Double balloon enteroscopy: Initial experience in a university hospital

Abstract

Introduction: The study of the small bowel is a challenging task that has sparked interest and progress in medicine. In this context, double balloon enteroscopy (DBE) has allowed the direct visualization of the small intestine. Objective: To describe indications, procedure characteristics, findings, complications, and follow-up of patients taken to DBE at the Hospital de San José, Bogotá, between November 2011 and April 2019. Methodology: Case series study. Patients with a clinical indication or diagnostic images suggestive of small bowel lesion were included. Descriptive statistics were used. Results: 45 enteroscopies were performed in 44 patients, with a median age of 58 years. The main indication was potential small bowel bleeding (53.3%) and chronic diarrhea (11.1%). Anterograde procedures were more frequent. Most of the results were normal (46.7%); tumors (11.1%), Crohn’s disease (8.9%), and ulcers/erosions (6.7%) were among the most frequent findings. The diagnostic yield was 53.3% and the correlation with capsule endoscopy (CE) was 37.5%, and with imaging studies 42.9%. There were no complications. 91.1 % of patients were followed up on after a median of 56 months, with 78.1 % reporting symptom remission. The aim of enteroscopy was diagnostic in 84.4%. Conclusions: DBE is useful in the evaluation of the small intestine with a therapeutic possibility. The results are similar to those reported in the world literature. Follow-up can define the need for repeating the procedure, performing further studies, or symptom resolution.

Keywords

Double Balloon Enteroscopy; Gastrointestinal Bleeding; Capsule Endoscopy.

INTRODUCTION

For a long time, the small intestine was considered the “black box” by gastroenterologists because of the impossibility of an endoscopic visualization by a non-surgical method; this was due to its length, anatomical position, and size(1). However, in the 21st century, endoscopic techniques were developed in order to study the small intestine without the need for surgery(2,3). Study methods include endoscopic video capsule (VCE), enteroscopy with different techniques, and imaging studies.

VCE is considered a first-line study with a high negative predictive value, but with the limitation of not performing therapeutic interventions(4). An additional technique is an
enteroscopy, which should be performed if the findings of the VCE or other imaging studies are positive since it has a therapeutic possibility (biopsy, coagulation, polypectomy, among others)\(^6\). However, enteroscopy is invasive, requires sedation, and is difficult in patients with adhesions\(^6\). Some studies show that VCE and double-balloon-enteroscopy (DBE) have comparable diagnostic yields of up to 60 %\(^6\).

Among the methods that have been developed, there is the assisted DBE introduced in 2001, single-balloon DBE in 2007, spiral DBE in 2008, and through-the-scope balloon-assisted enteroscopy (TTS-BAE\(^+\)) in 2013, which uses a standard endoscope without the need for an overtube. In general, these techniques have comparable diagnostic yields \(^7\,8\), and their choice depends on local experience and availability. There have been no reported differences in the diagnostic yield, therapeutic performance, or complication rate between spiral enteroscopy and DBE\(^9\,10\) and between single-balloon enteroscopy and DBE\(^11\,13\).

There are two possibilities to perform it. The access route is chosen depending on the clinical presentation and review of previous studies. In up to 85 % of cases, a complete examination of the small intestine is achieved when both pathways are used\(^14\,15\). Its complications are low and are more related to the performance of therapeutic procedures, including pancreatitis (2 %) and perforation (1 %)\(^14\). Intraoperative enteroscopy is a useful but invasive diagnostic and eventually a therapeutic procedure; in general, its use should be limited to settings with difficulty performing enteroscopy, either by availability, previous surgery, or severe adhesions\(^14\).

The main indication is potential bleeding from the small intestine, which accounts for 5 % of the causes of gastrointestinal bleeding\(^6\); it is called this way because by using all diagnostic tools, it is possible to establish the cause of the bleeding 75 % of the time, while obscure gastrointestinal bleeding is diagnosed in the patient with negative endoscopic and small intestine studies\(^16\,18\).

The study of small bowel bleeding is difficult, can be recurrent, and is related to neoplasms, especially in patients younger than 40 years who are more likely to have small bowel tumors (lymphoma, carcinoid tumors, adenocarcinoma, and hereditary polyposis)\(^14\). Therefore, a diagnostic algorithm that rationally uses the locally available tools is required. Considering the above, it is essential to carry out studies in patients brought to DBE that allow us to know the indications, findings, complications, and relationship with other diagnostic methods and their impact on the outcomes.

**METHODS**

Descriptive observational study type case series. The information was collected prospectively. Patients over 18 years old were included, whose clinical indication or diagnostic imaging suggesting small bowel injury, and thus, DBE was performed. It included intraoperative enteroscopies. DBE was performed with a Fujinon EN-450TS\(^+\) enteroscope according to the usual technique and without fluoroscopy (which is not used in most studies).

Information about sociodemographic variables was obtained—sex and age. In regard to the procedure, the following data were collected: indication, duration, access route defined according to the patient’s clinical picture, imaging studies or VCE, distance explored—it was calculated both in centimeters via antegrade starting from the pylorus and retrograde, from the ileocecal valve, adding the advances and subtracting the setbacks approximately—findings, results of biopsies, correlation with other studies, and patient’s clinical status in routine follow-up. Qualitative variables were described by absolute and relative frequencies. The quantitative variables were described using central tendency and dispersion measures: medians and interquartile ranges IQR if the distribution was not normal suggested or means and standard deviations (SD) if otherwise. **Diagnostic yield** was considered the relative frequency of abnormal findings and the correlation of similar findings between DBE and VCE or imaging studies.

**ETHICAL CONSIDERATIONS**

The Ethics Committee approved the protocol of the Hospital de San José in Bogotá and the Research Committee of the Fundación Universitaria de Ciencias de la Salud.

This work does not involve additional procedures, but it does use the information from them. Nor is any additional benefit expected since its scope is descriptive. In addition, it is classified as risk-free research according to resolution 8430 of 1993 of the Colombian Ministry of Health.

**RESULTS**

In total, 49 procedures were performed, four were excluded—three intraoperative enteroscopies and one performed on a child under 18 years; therefore, 45 enteroscopies were included out of 44 patients. The median age was 58 years (IQR: 48.5 to 70.5 years), with a minimum of 18 years and a maximum of 83 years. The majority were women (n = 29, 65.9 %).

The main indication was potential gastrointestinal bleeding from the small intestine (n = 24, 53.3 %) followed by chronic diarrhea (n = 5, 11.1 %) and chronic abdominal pain (n = 4, 8.9 %) (Table 1). The average procedure time was 90.2 minutes (SD: 23.6 minutes), with a minimum of 30 minutes and a maximum of 150 minutes.
28 procedures via anterograde and 17 via retrograde were performed. The median length achieved via antegrade was 310 cm (IQR: 222-400 cm), and via retrograde was 195 cm (IQR: 176-475 cm).

Most of the procedures were normal (n = 21, 46.7 %). Among the most frequent findings were tumors (n = 5, 11.1 %), Crohn’s disease (n = 4, 8.9 %), and ulcers or erosions (n = 3, 6.7 %) (Table 2). In five cases (11.1 %), enteroscopy diagnosed lesions within the scope of conventional endoscopic studies, either from intermittent bleeding or undiagnosed lesions. One patient had a giant hiatal hernia with Cameron ulcers that was taken to surgery 11 months after diagnosis. Two patients presented hemorrhage secondary to colon diverticulum managed endoscopically with follow-ups at 14 and 71 months without new bleeding episodes. One presented cecum angiectasis, which was managed with electrocoagulation and a follow-up at 56 months without new bleeding episodes. The fifth case was an immunosuppressed patient with lymphoproliferative syndrome who presented an inflammatory ulcer due to histology in the rectum; anemia was corrected by controlling the underlying pathology with a follow-up at 69 months.

Overall diagnostic yield of BDE was 53.3 % (n = 24 abnormal findings). For the most frequent case, potential gastrointestinal bleeding of the small intestine, this yield was 54.2 %. The correlation of the results with the CVE was 37.5 %, and imaging studies were 42.9 %, whereas either of the two was 40 % (Table 3). There were no complications.

Follow-up was achieved in 91.1 % (n = 41), in a median time of 56 months, with a minimum of 4 and a maximum of 87 months. The majority of these patients were asymptomatic and did not require further studies (n = 32, 78.1 %); four of the patients died from causes unrelated to the procedure (Table 4). Of the 24 patients with potential gastrointestinal bleeding from the small intestine, abnormal findings were reported in 13, of whom 2 (15.4 %) had a new episode of bleeding, while of the 11 patients with normal results, only 1 (9 %) presented a new bleeding episode that was considered secondary to an anal fissure in the coloproctology assessment.

For patients who underwent pathology studies (n = 21), the main result was cancer (n = 5) and chronic non-specific inflammation (n = 3), followed by infectious enteritis (n = 3) (Table 5), only 15.6 % (n = 7) of the BDE were therapeutic. 84.4 % (n = 38) had a diagnostic indication.
The route of insertion varies according to the most likely location of the lesion, determined mainly by the medical history associated with image studies such as VCE. The anterograde pathway was the most frequent, which is also the most used in the reported case series\(^{5,21,23,24}\). If the location of a lesion is unknown, the antegrade pathway is generally used since the retrograde technique is more complex, requires preparation, less intestine can be explored, and sometimes the ileocecal valve cannot be cannulated\(^{22}\).

The median distance reached via anterograde was similar to that reported worldwide\(^{13,23}\). The median distance reached via retrograde apparently was greater than reported in the literature\(^{16,24}\); it is important to note that these measurements in all series are subjective, non-homogeneous, and therefore, inaccurate, so comparisons are difficult. The rate and clinical impact of the complete visualization of the small intestine are controversial\(^{27-29}\). There seems to be a consensus that this does not guarantee a greater diagnostic or therapeutic yield\(^{30}\).

The average time of the procedure was 90.2 minutes, and these are very variable (40-180 minutes)\(^{24,26}\) due to different factors, such as training and experience of the gastroenterologist, history of previous surgery, intestinal adhesions, and obesity\(^{30}\).

Despite the frequency of normal findings\(^{26}\), the benefit of DBE should not be ruled out since the possibility of treatment offered reduces the need for more invasive interventions and surgical risks; moreover, it is a safe method with low complication rates\(^{22}\). The detection rate of abnormal findings can be increased with a rigorous patient selection and early procedure\(^{32}\).

The VCE has a variable diagnostic yield (between 45 % and 81 %), with an accuracy rate of up to 30 %; it is accepted that the DBE is a complement to its limitations\(^{31}\). In this study, overall diagnostic yield, defined as the percentage of abnormal findings, was 53.3 %, lower than in other studies\(^{31,21}\). This result can be explained in the late performance of the DBE due to administrative issues related to our healthcare system or overdiagnosis of previous studies that increased the amount of DBE that would not have to be performed.

The diagnostic yield for potential gastrointestinal bleeding of the small intestine was 54.2 %, similar to other studies\(^{4}\); however, it was low compared with series with results of close to 80 %\(^{3,31}\). This difference can be explained due to the long time taken from the onset of symptoms to the completion of complementary studies for administrative reasons already noted\(^{4,16,33,34}\).

The most frequent diagnoses in patients with potential gastrointestinal bleeding of the small intestine were tumors (12.5 %: two gastrointestinal stromal tumors (GIST), and one small intestine adenocarcinoma), followed by ulcerative...
REFERENCES


25. Xin L, Liao Z, Jiang YP, Li ZS. Indications, detectability, positive findings, total enteroscopy, and complications of diagnostic double-balloon enteroscopy: a systematic review of data over the first decade of use. Gastrointest Endosc.
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https://doi.org/10.1007/s00535-004-1532-5

https://doi.org/10.1016/s0016-5107(05)00372-x


https://doi.org/10.1016/j.giec.2016.08.006


https://doi.org/10.1016/j.gie.2007.07.047