

Digestive Endoscopy

Capsule endoscopy followed by single balloon enteroscopy in children with obscure gastrointestinal bleeding: A combined approach



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ABSTRACT

Background: This prospective single-centre study aims to evaluate a new diagnostic algorithm using capsule endoscopy, colon capsule endoscopy and single-balloon enteroscopy in the work-up of obscure gastrointestinal bleeding in children.

Methods: The usefulness of a new diagnostic algorithm was assessed comparing the clinically relevant findings revealed by each technique, and evaluating the clinical outcomes during the follow-up.

Results: A total of 22 paediatric patients were evaluated (14 male; mean age 12.5 years \pm 3.9). Capsule endoscopies were positive in 14 (63.6%), suspicious in 5 (22.7%) and negative in 3 (13.6%). A second look with colon capsule identified new lesions in 2/3 (67%) of previous negative cases. Enteroscopies were able to reach the positive and suspicious findings in all but 2, in which an intraoperative enteroscopy was needed. This combined approach showed positive findings in 21/22 of cases with a diagnostic yield of 95%. Eighteen patients (82%) had a complete resolution after therapy. One patient resolved his symptoms spontaneously. Despite diagnosis, in three patients (13.6%) the gastrointestinal bleeding was not resolved after therapy.

Conclusion: This algorithm achieves optimal levels of diagnostic yield (95%) and therapeutic outcome (82%). This approach deserves to be studied in a larger multicentre cohort of patients and for a longer follow-up period.

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1. Introduction

Obscure gastrointestinal bleeding (OGIB) is defined as bleeding of unknown origin that persists or recurs, after negative initial evaluation using bidirectional endoscopy and radiologic small-bowel imaging [1].

Although OGIB represents a small proportion of both adult and paediatric patients with gastrointestinal bleeding, it continues to be a challenge for clinicians because of difficulty and delay in diagnosis, for frequent blood transfusion and consequent morbidity and

mortality. In recent times, capsule endoscopy (CE) and balloon-assisted enteroscopy (BAE) have established their position in the management algorithm of adult patients with OGIB, and have had a significant impact on the outcome [2–5].

OGIB is a common indication for CE [6–9] and BAE [10–16] in children. Possible causative lesions can be found by CE in 75% with relevant findings resulting in a specific diagnosis in 60% of cases [7,17]. However, there is uncertainty how to proceed when CE is negative. Viazis et al. have reported a significantly increased diagnostic yield in repeating CE [18], but a second-look with second generation colon capsule endoscopy (CCE) could be more reliable and useful due to the double camera and larger number of images per second.

Recent reports on the use of BAE in children showed a high diagnostic yield in diagnosis the cause of OGIB (70–100%) with the clear advantage over CE because of the possibility for therapeutic

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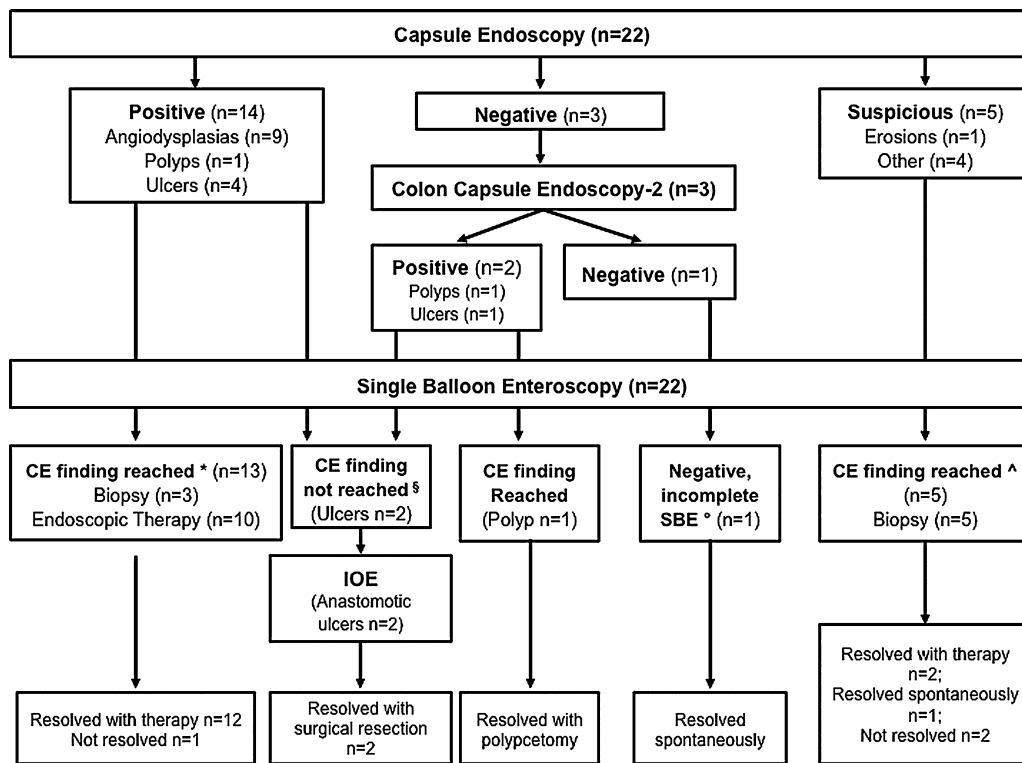


Fig. 1. Algorithm of the study showing results. * Total enteroscopy attempted and achieved in 1 case. Total enteroscopy attempted but not achieved in 2 cases. ° Total enteroscopy attempted but not achieved in this case. ^ Total enteroscopy attempted in 3 cases but achieved in 1 case. CE, capsule endoscopy; IOE, intraoperative enteroscopy; SBE, single balloon enteroscopy.

intervention [12,15,16]. But, in studies on adults, the diagnostic yield of BAE is considerably enhanced when lesions are previous identified by CE, making the procedure easier, shorter and more feasible [19,20].

With no studies in paediatric literature evaluating the role of combined use of CE and BAE in children with OGIB, the aim of our prospective study was to evaluate a new diagnostic algorithm based on a combined approach with CE, CCE and SBE comparing the clinically relevant findings revealed by each technique, and evaluating the clinical outcomes.

2. Patients and methods

2.1. Patient selection

We prospectively enrolled all paediatric patients referred to our unit for OGIB. Patients with contraindication to CE (implantable cardiac devices) and/or SBE (severe comorbidity with ASA score of 4 or greater, or recent major abdominal surgery) and those unwilling to give informed consent were excluded from the study. Before enrolment, all patients had undergone esophagogastroduodenoscopy and ileocolonoscopy. MR-enterography and Meckel's scan were usually performed before CE. MR-enterography was systematically used to exclude malformations potentially dangerous for capsule retention and needing surgical approach a first line technique. Meckel's scan was performed in all patients with bloody painful stool to exclude a diverticulum. Angiography has also been performed in patients during ongoing bleeding. For the purpose of this study, ongoing overt bleeding was defined as melena or haematochezia within 24 h before CE; previous overt bleeding as at least 1 episode of melena or haematochezia before CE, with a longer than 24-h interval between the last episode of overt bleeding and CE; and

occult bleeding was defined as persistent iron deficiency anaemia with positive faecal occult blood test.

2.2. Study interventions

The diagnostic algorithm applied in the study is shown in Fig. 1. All included patients underwent CE as the first primary small bowel endoscopic procedure; if CE was completely negative a second-look using CCE was performed, then SBE was systematically performed in all cases within 2 weeks of the capsule examination. Intraoperative enteroscopy was performed in children with positive findings at CE and the inability of SBE to reach the lesion. Follow-up data were obtained from medical records at our hospital and from questionnaires collected by mail from the doctors of other hospitals. The questionnaires included date of final examination, changes in haemoglobin level, existence of overt bleeding, additional examinations, amount of transfusions, amount of iron replacements, date of transfusion, and last date of iron replacement. All parents or caregivers gave written informed consent, after detailed information on the nature of the procedures. The study was approved by the local ethical committee.

2.3. Capsule endoscopy procedure

Capsule endoscopy was performed using the Pillcam SB2 (Given Imaging, Yoqneam, Israel), as reported before. In preparation, a 25 ml/kg of polyethylene glycol-based solution plus simethicone was given in the afternoon on the day prior to the procedure (Selg-Esse, Promefarm, Milan, Italy) [21]. Patients swallowed the capsule in the morning. Alternatively, CE was endoscopically placed in the duodenum using a dedicated device (US Endoscopy, Mentor, Ohio, USA). The recorder was disconnected 8 h after the beginning of the study. In patients with negative CE, a second-look using CCE (Given Imaging, Yoqneam, Israel) was performed within 1 week after the

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