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Original Article

Capsule endoscopy: A review of 259 cases

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Abstract

Aim: The aim was to determine the utility of capsule endoscopy (CE) in patients with obscure gastrointestinal bleeding (OGIB). **Materials and Methods:** A prospective study of patients who underwent CE at our institution from 2002 to 2010. **Results:** A total of 259 patients were included in this study (mean age 52.3 years; 200 male and 59 female), including 175 with overt OGIB, and 20 with occult OGIB, underwent CE. One hundred eighty-nine of 195 patients (96%) with OGIB had positive findings. Gastric erosions (23%), duodenal erosions (13%) and ileal erosions (11%) were the most frequent findings. **Conclusion:** Capsule endoscopy is a useful diagnostic technique in patients with OGIB.

Key words

Capsule endoscopy, obscure gastrointestinal bleed

Introduction

Obscure gastrointestinal bleeding (OGIB) is responsible for about 5% of all gastrointestinal (GI) bleeding.[1] Although it represents a small proportion of patients with GI bleeding, OGIB continues to be a challenge because of the delay in diagnosis and consequent morbidity and mortality. It was first introduced in 2000, and since then more than 700 studies have been published, which is indicative of its ease and the widespread acceptance of this new diagnostic tool.[2] According to reports by Given Imaging, more than 650,000 capsule endoscopy (CEs) have been performed, representing an increase in the utilization this technology of approximately 15%. Demonstration and diagnosis of small bowel lesions is a very challenging task probably because of anatomical inaccessibility of this region by the conventional diagnostic modalities. The available imaging tools of small intestine of X-ray studies that is, small bowel follow through, Small bowel enema, computed tomography (CT) scan, enteroscopy, angiography, and technetium 99 m labeled red blood cell (RBC) scan. Small bowel follow through has a low diagnostic yield 0–5.6% in the investigation of OGIB.[3] Diagnostic yield of nuclear scanning (sulfur colloid) or RBC scan and angiography are low even in patients with recurrent malena or hematochezia.[4,5] CE is a recent technology that allows visualization of small bowel noninvasively. In 1981, Dr. Gavriet developed a device by the name of mouth to anus (M2A) capsule which had a camera to visualize a small intestine after being swallowed by the patient.[6,7] CE is superior to push enteroscopy,[8,9] small bowel follow-through[10] and CT[11] for detection of the bleeding source in the small bowel. We present our experience of 259 cases of CE.

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Materials and Methods

Medical records of all patients who underwent CE for OGIB in our institution between 2002 and 2010 were included in the study. OGIB was defined as bleeding of unknown origin that persisted or recurred (i.e., iron deficiency anemia, fecal occult blood test positivity or visible bleeding) after negative initial endoscopic studies, namely, colonoscopy, and/or upper endoscopy. It was further classified as obscure-occult (iron deficiency anemia and/or positive fecal occult blood test), or obscure-overt (passage of visible blood). Any bleeding occurring within 24 h and persisting more than 24 h was considered as persistent bleeding.

All patients had undergone upper and lower GI endoscopy prior to CE. Any additional diagnostic procedures performed after CE were carefully reviewed and recorded. Follow-up information was obtained from patients.

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Capsule endoscopy procedure

Patients were allowed a light diet on the previous evening and were prepared using an oral purge at night 2 L polyethylene-glycol-based solution. Patients swallowed the capsule between 09:00 and 11:00 h, and were maintained on nil by mouth for the next 4 h.

The given M2A (given imaging; Yoqneam, Israel) video CE is a pill-shaped wireless device with a slippery coating for easy ingestion and measures 11 mm × 26 mm. It is composed of a white light-emitting diode as the light source, lens, imaging chip, batteries, and a radio transmitter with internal antenna. The image field is 140° and × 8.[2] Once swallowed, the capsule moves through the intestine via peristalsis and is excreted in the stool. The camera takes two images per second as it sweeps the intestine and transmits these to eight lead sensor arrays, arranged in a specific manner and taped to the anterior abdominal wall, connected to a recording device in the belt for the duration of the battery life, which is 6–8 h. Once the study is completed, the recording device and sensor arrays are removed and the images (50,000–60,000 images total) are downloaded to a computer with reporting and processing of images and data (Rapid, Given Imaging, Capsule Company) software that displays the video images on a computer monitor. This software includes a localizing system, blood detector, and some features to assist the interpreter. The suspected blood indicator is quite good at detecting active bleeding, but is not so useful at detecting other lesions and does not replace careful examination of the CE. It is recommended that patients avoid magnetic fields such as magnetic resonance imaging, and metal detectors until the capsule is excreted in the stool, which usually occurs in 24–48 h.

Image interpretation

The interpretation of images was done by VGM after initial detailed evaluation by a trained technician.

Follow-up

Patients were asked to note evacuation of the capsule, and those who were uncertain or concerned, as well as those who were suspected to have retained the capsule, as suggested by capsule image interpretation, were followed by serial X-ray/fluoroscopic screening at weekly intervals. Patients were also followed up with medical therapy (such as treatment of Crohn's disease, institution of antitubercular therapy, or antihelmintic therapy), surgical therapy (for tumors or bleeding ulcers) or enteroscopic evaluation (ulcers, polyps, or bleeding angiodysplasia), depending on the CE results. Those with

Table 1: Capsule Findings

Name of lesion	Patients with abdominal pain (*n*=64)	Patients with GI bleed (*n*=195)		Total number of patients with GI bleed (*n*=195)
		Overt (175)	Occult (20)	
Gastric erosions	15	38	8	46
Gastric ulcers	3	1	1	2
Gastric angiodysplasia	1	1	1	2
Duodenal erosions	5	26	0	26
Duodenal ulcers	3	2	0	2
Duodenal polyps	5	5	0	5
Duodenal angiodysplasia	0	2	0	2
Hemobilia	0	1	0	1
DJ polyps	1	6	0	6
Jejunal polyps and growth	2	14	2	16
Jejunal angiodysplasia	1	3	0	3
Jejunal bleed	0	3	0	3
Jejunal erosions	5	11	2	13
Jejunal ulcer	1	2	0	2
Ascaris in jejunum	1	1	0	1
Ileal polyp and growth	4	14	0	14
Ileal angiodysplasia	4	6	0	6
Ileal bleed	2	2	0	2
Ileal ulcers	2	4	1	5
Ileal erosions	2	20	3	23
Ileal vascular ectasia	0	1	0	1
Ileal varix	1	0	0	0
Small bowel stricture	1	0	0	0
Ceacal diverticular bleed	0	1	2	3
Cecal angiodysplasia	0	2	0	2
Ascaris in cecum	1	2	0	2
Polyp in colon	1	1	0	1
Ulcer in colon	1	0	0	0
No lesion visualized	2	6	0	6

GI=Gastrointestinal

negative CE were followed up with expectant treatment or surgery with preoperative enteroscopy. The study was approved by our institutional review board.

Results and Findings

A total of 259 patients were included in the study. There were 200 (77%) male and 59 (22%) were females. Male to female ratio was 3.1:1. Age of study population ranged from 4 to 90 years with a mean of 52.3 years. Mean transit time to cross stomach was 2 h 2 min and to cross ileum was 3 h 38 min.

Capsule endoscopy findings were more frequent in patients with overt OGIB (175/195 [90%]) than those with occult OGIB (20/195 [10%]), as shown in Table 1.

The most common lesions encountered were gastric erosions in 46 (23.5%) patients; other common lesions were duodenal erosions, ileal erosions, jejunal polyps, ileal polyps, and growths as shown in Table 2.

Discussion

Capsule endoscopy has gained widespread clinical acceptance in the diagnostic algorithm of OGIB.[12,13] As in our study, OGIB is now the leading indication for CE in most centers around the world. Prior to the introduction of CE, barium examination, push enteroscopy, and angiography were the principle diagnostic tools for OGIB. The diagnostic yield of these tests has been shown to be unequivocally inferior to CE in several studies. The reported yield of CE in OGIB varies widely. Previous studies have shown that detection rates for the source of bleeding varies

Table 2: Capsule Findings

Positive findings	Overt (*n*=175)	Occult (*n*=20)
Ileal and polyp growth	14	0
Ileal angiodysplasia	6	0
Ileal bleed	2	0
Ileal ulcers	4	1
Ileal erosions	20	3
Ileal vascular ectasia	1	0
Ceacal diverticular bleed	1	2
Ceacal angiodysplasia	2	0
Ascaris in ceacum	2	0
Polyp in colon	1	0
No lesion visualized	6	0
Gastric erosions	38	8
Gastric ulcers	1	1
Gastric angiodysplasia	1	1
Duodenal erosion	26	0
Duodenal ulcers	2	0
Duodenal polyps	5	0
Duodenal angiodysplasia	2	0
Hemobilia	1	0
DJ polyps	6	0
Jejunal polyps and growth	14	0
Jejunal angiodysplasia	3	0
Jejunal bleed	3	0
Jejunal erosions	11	2
Jejunal ulcer	2	0
Ascaris in jejunum	1	0

Figure 1: Apthoid erosion in colon

Figure 2: Live enterobius vermicularis

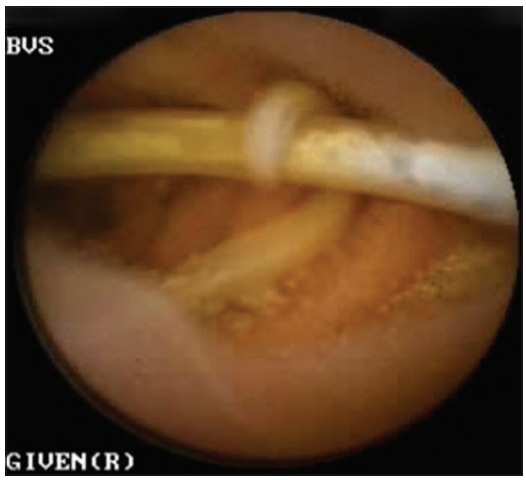

Figure 3: Live round worm in intestine

Figure 4: Angiodysplasia-caecum

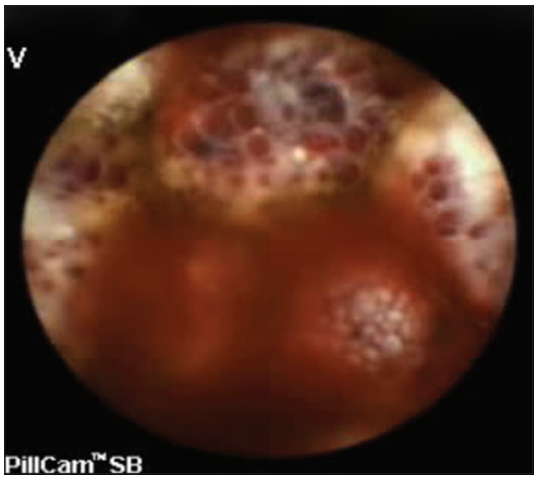

Figure 5: Proliferative growth in jejunum

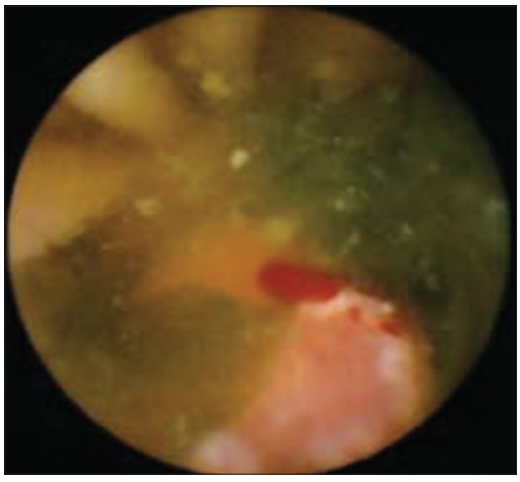

Figure 6: Jejunal mass with active bleeding

from 38% to 93%, and is in the higher range for those with overt OGIB.[12-14] This is further influenced by subjective interpretation of positive findings. Although the overall diagnostic yield in our study was 96%. In a recently reported series of 260 patients with OGIB, the yield was 87% in patients with ongoing overt OGIB, and 46% in those with occult OGIB.[13] In our patients, a definite lesion could be detected in 90% of patients with overt OGIB compared to 10% in patients with occult OGIB.

This study enabled us to analyze positivity rates, nature of lesions, and optimum timing of CE in a relatively large subjects comprising of a heterogeneous population of patients with OGIB.

In summary, high diagnostic yield, relative safety, and tolerability have established CE as an important diagnostic tool for OGIB. In this large study of OGIB patients, we demonstrate that small bowel ulcer/erosions secondary to Crohn's are the commonest lesions responsible for OGIB in this part of the world. Moreover, the diagnostic yield is significantly affected by the timing of CE and studies done within 48 h of an episode of overt bleed have the greatest potential for detecting a definite lesion [Figures 1-6].

Conclusion

Capsule endoscopy is a well-tolerated and safe examination with a high diagnostic yield.

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