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**Preventing incomplete and inadequately
cleansed capsule endoscopy
examinations. Is it possible?**

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EDITORIAL

Preventing incomplete and inadequately cleansed capsule endoscopy examinations. Is it possible?

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The introduction in clinical practice of small-bowel capsule endoscopy (SBCE) represented, not only for doctors specifically dealing with diseases of the small intestine, an epochal diagnostic progression. Since 2001, the year of its first clinical use, numerous scientific studies have shown its utility as a non-invasive technique for the diagnosis of small-bowel disorders. The term “capsule endoscopy” returns more than 4,000 items in PubMed, but the most robust scientific evidence for the use of the SBCE is for patients with suspected small bowel bleeding, Crohn's disease and small bowel neoplasms. New diagnostic algorithms for diagnosing these disorders have been developed (1,2).

Since the image quality of SBCE is high, the diagnostic yield (DY) of SBCE and, potentially, the patient's clinical outcome can significantly be limited by two confounders which hamper SBCE performance: 1) incomplete evaluation of the small bowel within the capsule's battery life; and 2) poor luminal visualization. If results of SBCE are negative and/or inconclusive and complete enteroscopy is not achieved, concerns remain over missed small bowel pathology, eventually leading to the need for further examinations and increased costs.

In this issue of *The Spanish Journal of Gastroenterology (Revista Española de Enfermedades Digestivas)*, Ponte et al. (3) evaluated the predictive factors for an incomplete SBCE and those for an inadequate small-bowel cleanliness. Consecutive patients with incomplete SBCE with Mirocam® CE system were retrospectively included over a 7-year period (2009-2016). These were compared with all consecutive patients with complete SBCE exams during a 2-year period (2014-2016). Patients who underwent SBCE between the latter period, including those with incomplete procedures, were evaluated in order to identify predictive factors for inadequate small-bowel

cleansing. It is noteworthy that a validated quantitative index and a qualitative evaluation scale for grading small-bowel cleansing for SBCE was used in this study. This represents an important quality measure for assessing this parameter. Thirty-one incomplete and 122 complete SBCE examinations were included for evaluating factors for an incomplete procedure. Three independent predictive factors were found: the degree of dependency, inpatient status, and prior abdominal surgery. Among 130 patients, the two independent predictive factors for an inadequate preparation, according to both index used, were: male gender and high small-bowel transit time.

The results of this interesting retrospective study further confirm what is already known with regard to the problem of incomplete SBCEs and also provide important points for discussion. It is known that the rate of incomplete SBCE is approximately 15-20% (4), which is a figure that should be regarded as too high. As a comparison, if we were measuring cecal intubation rates for colonoscopy at around 80%, this would be considered unacceptably low, and every effort would be made to improve it. Therefore, significant work needs to be done to develop interventions that consistently achieve a 100% completion rate for capsule studies. Some conditions have been associated with an incomplete small bowel examination, such as inpatient status or previous small-bowel surgery (5-7), while the effect of age, diabetes mellitus remains controversial.

There are no clear-cut explanations for incomplete small bowel examinations in inpatients, although the number and severity of comorbidities, use of medications which may affect small-bowel transit time, as well as the reduced physical activity of inpatients, have been postulated as potential contributing factors. It is therefore recommended that SBCE should be performed as an outpatient procedure if possible, since completion rates are higher in outpatients than in inpatients (8).

In some clinical scenarios the timing of SBCE is, however, a crucial issue (9). In patients with acute overt bleeding, which often occur during hospital stay, clinical guidelines (1,2) suggest performing SBCE as soon as possible after the bleeding episode (ideally within 24-72 hours). When clinically indicated, the examination should not be postponed simply because the patient is an inpatient. Therefore, in such situations all those practices that would favor a complete examination should be implemented.

Although prolonged gastric transit time has not been found in relation to incomplete SBCE by Ponte et al. (3), other studies have consistently reported this factor as a leading cause of incomplete small bowel examination (5). Patients at risk of delayed gastric emptying include inpatients, patients with diabetic neuropathy, severe hypothyroidism, or renal insufficiency, and/or those using psychotropic or narcotic medications. Recent technical guidelines (8) suggest that in these cases, a real-time viewer may guide appropriate intervention (administration of a prokinetic agent and/or endoscopically assisted capsule delivery into the duodenum) to optimize the SBCE examination (10). The use of newest SBCE devices with longer battery time may potentially be helpful in this situation. One key additional benefit of complete SBCE cannot be underestimated. The approach for device-assisted enteroscopy (oral or anal) is usually determined by the timing of the lesion as per SBCE. This crucial step is largely determined by the small-bowel transit time based only on complete SBCE (8).

A problem no less important is the quality small-bowel cleansing at SBCE. Optimal patient preparation for SBCE has been controversial. The manufacturers do not recommend preprocedure purgative use for SBCE; the only recommended requirement is a low-fiber diet on the day before the procedure with clear liquids only in the evening and a 12-hour fast. To date, five meta-analyses have concluded that the ingestion of 2 L of PEG solution prior to capsule ingestion leads to improved visibility of the small-bowel mucosa. However, the evidence relating to completion rates and DY is still inconclusive and the optimal timing for purgative use is yet to be established (11-15), although the most recent meta-analysis of randomized controlled trials has casted doubts on the effective usefulness of purgative preparation before SBCE for improving both the DY of SBCE and the quality of small-bowel mucosal visualization (16).

This last scientific evidence could have a practical utility from a patient's perspective, for which performing SBCE without any prior bowel preparation could increase patient acceptance and at the same time save some costs. With this said, we still need to look at the value of preparation in selected situations such as in groups at high-risk of having poorly cleansed studies and where there is increased likelihood of subtle findings such as mucosal aphthae and small growths.

In conclusion, large controlled prospective trials will be required to identify strategies to solve the issues raised by Ponte et al. (3). The complete knowledge of risk factors for incomplete SBCE procedures or inadequate small bowel cleansing allows for selectively targeting these factors in

future procedures to reduce the risk of such events. This should lead to an improved diagnosis, help minimize additional investigations, and assist the use of targeted enteroscopy for appropriate patients.

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