

Diagnostic and therapeutic yield is not influenced by the timing of small-bowel enteroscopy: morning versus afternoon

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Background: Small-bowel enteroscopies (BEs) are tedious and prolonged, and their efficacy may be affected by the timing of procedures.

Objective: We aimed to evaluate the differences in diagnostic yield, insertion depth, procedure duration, therapeutic yield, and adverse events (AEs) of enteroscopies performed in the morning versus the afternoon.

Design: Retrospective cohort study.

Setting: Tertiary referral center.

Patients: Patients who underwent BE for suspected small-bowel disease at a single institution between January 2008 and August 2009.

Main Outcome Measurement: Differences in diagnostic yield, insertion depth, procedure duration, therapeutic yield, and AEs between morning (started before noon) and afternoon (after noon) procedures.

Results: A total of 250 enteroscopies were performed on 250 patients, of which 125 patients (50%) underwent a procedure in the morning and 125 patients (50%) underwent the procedure in the afternoon. The diagnostic yield with anterograde enteroscopy was the same in both the morning and afternoon (63.7% and 63.7%, respectively; $P = .99$). The procedure durations were also similar (42.4 ± 21.5 minutes vs 46.2 ± 22.4 minutes, respectively; $P = .25$). Similarly the diagnostic yield with retrograde enteroscopy was similar in morning and afternoon (44.1% and 35.3%, respectively; $P = .46$). However, the procedure durations of retrograde BE were significantly shorter in the morning compared with the afternoon (51.3 ± 21.3 minutes vs 66.6 ± 32.9 minutes, respectively; $P = .03$). Therapeutic yield and AEs were similar.

Limitations: Retrospective study.

Conclusions: The timing of procedure, morning versus afternoon, did not affect the diagnostic and therapeutic efficacy of BE in patients with suspected small-bowel disease. (*Gastrointest Endosc* 2013;77:62-70.)

Studies on colonoscopy showed lower completion rates and adenoma detection rates in procedures performed in the afternoon compared with the morning.¹⁻⁴ Fatigue and decreased concentration have been hypothesized as causes for these poorer outcomes in afternoon procedures.¹⁻³ Small-bowel enteroscopy (BE) has revolu-

tionized the evaluation and management of small-bowel disease because of its dual diagnostic and therapeutic capabilities.⁵ Balloon-assisted enteroscopy is composed of double-balloon enteroscopy (DBE) and single-balloon enteroscopy (SBE). The third type of enteroscopy system is spiral enteroscopy (SE), which uses rotational force to

Abbreviations: APC, argon plasma coagulation; AE, adverse event; BE, small-bowel enteroscopy; DBE, double-balloon enteroscopy; SBE, single-balloon enteroscopy; SE, spiral enteroscopy.

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create linear insertion capability.⁶ Enteroscopy procedures are tedious and prolonged and could be tiring. Enteroscopy is also one of the highly operator-dependent procedures performed by gastroenterologists.⁷

We therefore hypothesized that physician fatigue, which increases as the day progresses, may decrease the efficacy of enteroscopies. The aims of this study were to evaluate the differences in efficacy of enteroscopies (both antegrade and retrograde) performed in the morning versus the afternoon in terms of diagnostic yield, insertion depth, procedure duration, therapeutic yield, and adverse events (AEs).

METHODS

Patients

A retrospective chart review of the prospectively maintained institutional review board–approved database of patients referred to our hospital for BE from January 2008 to August 2009 was performed. Patient demographics, indications, procedural findings, and AEs were collected.

Inclusion and exclusion criteria

We included patients who had negative findings on upper endoscopy and colonoscopy and/or localization of small-bowel pathology suspected on capsule endoscopy or other imaging studies in the small bowel. We excluded patients with known large esophageal varices, severe active inflammatory bowel disease, fresh surgical stoma, severe ulcerative esophagitis, medical instability, and inability to provide an informed consent. Patients who had intraoperative deep enteroscopy were excluded. In addition, individuals with altered GI anatomy or previous small-bowel resection or previous laparotomy were excluded from the study.

Clinical variables

All enteroscopy procedures were performed by 1 of 4 experienced endoscopists who had previous experience with BE and/or advanced therapeutic endoscopy training. All endoscopists had a minimum experience of performing 50 BEs as an attending physician, and more than 200 BEs had been performed in our endoscopy unit before the study period. The basic demographic information was entered in the database with supporting laboratory studies before the procedure. Urine pregnancy tests were also performed before the procedure in women of childbearing potential. Enteroscopy either through the antegrade or retrograde initial approach was used based on the clinical presentation. The default approach was to use the antegrade approach for the examination if no clinical features were available to guide the decision. If pathology was not reached with the initial insertion route, a tattoo was placed and the opposite anatomic approach was used, as deemed clinically appropriate.

Take-home Message

- The timing of procedures, AM versus PM, does not affect the diagnostic and therapeutic efficacy of small-bowel enteroscopy in patients with suspected small-bowel disease.
- Retrograde enteroscopies performed in the afternoon might take longer to complete the procedure than morning procedures.

We had previously described the protocol for doing antegrade and retrograde procedures in our institution.⁸ Total procedure duration was defined as the period from insertion to withdrawal of the enteroscope. Estimated maximal insertion depth with the antegrade approach was defined as the number of centimeters beyond the ligament of Treitz when no further advancement was possible. From the retrograde approach, this represented the number of centimeters passed into the small bowel proximal to the ileocecal valve. Insertion depth by SBE and DBE was measured in centimeters by using the total number of 40-cm push-and-pull cycles on insertion, as defined by May and Nachbar.⁹ The insertion depth by SE was estimated by counting the amount of small bowel traversed on withdrawal in 5- or 10-cm increments.¹⁰ All of the 4 endoscopists used the same technique for measuring the insertion depth. At the point of maximal insertion, a tattoo could be placed by using SPOT ink (GI Supply, Camp Hill, Pa). Total enteroscopy was defined as visualizing the entire small bowel if the ileocecal valve was reached from the antegrade route or as bidirectional complete visualization of the small bowel verified by reaching the previous tattoo site. Diagnostic yield was defined as proportion of cases in which a significant endoscopic finding consistent with patients' clinical presentation was found. The clinical significance of the endoscopic diagnosis was further classified as definite and suspicious based on the clinical indication for the enteroscopy and appearance of the endoscopic lesion. For example, a small red spot is considered a suspicious lesion for a patient presenting with GI bleeding, whereas a red spot with pulsatile bleeding is considered a definite lesion. Therapeutic yield was defined as the proportion of cases in which endoscopic intervention such as polypectomy, stricture dilation, foreign-body removal, and endoscopic hemostasis was performed. Information on AEs was obtained. An AE was defined based on the American Society for Gastrointestinal Endoscopy workshop as an event that prevents completion of the planned procedure and/or results in admission to hospital, prolongation of existing hospital stay, another procedure (needing sedation/anesthesia), or subsequent medical consultation.¹¹ AEs were categorized as mild (procedure aborted because of an AE, postprocedure medical consultation, or requiring up to 3 days of

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