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Meeting Abstracts of the WEO Capsule Endoscopy Global Summit (WEO-CEGS 2026)

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1. Worldwide overview of magnetic guided capsule from European perspective

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Abstract

The capsule endoscopy (CE) story started at the dawn of the new millennium. CE from the beginning can provide detailed examination of the small bowel; the first indication was suspected small bowel bleeding after bidirectional negative endoscopies. The passive motion of the capsule through the stomach can not provide sufficient, accurate examination of it due to its large lumen, lack of insufflation, and multiple peristaltic contractions. Therefore, the ability to actively navigate the capsule was a necessity. Magnetic guidance of the capsule proved to be effective in precisely navigating it inside the stomach and providing excellent gastric visualization in all parts of it. It was a European author who first published on the use of magnetically controlled capsule endoscopy (MCCE) for gastric examination, which involved the use of equipment jointly developed by Japanese and German companies, Olympus and Siemens, respectively. However, the development of this method was discontinued for commercial (financial) reasons, and Asian countries like China and South Korea took the lead in innovation and further development of the MCCE.

Enhanced resolution, field of view, and depth of field provided high-definition images; the brightness improved, and close-up view made possible detailed gastric mucosal pattern evaluation. Later, robotic guidance was developed, simplifying and revolutionizing the navigation challenges. Artificial intelligence played a role not only in the evaluation of the images but also in navigation, and will further ease

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doctors' tasks by generating initial reports, as well. Nowadays, MCCE has a high accuracy for detecting various gastric conditions, with excellent sensitivity and specificity, comparable to the gold standard esophagogastroduodenoscopy. Clinical applications have been increasing; the first clinical guideline on MCCE is from a group of Chinese experts. They stated the optimal indications of MCCE, as follows: Gastric examination for subjects who are unwilling to undergo or intolerable to conventional EGD (including sedated EGD), or at a high risk of adverse events when undergoing conventional EGD; Gastric examination during health checkup; Preliminary screening for gastric cancer (including superficial neoplasia); Detection and surveillance for gastric lesions including ulcer, polyp, varices, erosive and atrophic gastritis; Evaluation and surveillance for drug-related gastrointestinal mucosal injury; noncontact (including remote control) gastric examination. Suggested relative indications are: Acute upper gastrointestinal bleeding with stable hemodynamics; Esophageal diseases such as esophageal varices and Barrett's esophagus; Duodenal diseases such as ulcers and polyps; Surveillance after partial gastrectomy or minimally invasive endoscopic treatment; Sequential examination for small bowel after gastric examination. The vast majority of the MCCE publications came from Asia. The West, including Europe, did not generally accept the MCCE as part of the regular endoscopic toolkit. Until now, only a few European centers have applied MCCE and published their results. Obviously, it is essential to conduct larger, international, multicenter studies involving Western centers to confirm diagnostic accuracy in the Western population. Furthermore, robust cost-effectiveness studies are required to overcome the current negative Western attitude. The first promising indication that can make a breakthrough is non-hematemesis upper gastrointestinal bleeding in stable patients. This condition is frequent and needs a large economic investment to continuously provide 24/7 accessibility of an endoscopy team. Fully automated magnetically guided pan-intestinal capsule endoscopy can be the first-line examination for most gastrointestinal bleeding in the future. The increasing shortage of dedicated, well-trained physicians, including endoscopists and nurses, is more characteristic in Western countries than in Asia. Nowadays, our world has become more egocentric and selfish; the altruistic attitude and the sacrifice that is more or less mandatory to work in the healthcare system are not really attractive for new generations in the West. MCCE can fulfill the increasing gaps in human resources. MCCE is widely used for gastric cancer screening in China, where the prevalence of this malignant disease is extremely high compared to other parts of the world. Gastric cancer is not so prevalent in Europe; therefore, population-based screening programs for it are not expected. MCCE can be a noninvasive screening tool for asymptomatic patients with a high family risk of gastric cancer. MCCE is not a method for replacing upper gastrointestinal endoscopy; it is rather a sensitive and noninvasive tool to select those patients who need invasive gastroscopy and biopsy. This can shorten the waiting lists and save costs. Another important lesson that we learned from the pandemy is the usefulness of noncontact endoscopy, even with remote control, that can protect not only the patient, but the staff, as well, maintaining the reliability and operability of the healthcare system. MCCE can be a future even in young patients with uninvestigated functional dyspepsia but without alarming symptoms to decrease morbidity and mortality of benign and malignant upper gastrointestinal diseases. There are obvious advantages of the MCCE that can not be overlooked and definitely will drive the Western world to gradually accept its concept and spread outside Asia. Patient discomfort seems a more prominent issue in the

West. The high acceptance of MCCE by the patients, especially compared with endoscopy, will encourage healthcare providers to apply it more frequently in Europe. Serious adverse events that are more frequent during gastroscopy can raise legal concerns in Western countries, rather than in Asia; yet, these adverse events can be avoided by using MCCE instead of conventional invasive esophagogastroduodenoscopy. It can be predicted for sure that, at reasonable costs, MCCE with its standardized methodology, noninvasiveness, reproducibility, high sensitivity, high patient adherence, fewer adverse events, lack of serious ones, less need for human resources (anaesthesiologist, endoscopist, endoscopy nurse) without infection risk will definitely spread even in the Western world in the future.

2. Pan-enteric capsule endoscopy - role in gastrointestinal bleeding and beyond

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Abstract

Gastrointestinal bleeding represents a significant clinical entity with almost half a million annual hospital admissions and a relevant morbidity and mortality. The majority of cases can be managed endoscopically, but that mandates the identification of the culprit lesion. Traditionally, upper endoscopy and colonoscopy form the basis of the initial workup, depending on the form of presentation. However, in a substantial number of cases, the cause of bleeding is not identified, so-called obscure bleeding. Although this may be due to an unrecognized lesion in the upper GI tract or the colon, with intermittent bleeding, a substantial number is caused by small bowel lesions. For a long time, this was a "terra incognita" for endoscopy, but around the year 2000, the near-simultaneous introduction of device-assisted enteroscopy and capsule endoscopy (CE) paved the way for endoluminal imaging of even this segment of the gastrointestinal tract. Given its availability and simplicity, the inclusion of CE for workup of obscure GI bleeding was soon established for assessment of the small bowel.

Over time, CE technology has evolved with improved image quality, battery life, and smart features (like variable frame rate). The introduction of the colon capsule (CCE) with dual-camera represents a diagnostic alternative to colonoscopy and has been suggested as a screening tool for colonic pathology, although not yet fully implemented as such. Still, with an appropriate cleansing protocol, complete colonic imaging is indeed available even with CCE.

For non-variceal gastrointestinal bleeding, the ESGE (updated guidelines 2022) has defined the current role of CE as: The preferred modality for suspected small bowel bleeding, to be performed as soon as possible after a bleeding episode, preferred over second look endoscopy, and as the "preferred modality in iron deficiency anemia (IDA)" - when small bowel examination is indicated. However, the message is to consider CE after a negative upper and lower endoscopy, and no consideration was made for a role of pan-enteric capsule endoscopy (PCE), with small- and large bowel imaging, thus obviating the role of colonoscopy in the initial algorithm.

However, PCE is doable with current CCE technology, since the colonic capsule can also image the (already cleansed) small bowel, and - depending on the location and character of bleeding lesions this might offer an alternative to the current workup model.

Indeed, small introductory publications have pointed to the potential utility of this. Mussetto *et al.* performed a small feasibility study using PCE in 12 patients with negative upper endoscopy, and found a yield of 83%, with 43% of lesions located in the small bowel. Carretero *et al.* similarly looked at 100 high-risk

patients with obscure GI bleeding and found a yield of 61% and argued that conventional endoscopy could have been avoided in 2/3 of the patients.

Based on these preliminary findings, Rosa *et al.* embarked on the first controlled prospective study to look at the ability of PCE to avoid colonoscopy in the primary workup of GI bleeding. In 100 consecutive patients with overt bleeding or iron-deficiency anemia and a negative upper endoscopy, they performed PCE, as well as same-day colonoscopy. They assessed the relative utility of the two methods as well as completeness and safety. They defined potential hemorrhagic lesions (PHLs) as angiectasias, tumors, or ulcerations and recorded their presence and location.

Among the 100 patients, 19 presented with overt bleeding, the rest with IDA. PCE was deemed complete in 76%, and colonoscopy in 95%. Colon cleansing was deemed acceptable in 70%-80% of patients, though significantly less so in those with overt bleeding.

Altogether, PHLs were found in 46% of patients, 70% of those being angiectasias.

Understandably, more lesions were found with PCE visualizing the small as well as the large bowel (95% *vs.* 50%). 65% were found by PCE alone, while only 6% were found exclusively by colonoscopy. In overt bleeding, the methods were more comparable, but even among these patients, PHLs were documented in 9/19 patients.

28% of lesions were found in the ileocolonic segment, accessible by colonoscopy. The added utility of direct therapy was assessed, but only in 30% of these patients, primarily APC, clipping, and biopsies.

Importantly, 54% had no PHLs with either method. These patients were followed for a mean of 19 months, with various likely attributions to co-morbidities, but none with repeat GI bleeding.

In summary, half of the patients had no findings, and only one-third of the PHLs found were potentially accessible by colonoscopy. This understandably led the authors to suggest that PCE might replace colonoscopy in the algorithm for GI bleeding after a negative upper endoscopy, reserving invasive procedures to identify treatable lesions.

Access to capsule endoscopy and competent reading is a limiting factor in many contexts around the world. Also, the logistics of performing a colonoscopy during the same bowel cleansing may present a challenge, exposing patients to repeat cleansing with its downsides. Cost may also be an issue, although the inherent real cost of a colonoscopy is often underestimated.

On the other hand, capsule technology is progressing rapidly, with better cameras and image quality, more durable batteries, optimized cleansing schedules, and increasingly AI-supported automated reading of the capsule footage. With online direct access to live analysis of the imagery, two-way communication with the capsule may allow even better adaptation of imaging, e.g., increasing frame rate upon detection of lesions.

However, in the not-so-far horizon, other avenues are opening. With robotic guidance, full GI scanning with a single capsule may be achievable, with AI-directed complete visualization also of the gastric mucosa. This may offer new alternatives for screening programs, far beyond workup of GI bleeding.

Finally, the possibility of self-managed capsule procedures without a hospital visit aligns well with the increasing focus on green endoscopy, and this aspect of CE should not be underestimated.

In conclusion, Continuous improvement of CE is changing the landscape of endoluminal imaging, and pan-enteric capsule endoscopy may well take on a larger role in managing unexplained GI bleeding. And more.

A new panenteric capsule endoscopy-based strategy in patients with melena and a negative upper gastrointestinal endoscopy: a prospective feasibility study.

3. Capsule pan-endoscopy in the comprehensive evaluation of gastrointestinal manifestations of portal hypertension in patients with liver cirrhosis - lessons from 3 cases

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Abstract

Portal hypertension is one of the major consequences of advanced chronic liver disease and cirrhosis. Its gastrointestinal manifestations are traditionally evaluated using conventional endoscopic techniques, mainly esophagogastroduodenoscopy and colonoscopy. These procedures allow the identification of well-known complications such as esophageal and gastric varices, and portal hypertensive gastropathy. However, they only evaluate a limited portion of the gastrointestinal tract, leaving the small bowel largely unexplored.

Over the past two decades, capsule endoscopy has emerged as a valuable diagnostic tool for the investigation of small bowel diseases. In patients with portal hypertension, capsule endoscopy has demonstrated that vascular and mucosal changes may extend far beyond the areas accessible to conventional endoscopy. These findings have led to the concept of portal hypertensive enteropathy, a condition characterized by mucosal edema, erythema, vascular ectasias, and occasionally small bowel varices.

More recently, the concept of capsule pan-endoscopy has been introduced. By using a dedicated ingestion technique and appropriate bowel preparation, capsule endoscopy can be employed to evaluate the entire gastrointestinal tract in a single, minimally invasive examination. This approach has the potential to provide a comprehensive assessment of portal hypertension-related lesions throughout the digestive tract.

In this presentation, we explored the usefulness of capsule pan-endoscopy in patients with liver cirrhosis by analyzing 3 representative clinical cases. These cases were selected to illustrate the diversity of gastrointestinal manifestations associated with portal hypertension and to highlight the potential role of capsule endoscopy in their evaluation.

The preparation protocol used for capsule pan-endoscopy followed the same regimen routinely employed for colonoscopy, administered in split doses, with the last dose taken four hours before capsule ingestion. Bowel preparation consisted of polyethylene glycol with ascorbic acid, combined with bisacodyl and simethicone. Capsule ingestion was performed using a dedicated technique designed to allow adequate visualization of the esophagus. Patients swallowed the capsule with a simethicone solution and, when appropriate, domperidone to facilitate gastric emptying.

After confirmation of capsule passage into the duodenum, a booster solution consisting of magnesium citrate and sodium picosulfate was administered to promote intestinal transit. When the capsule was not expelled within eight hours after ingestion, a bisacodyl suppository was used to facilitate completion of the examination.

The 3 cases presented demonstrated different patterns of gastrointestinal involvement in portal hypertension. Some patients showed classical upper gastrointestinal findings, including esophageal varices and portal hypertensive gastropathy. However, capsule pan-endoscopy also revealed lesions located beyond the reach of conventional upper endoscopy, including vascular abnormalities in the small bowel and colonic mucosal changes compatible with portal hypertensive enteropathy and colopathy.

These findings reinforce the concept that portal hypertension should be considered a pan-gastrointestinal disease. The involvement of the small bowel appears to be more frequent than previously recognized and may contribute to clinical manifestations such as chronic anemia or obscure gastrointestinal bleeding in patients with cirrhosis.

Capsule pan-endoscopy offers several advantages in this context. It is a minimally invasive technique, well tolerated by patients, and capable of providing a global view of the gastrointestinal tract in a single examination. This comprehensive evaluation may help clinicians better understand the distribution and severity of portal hypertension-related lesions and may contribute to improved diagnostic strategies in selected patients.

Although capsule endoscopy cannot replace therapeutic endoscopy, it may represent an important complementary diagnostic tool, particularly in patients with unexplained anemia, suspected small bowel bleeding, or when the full extent of portal hypertension-related gastrointestinal involvement needs to be assessed.

In conclusion, capsule pan-endoscopy represents a promising approach for the comprehensive evaluation of gastrointestinal manifestations of portal hypertension in cirrhotic patients. By revealing lesions throughout the digestive tract, including areas inaccessible to conventional endoscopy, this technique may broaden our understanding of portal hypertensive disease and support the concept that portal hypertension is not limited to the upper gastrointestinal tract but rather affects the entire digestive system.

4. The role of artificial intelligence in suspected Crohn's disease

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Abstract

Crohn's disease (CD) is a chronic inflammatory bowel disease characterized by transmural inflammation that can affect any part of the gastrointestinal tract, from the mouth to the anus. The small bowel is commonly involved, with studies reporting small bowel disease in approximately 70%-90% of patients and isolated small bowel involvement in about 30% of cases. Because of the length and anatomical complexity of the small intestine, visualization of this segment remains challenging with conventional endoscopic techniques. As a result, diagnosis usually requires a multimodal approach integrating clinical evaluation, biochemical markers, endoscopic findings, radiologic imaging, and histological analysis.

Among the available diagnostic modalities, capsule endoscopy (CE) has emerged as a key tool for evaluating the small bowel. CE allows direct visualization of the entire small intestinal mucosa and enables identification of typical Crohn's disease lesions, including aphthous ulcers, linear or deep ulcerations, mucosal breaks, villous edema, and strictures. Early detection of these lesions is essential for establishing the diagnosis, determining disease extent and severity, guiding treatment decisions, and monitoring therapeutic

response. However, interpretation of capsule endoscopy examinations is time-consuming and subject to interobserver variability. These limitations have stimulated growing interest in using artificial intelligence (AI) to support capsule endoscopy interpretation.

Capsule Endoscopy in Suspected Crohn's Disease

The diagnosis of Crohn's disease relies on a combination of clinical presentation, laboratory findings, and imaging or endoscopic evidence of intestinal inflammation. European guidelines recommend small bowel capsule endoscopy in patients with suspected disease who do not have obstructive symptoms or known intestinal strictures. In clinical practice, capsule endoscopy is often performed in patients with persistent gastrointestinal symptoms and elevated fecal calprotectin levels but negative or inconclusive ileocolonoscopy results. In these situations, CE can identify mucosal abnormalities consistent with Crohn's disease that might otherwise remain undetected. The technique also has a high long-term negative predictive value, allowing clinicians to confidently exclude Crohn's disease when no inflammatory lesions are observed. Despite these advantages, capsule endoscopy interpretation presents practical challenges. Each examination generates tens of thousands of images that must be reviewed by experienced readers. This process can take 30-60 min per examination and may lead to reader fatigue. In addition, lesion miss rates of up to 19% have been reported, highlighting the need for technological tools to improve diagnostic accuracy and efficiency.

Artificial Intelligence in Capsule Endoscopy

Recent advances in artificial intelligence, particularly deep learning methods such as convolutional neural networks (CNNs), have created new opportunities for automated image analysis in gastrointestinal endoscopy. These algorithms can be trained on large datasets of capsule endoscopy images to recognize pathological features associated with Crohn's disease. Deep learning models trained on thousands of annotated images have achieved sensitivity rates approaching 95%-98% and specificity rates close to 99% for detecting ulcers and erosions, results comparable to those of expert readers. A major advantage of AI-assisted systems is the reduction in reading time. By automatically identifying frames that may contain abnormalities, AI algorithms allow clinicians to focus only on relevant images instead of reviewing the entire video sequence. This substantially reduces the number of frames requiring manual inspection. Importantly, the AI-assisted system reduced the missed detection rate and decreased reading time by more than 50%. In addition to lesion detection, modern AI systems are increasingly capable of performing tasks such as lesion localization, classification of inflammatory severity, and differentiation between various mucosal abnormalities. These capabilities may help reduce interobserver variability and promote more standardized reporting in inflammatory bowel disease.

The SCAI Study

Although many retrospective studies have produced promising results, prospective evidence evaluating AI-assisted capsule endoscopy in routine clinical practice remains limited. The SCAI (Comparison Between Artificial Intelligence and Standard Reading to Investigate Suspected Crohn Disease) study was designed to address this gap.

SCAI is an observational, prospective, multicenter trial evaluating AI-assisted capsule endoscopy using the OMOM SmartScan system. SmartScan is a computer-aided detection algorithm based on convolutional neural networks designed to automatically detect and classify small bowel lesions. The primary objective of the study is to evaluate the performance of AI-assisted capsule endoscopy in detecting inflammatory lesions - specifically erosions and ulcers - in patients with suspected Crohn's disease. The study compares AI-assisted reading with conventional capsule endoscopy interpretation in terms of lesion detection and diagnostic accuracy. In the study design, capsule endoscopy recordings are first interpreted in accordance with standard clinical practice. The same examinations are then reviewed using the AI-assisted SmartScan system for

research purposes. This approach allows direct comparison between standard and AI-assisted readings. Eligible participants include patients presenting with clinical symptoms and laboratory findings suggestive of Crohn's disease who have already undergone ileocolonoscopy that either excluded other organic pathology or yielded inconclusive results. This reflects a common clinical scenario in which further evaluation of the small bowel is needed to clarify the diagnosis. By assessing AI-assisted capsule endoscopy across multiple centers, the SCAI study aims to determine whether AI can reduce reading time while maintaining the same diagnostic yield and accuracy as standard interpretation.

Clinical Implications and Future Perspectives

Artificial intelligence has the potential to significantly improve the diagnostic pathway of Crohn's disease. AI-assisted capsule endoscopy may increase sensitivity for detecting inflammatory lesions, reduce the risk of missed abnormalities, and substantially shorten interpretation time.

Beyond improving efficiency, AI systems may contribute to more standardized reporting and reduced variability among readers. Automated detection and classification of mucosal lesions could facilitate objective assessment of disease severity and support treat-to-target strategies in inflammatory bowel disease management.

Future developments will likely focus on integrating AI-based image analysis with other clinical data sources, including biomarkers, radiologic imaging, and electronic health records. Such integration could lead to more comprehensive diagnostic models and contribute to personalized treatment approaches. Nevertheless, artificial intelligence should currently be considered a decision-support tool rather than a replacement for clinical expertise. Human interpretation remains essential to confirm findings and integrate them into the broader clinical context. The SCAI study will provide important prospective evidence regarding the real-world performance of AI-assisted capsule endoscopy. If these results are confirmed, they may support wider adoption of AI technologies in the diagnostic pathway of Crohn's disease, ultimately improving diagnostic efficiency and patient care.

5. Optimization of bowel preparation in colon capsule endoscopy: an umbrella review

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Abstract

Background and aims: Colon capsule endoscopy (CCE) is now positioned as a validated, minimally invasive alternative to colonoscopy, yet its diagnostic reliability remains constrained by cleansing quality and completion rates (CR). These requirements impose more stringent preparatory demands than conventional colonoscopy. Existing systematic reviews (SRs) and meta-analyses (MAs) provide heterogeneous and sometimes conflicting recommendations, making evidence-based regimen optimization difficult. This umbrella review synthesizes and critically evaluates SRs/MAs to identify preparation components that consistently enhance adequate cleansing rate (ACR) and CR in CCE.

Methods: A comprehensive search of PubMed/MEDLINE, Embase, Cochrane Library, and Scopus was completed in November 2025 using predefined search strings. Methodological quality was assessed using AMSTAR 2, and primary study overlap was quantified using the corrected covered area (CCA). Primary outcomes were ACR and CR; data were stratified by regimen components (laxatives, boosters, prokinetics, diet) and specific patient populations.

Results: Fourteen SRs (comprising 11 MAs), including 102 unique primary studies, were included. The CCA was 8.59%, indicating moderate overlap. Methodological quality was variable: only two reviews were rated as high quality, while the majority were classified as low or critically low due to reporting limitations. Overall pooled ACR (72.5%-76.8%) and CR (79.8%-83.0%) remained suboptimal compared to colonoscopy standards. In patients with inflammatory bowel disease (IBD), efficacy varied widely (ACR 49%-98.5%) with no significant difference between regimens. In the general population, component analysis identified superior strategies: low-volume polyethylene glycol (PEG < 4 L) yielded numerically higher ACR (77.5%) compared to high-volume PG regimens (72.9%). Sodium phosphate (NaP) boosters consistently outperformed PEG boosters, with the NaP + Gastrografin combination achieving the highest absolute CR (93.1%). Castor oil significantly improved excretion rates (OR 0.17 for incomplete transit), and routine prokinetics were superior to selective use (OR 1.86). Finally, a low-fiber diet was associated with better cleansing than a clear liquid diet (ACR 78.5% *vs.* 70.0%).

Conclusions: Standard CCE bowel preparation regimens often yield suboptimal outcomes. Meta-analytic evidence supports the optimization of regimens by combining low-volume PEG, NaP-based or Gastrografin boosters, routine prokinetics, and a low-fiber diet. However, a "one-size-fits-all" approach may be insufficient, particularly for IBD patients and high-risk groups, suggesting a need for personalized protocols. Future implementation of standardized scoring systems and artificial intelligence (AI)-assisted assessment is critical to reduce heterogeneity and improve clinical cost-effectiveness.

6. Impact of prucalopride on colonic transit, bowel cleansing, and completion rate in colon capsule endoscopy: a real-world comparative study

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Abstract

Optimal preparation for colon capsule endoscopy (CCE) remains a global challenge. CCE effectiveness depends on adequate colonic transit, bowel cleansing, and study completion before battery expiration. This real-world observational study evaluates the impact of prucalopride as a prokinetic agent across different bowel preparation protocols, comparing complete examination (CE) rates, colonic transit time (CTT), and cleansing quality using the CC-CLEAR score. Three patient groups (n = 100) were analyzed: Group A (standard preparation), Group B (standard + prucalopride), and Group C (simplified preparation + prucalopride). Prucalopride significantly improved CE rates and accelerated CTT, while the simplified protocol maintained comparable performance and demonstrated superior acceptability. Prucalopride is a beneficial adjunct in CCE preparation and endorses simplified approaches for clinical practice. Additionally, an acceptability survey indicated that 72% of Group A, 79% of Group B, and 83% of Group C patients would repeat the procedure under the same conditions.

Introduction

Colon capsule endoscopy (CCE) is a non-invasive diagnostic modality that allows evaluation of the colonic mucosa without sedation or radiation exposure. However, its diagnostic yield is highly dependent on

adequate bowel cleansing, rapid capsule transit, and successful excretion prior to battery depletion. Despite growing adoption worldwide, the optimal bowel preparation regimen for CCE remains debated, and patient adherence continues to pose challenges. Prokinetic agents have been investigated to enhance gastrointestinal transit and improve CCE performance. Prucalopride - a selective 5-HT4 receptor agonist - has demonstrated efficacy in accelerating colonic motility in chronic constipation and preliminary CCE studies, though evidence in real-world settings is still limited. This study examines the effectiveness of prucalopride incorporated into two preparation strategies (standard and simplified) compared with a conventional regimen, evaluating both objective performance metrics and patient-reported tolerability.

Methods

Study Design and Setting

A retrospective observational study was conducted at a tertiary gastroenterology center, including all consecutive adult patients who underwent CCE between January 2022 and October 2025. The study followed the STROBE guidelines for observational research and complied with institutional ethical standards.

Eligibility Criteria

Inclusion criteria included adults ≥ 18 years, CCE performed for clinical indications, and availability of complete procedural data. Exclusion criteria included suspected obstruction, pregnancy, incomplete records, failure to ingest the capsule, or contraindications to PEG.

Study Groups and Preparation Protocols

Participants were assigned into three groups according to institutional practice evolution.

Group A - Standard Preparation

- Low-residue diet for 4 days
- Split-dose PEG regimen:
• 2 L PEG the night before the procedure
• 2 L PEG the morning of the examination
- Standard booster regimen with sodium phosphate or PEG as needed
- Bisacodyl allowed as rescue therapy

Group B - Standard Preparation + Prucalopride

- Same regimen as Group A
- Addition of 2 mg prucalopride 60 min prior to capsule ingestion

Group C - Simplified Preparation + Prucalopride

- Low-fiber breakfast and lunch the day before
- 2 L PEG at 19:00
- 1 L PEG the morning of the procedure
- 2 mg prucalopride one hour before CCE
- Boosters and bisacodyl as needed

Capsule Procedure

CCE was performed using second-generation PillCam™ COLON devices following standardized activation, ingestion, and monitoring protocols.

Outcome Measures

Primary outcomes:

- Complete Examination (CE) rate
- Colonic Transit Time (CTT)

- Bowel cleansing quality (CC-CLEAR)
Secondary outcomes:
- Patient acceptability
- Adverse events

Results
CE rates were: Group A 58.3%, Group B 84.4%, Group C 81.3%. CTT improved from 372 min in Group A to 243 min (Group B) and 281 min (Group C). CC-CLEAR scores improved from 6 (A) to 7 (B and C). Group C reported the highest acceptability. No major adverse events were observed.

Discussion
Prucalopride improved capsule transit, cleansing scores, and completion rates. The simplified regimen showed comparable performance to the standard regimen with superior tolerability, aligning with global efforts to simplify bowel preparation for CCE. Prospective randomized trials are necessary. The acceptability survey further supports these findings, with repeat-procedure willingness increasing from 72% (Group A) to 79% (Group B) and 83% (Group C), reinforcing the improved tolerability of prucalopride-enhanced protocols.

Conclusion: Prucalopride is a beneficial adjunct in CCE preparation, enhancing key performance outcomes. A simplified regimen using reduced PEG volume with prucalopride maintains efficacy while improving acceptability, supporting its use in clinical practice pending further validation. Acceptability outcomes were also favorable, with higher willingness to repeat the procedure in groups receiving prucalopride, supporting its role in enhancing patient experience.

7. Duodenal visibility and patient tolerance of a wired magnet-assisted capsule endoscopy system: a randomized controlled trial

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Abstract

Background and objectives: Magnetically controlled capsule endoscopy (MCCE) has been widely accepted as a modality for examining the upper gastrointestinal tract. However, the duodenum - an area of consistent interest - represents a technically challenging anatomical target for MCCE due to difficult pyloric access. This limitation restricts completion rate of detection in upper gastrointestinal examinations. A novel MCCE modality, a wired magnet-assisted capsule endoscopy system, featuring a hand-held external magnetic field navigator and a connecting wire, presents with strong maneuverability that may potentially facilitate access to the duodenum. This study aimed to evaluate the ability of this system to pass through the pylorus and visualize the duodenum.

Methods: A total of 78 eligible subjects were randomly and equally allocated to the study group (the wired magnet-assisted capsule endoscopy system, n = 39) and the control group (n = 39). Cases in which manually manipulated access to the pylorus was achieved using either type were defined as successful pyloric access. Cases in which the capsule endoscopes were propelled into the pylorus by peristalsis were excluded. The outcome measures were: (1) duodenal visibility rate; (2) Patient tolerance, which is graded on a 0-3 scale with

0 being the least discomfort and 3 the most discomfort. These indices were statistically compared between the two groups.

Results: In the study group, the wired magnet-assisted capsule endoscopy was navigated through the pylorus into the duodenum in 30/39 cases, compared with 8/39 in the control group. The duodenal visibility rate was significantly higher in the study group than in the control group (76.9% *vs.* 20.5%, $P < 0.01$). There was no significant difference in patient tolerance between the two groups ($P > 0.05$), indicating that patients exhibited comparable tolerance to both MCCE systems.

Conclusion: The novel wired magnet-assisted capsule endoscopy system demonstrates superior performance in duodenal examination compared with control group while maintaining comparable patient tolerance. This highlights its potential value for improving diagnostic efficacy in duodenal imaging.

8. Inflammatory lesions of the small bowel: correlation between capsule endoscopy and double balloon enteroscopy

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Abstract

Aims: Inflammatory disorders of the small bowel represent a heterogeneous spectrum of diseases, in which endoscopic lesions show considerable variability in terms of location, extent, and morphological features. The aim of the study was to investigate the correlation between capsule endoscopy (SBCE) and double balloon enteroscopy (DBE) in the evaluation of inflammatory lesions of the small bowel.

Methods: This is a retrospective, single-center observational study including all SBCE and DBE performed at an Italian tertiary referral center between January 2018 and June 2025. The selected study period was determined by the availability of complete endoscopic data within the hospital's Picture Archiving and Communication System (PACS), which ensured a comprehensive and standardized data source for retrospective analysis. Patients with at least one inflammatory small-bowel mucosal lesion on SBCE or DBE were included. These inflammatory findings were defined according to the Delphi consensus on Crohn's disease capsule endoscopy lesions and the I-CARE international consensus on atrophic patterns. Patients with a conclusive diagnosis of neoplasia were excluded. SBCE PillCam SB3 or PillCam Crohn's were used according to clinical indication. Fujifilm DBE was performed antegrade or retrograde based on presumed lesion location. The diagnostic performance of SBCE for inflammatory lesions was assessed using DBE as the reference standard; sensitivity, specificity, and Cohen's kappa were calculated.

Results: 295 endoscopic procedures were analyzed, 195 SBCE (145 PillCam SB3, 50 PillCam Crohn) and 100 DBE (73 anterograde, 27 retrograde). Among these, 102 paired enteroscopies were performed (51 SBCE and 51 DBE) within six months, thus allowing comparison of the two techniques. SBCE demonstrated an overall high specificity, greater than 80%, for all inflammatory lesions. Sensitivity was more variable: high (> 80%) for aphthoid lesions and villous atrophy, good (70%) for deep ulceration, stenosis and scalloping, and lower

for the other lesions. Agreement was excellent (κ ≥ 0.6) for stenosis, edema and villous atrophy; good (κ 0.4-0.6) for deep ulceration, hyperemia, mucosal denudation and mosaicism; and only fair to weak for aphthous lesions and superficial ulcerations. Fold reduction and granular mucosa showed very low κ values, probably due to the small number of cases.

Conclusions: SBCE demonstrated an overall good performance in the evaluation of inflammatory lesions of the small bowel. It showed good agreement with DBE, the reference standard for enteroscopy, in detecting most inflammatory lesions, including both ulcerative–stenosing and atrophic patterns. Further multi-center studies with larger sample sizes and external validation in different study populations are needed to confirm these findings.

9. Handheld magnetically assisted esophagogastric capsule endoscopy: a randomized controlled trial and additional colorectal examination

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Abstract

Objectives: We developed a handheld magnetic device through which a conventional colon capsule endoscope (CE: PillCamTM COLON2) without an internal magnet can be manipulated. We aimed to determine its safety and detection rates of esophageal, gastric, and colorectal polyps or tumors (CRTs) during a single procedure.

Methods: In a randomized controlled trial, 96 patients harboring superficial esophageal carcinomas, gastric tumors, or CRTs were enrolled; 47 and 49 patients were allocated to the nonmagnetic group (NM) group using a nonmagnetic device and the magnetic (M) group using this magnetic device, respectively. Device-assisted CE was performed mainly in the esophagus and stomach, while it was attempted only in patients with prolonged lodging in the colorectum.

Results: Although the per-patient detection rates of the representative gastric tumors in the NM and M groups were 95.2% and 100.0%, respectively ($P = 0.4773$), the per-lesion rates of gastric polyps and xanthomas were significantly greater in the M group ($P < 0.0001$), especially those localized in the upper and middle portions and smaller than 5 mm in size. There were significantly different observation rates of total gastric sites between the NM and M groups (87% *vs.* 98%, $P < 0.0001$). The per-patient detection rates of the superficial esophageal carcinomas in the NM and M groups were 80.0% and 75.0%, respectively ($P > 0.9999$). In both groups, the per-patient detection rates of CRTs ≥ 6 mm and ≥ 10 mm were 90.9% and 96.7%, respectively. There were no adverse events associated with magnetic guidance.

Conclusions: This magnetically assisted CE safely and effectively detects gastrointestinal lesions.

10. AI performance in practical tasks during CE reading: landmark identification and reader's cleansing perception

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Abstract

Background and aims: Beyond lesions' detection and characterization, artificial intelligence (AI) in small bowel (SB) capsule endoscopy (CE) is expected to reliably identify CE landmarks (first stomach image, first duodenal, first jejunal and first colic ones) and to automatically score SB cleansing, in order to replace human CE reading in clinical practice. With respect to automated cleansing scoring, no current CE systems available in the market are embedded with this task. Hence, estimation of SB cleansing lacks objectivity and still relies on the subjective reader's judgment. When performing AI-assisted reading (AIR), the subjective reader's perception of SB cleansing could be affected by the extreme brevity of CE videos, lasting 3-4 min rather than the 2-6 h of SB transit. To date, there is no real-world evidence of the performance of AI in the automatic definition of landmarks. Similarly, no clinical study published in the literature has analyzed how much AI-assisted reading impacts the reader's perception of SB cleansing. The aim of this study is to evaluate these AI tasks using standard reading (SR) as a gold standard for comparison.

Materials and methods: 133 videos of SBCE (Navicam SB system, Ankon, China) from 14 European centers were analyzed. Indication for SBCE was suspected small bowel bleeding. Initial reading was performed in SR, and the reader manually selected the landmarks (single frames expressed in hh:mm:ss). Second blinded reading was performed with AI assistance (AIR). In this setting, the AI performed a first automated reading with automated selection of landmarks. After CE reading in each modality, standard readers and AI-assisted readers defined SB cleansing as "excellent-good" or "fair-poor", according to the Brotz Qualitative Scale, based on their perception of cleansing while watching the video (either standard mode or AI mode). To assess the discrepancy between SR and AI in landmark identification, two cut-offs and three ranges were identified: within 15 s, between 15 and 60 s, and more than 60 s. If the timing of any landmark differed by less than 15 s, AI precision was considered comparable to SR. With an error > 60 s, AI was considered inaccurate. Cleansing comparison between SR and AIR was measured using the McNemar test.

Results: Regarding landmark identification, AI accurately recognized the first gastric image in the majority of cases. Exact concordance (within 15 s) with SR was observed in 76.0% of examinations, while a reasonably accurate match (frame delay ≤ 60 s) was found in 12.5%. In 11.5% of cases, landmark identification was inaccurate, with a delay exceeding 60 s. For the first small bowel image, exact concordance between SR and AI was achieved in 56.2% of cases, with an additional 9.4% showing reasonable accuracy. Inaccurate identification occurred in 34.4% of examinations. The first colonic image showed lower concordance: exact agreement was observed in 42.7% of cases, with reasonable accuracy in 6.2%, while more than half of cases (51.1%) were classified as inaccurate due to a frame delay greater than 60 s.

Regarding small bowel cleansing assessment, AI and standard readers were concordant in 73% of cases, classifying cleansing as "excellent–good" in 62% and as "fair–poor" in 11%. Discordant assessments occurred in 27% of cases and were evenly distributed between AI and standard readers. This difference was not statistically significant.

Conclusions: Compared with standard reading, AI-assisted capsule endoscopy does not significantly influence readers' perception of small bowel cleansing, with no evidence of systematic overestimation or underestimation of luminal cleanliness. Conversely, AI landmark recognition demonstrates persistent inaccuracies, particularly in identifying the first colonic image, likely due to limited or absent training of small bowel–focused AI systems in recognizing gastric and colonic landmarks, as well as normal findings. Future AI development should incorporate targeted training and integration of comprehensive landmark recognition tasks, along with automated cleansing scoring systems, to reduce reader subjectivity and improve overall performance.

11. Survey on capsule endoscopy use, availability, and diagnostic accuracy in Africa & the Middle East

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Abstract

Background: Capsule endoscopy (CE) is central to small-bowel evaluation, yet real-world data on access, utilization, quality performance, outcomes, and implementation barriers across Africa and the Middle East remain limited.

Aim: To define the current status of CE availability, utilization patterns, diagnostic yield, quality indicators, complications, and barriers to use across Africa and the Middle East.

Methods: We conducted a multinational, cross-sectional, web-based survey of physicians involved in small-bowel disease management across Africa and the Middle East. The questionnaire captured participant/institution characteristics; CE availability, indications, and volumes; quality indicators (prep, mucosal visualization, completion, timing in overt bleeding, reporting standards, reading settings, AI use); outcomes/complications (retention and management); alternative small-bowel tools; and perceived barriers and expansion needs. Descriptive statistics were reported; availability was additionally compared across facility types using chi-square testing.

Results: A total of 403 physicians from 17 countries responded; most were gastroenterologists (264/403, 65.5%). Practice settings included tertiary hospitals (149/403, 37.2%), private sector (91/403, 22.6%), primary hospitals (85/403, 21.1%), and secondary hospitals (67/403, 16.7%). CE access was reported by 119/394 (30.2%; 95%CI 25.9%-34.9%), with marked inter-country variability (e.g., higher access in Egypt *vs.* very low access in several African countries). Availability differed significantly by facility type (tertiary 42.1% *vs.*

primary 13.1%; $P < 0.001$). Among centers with CE, services were relatively recent (95/120, 79.1% < 5 years) and generally low-volume (79/120, 65.8% < 20 cases/year). PillCam was most commonly used (53/119, 44.5%), followed by MiroCam (25.2%), CapsoCam (18.5%), and OMOM (13.4%). The most frequent indications were obscure GI bleeding (212/252, 84.1%) and iron deficiency anemia (111/252, 44%). In suspected small-bowel bleeding, CE was used first-line "always/often" in 91/214 (42.6%). Patency capsule use was inconsistent: 38/200 (19%) always; 102/200 (51%) never. Quality monitoring showed gaps: ≥ 80% adequate visualization was reported by 39/181 (21.5%), and completion ≥ 95% by 37/175 (21.1%), while 73/175 (41.7%) reported completion "not measured". For overt bleeding, only 34/182 (18.7%) achieved CE within 48 h in ≥ 90% of cases. Structured reporting was used always by 44/168 (26.2%), and AI-assisted reading was routine in 50/172 (29.1%). Nearly one-third had encountered capsule retention (67/200, 33.5%); management was most often conservative (113/171, 66.1%), with endoscopic retrieval available in 32/171 (18.7%). Despite limited CE access, alternative tools were commonly available (CT enterography 65.8%, MR enterography 60.6%). Key barriers ($n = 298$) were high procedure cost (58.7%), limited capsule availability (48.7%), lack of insurance coverage (44.6%), and lack of trained readers (44.6%). Reduced cost/reimbursement (40.4%) and physician training programs (27.4%) were the most commonly endorsed expansion needs. Overall, 219/285 (76.8%) believed CE should "definitely" be more widely adopted.

Conclusions: Across Africa and the Middle East, CE availability is limited (~30%) and concentrated in tertiary/private settings, with generally low procedural volumes and substantial variability in quality monitoring and adoption of best practices (patency use, structured reporting, timely deployment in overt bleeding). High cost, reimbursement constraints, and workforce/training limitations are the dominant barriers. Regional strategies prioritizing reimbursement pathways, structured training and credentialing, and scalable quality indicators are likely to yield the greatest gains in equitable CE implementation and performance.

12. When the "hidden small bowel" meets the "non-invasive eye": the diagnostic breakthrough of capsule endoscopy in critical malabsorption syndromes - insights from 3 cases

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Abstract

Background and objectives: The diagnosis of unexplained small intestinal diseases, characterized by chronic diarrhea, hypoproteinemia, and progressive weight loss, often presents significant clinical challenges. Conventional endoscopy has a limited reach, and while device-assisted enteroscopy is diagnostically valuable, it carries substantial risks and technical difficulties for patients in poor general condition or with severe malnutrition. This study aimed to elucidate the diagnostic value of capsule endoscopy (CE), a non-invasive tool for complete small bowel visualization, in critically ill or debilitated patients by presenting three cases with similar presentations but distinct pathological diagnoses, supplemented by a literature review.

Methods: We detailed the diagnostic and therapeutic courses of three patients. Our analysis focused on the correlation between CE findings and traditional diagnostic methods, and how CE guided the final diagnosis. Additionally, we conducted a comparative review of relevant literature on the application of CE in diagnosing similar small intestinal disorders.

Results: All three patients exhibited clinical features of malabsorption syndrome, including chronic diarrhea, refractory hypoproteinemia, and weight loss. CE revealed distinct patterns: In Case 1 (a 24-year-old female), diffuse villous atrophy and a granular mucosal appearance throughout the small intestine, consistent with autoimmune enteropathy, which was later confirmed histopathologically. In Case 2 (a 60-year-old male), multiple irregular, well-defined, depressed ulcers in the jejunum and ileum with increased mucosal friability, findings highly suspicious for neoplastic lesions such as lymphoma; the final diagnosis was monomorphic epitheliotropic intestinal T-cell lymphoma. In Case 3 (a 49-year-old male), villous atrophy, scalloping of circular folds, mucosal fissures, and a mosaic pattern, characteristic of celiac disease, led to a diagnosis confirmed by clinical response to a gluten-free diet. The literature review confirmed that the diagnostic yield of CE for obscure gastrointestinal bleeding, Crohn's disease, and small bowel tumors is superior to traditional radiological examinations. In malabsorption syndromes, CE effectively identifies villous atrophy (e.g., celiac disease, autoimmune enteropathy) and ulcerative lesions (e.g., lymphoma, Crohn's disease), with a reported diagnostic yield of 40% to 70%.

Conclusion: This case series and supporting literature suggest that for patients with suspected severe small intestinal malabsorption, progressive weight loss, poor general condition, and refractory hypoproteinemia, capsule endoscopy should be considered a first-line diagnostic tool. It enables a safe and systematic evaluation of the entire small intestinal mucosa. Its characteristic findings (e.g., diffuse villous atrophy *vs.* focal ulcers) provide crucial clues for differentiating inflammatory, autoimmune, and neoplastic diseases, thereby overcoming the limitations of invasive procedures in high-risk patients and facilitating early, precise diagnosis to avoid delays. Further prospective studies are warranted to define its optimal application timing and diagnostic efficacy in this specific critically ill population.

13. Performance of TOP100 software in detecting key small bowel findings at capsule endoscopy

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Abstract

Aims: Capsule endoscopy (CE) is a non-invasive diagnostic modality that has become a valuable tool for evaluating small bowel (SB) pathology. Despite its clinical value, it is limited by the time required for complete video interpretation and the associated reader fatigue. Studies have shown that accuracy drops even in the hands of experts after just one video. Artificial intelligence software has been developed to assist the reporting process. TOP100 is an integrated software that selects 100 images most likely to contain abnormalities. The aim of this study was to assess the overall diagnostic performance of TOP100 for specific SB findings in real-life clinical practice, by comparison with the standard reader, together with its performance across different clinical indications.

Methods: A retrospective single-center cohort study was conducted at our tertiary referral center. We included all consecutive patients who underwent CE using the PillCam™ SB3 system between January 2024 to August 2025. Data collected included: baseline demographics, comorbidities, previous endoscopy and laboratory findings, indications for CE, and adequacy of bowel preparation. CE findings were compared between the standard reader (SR) and a second reader using the TOP100 images, who was blinded to the original report. All CE readers had read > 500 CE in their lifetime. The sensitivity, specificity, positive

predictive value (PPV), and negative predictive value (NPV) of TOP100 were compared to the SR (gold standard) for each type of CE finding (inflammatory, bleeding, *etc.*). A sub-analysis of diagnostic accuracy was also performed based on the CE indication.

Results: A total of 812 patients were included, however 5 were excluded from the analysis, with 3 unable to swallow the capsule and 2 lacking available Top100 readings. The final analysis comprised of 807 patients (57% female, median age 53 years, IQR 34-65). The most common indications were suspected or known inflammatory bowel disease (IBD) (50%), and iron-deficiency anaemia (24%). In 88% of patients the bowel prep was adequate and 90% had a complete examination. Median SB transit time was 3 h 51 min (2 h 46 m - 4 h 50 m).

The diagnostic yield of findings at CE was significantly higher by SR compared to TOP100 (40% *vs.* 29%, $P < 0.01$). For any indication, the sensitivity and specificity of TOP100 for active bleeding were 58% (54%-61%) and 97% (95%-98%), and for angiodysplasias were 58% (54%-61%) and 97% (95%-98%), respectively. In patients with overt bleeding, TOP100 identified 80% of the total angiodysplasias and 71% of active bleeding reported by SR, with a sensitivity and specificity for P2 lesions of 65% (59%-77%) and 100% (100%-100%), respectively. The overall sensitivity and specificity of TOP100 for ulcers were 53% (49%-56%) and 96% (94%-97%), and for erosions were 40% (40%-44%) and 90% (88%-92%). In patients with suspected or known IBD, the diagnostic performance of TOP100 for ulcers was similar, while sensitivity improved for erosions by almost 12%.

Conclusions: SR remains the reference standard for reading and reporting CE; however, TOP100 can be a useful tool for quick preview of the video to assist in capsule reading and identifying cases that need to be prioritized - especially in high-volume centers. The diagnostic performance also depends on the indication of CE, with improved performance noted in bleeding and IBD.

14. Pillcam Genius pilot experience - an eruditive innovative - time to ditch the belt?

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Abstract

Aims: Capsule endoscopy (CE) is a useful modality to investigate the small bowel (SB). Since its invention in 2001, several iterations and prototypes have been developed. PillCam Genius is a new technology where the data recorder has been replaced entirely by a link device which is placed on the patient's abdomen. This allows the patient to post the link device back containing the data and hasten reaching a diagnosis. We conducted a pilot study to assess the utility of this new technology and the acceptability to patients.

Methods: This was a prospective multicenter site study of patients having Pillcam Genius. Demographic data and blood parameters, findings at CE and diagnosis, and follow-up data were collated.

Results: A total of 30 patients from 4 sites in the United Kingdom, France, Italy and Germany underwent SB investigation with PillCam Genius from September 1st, 2025 to November 28th, 2025. The median age was 72.5 years (52.0-80.0), with 57% female. The commonest indications were overt gastrointestinal (GI) bleeding (40%), iron deficiency anemia (IDA) (37%), and Crohn's disease (17%). All procedures but one were completed (97%), with no cases of CE retention. About half (53%) of the CE were done in an outpatient setting, with the remaining in an inpatient setting. In the 23 patients with suspected SB bleeding (overt and IDA), the median age was 76 years (57-83) and the median ASA score was 2.5 (2-3). The diagnostic yield for P1 and P2 lesions was 57%, while for P2 lesions only was 22%. Management was altered in 26%, with suggested enteroscopy in 22% and starting treatment with somatostatin analogs in 4%. In patients with overt GI bleeding, the diagnostic yield for P1 and P2 lesions was 33%, while for P2 lesions only was 17%. The median time of CE from presentation of overt bleeding was 6.5 days (4.5-15). The mean small bowel transit was 4 h 30 m (SD 2 h 06 m). One patient had a rebleeding episode at 7 days; all other 11 patients did not have any rebleeding episodes at 7 days or at follow-up. The median follow-up time was 21 days (9-28). All patients tolerated Pillcam Genius well and were satisfied with the minimalist technology.

Conclusions: The pilot study has demonstrated that Pillcam Genius is a good addition to the current technology of CE with a high diagnostic yield. It has the potential to reduce the travel burden of the patient and hence reduce carbon emissions. It also has the potential to offer a hub and spoke service to smaller and more remote hospitals which do not have a CE service and reduce time to diagnosis, particularly with large referral centers covering wide catchment areas.

15. TOP100: is it enough to top the human reader?

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Abstract

Aims: Capsule endoscopy (CE) is an accepted modality to investigate the small bowel (SB). Reading and reporting of CE, however, can be time-consuming. Previous studies have shown that even in the hands of experts, reader attention span drops after just one study. Artificial intelligence has exploded in the field of medicine, including within CE. The TOP100 is a feature on the CE software that identifies the 100 most significant images from the entire video, which may help to reduce physician reporting time. Previous studies have shown good diagnostic performance, especially for active bleeding and inflammatory lesions, and good agreement between standard human reading (SR) and TOP100. The aim of this study is to evaluate the agreement in findings and patient management between the same reader and different readers with SR and TOP100.

Methods: A retrospective analysis was conducted to compare SR of an entire video with TOP100 images identified by the software. The two experienced physician experts and a senior trainee had all read > 500 lifetime CE videos. The 2 experts who reported the original video were asked to review TOP100 images in a short-video format in a blinded fashion. The senior trainee was asked to read TOP100, which was subsequently compared to the expert-standard reading. Comparisons were made on significant findings and

main diagnosis and subsequent suggested management. Secondary outcomes were a comparison of reading time between standard read and TOP100 reads, and interobserver variability of CE readers between the standard human *vs.* TOP100 reads. A comparison was also made between TOP100 by the trainee compared to the physician-read.

Results: A total of 50 CE videos were reviewed by each expert with TOP100. Findings were recorded, and patient management was suggested based on TOP100 findings and the CE indication. Each expert reviewed 25 videos of suspected SB bleeding and 25 videos of known or suspected inflammatory bowel disease (IBD). Both expert readers had a substantial intra-observer agreement (K 0.61-0.80) between SR and TOP100 for ulcers and active bleeding. One reader had only a fair (K 0.37, $P < 0.01$) intra-observer agreement for angiodysplasias, while the other reader had a moderate agreement (K 0.68, $P < 0.01$) for the same category. Agreement on patient management based on TOP100 readings was similar between the two experts (75% and 78%), respectively. The inter-observer agreement between the senior trainee and the expert readers when using TOP100 was substantial for ulcers (K 0.90, $P < 0.01$), angiodysplasias (K 0.61, $P < 0.01$), and with an overall diagnostic yield (K 0.69, $P < 0.01$). Agreement was moderate for active bleeding (K 0.54, $P < 0.01$) and erosions (K 0.58, $P < 0.01$). The mean reading time per CE video with TOP100 was 1 m 48 s *vs.* 40 min for SR.

Conclusions: The TOP 100 has shown moderate intra-observer agreement compared to standard reading for the final CE diagnosis and subsequent changes in management of the two expert readers. On comparison between the TOP100 read by the senior trainee and the expert read, there was moderate to substantial agreement, suggesting that the TOP100 could be an adjunct to trainees in reporting of CE. Further studies with a larger pool of trainees with diverse experiences would help substantiate our study's findings.

16. AI-assisted cable-transmission magnetically controlled capsule endoscopy with anatomical localization for gastric disease screening

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Abstract

Introduction: Gastric cancer frequently presents at advanced stages due to its asymptomatic early progression, necessitating effective screening methodologies. Conventional magnetically controlled capsule endoscopy (MCCE) offers a non-invasive approach to gastric examination but exhibits limitations in image resolution and precise anatomical localization, resulting in potential diagnostic omissions. To address these deficiencies and minimize missed lesions during screening procedures, we developed a novel cable-transmission MCCE (CT-MCCE) system integrated with an AI-assisted anatomical localization model.

Methodology: We conducted a prospective, multi-center, self-controlled study comprising 180 CT-MCCE examinations between October 2022 and July 2023. Endoscopic video sequences were utilized to develop a real-time anatomical localization model based on the EfficientNet architecture. The model was trained on 5,265 images (585 per anatomical category) and evaluated on an independent test set of 900 images (100 per category). External validation was performed using 30 additional CT-MCCE cases. The AI model outputs were further processed using a post-processing algorithm to construct a comprehensive gastric examination

map. Performance metrics included sensitivity, specificity, and accuracy for focal lesion detection in the stomach, with Top-1 accuracy assessed for anatomical localization precision.

Results: The AI-assisted anatomical localization model achieved a Top-1 accuracy of 85% and an overall accuracy of 96.7% across anatomical regions, including the esophagus (97.1%), cardia (95.9%), fundus (97.7%), gastric body (99.3%), antrum (94.9%), gastric angle (93.8%), pylorus (95.6%), and duodenum (98.3%). The model also achieved a Top-3 accuracy of 97% and demonstrated strong discriminative ability, with an AUPRC of 0.936 and an AUROC of 0.989. CT-MCCE demonstrated excellent diagnostic performance for gastric focal lesions, with a sensitivity of 96.81%, specificity of 98.82%, and accuracy of 97.77% in the PPS analysis. It successfully identified one case of advanced gastric carcinoma without missing any significant lesions, such as tumors or large ulcers. No adverse events were observed.

Conclusion: The CT-MCCE system, combined with an AI-assisted anatomical localization model, offers a comfortable and efficient option for gastric disease screening. The AI-assisted localization enhances examination completeness and significantly improves diagnostic efficiency, reducing missed pathologies and supporting effective surveillance, particularly for malignant neoplasms.

17. Comparative performance of neural network models in small-bowel capsule endoscopy: a systematic review and meta-analysis

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Abstract

Background: Artificial intelligence (AI), particularly deep learning with convolutional neural networks (CNNs), has rapidly transformed medical imaging and gastrointestinal endoscopy. In small-bowel capsule endoscopy (SBCE), AI has emerged as a promising solution to long reading times, reader fatigue, and inter-observer variability, while potentially improving lesion detection and standardization of reporting. Although numerous neural-network architectures have been proposed for SBCE, their overall diagnostic performance and impact on clinical workflow remain heterogeneous and incompletely synthesized.

Methods: We performed a systematic review and meta-analysis in accordance with PRISMA guidelines. PubMed and Scopus were searched from January 2016 to October 2025 for studies evaluating neural-network–based applications in capsule endoscopy. Studies reporting lesion detection accuracy and/or reading time were included. Validation studies assessing diagnostic performance of neural networks and clinical studies evaluating AI-assisted reading were analyzed separately. A random-effects meta-analysis was used to calculate pooled accuracy and pooled mean differences in reading time between standard and AI-assisted reading. Heterogeneity was assessed using Q and I^2 statistics, publication bias with Begg's test, and study quality with QUADAS-2.

Results: Forty-four primary studies were included: 36 validation studies for accuracy analysis and 9 clinical studies for reading-time analysis (one contributing to both). Most studies were retrospective, with a balanced geographic distribution. CNNs accounted for 91% of reported architectures, with Xception, ResNet, and AlexNet being the most frequently used; more recent models included transformer-based and capsule networks. The pooled lesion detection accuracy across validation studies was 95.3% (95%CI 94.1-96.5), despite substantial heterogeneity (I^2 = 99.8%). Accuracy ranged from 88% to 100%, and no publication bias was detected. Subgroup analyses showed significantly higher accuracy with newer neural network architectures than for classical CNNs (98% *vs.* 93%, P = 0.015). No significant differences were observed by geographic region, year of publication, lesion type, or capsule platform. In clinical studies, AI-assisted SBCE reading resulted in a marked reduction in reading time. The pooled mean reading time decreased from 50.9 min with standard reading to 7.0 min with AI assistance, corresponding to an average reduction of approximately 84%. This substantial time saving was consistent across studies, even when conservative assumptions were applied to missing variance data.

Conclusion: Neural-network–based systems demonstrate very high accuracy for lesion detection in small-bowel capsule endoscopy and substantially reduce reading times without compromising diagnostic performance. Emerging architectures, including transformer-based and capsule networks, appear to outperform traditional CNNs, highlighting the importance of exploiting global and temporal information in video-based endoscopy. Despite considerable heterogeneity and a predominance of retrospective studies, current evidence supports the integration of AI into SBCE workflows to enhance efficiency, reduce clinician burden, and improve standardization. Future multicenter, prospective studies using standardized outcome measures are needed to confirm generalizability and facilitate widespread clinical adoption.

18. Intense gastrointestinal bleeding due to Meckel's diverticulum: a diagnostic and therapeutic challenge

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Abstract

Case presentation: A 16-year-old male patient was admitted to the emergency department with overt gastrointestinal bleeding for five days, associated with acute anemia. He received five units of packed red blood cells; however, the hemoglobin curve continued to decline. Upper gastrointestinal endoscopy showed no abnormalities. Colonoscopy revealed active bright red bleeding with clots refluxing from the small bowel through the ileocecal valve. Endovascular arteriography was performed but showed no contrast extravasation suggestive of active bleeding. Capsule endoscopy was then indicated, which revealed a large amount of fresh blood within the ileal lumen. Despite the bleeding, the capsule captured two "double-lumen" images, strongly suggesting the diagnosis of Meckel's diverticulum. The patient underwent laparotomy, which identified a Meckel's diverticulum measuring approximately 5 cm, and diverticulectomy was performed using a linear stapler.

Discussion: The diagnostic workup of gastrointestinal bleeding begins with upper endoscopy and colonoscopy. When these examinations fail to identify the bleeding source, small bowel origin is suspected, and capsule endoscopy is performed. In cases of massive enterorrhagia with bleeding rates greater than 0.5-1.0 mL/min, endovascular arteriography may be an alternative. Double-balloon enteroscopy is indicated when therapeutic intervention is required, with the insertion route guided by capsule endoscopy findings.

Final remarks: This case highlights the importance of a systematic diagnostic approach to gastrointestinal bleeding originating from the small intestine. The sequential use of endoscopic and radiological methods allowed accurate localization of the bleeding site and guided therapeutic management, with capsule endoscopy playing a fundamental role in topographic and etiological diagnosis.

19. Artificial intelligence in capsule endoscopy, science fiction made reality. A systematic review

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Abstract

Background and aim: Capsule endoscopy (CE) is a non-invasive diagnostic tool that allows visualization of the gastrointestinal tract. However, manually reviewing generated videos is a long and labor-intensive process. In recent years, artificial intelligence (AI) has emerged as a solution to automate this analysis, improving diagnostic accuracy and reducing reading times. Our aim was to evaluate the accuracy and effectiveness of AI in interpreting CE images for the diagnosis of gastrointestinal pathologies, focusing on sensitivity, specificity, impact on reading times, and the error rate of algorithms compared to standard reading.

Methods: A systematic review was conducted in accordance with the PRISMA statement and the GRADE scale to assess the quality of the evidence. The search included studies in PubMed and SciELO, selecting research published between 2016 and 2024 that employed AI in CE. Both experimental and observational studies reporting outcomes in sensitivity, specificity, reading times, and error rates were included.

Results: 168 studies were identified; 19 met the inclusion criteria. The findings highlighted that AI offers diagnostic accuracy comparable to human experts, with significant reductions in analysis times (up to 90%) and high sensitivity and specificity (over 90% in multiple studies). The evaluated models also demonstrated the ability to minimize errors and improve clinical efficiency.

Conclusion: AI has demonstrated sensitivity and specificity comparable to or better than standard reading, optimizing the detection of gastrointestinal pathologies. The integration of AI significantly reduces reading time without compromising diagnostic quality, facilitating faster diagnosis. Algorithms minimize errors in lesion detection, although their effectiveness depends on the quality of the training data. AI complements human work by standardizing diagnostic quality and mitigating interobserver variability. Despite the advances, challenges remain in standardizing protocols, generalizing results, and ensuring the availability of high-quality data.

20. Off-label use of a dual-lens OMOM colon capsule for small bowel evaluation: a real-world experience

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Abstract

Background: Capsule endoscopy is a well-established investigation for small bowel pathology. Conventional single-lens systems may miss subtle lesions; in some cases, up to 14% of lesions were seen with one lens and

not the other in one double-tip capsule study. Experience with alternative dual-lens platforms remains limited.

Aim: To assess feasibility, completion rate, diagnostic yield, and clinical impact of the dual-lens OMOM colon capsule used off-label for small bowel evaluation.

Methods: Real-world observational study of 39 patients undergoing capsule endoscopy with the dual-lens OMOM colon capsule. Indications included iron deficiency anaemia/low haemoglobin (n = 21), small bowel bleeding (n = 5), suspected or established IBD (n = 12), and coeliac disease assessment (n = 1). Data included preparation quality, completion, findings, reader confidence, and clinical impact.

Results: Mean age was 48.6 years, with 61.5% female and 38.5% male. Adequate or good preparation was achieved in 94.9%. Completion rate was 84.6%. Two studies were incomplete due to distal jejunal stricture and capsule hold-up in a large jejunal diverticulum. Lesions included angioectasias, inflammatory changes, ulcers, and mass-like lesions. In 5 cases, lesions were visualised by only one capsule lens. Findings altered clinical impression in 25.6% (10). Mean reader confidence was 4.8/5.

Conclusion: Off-label small bowel evaluation using the dual-lens OMOM colon capsule is feasible, produces satisfactory completion and diagnostic rates, and may serve as a practical alternative capsule system, especially where standard dual-lens small bowel capsules are unavailable or in limited supply.

21. Capsule endoscopy as a diagnostic tool in digestive pathology: experience from the Gastroenterology and Digestive Endoscopy Unit at Roosevelt Hospital, Guatemala (last 2 years)

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Abstract

Background: Capsule endoscopy (CE) has revolutionized the diagnosis of small bowel diseases by enabling visualization of areas inaccessible to conventional endoscopy. In Guatemala, Roosevelt Hospital was the first public healthcare center to implement this technology, becoming a national reference for digestive pathology diagnosis.

Methods: A retrospective study was conducted including all patients who underwent capsule endoscopy between January 2024 and September 2025 at the Gastroenterology and Digestive Endoscopy Unit of Roosevelt Hospital. All patients had previously undergone upper gastrointestinal endoscopy and colonoscopy. Clinical records and endoscopy reports were reviewed, and statistical analysis was performed using Jamovi software.

Results: A total of 26 capsule endoscopy procedures were performed during the study period. Women represented 57.7% of patients, with a mean age of 51.8 years. The main indication was obscure gastrointestinal bleeding (65.4%), followed by unexplained anemia (23.1%) and inflammatory bowel disease (11.5%). Positive findings were identified in 53.8% of cases, most commonly angiodysplasias (23.5%) and multiple ulcers (23.5%). Capsule retention occurred in 7.7% of patients (2 cases), both associated with intestinal stenosis, and resolved spontaneously without intervention.

Conclusions: Capsule endoscopy proved to be a safe and effective diagnostic tool for the evaluation of small bowel pathology, particularly in cases of obscure gastrointestinal bleeding. Despite a temporary reduction in procedures during 2024, increased utilization in 2025 reflects its growing clinical relevance. Our findings are consistent with national and international literature, supporting the continued implementation of capsule endoscopy in public healthcare settings in Guatemala.

22. Can colon capsule endoscopy help patients overcome barriers to conventional endoscopy?

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Abstract

Introduction: Colorectal cancer, a major cause of morbidity and mortality, can be prevented through early detection and removal of precancerous polyps. Although conventional endoscopy remains the gold standard for this purpose, its use is often limited by low patient acceptance, largely due to concerns related to invasiveness and anesthesia. Colon capsule endoscopy (CCE) is a minimally invasive modality for polyp detection that offers a safe and well-tolerated alternative, enabling comprehensive gastrointestinal visualization in a single examination and promoting acceptance of follow-up conventional endoscopy when required.

Aim of the study: This study aimed to evaluate the effectiveness of CCE for colonic polyp detection and subsequent therapeutic management in patients who had previously avoided preventive conventional endoscopy primarily due to procedure-related anxiety.

Methods: This study was conducted at two centers (New Hospital, Serbia, and Be Well, Bosnia and Herzegovina). A total of 150 patients (58% male, 42% female), aged 15-86 years, underwent CCE following standard bowel preparation protocols. Colon capsule endoscopy was performed using the OMOM CCE, which allowed up to 12 h of operation and included artificial intelligence–assisted image analysis. The analysis was restricted to patients with no prior symptoms or clinical findings.

Results: Among 150 patients, colonic polyps were identified in 7.3%, while nonspecific colitis was identified in 84%. Patients with diagnosed polyps were analyzed further. Of these, 54.5% had a single polyp and 45.5% had multiple polyps. Polyps were predominantly located in the descending colon (86.2%), with fewer lesions in the transverse (6.9%) and ascending colon (6.9%). Most polyps were non-bleeding (86%), whereas bleeding during CCE was observed in 13.8% of cases. Morphologically, 65.5% of polyps were sessile, and 34.5% were pedunculated. In 81.8% of cases, capsule excretion occurred within 12 h, prior to battery depletion. All patients in whom polyps were detected by capsule endoscopy subsequently underwent conventional colonoscopy under analgosedation for biopsy and polypectomy. All patients accepted the follow-up procedure without resistance. Histopathological examination revealed adenocarcinoma in 9% of patients, while tubular adenoma was identified in all remaining cases. Notably, the lesion later confirmed as adenocarcinoma was not observed by the artificial intelligence system.

Conclusion: Asymptomatic individuals who had previously been reluctant to have conventional endoscopy because of anxiety, chose colon capsule endoscopy for its non-invasive, anesthesia-free nature. Detection of polyps resulted in complete acceptance of subsequent colonoscopy under analgosedation, with no hesitation reported, despite prior refusal. These findings support CCE as a well-accepted screening strategy with the potential to improve adherence to colorectal cancer screening. Moreover, the study highlights that there is considerable room for improvement in the application of artificial intelligence in this field.

23. Extracorporeally controlled ingestible micro-robotic endoscope: prototype development and feasibility evaluation

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Abstract

Background: Limited active locomotion and maneuverability restrict the diagnostic and therapeutic capabilities of conventional capsule endoscopy. Although magnetically guided systems have been explored, their complexity and cost have impeded widespread clinical adoption. We developed a prototype ingestible micro-robotic endoscope with extracorporeal control to enable active navigation and potential intervention.

Methods: The device integrates a miniaturized camera and propulsion system driven by ultra-small motors and powered by either onboard lithium-ion batteries or a wireless balloon-based power-transfer system positioned in the stomach. Real-time visual feedback allowed extracorporeal manual control, supplemented by simplified navigation algorithms. Performance was evaluated in water-based experimental settings (phantom model) simulating gastrointestinal conditions.

Results: Continuous operation using onboard batteries was sustained for approximately 65 min and exceeded 120 min with intermittent use. The device achieved a propulsion speed of approximately 0.8 mm/s in water. Positional changes of the experimental subject facilitated directional movement. Independent power circuits for imaging and propulsion improved signal stability. Wireless power transfer via a gastric balloon demonstrated feasibility for extended operation and enabled simulated functions including marking, localized drug delivery, balloon dilation, and electrical stimulation.

Conclusions: This study demonstrates the technical feasibility of an extracorporeally controlled ingestible micro-robotic endoscope capable of active locomotion and multifunctional operation. Further advances in biocompatible, high-density power sources are required prior to clinical translation.

24. Colon capsule capabilities in diagnostics of small bowel disorders

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Abstract

Objectives: Colon capsule endoscopy (CCE) was developed in 2006 to detect colon diseases. However, its capabilities also include examination of the small bowel, which can significantly impact the correct diagnosis, especially in diagnostics or surveillance of patients with suspected or known IBD. The aim of the study is to

investigate the possibilities of capsule colonoscopy in diagnostics of small bowel diseases, including IBD.

Methods: From 31.03.2021 to 22.12.2025, small bowel disorders were identified in 50 (12.7%) pts (m-27, f-23, mean age 43.8 ± 15.6 years, range 15-79) among 394 pts admitted for performing CCE. Indications for CCE (Colon 2, Medtronic) in those 50 pts were: screening - in 11 (22.0%) pts, anemia associated with patients' refusal to undergo traditional colonoscopy/ it's earlier performance within 3 years prior to CCE - in 15 (30.0%) pts, suspicion of Crohn's disease - in 12 (24.0%) pts, monitoring the condition of small bowel and colon after verified Crohn's disease - in 9 (18.0%) pts, examination of small bowel and colon with Peutz-Jeghers (P-J) Syndrome - in 3 (6,0%) pts. Treatment in anamnesis was performed in 5 (10.0%) pts and included: resection of small bowel for Crohn's disease - in 1 pt, for P-J Syndrome in childhood - in 3 pts, radiation therapy for prostate cancer - in 1 pt. Bowel preparation included a split-dosage regimen (PEG/trisulfate) the day before and on the day of examination, and booster intake during the process of CCE. During the study, the capsule was activated to examine not only the colon, but also the small bowel.

Results: Intestinal abnormalities in 50 pts included: angioectasia of small bowel, as a cause of anemia - in 13 (26.0%) pts, enteropathy - in 31 (62.0%) pts, malignant tumors - in 3 (6.0%) pts with anemia, Peutz-Jeghers syndrome - in 3 (6.0%) pts. After CCE, balloon-assisted enteroscopy was recommended to all 13 pts with angioectasia, successfully performed in 8 (61.5%) pts with Hb level recovery.

Surgical resection of small bowel with tumor was performed in 3 pts with suspicion of tumors. The result of pathomorphological examination was gastrointestinal stromal tumor (GIST) (n = 2) and adenocarcinoma (n = 1). In P-J syndrome (n = 3), CCE allowed detection of hamartomas in the small bowel in 2 pts, in small bowel and colon - in 1 pt, and to perform balloon-assisted enteroscopy with polypectomy.

Among patients with enteropathy (n = 31), the surveillance of small bowel and colon mucosa was performed in 8 (25.8%) pts with verified Crohn's disease. Crohn's disease was confirmed in 2 (6.4%) pts with previously diagnosed ulcerative and undifferentiated colitis and unsuccessful response to therapy. Crohn's disease was excluded in 21 (67.7%) pts: NSAID-induced ulcerative/erosive enteritis was detected in 3 (14.3%) pts, radiation enteritis after radiation therapy for prostate cancer - in 1 (4.7%) pt, celiac disease - in 1 (4.7%) pt, erosions of the terminal ileum - in 16 (76.3%) pts.

Conclusion: Colon capsule endoscopy provided to reveal not only the colon pathological changes, but also small bowel abnormalities in 12.7% of cases. In patients with angioectasia and anemia, CCE allowed to determine the indications for balloon-assisted enteroscopy, as well as to identify angioectasia in different parts of small bowel and colon, 2 potential sources of bleeding. It helped to reveal malignant tumors, as a cause of unclear anemia, and provide the total examination of bowel in patients with PJ-syndrome. It was also helpful in surveillance of patients with Crohn's disease and in differential diagnosis of Crohn's disease and other inflammatory diseases.

25. Artificial intelligence in capsule endoscopy to bridge the diagnostic gap between trainees and experts

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Abstract

Background: Small bowel (SB) capsule endoscopy (CE) is a time-consuming and highly reader-dependent procedure. Artificial intelligence-assisted reading (AIR) systems have demonstrated promising potential in improving efficiency and accuracy. This study aimed to assess lesion detection and reading time performance of trainees using AIR *vs.* conventional reading (CR), comparing their results with those of CE experts.

Methods: This multicentre observational cross-over study evaluated 80 full-length Navicam SBCE videos acquired between January 1, 2021, and August 31, 2023, across two Italian centers. Four trainees and two experts interpreted videos using AIR and CR (trainees split AIR/CR; one expert CR, one expert AIR). An independent top expert established a per-lesion reference standard. Trainees' performance in lesion detection [accuracy, sensitivity, diagnostic yield (DY)] and reading time were assessed across both modalities and compared with experts' performance.

Findings: Eighty patients were included (43 male, 37 female; mean age 70.9 years). The main indication was suspected small-bowel bleeding (83.8% of cases). A total of 173 SB lesions were identified by the independent reviewer. Among trainees, AIR significantly improved diagnostic performance compared to CR: accuracy increased from 57% to 68% ($P = 0.002$); sensitivity from 67.0% to 83% ($P = 0.001$); DY from 72% to 86% ($P = 0.001$). Trainees using AIR achieved detection metrics comparable to/or exceeding those of CR-experts (accuracy: 72%, sensitivity: 75%, DY: 75%). Reading time was significantly ($P = 0.001$) reduced from 41:10 min in CR to 5:37 min in AIR among trainees and from 22:30 min in CR to 3:31 min in AIR among experts.

Interpretation: AIR narrows the diagnostic gap between trainees and experts, enabling trainees to achieve performances comparable to or exceeding those of experts using CR. Moreover, AIR allows a 6-8-fold reduction in reading time among trainees and experts, supporting AI integration into routine clinical practice.

26. Life-threatening obscure gastrointestinal bleeding revealed by capsule endoscopy: a rare case of small intestinal GIST with vascular malformations

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Abstract

Background: Obscure gastrointestinal bleeding (OGIB) originating from small bowel lesions remains a major diagnostic and therapeutic challenge. Capsule endoscopy (CE) has become the most effective tool for identifying small intestinal bleeding sources when conventional endoscopic evaluations are inconclusive, particularly in rare and potentially life-threatening conditions.

Case presentation: A 45-year-old female presented with a 2-day history of melena and hematochezia preceded by acute dizziness and gait instability. Laboratory testing revealed profound anemia with a hemoglobin level of 37 g/L. After initial hemodynamic stabilization, CE promptly identified the bleeding

source, demonstrating a large vascular malformation with multiple capillary malformations at the jejunoileal junction. The patient was referred for surgical management. Intraoperatively, the small bowel appeared diffusely pale, consistent with severe anemia. A giant exophytic small intestinal tumor with extensive adjacent vascular malformations was identified at the jejunoileal junction, with no additional lesions detected from the ligament of Treitz to the ileocecal valve. Initial laparoscopic ligation of mesenteric vessels was performed for precise localization; however, due to the giant tumor size and extensive vascular involvement, conversion to open surgery via a 10-cm midline incision was required. Definitive suture ligation of the tumor and vascular malformation blood supply was followed by segmental small bowel resection. Postoperative pathology confirmed a high-risk small intestinal gastrointestinal stromal tumor (GIST) with a maximum diameter of 8 cm and a mitotic index of < 5/50 HPF. Immunohistochemistry showed CD117(+), DOG1(+), CD34(-), SMA(-), Desmin(-), S-100(-), SDHB(+), and a Ki-67 index of 1%. Surgical margins were tumor-free. The patient recovered uneventfully.

Conclusion: This case demonstrates the pivotal role of CE in the rapid diagnosis of massive, obscure small bowel bleeding. The coexistence of a giant small intestinal GIST and extensive vascular malformations represents an exceptionally rare and life-threatening dual pathology. Early application of CE enables timely localization of bleeding sources and guides definitive surgical intervention, underscoring its essential role in the diagnostic algorithm of severe unexplained OGIB.

27. Discover the future of colorectal cancer screening: video capsule colonoscopy-painless, safe, and effective!

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Abstract

Colorectal cancer remains one of the most common and deadly types of cancer worldwide. As medical technologies continue to advance, colon capsule endoscopy is emerging as a promising alternative to traditional invasive and labor-intensive screening methods, offering a non-invasive and patient-friendly approach. We anticipate that in the near future, colon capsule endoscopy will become a widely used tool for detecting epithelial lesions in the colon, transforming the landscape of colorectal cancer screening.

From 31.01.2014 to 31.10.2025, we performed 417 colon capsule endoscopies, including 111/417 (26.6%) followed by subsequent colonoscopy: male-59 (53.1%), female-52 (46.9%), range 19-84, mean age 48.9 ± 14.4 years. The indication for colon capsule endoscopy was colorectal cancer screening in 59/111 (53.1%) patients; complaints of pain, constipation, or diarrhea in 21 (18.9%); symptoms of iron deficiency anemia in 17 (15.3%); postpolypectomy surveillance in 13 (11.8%), and after APC of vascular malformation - 1 (0.9%). Colon capsule endoscopy was performed using PillCam (Given Imaging), PillCam Colon2 in 105 (94.6%) cases, and Crohn's in 6 (5.4%). Preparation included a low-fiber diet and PEG-4 liters in split dosage. As a booster, we used oral sodium phosphate solution in 45 (40.6%) patients, and oral sodium sulfate solution in 66 (59.4%). The results of colon capsule endoscopy and subsequent colonoscopy («gold standard») were compared.

Bowel preparation was adequate in 108/111 (97.3%) patients. A complete colon capsule endoscopy examination was performed in 42 (93.3%) patients when used as booster sodium phosphate solution and in 65 (98.5%) with oral sodium sulfate solution. Colon capsule endoscopy detected 119 polyps and 2 advanced cancers in 49 patients. No lesions were found in 60 patients, either during colon capsule endoscopy or colonoscopy. In the 2 remaining patients, the results were completely contradictory: in one case, a 7 mm polyp detected during colon capsule endoscopy was not confirmed during colonoscopy; in another case, inadequate preparation for colon capsule endoscopy led to the omission of a 6 mm sigmoid adenoma detected during colonoscopy. The 7 (5.9%) 3-12 mm polyps were not detected by colon capsule endoscopy, but were detected by colonoscopy. The 2 (1.7%) 5 and 9 mm polyps were detected during colon capsule endoscopy, but were not confirmed by colonoscopy. The complication of the colon capsule endoscopy was capsule retention in 1 patient with obstructive cancer (extraction during hemicolectomy). The sensitivity of colon capsule endoscopy was 94.4% (95%CI; 81.12%-97.82%); specificity was 96.8% (95%CI; 88.5%-99.6 %). The PPV and NPV for the colon capsule endoscopy were 98.4% (95%CI; 93.8%-99.6%) and 89.6% (95%CI; 80.6%-94.6%), respectively. These indicators are slightly varied depending on the size and location of the polyps. Complete removal of 111 (93.3%) polyps was performed during colonoscopy. According to the histological examination, it was: hyperplastic polyps - 46/111 (41.4%), serrated sessile lesions - 20 (18.0%), adenomas - 42 (37.9%), adenocarcinoma *in situ* - 3 (2.7%). In 2 patients with advanced adenocarcinoma of the ascending colon, right hemicolectomy was performed. Colon capsule endoscopy is a promising and safe method of early diagnosis of colorectal lesions. Its high sensitivity (94.4%) and specificity (96.8) allow it to be used on a larger scale. Further studies, including prospective ones, are needed to refine the preparation protocols and evaluate long-term effectiveness. In the future, colon capsule endoscopy may become an important component of colorectal cancer screening and early diagnostic programs, improving patient compliance with screening.

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Ethical approval and consent to participate

Not applicable.

Consent for publication

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