Usefulness of Capsule Endoscopy for Full Examination of the Colon in Patients with Large Bowel Cancer Treated Using Self-Expanding Metal Stents

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Abstract

Since the discovery of capsule endoscopy, have been introduced in different indications. It is used mainly to examine the small intestine. Newly Introduced Improvements include the technical design of specific capsules for the esophagus and colon. We must not forget that colon capsule preparation needed before the colon, like a colonoscopy. The most common indications are screening for colorectal cancer when colonoscopy is incomplete and when the patient refuses to undergo colonoscopy.

This article aims to describe a possible indication of colon capsule endoscopy and the experience gained in our hospital. The indication would be in patients with stenosing left colon tumors treated using self-expanding metal stents. This technique would be an alternative to colonoscopy colon through the colon prostheses as a bridge to surgery.

In our experience, we must be modified the colon preparation adding lactulose, and we waiting that the colon diameter at ends of the stent both is similar. We have obtained promising results with a diagnosed case of synchronous cancer, and we have not had any cases of impaction of the capsule.

Keywords: Colon capsule endoscopy; Stenosing Colorectal Cancer; Self-expanding metal stent

Introduction

Capsule endoscopy is a relatively new diagnostic technique that was first investigated in Israel in the 1980s by a mechanical and optical engineer, Dr. G. Iddan. It is used mainly to examine the small intestine [1,2]. Visualization of the colon is usually hampered by intestinal fecal content, and visualization of the stomach is incomplete because of the lack of distension and the fact that some areas remain outside the field of vision. The capsule measures 26 × 11 mm, and this is of particular relevance when evaluating its usefulness in specific conditions affecting the colon. Since its introduction at the end of 2001, the capsule has been widely used, thanks to its high diagnostic efficacy.

The main indications for capsule endoscopy are as follows:

Visible or occult hemorrhage of unknown origin (iron deficiency anemia)

- Suspected Crohn disease
- Suspicion of intestinal tumors and follow-up of intestinal polyposis syndromes
- Study of malabsorption disorders such as celiac disease

This technique is contraindicated in pregnancy, patients with swallowing disorders, and patients with small bowel stricture, such as that caused by inflammation, cancer, or extrinsic compression, as is the case in postsurgical adhesions [1,2].

The complications of this technique are uncommon and include inability to swallow, impaction of the pyriform sinus, impaction of the esophagus or bronchus, delayed evacuation of the stomach, retention in an afferent loop or in lesions of the small intestine, impaction in the small intestine (including perforation), and retention in the colon (eg. diverticula) [1-3].

Newly introduced technical improvements include the design of specific capsules for the esophagus and colon. The endoscopic PillCam™ ESO capsule was approved by the United States Food and Drug Administration in October 2004 for visualization of the esophagus. The device was modified to include cameras on each end that enable it to acquire 7 images per second as it passes through the esophagus. In addition, the batteries last 20-30 minutes, which is sufficient time to explore the esophagus and part of the stomach. The main indications are examination of the esophagus, esophageal varices, or suspected Barrett esophagus [4,5]. The advantage of the technique is that the patient does not have to be sedated and can return to normal daily activities after the procedure. Capsule endoscopy is indicated in patients who refuse to undergo conventional endoscopy, which continues to be the diagnostic method of choice.

Colon Capsule

Colonoscopy is the gold standard when screening for diseases of the large intestine, including colorectal cancer. This invasive approach requires the colon to be intubated and insufflated. It is operator-dependent and requires extensive training. In addition, the technique carries a 0.3% risk of complications in diagnostic uses, and this could increase to 2% in polypectomy.

A new application of the endoscopic capsule, the PillCam™ Colon Capsule, has recently been developed. This capsule is different from that used to examine the small intestine. First, it is 31 mm long (4 mm longer than other types), although the diameter remains unchanged. The camera at each end can acquire 4 images per second [6,7]. Its battery lasts longer (9-10 hours) and can be disconnected for several

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hours after ingestion in order to conserve power in the colon. The second-generation PillCam Colon Capsule is slightly larger (31.5 mm × 11.6 mm) than its predecessor. In addition, the angle of vision at each end has been increased, enabling 35 images per second to be acquired when the capsule is moving. These improvements have enhanced visualization of the colon [8,9].

**Preparation**

The colon should be carefully prepared. Cleansing before ingestion is similar to that used for traditional colonoscopy [6-10]. The patient should begin a low-fiber diet 2 days before the procedure. The day before the examination, the patient should receive a laxative (eg. 4 liters of polyethylene glycol taken in 2 doses), with or without prokinetic drugs before ingestion, depending on the protocol. After ingestion, the patient should take another laxative (eg. 30-45 ml of sodium phosphate) and a prokinetic agent (tegaserod 6 mg) in order to maintain the colon clean and promote propulsion of the capsule to ensure that it is excreted 9-10 hours after ingestion.

**Indications**

Studies have shown that the capsule has 69-76% sensitivity, a 74-83% positive predictive value, and a 54-78% negative predictive value in the diagnosis of polyps (any size) [6-10]. These values are lower than those of colonoscopy [11]. The technique has also been used for the diagnosis of inflammatory lesions such as diverticulitis and ulcerous colitis. The most common indications, however, are screening for colorectal cancer when colonoscopy is incomplete and when the patient refuses to undergo colonoscopy.

**Safety and cost-effectiveness**

Capsule endoscopy is a safe technique with few side effects, which do not usually last longer than 24-48 hours. The most common complications include those arising during preparation, namely, laxative-induced abdominal pain, nausea, and vomiting. In addition, 1.6% of patients find it impossible to swallow the capsule [10,11].

Capsule endoscopy is an attractive noninvasive method that can be used to screen for colorectal cancer, especially in patients who cannot undergo currently available screening procedures. If screening for colorectal cancer increased by more than 30%, this technique could prove more cost-effective than colonoscopy.

**Colon Capsule in Stenosing Colorectal Cancer**

One of the manifestations of stenosing tumors is obstruction of the intestinal lumen, defined as an interruption of the course of intestinal contents (feces, gas, enteral content) through the intestine as a result of functional or organic conditions (eg. colon tumors). Currently available therapeutic approaches aim to relieve or eliminate the obstruction and correct water electrolyte imbalance. Obstructions can be relieved or eliminated using surgery, or, where possible and the patient’s condition permitting (i.e absence of perforation or colonic ischemia), a self-expanding metal stent can be fitted using endoscopy or radiological techniques. In addition to relieving or eliminating the symptoms, this palliative approach allows more time for the tumor to be properly assessed and has lower morbidity and mortality than emergency surgery. In patients with obstruction, the colon should be examined as far as the stricture; other techniques have been proposed, including virtual colonoscopy (computed tomography), opaque enema, stent-based colonoscopy, and even capsule endoscopy (Figures 1 and 2).

Capsule endoscopy is contraindicated in cases of suspected obstruction of the small or large intestine. However, this contraindication would theoretically no longer be valid if it was possible to prevent the stricture and if the capsule could improve diagnosis and treatment. Consequently, the group of patients that would most benefit from the technique would be operable patients with nonmetastasizing stenosing cancer of the left colon. Given that obstructed colon is an emergency indication for self-expanding metal stents, a device measuring 25 mm in diameter and 6-9 cm in length can be fitted and an extension study can be performed to rule out metastasis.

These patients can be offered capsule endoscopy for compassionate use instead of colonoscopy after stenting (greater risk of perforation) or virtual colonoscopy (poor definition due to poor preparation). Initially, standard preparation was insufficient in patients undergoing this technique, for reasons such as dilation of the colon as far as the stricture, poorer motility of the dilated colon, and extensive accumulation of feces [12].

Therefore, in order to improve cleansing, we recommend the following modifications to standard preparation:

- Perform capsule endoscopy 7-8 days after stenting.
- From day 4 after stenting (and ensuring that that the stent works), the patient should receive lactulose 15 ml every 8 hours and abundant water. In addition, the patient should get up and walk around, if possible.
Abdominal radiographs should be taken on day 6-7 to ensure that the diameter at both ends of the stent is similar and that patency is maintained. If this is the case, standard preparation for the colon capsule should be undertaken.

These modifications make it possible to cleanse the colon more efficiently; however, they should be verified in further studies. Imaging by capsule has enabled us to diagnose the presence of synchronous cancer (1 patient) and polyps and thus modify surgical treatment and plan endoscopic polypectomy before or after surgery depending on the size of the polyp [12].

Even though the stent is open, the capsule could become stuck (although we have had no cases to date). However, if this did occur, the capsule could be extracted using colonoscopy. In the presence of a stenosing synchronous tumor, another metal stent could be fitted and the capsule withdrawn or the stent could be removed by surgical resection (treatment of localized colon tumors).

In summary, capsule endoscopy of the colon would be indicated in patients with stenosing left colon tumors treated using self-expanding metal stents. This approach entails few risks and provides huge benefits in the extension study.

References


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