to enable linkage to patient clinical characteristics and were excluded. Of the remaining 93 videos, 6 were duplicate recordings, and were also excluded, thus yielding 87 videos. From this subset, 70 ileocolonoscopies of adequate video quality were used in the current study. Reasons for video exclusion (n = 17) were black-and-white recording (n = 1), normal ileocolonic anatomy (n = 1), failure to intubate the neoterminal ileum despite the absence of an anastomotic stenosis (n = 6), and unacceptably poor video quality (eg, solid fecal residue precluding assessment, endoscopic images out-of-focus with inadequate resolution) (n = 9).

Of 70 videos in the final dataset, the neoterminal ileum could not be evaluated due to stenosis in a total of 3, and the distal colonic segment could not be evaluated in 1 due to inadequate visualization.

Baseline clinical data, including treatment assignment were available for a total of 69 of the 70 patients from the PREVENT trial whose ileocolonoscopy recordings were assessed in the current study (infliximab: n = 33; placebo: n = 36) (Table 1). Patient characteristics were similar to those reported in the original trial.[14] The mean Crohn's Disease Activity Index at baseline was 107.6 ± 49.4, consistent with patients in clinical remission postsurgery.

Table 1. Baseline and Clinical Characteristics

Variable	Infliximab (n = 33)	Placebo (n = 36)	Total (n = 69)
Age, y	36.7 ± 13.1	36.1 ± 13.3	36.4 ± 13.1
Female	18 (54.5)	19 (52.8)	37 (53.6)
Active smoker	12 (36.4)	7 (19.4)	19 (27.5)
Disease duration, y	7.3 ± 6.9	6.7 ± 7.5	7.0 ± 7.1
Baseline CDAI	101.3 ± 50.4	113.3 ± 48.4	107.6 ± 49.4
Baseline systemic corticosteroid use	4 (12.1)	2 (5.6)	6 (8.7)
Baseline thiopurine use	10 (30.3)	6 (16.7)	16 (23.2)
Baseline methotrexate use	1 (3)	0	1 (1.4)

For one of the patients, clinical characteristics were not available in the dataset.
Values are mean ± SD or n (%).
CDAI, Crohn's Disease Activity Index.

Table 2. Reliability and Responsiveness of the Overall Endoscopic Scores

Index	ICC (95% CI)		WinP (95% CI)	
	Interrater	Intrarater	Treatment Assignment	Clinical Recurrence
Rutgeerts score	0.74 (0.62–0.83)	0.90 (0.85–0.94)	0.77 (0.65–0.86)	0.72 (0.57–0.83)
Modified Rutgeerts score	0.79 (0.68–0.86)	0.92 (0.88–0.96)	0.81 (0.69–0.89)	0.68 (0.52–0.81)
POCER index	0.49 (0.26–0.64)	0.89 (0.78–0.95)	0.54 (0.43–0.65)	0.61 (0.46–0.74)
REMIND				
Ileal	0.79 (0.67–0.87)	0.91 (0.85–0.96)	0.83 (0.72–0.91)	0.71 (0.55–0.83)
Anastomotic	0.30 (0.14–0.47)	0.81 (0.71–0.89)	0.53 (0.42–0.64)	0.62 (0.47–0.75)
SES-CD	0.79 (0.7–0.86)	0.93 (0.87–0.96)	0.80 (0.66–0.89)	0.70 (0.54–0.82)
Ulcer size	0.76 (0.65–0.84)	0.89 (0.83–0.94)	0.78 (0.65–0.88)	0.69 (0.54–0.81)
Ulcerated surface (%)	0.67 (0.56–0.76)	0.89 (0.84–0.93)	0.80 (0.68–0.89)	0.68 (0.54–0.80)
Affected surface (%)	0.72 (0.58–0.81)	0.91 (0.84–0.95)	0.77 (0.64–0.87)	0.75 (0.62–0.85)
Narrowing	0.28 (0.04–0.57)	0.56 (0.20–0.94)	0.51 (0.44–0.57)	0.54 (0.44–0.63)
CDEIS	0.80 (0.72–0.86)	0.91 (0.86–0.95)	0.75 (0.61–0.86)	0.70 (0.56–0.81)
Deep ulcer	0.47 (0.27–0.63)	0.79 (0.65–0.90)	0.56 (0.47–0.65)	0.54 (0.42–0.65)
Superficial ulcer	0.64 (0.49–0.75)	0.89 (0.82–0.95)	0.76 (0.64–0.85)	0.67 (0.55–0.78)
Ulcerated surface (%)	0.53 (0.39–0.70)	0.87 (0.78–0.94)	0.79 (0.66–0.88)	0.68 (0.53–0.79)
Affected surface (%)	0.70 (0.59–0.79)	0.94 (0.89–0.97)	0.78 (0.64–0.87)	0.73 (0.59–0.83)
Overall VAS	0.81 (0.72–0.87)	0.90 (0.84–0.94)	0.80 (0.67–0.88)	0.71 (0.55–0.83)

CDEIS, Crohn's Disease Endoscopic Index of Severity; CI, confidence interval; ICC, intraclass correlation coefficient; POCER, postoperative Crohn's endoscopic recurrence; SES-CD, Simple Endoscopic Score for Crohn's Disease; VAS, visual analog scale; WinP, win probability.

Reliability of Endoscopic Indices

Substantial interrater reliability was observed for the Rutgeerts score (ICC 0.74 [95% CI, 0.62–0.83]), the modified Rutgeerts score (ICC 0.79 [95% CI, 0.68–0.86]), the ileal component of the REMIND score (ICC 0.79 [95% CI, 0.67–0.87]), the SES-CD (ICC 0.79 [95% CI, 0.70–0.86]), and the CDEIS (ICC 0.80 [95% CI, 0.72–0.86]) (Table 2). There was also substantial interrater reliability for all component-level items of the SES-CD except for narrowing (ICC 0.28). Interrater reliability was moderate for the POCER index (ICC 95% CI, 0.49 [95% CI, 0.26–0.64]) and fair for the anastomotic component of REMIND score (ICC 0.30 [95% CI, 0.14–0.47]). Intrarater reliability was almost perfect for all indices.

When indices were applied individually to specific segments, the neoterminal ileum was consistently the most reliably evaluated. Interrater reliability was substantial or almost perfect for assessment of the neoterminal ileum (Supplementary Table 5), fair to moderate for the anastomosis (Supplementary Table 6), and slight to fair for the distal colonic segment (Supplementary Table 7). Item-level reliability for SES-CD and CDEIS was also consistently worse at the anastomosis or distal colon compared with the neoterminal ileum, except for the narrowing component (ICC 0.07 in the neoterminal ileum vs 0.31 at the anastomosis).

Recognizing that it may be challenging to clearly delineate the anatomy between the distal colonic segment and the anastomosis, a sensitivity analysis was performed to evaluate the interrater reliability of indices using the worst disease activity score from either the anastomosis or distal colonic segment. Interrater reliability remained fair to moderate. (Supplementary Table 8).

Responsiveness of Endoscopic Indices

A large degree of responsiveness was observed for the Rutgeerts score (WinP 0.77 [95% CI, 0.65–0.86]), the modified Rutgeerts score (WinP 0.81 [95% CI, 0.69–0.89]), the ileal component of the REMIND score (WinP 0.83 [95% CI, 0.72–0.91]), the SES-CD (WinP 0.80 [95% CI, 0.66–0.89]), and the CDEIS (WinP 0.75 [95% CI, 0.61–0.86]) when treatment assignment was used as the criterion for change (Table 2). Both the POCER index (WinP 0.54 [95% CI, 0.43–0.65]) and the anastomotic component of the REMIND score (WinP 0.53 [95% CI, 0.42–0.64]) had a small degree of responsiveness.

For indices that were applied individually to specific segments, a large degree of responsiveness based on treatment assignment was observed in the neoterminal ileum (Supplementary Table 5), whereas a small degree of responsiveness was observed for the indices in the anastomosis (Supplementary Table 6) and the distal

colonic segment (Supplementary Table 7). The degree of responsiveness of the indices remained small when the worst score from the anastomosis or the distal colonic segment was utilized in sensitivity analysis (Supplementary Table 8).

A sensitivity analysis using the development of clinical recurrence as the criterion for change, instead of treatment assignment to infliximab vs placebo was also performed. It should be noted that infliximab was not superior to placebo for preventing clinical recurrence in the PREVENT trial. Estimates of responsiveness were smaller when using this criterion for change in the neoterminal ileum, and responsiveness was similar at the anastomosis and distal colon when compared against treatment assignment (Supplementary Tables 5-7).

Discussion

Multiple endoscopic indices have been proposed for use in clinical and research settings to evaluate postoperative CD; however, their reliability and responsiveness have not been comprehensively assessed. In the current study, we demonstrated that the Rutgeerts score, the modified Rutgeerts score, and the ileal component of the REMIND score had substantial interrater reliability and a large degree of responsiveness. The performance of the SES-CD and CDEIS, which were not explicitly developed for assessing postoperative CD, were similar. However, the POCER index, which specifically assesses the ileocolonic anastomosis, and the anastomotic component of the REMIND did not demonstrate comparable reliability and responsiveness, with only fair-to-moderate interrater reliability and a small degree of responsiveness in both cases. No appreciable differences in reliability and responsiveness of the indices were observed in sensitivity analyses when calculations were based on the worst score from the anastomosis or distal colon. Overall, these findings highlight the importance of assessing the neoterminal ileum postsurgery to guide therapeutic decision making and determine treatment efficacy. Comparatively, while ulcerations and strictures are frequently observed at the anastomosis, this anatomy is difficult to accurately and reliably discern, even among experts, and may be less responsive to treatment.

The reliability of the original and modified Rutgeerts scores observed here is consistent with prior studies that found substantial interrater reliability of these well-established endoscopic indices for postoperative CD.[13,22] Our data are also expectedly concordant with reliability data reported from the original development of the ileal REMIND score (weighted kappa of 0.82), which comprises the same items as the Rutgeerts score.[9] However, substantially lower interrater reliability was observed for assessment of the anastomotic component of the REMIND score in our study compared with the original derivation (ICC 0.30 vs weighted kappa 1.00). It should be noted that there were only 2 readers in the original study and that assessment was based on endoscopic lesions as documented in an electronic database, rather than images or videos. Results from video-based assessment in a study by Bak et al[22] align closer with our findings, as the weighted kappa for the anastomotic component was 0.46.

Challenges with reliably assessing the anastomosis are further illustrated by the moderate interrater reliability observed for the POCER index, which limits assessment to the anastomosis. We hypothesize that this reduction in interrater reliability reflects the intrinsic problem of unequivocally defining the anastomosis and its demarcation from the neoterminal ileum. This difficulty in correctly identifying the anatomy is heightened further by the variability in surgical technique when creating the anastomosis resulting in variable anatomy observed endoscopically. Accordingly, we found that endoscopic indices with substantial overall interrater reliability (eg, SES-CD and CDEIS) were only moderately reliable when evaluated specifically at the anastomosis. Interestingly, intrarater reliability at the anastomosis was almost perfect, suggesting that individual readers followed a clear "internal" definition of the anastomosis that was not uniform despite prior study-specific training. A prior RAND/UCLA initiative to standardize endoscopic assessment in postoperative CD concluded that a comprehensive definition capable of clearly delineating the anastomosis from both the neoterminal ileum and the distal colonic segment was difficult to formulate.[4] Recently, an updated classification specific to the anastomosis type was proposed, further defining additional anatomical regions: the ileal body, the ileal inlet, and the ileal blind loop.[23] Initial data, however, show no substantial improvement in reliability of the Rutgeerts score by accounting for these locations.[22]

Our study is the first to evaluate the responsiveness of endoscopic indices in postoperative CD. Encouragingly, a large degree of responsiveness was observed for the most commonly used indices in this setting, the Rutgeerts and modified Rutgeerts scores, and estimates of the effect size for responsiveness were numerically highest in the neoterminal ileum. Expectedly, estimates of responsiveness were smaller when change was defined by clinical recurrence owing to the well-known discrepancy between endoscopy and symptoms in postoperative CD.[24] A large degree of responsiveness was also observed for the SES-CD and the CDEIS. Although these indices would be appropriate for use in clinical trials based on their operating characteristics, current clinical decision-making in postoperative CD is primarily based on the (modified) Rutgeerts score,[25] potentially decreasing the applicability of the SES-CD and CDEIS in the postoperative CD trial setting.

Despite the operational disadvantages of specifically scoring the anastomosis, the Rutgeerts score and the modified Rutgeerts score are nevertheless the optimal evaluative indices for use in clinical trials of

postoperative CD given their substantial interrater reliability and large degree of responsiveness. Development of a more refined index with superior operating properties would be challenging and potentially redundant. In an individual patient meta-analysis, no difference was observed between i2a and i2b regarding clinical or surgical postoperative recurrence.[26] Some authors have therefore proposed to revert to the original Rutgeerts score pending future prospective strategic trials,[26] such as the POMEROL (Management of Moderate POstoperative Recurrence in Crohn's Disease: a randoMizEd contROLled Trial of Therapeutic Escalation) trial (NCT05072782), which randomizes patients with i2 recurrence at 6–12 months postoperatively to treatment with infliximab or no additional intervention. Furthermore, our results suggest that scoring of the anastomosis is not reliable even when assessed by experts. Pending the results of future trials that may provide further insight into the prognostic value of the individual indices, the continued use of either the Rutgeerts score or its modified version in clinical practice is warranted.

The key strength of our study was the rigorous assessment of reliability and responsiveness of endoscopic indices in postoperative CD based on ileocolonoscopy videos from a randomized, placebo-controlled trial of effective therapy. Given that infliximab was effective for prevention of postoperative endoscopic recurrence, we were able to measure the responsiveness of the indices based on treatment assignment, which is the gold standard for evaluation of this operating property. Endoscopic assessment was performed by expert central readers who underwent dedicated training prior to the study. However, our study has several important limitations. First, novel variations of ileocolonic anastomoses, such as the Kono S anastomosis, could not be assessed as they had not yet been developed at the time the PREVENT trial was performed, although our findings regarding the neoterminal ileum probably remain valid. Our findings were derived from central reading by expert readers within a clinical trial setting, whereas the reliability in routine practice with non-IBD expert assessors may be different. Finally, video recordings from the PREVENT trial focused primarily on the neoterminal ileum and the anastomosis, and relatively less time was spent visualizing the distal colonic segments. Therefore, we evaluated the immediately distal colonic segment, rather than the entire colon, although the area of greatest relevance in postoperative CD is the neoterminal ileum and the anastomosis. Finally, it should be noted that scoring the anastomosis separately was introduced to refine the prognostic value of indices, not due to superior index operating properties in this location. Our study only evaluated the operating properties when scoring the anastomosis, while the prognostic value of endoscopic disease activity scores in this location remains to be determined by future studies.

In conclusion, the Rutgeerts and modified Rutgeerts scores are both reliable and responsive for the assessment of postoperative endoscopic CD. The ileal component of the REMIND score had similar operating properties, whereas indices and their subcomponents focusing on the anastomosis performed poorly. These findings suggest that endoscopic evaluation in the context of a clinical trial should rely on the use of established endoscopic indices with favorable operating properties, and that assessment should likely be focused on the neoterminal ileum.

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Clinical Gastroenterology and Hepatology* at www.cghjournal.org, and at https://doi.org/10.1016/j.cgh.2025.08.021.

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Correspondence
Address correspondence to: Christopher Ma, MD, MPH, Division of Gastroenterology & Hepatology, Departments of Medicine & Community Health Sciences, University of Calgary, 6D61 Cal Wenzel Precision Health Building, 3280 Hospital Drive NW, Calgary, Alberta, Canada, T2N 4Z6. e-mail: christopher.ma@ucalgary.ca.

CRediT Authorship Contributions

Jurij Hanzel (Conceptualization: Lead; Formal analysis: Supporting; Investigation: Equal; Methodology: Lead; Writing – original draft: Lead; Writing – review & editing: Equal)
Sudheer K. Vuyyuru (Investigation: Equal; Writing – review & editing: Equal)
Brian Bressler (Investigation: Equal; Writing – review & editing: Equal)
Mark A. Samaan (Investigation: Equal; Writing – review & editing: Equal)
Malcolm Hogan (Data curation: Lead; Formal analysis: Lead; Methodology: Lead; Writing – review & editing: Equal)
Guangyong Zou (Formal analysis: Lead; Methodology: Lead; Writing – review & editing: Equal)
Lisa M. Shackelton (Formal analysis: Supporting; Writing – review & editing: Equal)
Julie Rémillard (Project administration: Lead; Resources: Lead; Writing – review & editing: Equal)
Peter De Cruz (Investigation: Equal; Writing – review & editing: Equal)
Miguel Regueiro (Investigation: Equal; Writing – review & editing: Equal)
Siddharth Singh (Investigation: Equal; Writing – review & editing: Equal)
Ryan W. Stidham (Investigation: Equal; Writing – review & editing: Equal)
Marjolijn Duijvestein (Investigation: Equal; Writing – review & editing: Equal)
Geert R. D'Haens (Investigation: Equal; Writing – review & editing: Equal)
Laurent Peyrin-Biroulet (Investigation: Equal; Writing – review & editing: Equal)
Silvio Danese (Investigation: Equal; Writing – review & editing: Equal)
Bruce E. Sands (Investigation: Equal; Writing – review & editing: Equal)
Remo Panaccione (Investigation: Equal; Writing – review & editing: Equal)
Brian G. Feagan (Conceptualization: Lead; Investigation: Equal; Methodology: Lead; Writing – review & editing: Equal)
Vipul Jairath (Conceptualization: Lead; Investigation: Equal; Methodology: Lead; Resources: Lead; Supervision: Lead; Writing – review & editing: Equal)
Christopher Ma, MD MPH (Conceptualization: Lead; Formal analysis: Supporting; Investigation: Equal; Methodology: Lead; Supervision: Lead; Writing – original draft:Lead; Writing – review & editing: Equal)

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Sands has received research grants from Janssen and Bristol Myers Squibb; has received consulting fees from AbbVie, Abivax, Adiso Therapeutics, Agomab, Alimentiv, Amgen, AnaptysBio, AstraZeneca, Biora Therapeutics, Boehringer Ingelheim, Bristol Myers Squibb, Celltrion, Ensho Therapeutics, Equillium, Ei Lilly and Company, Enthera, Enveda Biosciences, Evommune, Ferring, Fzata, Galapagos, Genentech, Gilead Sciences, GlaxoSmithKline, Gossamer Bio, Imhotex, Index Pharmaceuticals, Innovation Pharmaceuticals, Janssen, Johnson & Johnson, Kaleido, Kallyope, Merck & Co., Microba, Microbiotica, Mitsubishi Tanabe Pharma, Mobius Care, Morphic Therapeutics, MRM Health, Nexus Therapeutics, Immunyx Therapeutics, Nimbus Discovery, Odyssey Therapeutics, Palisade Bio, Pfizer, Progenity, Prometheus Biosciences, Prometheus Laboratories, Protagonist Therapeutics, Q32 Bio, Rasayana Therapeutics, Recludix Therapeutics, Reistone Biotherapeutics, Sanofi, Sorriso Pharmaceuticals, Spyre Therapeutics, Surrozen, Target RWE, Takeda, Teva, Theravance Biopharma, TLL Pharmaceutical, TR1X, Union Therapeutics, and Ventyx Biosciences; has received lecture fees from AbbVie, Abivax, Bristol Myers Squibb, Celltrion, Ei Lilly and Company, Janssen, Mitsubishi Tanabe Pharma, Pfizer, and Takeda; has received support for attending meetings and/or travel from Ei Lilly and Company, Janssen, and Takeda; has served on the advisory board for Agomab and Amgen; owns stock or stock options from Ventyx Biosciences; and has provided medical writing/editorial support for AbbVie, Abivax, Bristol Myers Squibb, Celltrion, Eli Lilly and Company, Janssen, Merck & Co., Pfizer, Ventyx Biosciences, Morphic Therapeutics, Takeda, and Alimentiv. Remo Panaccione has served as a consultant, advisor, and/or speaker for Abbott, AbbVie, Abbivax, Alimentiv (formerly Robarts), Amgen, AnaptysBio, Arena Pharmaceuticals, AstraZeneca, Biogen, Boehringer Ingelheim, Bristol-Myers Squibb, Celgene, Celltrion, Cosmos Pharmaceuticals, Eisai, Elan, Eli Lilly, Ferring, Galapagos, Fresenius Kabi, Genentech, Gilead Sciences, Glaxo-Smith Kline, JAMP Bio, Janssen, Merck, Mylan, Novartis, Oppilan Pharma, Organon, Pandion Pharma, Pendopharm, Pfizer, Progenity, Prometheus Biosciences, Protagonist Therapeutics, Roche, Sandoz, Satisfai Health, Shire, Sublimity Therapeutics, Spyre Therapeutics, Takeda Pharmaceuticals, Theravance Biopharma, Trellus, Union Biopharma, Viatris, Ventyx, and UCB. Brian G. Feagan has received consulting fees from AbbVie, Abivax, Adiso, AgomAB Therapeutics, Allianthera, Amgen, AnaptysBio, Arena Pharma, Avoro Capital Advisors, Atomwise, BioJamp, Biora Therapeutics, Blackbird Laboratories, Boehringer Ingelheim, Boxer Capital, Celsius Therapeutics, Celgene/BMS, Connect BioPharma, Cytoki, Disc Medicine, Duality, EcoR1, Eli Lilly, Equillium, Ermium, First Wave, Forbion, Galapagos, Galen Atlantica, Genentech/Roche, Gilead, Gossamer Pharma, GSK, Hinge Bio, Index Pharma, Imhotex, Immunic Therapeutics, Intercept, JAKAcademy, Janssen, Japan Tobacco Inc., Kaleido Biosciences, Klick Health, Landos Biopharma, Lenczner Slaght, LifeSci Capital, Lument AB, Mage Biologics, Mestag, Millennium, MiroBio, Monte Rose Tx, Morgan Lewis, Morphic Therapeutics, Mylan, Nexys Therapeutics, Nimbus Therapeutics, OM Pharma, OrbiMed Origo BioPharma, Orphagen, Pandion Therapeutics, Pendopharm, Pfizer, Prometheus Therapeutics and Diagnostics (Merck), Progenity, Protagonist, PTM Therapeutics, Q32 Bio, Rebiotix, REDX, Roche, Roivant/Televant, Sandoz, Sanofi, Seres Therapeutics, Silverback Therapeutics, Sobi, Spyre Therapeutics, Surrozen, Synedgen, Takeda, Teva, Thelium, Tigenix, Tillotts, Triastek, and Ventyx; has received lecture fees from Takeda, Janssen, and AbbVie; has served on advisory board for AbbVie, AnaptysBio, Boehringer-Ingelheim, Celgene/BMS, Eli Lilly, Genentech/Roche, Janssen, Merck, MiroBio, Origo BioPharma, Pfizer, REDX Pharma, Sanofi, Takeda, Teva, Ecor1Capital, Morphic, and GSK; and owns stock or stock options from Evida, EnGene, and Connect Biopharma. Vipul Jairath has received consulting fees from and served on advisory board for AbbVie, Alimentiv, Altrubio, Amgen, AnaptysBio, Arena Pharmaceuticals, Asahi Kasei Pharma, Asieris, Astra Zeneca, BiomeBank, Boehringer Ingelheim, Bristol Myers Squibb, Calluna Pharma, Celltrion, Eli Lilly, Endpoint Health, Ensho Therapeutics, Enthera, Exeliom Biosciences, Ferring, Flagship Pioneering, Fresenius Kabi, GlaxoSmithKline, Genentech, Gilead, Janssen, Merck, MRM Health, Nxera Therapeutics, Pandion, Pendopharm, Pfizer, Protagonist, Reistone Biopharma, Roche, Roivant, Sandoz, Sanofi, Second Genome, Sorriso, Spyre Therapeutics, Takeda, Teva, Tillotts, Ventyx, and Vividion; and received speaker fees from AbbVie, Ferring, Bristol Myers Squibb, Galapagos, Janssen, Pfizer, Takeda, Tillotts, and Fresenius Kabi. Christopher Ma has received consulting fees from AbbVie, Alimentiv, Amgen, AVIR Pharma, Bristol Myers Squibb, Celltrion, Domain Therapeutics, Eupraxia, Eli Lilly, Ferring, Forte Biosciences, Fresenius Kabi, Gilead, Janssen, McKesson, Mirador Therapeutics, Pendopharm, Pfizer, Prometheus Biosciences, Roche, Sanofi, Takeda, Tillotts Pharma; speaker fees from AbbVie, Amgen, AVIR Pharma, Alimentiv, Bristol Myers Squibb, Eli Lilly, Ferring, Fresenius Kabi, Janssen, Merck, Organon, Pendopharm, Pfizer, Sanofi, Takeda, Tillotts Pharma; and royalties from Springer Publishing; research support from AbbVie, Eli Lilly, Ferring, and Pfizer.