Result of Wireless Capsule Endoscopy in Patients with Suspected Small Bowel Disease: The First Series from Thailand

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Background and Aims : *Capsule endoscopy (CE) is a promising diagnostic tool for patients with obscure gastrointestinal bleeding. Only a few papers have reported data from Asian countries. This retrospective study aimed to demonstrate result of capsule endoscopy in patients with suspected small bowel disease as the first series from Thailand.*
Method : *Twenty-one patients who underwent wireless capsule endoscopy between July 2003 and June 2004 at King Chulalongkorn Memorial Hospital were retrospectively reviewed in the present study. The indications for capsule endoscopy were overt obscure gastro-intestinal bleeding (n=12), occult obscure gastro-intestinal bleeding (n=5), chronic recurrent abdominal pain (n=3) and chronic diarrhea (n=1). Diagnoses according to findings of capsule endoscopy were classifield into definite, suspicious and negative finding.*
Results : *The mean age of the 21 patients (10 men and 11 women) was 46 (standard deviation, 18.57) years. Of those 17 obscure gastrointestinal bleeding patients, there were positive findings in 11 from 17 patients (65%). Four patients (24%), 3 with tumor and another with AVM, were classified as definite results. Seven patients (41%), 6 with angioectasia and another with a small ulcer, were classified as suspicious because there was no demonstrated active bleeding lesion and no other clinical supportive evidence. Of these 3 patients with recurrent abdominal pain, one patient (33%) with terminal ileum lymphoid hyperplasia was classified as definite result because of clinical improvement after treatment of the lesion. Another case of chronic diarrhea yielded a negative result.*
Conclusion : *Wireless capsule endoscopy is a safe and useful mode of investigation for the diagnosis of obscure gastrointestinal bleeding in Thailand. There is not so much difference in capsule endoscopy results between Western and Asian series.*

Keywords : *Obscure bleeding, Gastrointestinal, Capsule endoscopy*

J Med Assoc Thai 2004; 87 (Suppl 2): S35-40
e-Journal: *http://www.medassocthai.org/journal*

With recent advances in gastrointestinal endocopy for the stomach and colon, small bowel is still the most difficult area for investigation in the gastrointestinal tract. Previously, there were many types of conventional small bowel imaging, such as enteroclysis, which were generally considered to be suboptimal. Since the first report of wireless capsule endoscopy study by Gong et al in 1994[1], now capsule endoscopy seems to be the best tool to investigate patients with suspected small bowel disease. Because of its non-invasive nature for direct visualization of the small bowel mucosa, therefore, it has become the first test for investigation of obscure gastrointestinal bleeding. The currently available capsule endoscope is measure as a 11 x 26 mm device with a battery lasting about 8 hours, which enables to take up 55,000.jpg images (Fig. 1). Downloading pictures from the recorder to workstation takes about 2.5 hours.

In August 2001, the wireless capsule endoscopy was approved for clinical use by the United States Food and Drug Administration. Several papers reported about the efficacy of capsule endoscopy but most of them were data from Western countries. Only a few papers reported data from Asian countries[2]. Therefore, this retrospective study aimed to demonstrate the result of capsule endoscopy in patients with suspected small bowel disease as the first series from Thailand.

Material and Method

Patients with suspected small bowel pathology who underwent capsule endoscopy at the King Chulalongkorn Memorial Hospital between July 2003 and June 2004 were included in the present study. Indications for capsule endoscopy included overt

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Fig. 1 The capsule endoscope

obscure gastrointestinal bleeding, occult obscure gastrointestinal bleeding, recurrent abdominal pain and chronic diarrhea. Definition of these technical terms were described elsewhere[8]. Patients with suspected small bowel stricture, intestinal obstruction, or swallowing difficulties were excluded, as were patients with pacemakers and pregnant women.

Capsule endoscopy was performed after patients had fasted overnight. Eight aerials with a battery-powered portable data recorder, were attached to the chest and abdominal wall before the procedure. Patients were then asked to swallow the capsule endoscope (M2A capsule; Given Imaging, Yoqneam, Israel) with plenty of water. Clear liquid and normal diet were allowed 2 and 4 hours later, respectively. The sensor array and recorder were removed after approximately 8 hours of recording, and recorded images were downloaded to a computer workstation and viewed using RAPID software (Given Imaging, Yoqneam, Israel).

The capsule was passed out of the body naturally and patients were contacted at 1 week for any potential discomfort and the timing of spontaneous passage of the capsule. Patients who were uncertain of the natural passage of the capsule were called back for abdominal X-ray to check for possible retention.

All capsule images were viewed by gastroenterologists (PK, ST, RR). Discrepant findings were resolved through discussion with another gastroenterologist. Lesions were classified as definite (clear-cut explanation of the clinical situation, i.e., multiple angiodysplasias, actively bleeding lesions, ulcers, tumors) or as suspicious (mucosal changes were seen, but their relationship to the bleeding was uncertain, i.e., small isolated angiodysplasias, single small erosions, minute polyps, dilated mucosal vessels), and negative (no abnormality was found)[3].

Results

Patient characteristics

During the 12-month study period, 21 patients (10 men and 11 women) were examined. Seventeen, three, and one of all the patients were Thai, Caucasian and Japanese respectively. Their mean age was 46 (standard deviation,18.57) years. Indications for capsule endoscopy were overt obscure gastro-intestinal bleeding (n=12), occult obscure gastro-intestinal bleeding (n=5), chronic recurrent abdominal pain (n=3) and chronic diarrhea (n=1). Among 17 patients with obscure gastrointestinal bleeding, none had regularly used NSAIDs or aspirin or chemotherapy, two of them had used an anticoagulant. Eleven of 17 patients had previously received blood transfusion. One patient had previously undergone colectomy for obscure bleeding prior to capsule endoscopy, but bleeding persisted after surgery.

All the patients had previously undergone gastroscopy and colonoscopy, which failed to account for their presenting symptoms except one of them that had colonic AVM from colonoscopy. Five of 17 patients underwent small bowel follow through studies that were unremarkable. Eight of them underwent enteroscopies which were unremarkable, no patient had intra-operative enteroscopy. One of them underwent RBC scan with an unremarkable result. Another underwent angiography which showed corresponding result with terminal ileum lesion from the capsule endoscopy.

Capsule endoscopic findings

Thirteen capsules reached the cecum, with a mean small bowel transit time of 306.43 (standard deviation, 99.89) minutes. Seven capsules did not reach the cecum due to stasis around the terminal ileum and another one due to technical failure. The most common indication was overt obscure gastrointestinal bleeding (n=12) which was followed by occult obscure gastrointestinal bleeding (n=5).

In the 17 obscure gastrointestinal bleeding patients, there were positive findings in 11 from 17 cases (65%) as shown in Table 1. Four patients (24%), 3 with a tumor and 1 with AVM, were classified as definite results because of other supportive clinical courses (Fig. 2, 3, 4). Seven patients (41%), 6 had angioectasia and 1 had a small ulcer, were classified as suspicious because there was no demonstrated active bleeding lesion and no other clinical supportive evidence.

For 3 cases of recurrent abdominal pain, one patient (33%) with terminal ileum lymphoid hyperplasia

Table 1. Summary of capsule endoscopy indications and findings

Indication	Diagnosis	Number of patients	Level of diagnosis
Overt-obscure GI bleeding (n=12)	Angioectasia	4*	Suspicious
	Tumor	3	Definite
	AVM	1	Definite
	A small ulcer	1	Suspicious
	Unremarkable	3**	Negative
Occult-obscure GI bleeding (n=5)	Angioectasia	2	Suspicious
	Unremarkable	3	Negative
Recurrent abdominal pain (n=3)	Lymphoid hyperplasia	1	Definite
	Unremarkable	2	Negative
Chronic diarrhea (n=1)	Unremarkable	1	Negative

* One patient with ongoing active bleeding
** One case did not reach the cecum due to technical failure

was classified as definite result because his symptom was much improved after steroid challenging. Another case of chronic diarrhea yielded a negative result.

Other previous investigations are shown in Table 2 and 3. All patients passed the capsule out spontaneously without any complication.

Discussion

In the present series, efficacy of capsule endoscopy was highest in the obscure gastrointestinal bleeding group (65%). Prior to capsule endoscopy, nearly all the patients were failed to reveal the cause of obscure gastrointestinal bleeding from conventional investigations including small bowel enteroscopy (some patients). It reflected that they were truly difficult cases. Hence, it can not be concluded that capsule endoscopy is better than conventional methods from the present study. A conclusion should only be limited to similar percentage of efficacy of capsule endoscopy in obscure gastrointestinal bleeding in the present series and other from Western series[4-6]. In other indications such as abdominal pain and diarrhea, the capsule has a lower rate for definite diagnosis.

The diagnostic yield of capsule endoscopy seems to vary according to the type of bleeding, 9/12 (75%) for overt -obscure gastrointestinal bleeding group versus 2/5 (40%) for occult-obscure gastrointestinal bleeding group. But only 4 cases with definite findings were in the overt-obscure gastrointestinal bleeding group. This is similar to higher definite results from overt bleeding in a study by Penazzio et al[3]. They also demonstrated the diagnostic yield of 92.3%

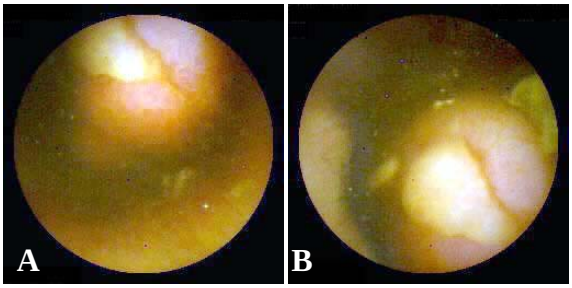

Fig. 2 A and B Capsule endoscopic views of distal small bowel tumor

Fig. 3 Capsule endoscopic view of proximal bowel tumor

Fig. 4 Capsule endoscopic view of mid-distal small bowel tumor

Table 2. Detail of each case indications and previous investigations

Case	Sex	Age	Indication	EGD	Colonoscopy
1	Female	25	Obscure-overt bleeding	Unremarkable	Unremarkable
2	Female	79	Obscure-overt bleeding	GU, erosion	Unremarkable
3	Male	37	Obscure-overt bleeding	GU	Unremarkable
4	Male	46	Obscure-overt bleeding	Unremarkable	Unremarkable
5	Female	62	Obscure-overt bleeding	Unremarkable	Unremarkable
6	Female	28	Obscure-overt bleeding	Unremarkable	AVM
7	Male	44	Obscure-overt bleeding	Unremarkable	Post colectomy
8	Female	65	Obscure-overt bleeding	Unremarkable	Unremarkable
9	Female	59	Obscure-overt bleeding	Unremarkable	Unremarkable
10	Male	31	Obscure-overt bleeding	Unremarkable	Unremarkable
11	Female	69	Obscure-overt bleeding	Unremarkable	Post colectomy
12	Male	65	Obscure-overt bleeding	Unremarkable	Unremarkable
13	Female	41	Obscure-occult bleeding	Unremarkable	Unremarkable
14	Female	27	Obscure-occult bleeding	Unremarkable	Unremarkable
15	Female	71	Obscure-occult bleeding	Unremarkable	Unremarkable
16	Male	53	Obscure-occult bleeding	Unremarkable	Unremarkable
17	Male	17	Obscure-occult bleeding	Unremarkable	Unremarkable
18	Female	55	Chronic diarrhea	Unremarkable	Unremarkable
19	Male	33	Chronic abdominal pain	Unremarkable	Unremarkable
20	Male	43	Chronic abdominal pain	Unremarkable	Unremarkable
21	Male	16	Chronic abdominal pain	Unremarkable	Unremarkable

NA: Not available, EGD: Esophagoduodenoscopy

for patients with ongoing-overt bleeding compared with 44.2% for obscure-occult bleeding and 12.9% for recent bleeding. Moreover the study showed the benefit of early examination in patients with recent bleeding. The culprit of too early capsule endoscopic test is the possibility of blood obscuring the view of the capsule. Zvi Fireman stated from his experience that there was a significant difficulty of capsule endoscopy in this situation[7]. In addition, recent published data from Selby W et al could not convince that the clinical presentation of a patient can predict the likelihood of capsule endoscopic result[8].

Angioectasia was the most common finding from this series and others[3,8]. However, it is a problematic lesion because most of them were classified as a suspicious lesion due to the inability to detect one with active bleeding in most studies. More importantly, angioectasia was also found in asymptomatic healthy volunteers. Therefore, further studies are needed to clearly demonstrate the actual relationship between angioectasia without active bleeding and the clinical outcome of the patient after treatment. However, the advantage of capsule endoscopy generally is better than other investigations for angioectasia.

In the present series, there was a case of lymphoid hyperplasia which improved after a trial of steroid. It is interesting because using capsule endoscopy in abdominal pain has become more useful in a special group of patients with abdominal pain especially those with potential findings. In the present series, the authors showed a benefit from capsule endoscopy for this condition. But conclusion should not be made from this positive result in patients because of the very limited number of patients in the present study.

One of the fearful complications is capsule stagnation. The capsule may get stuck at the stricture or tumor area. Patients who developed this complication usually required surgical intervention. Many experts recommended small bowel x-ray prior to capsule endoscopy to prevent this complication. But some stated that a patient who has a stuck capsule will need surgery anyway[9]. Moreover, Barkin et al showed that even with a normal small bowel series, patients still had a chance of developing this complication. In their series, seven patients from 934 capsules required surgery and six patients had a normal small bowel x-ray prior to the examination[10].

One feature that can affect the diagnostic yield of capsule endoscopy is the time consuming process because of both procedural time (requiring 8 hours) and image analytic process (requiring 90-120 minutes). Hence, it seems to be inappropriate to do capsule endoscopy in some critical cases without adequate resuscitation and monitoring.

Table 3. Detail of each case previous investigation

Case	SBFT	Ba enema	Enteroscopy	Angiogram	RBC scan
1	NA	NA	NA	NA	NA
2	NA	NA	NA	NA	NA
3	NA	NA	NA	NA	NA
4	NA	NA	NA	NA	NA
5	NA	NA	Submucosal mass	NA	NA
6	NA	NA	Unremarkable	NA	NA
7	NA	Post colectomy	Unremarkable	NA	NA
8	NA	NA	Unremarkable	NA	Unremarkable
9	NA	NA	NA	Positive	NA
10	Unremarkable	NA	NA	NA	NA
11	Unremarkable	NA	Unremarkable	NA	NA
12	Unremarkable	Unremarkable	Unremarkable	NA	NA
13	NA	NA	Unremarkable	NA	NA
14	NA	NA	NA	NA	NA
15	NA	NA	NA	NA	NA
16	NA	NA	NA	NA	NA
17	Unremarkable	NA	Unremarkable	NA	NA
18	NA	NA	NA	NA	NA
19	NA	NA	NA	NA	NA
20	Unremarkable	NA	NA	NA	NA
21	NA	NA	NA	NA	NA

NA: Not available, SBFT: Small bowel follow through

In conclusion, there was not so much difference in the capsule endoscopy results between Western and Asian series. There are quite similar problems between Western countries and Thailand on capsule endoscopy reimbursement. A unique problem for Thailand is the high cost of capsule endoscopy which interferes with liberal use in truly needy patients.

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รายงานชุดแรกจากประเทศไทย: การตรวจลำไส้เล็กในผู้ป่วยด้วยการกลืนกล้องไร้สาย

ประเดิมชัย คงคำ, สมบัติ ตรีประเสริฐสุข, วโรชา มหาชัย, รังสรรค์ ฤกษ์นิมิตร

ที่มาและเหตุผล *: capsule endoscopy เป็นเครื่องมือชนิดใหม่ที่นำมาใช้เพื่อการวินิจฉัยหาสาเหตุของผู้ป่วยที่มีเลือดออกในทางเดินอาหารที่ไม่ทราบสาเหตุ ในขณะนี้มีรายงานจำนวนไม่มากนักจากประเทศในแถบเอเชียที่เกี่ยวกับการตรวจด้วยวิธีนี้ การศึกษาย้อนหลังครั้งนี้จึงมีจุดประสงค์เพื่อที่จะแสดงให้เห็นถึงผลของการตรวจค้นหาสาเหตุโดย capsule endoscopy ในผู้ป่วยที่สงสัยว่าจะมีโรคในลำไส้เล็ก ซึ่งนับว่าเป็นรายงานชุดแรกจากประเทศไทย*

วิธีการ *: จากข้อมูลผู้ป่วยจำนวน 21 ราย ที่ได้รับการตรวจค้นด้วยวิธี capsule endoscopy ที่รพ.จุฬาลงกรณ์ ตั้งแต่เดือนกรกฎาคม พ.ศ. 2546 จนถึงเดือนมิถุนายน พ.ศ. 2547 ได้นำมาทำการศึกษาย้อนหลัง ซึ่งข้อบ่งชี้ในการตรวจค้นผู้ป่วยเหล่านี้ คือ ภาวะเลือดออกในทางเดินอาหารอย่างเฉียบพลันที่ไม่ทราบสาเหตุ 12 ราย, ภาวะโลหิตจางที่คาดว่าเลือดน่าจะออกจากทางเดินอาหารแต่ไม่ทราบสาเหตุ 5 ราย, ภาวะปวดท้องเรื้อรัง 3 รายและภาวะท้องเสียเรื้อรัง 1 ราย การวินิจฉัยซึ่งพบจาก capsule endoscopy ได้รับการจำแนกเป็น 1. ใช่, 2. สงสัย, 3. ตรวจไม่พบ โดยที่กลุ่มที่ 1 และ 2 ถือว่าผลตรวจเป็นบวก กลุ่มที่ 3 ถือว่าผลตรวจเป็นลบ*

ผลการศึกษา *: อายุเฉลี่ยของผู้ที่ได้รับการศึกษา 21 ราย (ผู้ชาย 10 ราย และผู้หญิง 11 ราย) คือ 46 ปี (ค่าเบี่ยงเบน 18.57 ปี) ในผู้ป่วยจำนวน 17 รายที่มีภาวะเลือดออกไม่ทราบสาเหตุมีผลการตรวจเป็นผลบวกจำนวน 11 จาก 17 ราย (65%), ผู้ป่วย 4 ราย (24%) ได้รับการจำแนกว่าใช่โดยประกอบไปด้วย 3 รายที่มีเนื้องอกและอีก 1 รายมีภาวะการงอกของเส้นเลือดอย่างผิดปกติ, ผู้ป่วย 7 ราย (41%) ได้รับการจำแนกเป็นภาวะสงสัยเพราะอาการทางคลินิกไม่สามารถได้รับการอธิบายจากรอยโรคได้ชัดเจนซึ่งประกอบไปด้วย 6 รายที่มีเส้นเลือดขยายตัวมากกว่าปกติ และ 1 ราย ที่มีแผลขนาดเล็ก ในผู้ป่วยที่ได้รับการตรวจด้วยภาวะปวดท้องเรื้อรัง ได้รับการวินิจฉัยในขั้นยืนยันชัดเจน เป็นจำนวน 1 ราย (1/3) จากรอยโรคที่มีต่อมน้ำเหลืองโตมากกว่าปกติที่บริเวณลำไส้เล็กส่วนปลาย เนื่องจากอาการดีขึ้นหลังจากการรักษาชัดเจน ผู้ป่วย 1 รายที่ได้รับการตรวจเนื่องจากภาวะท้องเสียเรื้อรังไม่พบสาเหตุของอาการท้องเสีย*

สรุป *: capsule endoscopy เป็นเครื่องมือในการตรวจที่ได้ประโยชน์และปลอดภัยสำหรับการวินิจฉัยภาวะเลือดออกในทางเดินอาหารในประเทศไทย จากการศึกษานี้ไม่พบว่ามีความแตกต่างในผลของการตรวจค้นโดย capsule endoscopy ระหว่างประเทศไทยและประเทศทางตะวันตก*