



RAPID COMMUNICATION

How much helpful is the capsule endoscopy for the diagnosis of small bowel lesions?

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Abstract

AIM: To assess the practically usefulness and diagnostic yield of this new method in a group of patients with suspected small bowel lesions.

METHODS: Capsule endoscopic (CE) examination by using M2A capsule endoscope TM (Given Imaging, Yoqneam, Israel) was performed in thirty nine patients (26 males, 13 females) with suspected small intestinal lesions. The composing of the patients was as follows: obscure gastrointestinal bleeding in twenty three patients, known Crohn's disease in 6 patients, in whom CE was used to evaluate the severity and extension of the diseases, chronic diarrhea in 8 patients, abdominal pain in one patient and malignancy in one patient with unknown origin.

RESULTS: In two patients CE failed. Different abnormalities were revealed in 26 patients overall. Detection rate of abnormalities was highest among patients with obscure gastrointestinal bleeding and the source of bleeding was demonstrated in 17 of 23 patients with obscure bleeding (73.9%). Entero-Behcet was diagnosed in two patients by CE as a source of obscure gastrointestinal bleeding. In 6 patients with known Crohn's disease, CE revealed better evaluation of the disease extension. In 3 of 8 (37.5%) patients with chronic diarrhea; CE revealed some mucosal abnormalities as the cause of chronic diarrhea. In a patient with unexplained abdominal pain and in a cancer patient with unknown origin, CE examination was normal.

CONCLUSION: In our relatively small series, we found that capsule endoscopy is a useful diagnostic tool particularly in diagnosis of obscure gastrointestinal bleeding, chronic diarrhea and in estimating the extension of Crohn's disease.

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INTRODUCTION

Demonstration of small bowel lesions was always difficult due to its inaccessibility in conventional modalities. Currently available diagnostic methods such as enteroclysis or push enteroscopy are far from satisfactory results regarding diagnostic yields, patients comfort and technical ease. The technology used in present study permits us to demonstrate the whole small bowel, which was relatively not possible by using conventional modalities. When the diseased area is located to the small bowel, endoscopic evaluation can be extremely difficult. Push enteroscopy has the ability to demonstrate only the proximal to mid-jejunal lesions^[1,2]. Endoscopic imaging of the entire small bowel can only be carried out by sonde enteroscopy or surgically assisted enteroscopy which are invasive and uncomfortable techniques^[3-6]. On the other hand, capsule endoscopy (CE) allows painless, non-invasive and to get physiologic imaging of the small bowel lesions. Many studies have demonstrated that this technique is superior to the conventional investigations.

In this study, our aim was to investigate the diagnostic capability of CE in different small bowel pathologies in which conventional modalities failed to demonstrate the organic lesions.

MATERIALS AND METHODS

All patients undergoing CE were from February, 2002 to February, 2005 at the Department of Gastroenterology of Hacettepe Medical Center. Thirty nine patients (26 males, 13 females) were evaluated (Table 1). The mean age of the patients was 43 ± 17 years (range, 13-83 years). The indications for the study were obscure gastrointestinal bleeding (23 patients), evaluation of Crohn's disease (6 patients), chronic diarrhea (8 patients), chronic abdominal

Table 1 Indications and findings of capsule endoscopy in thirty nine patients

No	Age (yr)	Sex (F/M)	Indication	Diagnosis/Finding	Comp
1	83	M	OGB	Angiodysplasia in ascending colon	(-)
2	50	M	OGB	Angiodysplasia in distal intestine (with Billroth I gastrectomy for ulcer)	(-)
3	74	M	OGB	Normal	(-)
4	29	M	Diarrhea	Normal	(-)
5	54	M	Diarrhea	Inadequate recording time	(-)
6	56	M	Cancer with unknown origin	Normal	(-)
7	35	M	OGB	Ulcer in distal intestine (CD)	(-)
8	62	M	OGB	The capsule failed to pass the pyloric channel	(-)
9	59	M	OGB	Vegetan mass (Jejunal metastases of operated renal cell carcinoma)	(-)
10	29	M	OGB	Ulcers in distal intestine (CD)	(-)
11	46	M	OGB	Ulcers in proximal intestine (Vasculitis)	(-)
12	58	F	Diarrhea	Ulcers in proximal intestine (with Billroth II gastrectomy for gastric lymphoma)	(-)
13	16	M	OGB	Normal	(-)
14	52	F	OGB	Normal	(-)
15	59	F	OGB	Normal	(-)
16	23	M	CD	Ulcers in distal intestine	(-)
17	70	M	OGB	Angiodysplasia in proximal intestine and ulcers in distal intestine (Behcet's Disease)	(-)
18	39	M	OGB	Ulcer in proximal intestine (GIST in operation)	(-)
19	73	F	OGB	Active bleeding in proximal intestine	(-)
20	54	F	OGB	Aphthous ulcers in distal intestine (CD)	(-)
21	18	M	CD	Ulcers and pseudopolyps in distal intestine	(-)
22	63	M	OGB	Multiple angiodysplasia in distal and proximal intestine	(-)
23	22	M	Diarrhea	Polyp-like lesions (BLH) and Hymenolepsis Nana in all small intestine	(-)
24	20	M	Diarrhea	Normal	(-)
25	71	F	OGB	Normal (with Billroth I gastrectomy for ulcer)	(-)
26	44	F	Diarrhea	Normal	(-)
27	32	M	CD	Deep ulcers in distal intestine	(-)
28	43	M	OGB	Active bleeding in proximal intestine (Angiodysplasia in operation)	(-)
29	21	M	Diarrhea	Polyp-like lesion in proximal intestine (BLH)	(-)
30	42	F	OGB	Active bleeding in proximal intestine (Angiodysplasia in operation)	(-)
31	34	F	Diarrhea	Normal	(-)
32	60	M	OGB	Angiodysplasia	(-)
33	13	F	OGB	Angiodysplasia in proximal intestine	(-)
34	39	M	CD	Ulcers in distal intestine	(-)
35	41	M	OGB	Punched ulcers in distal intestine (Behcet's Disease)	(-)
36	38	F	AP	Normal	(-)
37	27	F	CD	Small ulcers in small intestine	(-)
38	48	M	CD	Ulcer and hyperemia in terminal ileum	(-)
39	52	F	OGB	Angiodysplasia in proximal intestine	(-)

OGB: Obscure gastrointestinal bleeding, CD: Crohn's Disease, AP: Abdominal pain, BLH: Benign lymphoid hyperplasia.

pain (one patient), and malignancy with unknown origin (one patient) (Table 2). All patients were undergone by upper gastrointestinal endoscopy and colonoscopy, as well as small bowel follow-through barium studies to exclude any structuring lesions. Some patients were undergone by these endoscopic procedures more than two times when bloody mucosa exists during first examination.

Technique used

All patients swallowed Given M2A video capsule (Given Imaging Yoqneam, Israel) after a 10-12 h fasting period. Laxative preparations were not used. The sensors were attached to eight locations on the anterior abdominal wall. A belt containing data recorder was positioned outside the anterior abdominal wall. Patients then swallowed the M2A Capsule with a mouthful of water. The patients re-

Table 2 Indications for capsule endoscopy

Indication of patient for CE	Number of patients
Obscure gastrointestinal bleeding	23
Crohn's disease	6
Chronic diarrhea	8
Abdominal pain	1
Cancer of unknown origin	1
Total patients	39

mained nil orally for 2 h. Then they allowed to drink clear fluid and after an additional 2 h were allowed to resume their daily diet and activity if their conditions were good enough to do so. After completion of the examination, the recorder was removed and data were transferred to a com-

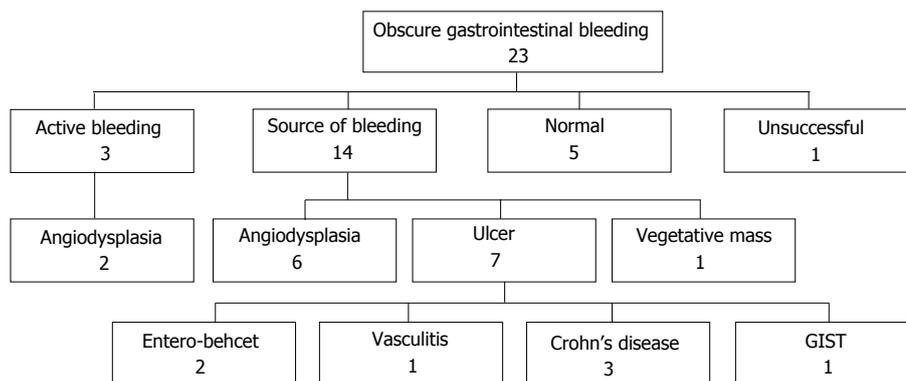


Figure 1 Results of obscure gastrointestinal bleeding.



Figure 2 Angiodysplasia in small intestine without evidence of active bleeding.



Figure 3 Jejunal invasion of recurrent renal cell carcinoma.



Figure 4 Punched-out ulcer in Behcet's disease.



Figure 5 Capsule endoscopic findings of Crohn's disease in small bowel: large ulcer in ileum.



Figure 6 Polyp-like lesions located entire small intestine: benign lymphoid hyperplasia.

puter workstation through a high capacity digital link. The images were reviewed by 2 gastroenterologists.

RESULTS

CE examinations were unsuccessful in two patients. In one elderly patient with obscure gastrointestinal bleeding, the capsule failed to pass the pyloric channel since the patient was in supine position because of his medical condition. In another patient with chronic diarrhea, CE examination was unsuccessful after recording about 3 h.

Two patients with obscure gastrointestinal bleeding had undergone surgery for complicated peptic ulcer and one patient with chronic diarrhea for gastric lymphoma in the past (Table 1).

The average gastric emptying time (based on 35 patients) was 37 ± 30 min. (range 3 to 113 min.). In 28 of the

39 patients, the capsule passed the ileocecal valve within the duration of the examination. The mean small bowel transit time (based on 26 patients) was 280 ± 101 min. (range 149 to 484 min.). Neither had symptoms of intestinal hurrying, nor were on prokinetic drugs and encountered complain related to the capsule used. Potentially bleeding sites were identified in 17 patients (73.9%) including active bleeding area (three patients), ulcer (seven patients), angiodysplasia (six patients) and vegetative mass (one patient) (Figure 1).

In three of twenty-three patients with obscure gastrointestinal bleeding; active bleeding (fresh blood) sites were noted as in proximal small intestine, but the source of the bleeding was not clearly seen. In two of the three, the bleeding sources were identified as angiodysplasia located at proximal small intestine related to operation. Six patients had angiodysplasia noted (3 proximal intestine, 1 proximal and distal intestine, 1 distal intestine, 1 colon) without evidence of active bleeding (Figure 2). These lesions were thought to be the cause of the bleeding. Colonic angiodysplasia missed during colonoscopy. In one patient, a vegetative mass was demonstrated in the proximal jejunum which was missed during abdominal CT scan small bowel series. This patient was operated and diagnosed as a jejunal invasion of recurrent renal cell carcinoma (Figure 3). Very interestingly, in two patients with obscure gastrointestinal bleeding, CE demonstrated ulcerations and/or angiodysplasia in terminal ileum which are specific lesions for Behcet's disease (Figure 4). In five patients with obscure gastrointestinal bleeding single or multiple ulcers were

found. In the three of five patients, typical ulcers in distal intestine have been identified in which abdominal CT scan small bowel series were negative for typical findings of Crohn's disease. In one patient with vasculitis, CE found multiple ulcers in proximal intestine. Leiomyosarcoma was demonstrated in one of those patients through the histopathologic examination of the surgical specimen. In those five patients neither active bleeding nor a positive source of bleeding was demonstrated.

Of the six patients with known Crohn's disease, all had obvious ileal ulcer (Figure 5).

As seen in Table 1, in 2 of the eight patients with chronic diarrhea typical benign lymphoid nodular hyperplasia was demonstrated on entire small bowel (Figure 6). Many parasites looks-like *Hymenolepis nana* were demonstrated throughout the small intestine of one patient with benign lymphoid hyperplasia. His feces were examined carefully and cystic forms of giardia and eggs of *Hymenolepis nana* were demonstrated. In one patient with Billroth II because of stomach lymphoma, CE found multiple ulcers in small intestine.

In a patient with unexplained abdominal pain and in another cancer patient with unknown origin, CE didn't reveal any abnormalities.

DISCUSSION

In daily practice, available imaging techniques of the small intestine consists of push-endoscopy and X-Ray studies such as small bowel series and enteroclysis. In most cases upper endoscopy can easily reach to the second part of the duodenum. Enteroscopy can demonstrate more extent sites of intestine, but maximally only reach to the mid-jejunum^[1,2]. Biopsy is also possible during enteroscopy. Push and sonde enteroscopies have been used for revealing the small intestinal lesions, but these techniques are not easy to neither carry out nor give a high diagnostic yield. In radiological studies, diagnostic accuracy of any small bowel pathology is often low as well as being very uncomfortable. Overall visualization of the mid and distal portion of small bowel is unsatisfactory. Regarding the difficulty for evaluation of occult GI bleeding, which has often been attributed to a source in the small intestine, the many patients finally undergo surgery without knowing the actual source of bleeding.

CE has shown a good diagnostic tool in patients with obscure gastrointestinal bleeding^[7-14]. In several clinical studies, it has been shown that this modality may be superior to push enteroscopy^[15-21], small bowel series^[7,22], enteroclysis^[23] and CT scan^[24] in identifying small bowel lesions in obscure gastrointestinal bleeding. Currently, obscure GI bleeding is very common^[25]. The diagnostic yield of CE for the suspected bleeding source in obscure GI bleeding has been reported up to from 38% to 93%^[9]. In this study, this modality demonstrated the source of bleeding in 17 of the 23 patients (73.9%) with obscure GI bleeding. In our two cases diagnosed as Behcet's disease with obscure GI bleeding, CE revealed multiple punched-out ulcers in which some are bleeding located at terminal ileum. The punched-out ulcer was first time demonstrated in the literatures by using CE.

Definitive diagnoses included angiodysplasia 53%, malignancy 6.3% and inflammatory disease 6.3%^[15]. In our study the most important finding is that CE clearly demonstrated angiodysplasia in 6 patients (26%).

Intestinal metastases from renal cell carcinoma are rare. The most common clinical presentation of intestinal metastases of renal cell carcinoma is intestinal bleeding^[26]. In the literature, one patient with a history of renal-cell carcinoma had a mass in the proximal small bowel found by using CE^[27]. In our study, we diagnosed metastatic tumors originating from renal cell carcinoma in one patient who had severe gastrointestinal bleeding and required 25 units blood transfusion. Small bowel follow-through barium series and abdominal CT scan didn't reveal any abnormalities but CE demonstrated the tumor mass and bleeding area. Only in five patients with obscure GI bleeding, CE did not find any abnormalities.

CE is a superior and more sensitive diagnostic tool than barium follow-through and entero-computerised tomography in patients with suspected Crohn's disease^[24,28]. CE is effective in diagnosing patients with suspected Crohn's disease undetected by using conventional diagnostic methods^[29-33]. In six cases with known Crohn's disease who underwent CE as a part of routine evaluation of the effectiveness of the treatment, we found obvious ileal ulcers that were missed during small bowel series. Additionally, in three patients with obscure gastrointestinal bleeding, there were typical ileal ulcers and pseudopolyps for Crohn's disease. It is clear that in these three patients CE was very helpful for diagnosis of such abnormalities. On the other hand, this modality took the images out is only lasting 2 to 4 h.

CE did not play an important role in the evaluation of patients with chronic abdominal pain of unknown origin^[34]. In patients with undiagnosed abdominal pain the yield of CE appears to be low^[35]. In our patients with unexplained abdominal pain CE did not find any abnormalities.

In conclusion, this modality is an exiting new diagnostic technique allowing us to visualize an important section of the gut, which previously has been considered an inaccessible area. When compared with push enteroscopy and small bowel radiography, CE is superior in diagnostic accuracy. In particular for Crohn's disease, CE was is very useful for making the diagnosis and determining the extent and severity of involvement.

In our relatively small series, we found that CE is a useful endoscopic technique particularly in diagnosing obscure gastrointestinal bleeding, chronic diarrhea and Crohn's disease.

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