

## Double-balloon enteroscopy in the elderly: safety, findings, and diagnostic and therapeutic success

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**Background:** Double-balloon enteroscopy (DBE) is an important tool in the evaluation and management of small-bowel disease. Limited data are available on the safety, findings, and outcomes of DBE in elderly patients.

**Objective:** To determine the safety and efficacy of DBE in elderly patients.

**Design:** Single-center, retrospective analysis of prospectively collected database.

**Setting:** Open-access, tertiary care referral center.

**Patients:** A total of 176 patients undergoing DBE (216 procedures) for evaluation of small-bowel disease between August 2007 and August 2008.

**Interventions:** Argon plasma coagulation of bleeding small-bowel lesions.

**Main Outcome Measurements:** DBE complication rate, diagnostic/therapeutic success of DBE.

**Methods:** An age cutoff of 75 years and older was used to designate patients as elderly. Data on complications, indications, findings, and diagnostic and therapeutic success of DBE were compared between age groups.

**Results:** The mean age of patients was  $66 \pm 16.4$  years (range 20-95 years). DBE was performed in 185 patients, including 60 patients age 75 years and older and 110 patients younger than age 75. An overall complication rate of 0.9% was seen for DBE in this study, with no significant difference between age groups. No major complications were observed in elderly patients. Elderly patients were more likely to have angioectasias (39% vs 23%;  $P = .01$ ) and were more likely to require endoscopic therapy during DBE (46.8% vs 29.2%;  $P = .01$ ).

**Limitations:** Single-center, retrospective study.

**Conclusions:** DBE is safe in elderly patients. Elderly patients are more likely to have angioectasias and to require endoscopic therapy during DBE. (Gastrointest Endosc 2010;71:983-9.)

Since its development in 2001 by Yamamoto et al,<sup>1</sup> double-balloon enteroscopy (DBE) has emerged as an important tool in the evaluation and management of small-bowel disease.<sup>2</sup> DBE allows endoscopic therapy

that is not possible with video capsule endoscopy (VCE) in areas of the small bowel that are inaccessible to push enteroscopy.<sup>3,4</sup> Increasing data demonstrate that DBE is safe, with a complication rate comparable with that of

*Abbreviations:* CO<sub>2</sub>, carbon dioxide; DBE, double-balloon enteroscopy; OGIB, obscure GI bleeding; VCE, video capsule endoscopy.

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conventional endoscopic procedures.<sup>5-7</sup> Additionally, there are data suggesting that DBE has a diagnostic yield comparable with that of VCE in the evaluation of small-bowel disease<sup>8-11</sup> and, in some cases, detects lesions missed by VCE.<sup>12,13</sup> Obscure GI bleeding (OGIB) is a common indication for both DBE and VCE, accounting for approximately 5% of cases of GI bleeding.<sup>14</sup> With an aging population, an increasing number of endoscopic procedures are being performed in older patients. Previous studies have established the safety of upper endoscopy, colonoscopy, and ERCP in older patients.<sup>15-19</sup> However, there are no published data evaluating the safety and efficacy of DBE in older patients. In this study, we describe our single-center, 1-year experience with DBE with a comparison of outcomes in patients older and younger than the age of 75.

## MATERIALS AND METHODS

### Patient population

We retrospectively reviewed data from a prospectively collected database at Fox Chase Cancer Center on all patients undergoing DBE for the evaluation of small-bowel disease between August 2007 and August 2008. Data collection and analysis were approved by our institutional review board. A total of 170 patients and 216 procedures were identified during this period. An age cutoff of 75 years old and older was used to designate patients as elderly. A total of 60 patients were designated as elderly based on this age cutoff and underwent a total of 79 procedures. The remaining 110 patients were younger than age 75 and underwent 137 procedures. Data on indications, findings, complications, diagnostic success, therapeutic success, and agreement of DBE with VCE were compared in patients older and younger than age 75.

### Procedure-related information

All DBE examinations were performed by using the Fujinon EN 450 T5 enteroscope, TS 12140 overtube, BS-1 balloon, and PB-10 balloon controller (Fujinon, Inc., Saitama City, Japan). The depth of enteroscope insertion was estimated as previously described.<sup>20</sup> VCE studies, when performed before DBE, were read and interpreted by the referring physician and were not re-reviewed at our institution. DBE procedures were routinely performed with patients under monitored anesthesia care, carbon dioxide (CO<sub>2</sub>) insufflation, and without fluoroscopy. Antiplatelet and anticoagulation therapy was held at least 5 days before DBE procedures. Argon plasma coagulation performed with an ERBE generator at a power setting of 20 to 30 W, a flow rate of 1 L/min, and either forced or pulsed mode was the primary modality of endoscopic therapy used for treatment of vascular small-bowel lesions.

## Capsule Summary

### What is already known on this topic

- Double-balloon enteroscopy (DBE) is an important tool in the evaluation and management of small-bowel disease, especially obscure GI bleeding.

### What this study adds to our knowledge

- In a retrospective study of DBE in 60 patients older than 75 years and 110 younger patients, the groups revealed no difference in the success and complication rates, although the elderly patients were more likely to have angioectasias (39% vs 23%) and to require endoscopic therapy during DBE (46.8% vs 29.2%).

## Statistical analysis

Statistical analyses were performed by using SAS software (Version 9.1; SAS, Cary, NC). All continuous variables were compared by using a 2-tailed Student *t* test. All categorical variables were compared by using the Fisher exact test. A *P* value of .05 was used as a cutoff for statistical significance. The null hypothesis of the study was that the complication rate was equivalent in the two age groups. The study had 80% power to detect a difference of 11% in the DBE complication rate between both age groups by using a 2-sided test with a 5% type I error.

## RESULTS

### Patient characteristics

Table 1 shows the demographic data on patients undergoing DBE at our center. The mean age of patients in the elderly group was  $83.4 \pm 5.3$  years compared with  $57.2 \pm 13.2$  years in the age younger than age 75 group ( $P < .0001$ ).

A high percentage of our patients were white (85%). However, there was no significant difference in the proportion of white patients between both age groups. In the elderly group, there was a significantly higher percentage of patients with cardiac disease (46.7% vs 28.2%;  $P = .02$ ) and a significantly higher percentage of patients receiving anticoagulation therapy (26.7% vs 11.8%;  $P = .02$ ). There was no significant difference seen in the percentage of patients in either age group with regard to pulmonary disease, diabetes, smoking, antiplatelet therapy, and previous abdominal surgery.

### Safety of DBE

Complications were assessed immediately after the procedure and on the basis of follow-up telephone calls 24 to 48 hours after the procedure. The overall complication rate for DBE was 0.9% (Table 2). Complications (transient hypoxia in 1 patients and transient cardiac arrhythmia in 1

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