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Video capsule endoscopy: Initial experience from a tertiary care center in Sri Lanka

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ABSTRACT

Background: Since its global introduction in 2000, capsule endoscopy (CE) has revolutionized the evaluation of small bowel disease. **Aims and Objective:** The aim of this study was to share our experience with CE including the findings and its diagnostic yield. **Materials and Methods:** A retrospective study was carried out at Colombo South Teaching Hospital of Sri Lanka. Data of patients who underwent CE from its initiation in 2017 until June 2020 were obtained from the hospital computer database. These included the patient demographics, indications for the study, quality of bowel preparation, and its findings. **Results:** The study included 54 patients with a mean age of 55 years. Mean gastric time and small bowel transit time were 52 and 272 min, respectively. Forty-five CE studies were done for the evaluation of small bowel bleeding and an abnormal study was found in 26 (57.78%) patients. Small intestinal ulcers and erosions were the most frequently found abnormality (n = 16, 35.56%) followed by tumors (n = 5, 11.11%). Active bleeding was evident in 14 (31.11%) patients. Overall diagnostic yield was higher in those with a history of overt bleeding (n = 15, 71.43%) compared to occult bleeding (n = 11, 45.83%). Most patients who were evaluated for abdominal pain and diarrhea had normal CE except for two who had small intestinal ulcers and subepithelial lesions. Only one case was complicated with capsule retention. **Conclusion:** CE is a useful investigation for the evaluation of small bowel disease, particularly in suspected small bowel bleeding. In contrast to western population, ulcers and erosions were the more frequently found abnormalities seen in local setting.

Key words: Capsule endoscopy; Gastrointestinal hemorrhage; Small bowel disease; Anemia

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INTRODUCTION

Advent of fiber-optic endoscope in 1957 by Basil Hirschowitz and Larry Curtiss has revolutionized the field of gastroenterology.[1] However, evaluation of small bowel with conventional endoscopy has been a major challenge until the 21st century.[2] Video capsule endoscopy (VCE), introduced globally in 2000, has revolutionized the evaluation of small bowel disease.[3,4] Even though device-assisted enteroscopy techniques including single- and double-balloon enteroscopy and spiral enteroscopy have also seen a significant advancement, capsule endoscopy (CE) has gained more attention due to its relatively non-invasiveness and better patient tolerance.[2,5]

Since its introduction, the techniques of VCE have also undergone significant improvement.[4] These include development of more sophisticated capsules with better image quality, introduction of possibility of external control of capsule movement, and development of more advanced software helping interpretation. In current clinical practice, VCE is mainly used in the evaluation of suspected small bowel bleeding which was termed obscure gastrointestinal bleeding few years back.[6] It is also considered in the evaluation of patients with chronic diarrhea, unexplained abdominal pain, and suspected small bowel Crohn's disease or to assess its disease activity.[7]

Although many have described their experience with VCE, most of these studies have been carried

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out in western population and mainly in developed countries.[2,3,8]

Aims and objectives

The aim of this study was to share our initial experience with VCE and particularly to find out local disease patterns and outcomes in a resource-limited tropical setting. This included the indications, quality of bowel cleanliness, findings, and the diagnostic yields.

MATERIALS AND METHODS

A retrospective study was carried out at gastroenterology unit of Colombo South Teaching Hospital (CSTH) which is one of the leading tertiary care hospitals in Sri Lanka. CE service at CSTH was initiated in 2017 and since then a total of 54 CE studies had been carried out by June 2020. All cases were included in the study. Data were collected from hospital maintained internal computer database which stores patient details, CE recordings, and reports. All patients had esophagogastroduodenoscopy (OGD) and colonoscopy performed before the study. Patient details including age, sex, indication for the procedure, and CE findings including the quality of bowel preparation were transferred to a separate database for analysis. Mean, median, standard deviation, and percentages were calculated to present quantitative data. Ethics approval was obtained from the institutional ethics review committee of CSTH.

Equipment and procedure

CE procedures were carried out using MiroCam system developed by IntroMedic Co., Ltd., South Korea. All studies were performed as inpatient procedures. The patient preparation was done on the preceding day. A low-fiber diet was advised on the day before the procedure. Patients were given 1 L of polyethylene glycol solution in the evening followed by fasting for 12 h before the procedure. Following ingestion of capsule, patients were allowed to have a light diet after 6 h. All CE recordings were interpreted by a specialist gastroenterologist using the MiroView software developed by IntroMedic Co., Ltd. Bowel cleanliness was graded as excellent, good, fair, or poor according qualitative evaluation of small bowel cleanliness developed by Brotz et al.[9] Patients in whom capsule fails to reach cecum during recording period were followed up and capsule retention was defined as non-passage of VCE in to the cecum within a 2-week period.[5]

RESULTS

A total of 54 VCE studies had been carried out in our unit during the period from June 2017 to June 2020. Mean age was 55.64 years (SD 18.40). Out of those, 32 patients were male (59.26%) and 22 were female (40.74%). Forty-five (83.33%) studies were performed for the evaluation of suspected small intestinal bleeding and 6 (11.11%) and 3 (5.56%) studies were for the evaluation of unexplained abdominal pain and chronic diarrhea, respectively. Thirty-nine (72.22%) studies had been carried out with single end capsules while 15 (27.78%) studies had been carried out with double end capsules. One patient was excluded from the analysis due to improper bowel preparation.

Out of 53 cases, in 4 patients (7.55%), study was incomplete due to failure of capsule to reach cecum during the study period. Gastric time, small bowel transit time, and findings are summarized in the Table 1. Bowel cleanliness was excellent or good in 29 (54.72%) patients. Twenty-four (45.28%) studies were finally concluded as normal. Small bowel abnormality was identified in 25 (47.17%) patients while a gastric abnormality was identified in 11 (20.75%) patients.

Out of the 45 patients evaluated for suspected small bowel bleeding, an abnormal study was found in 26 (57.78%) patients. Findings are summarized in Table 2. Small bowel

Table 1: Summary of capsule endoscopy findings

Gastric time	
Mean	52.36 min
Range	2–289 min
SD	54.13
Small bowel transit time	
Mean	272.49 min
Range	73–556 min
SD	112.45
Bowel cleanliness	
Excellent	3 (5.66%)
Good	26 (49.05%)
Fair	17 (32.07%)
Poor	7 (13.20%)
Findings	
Small bowel	
Normal	28 (52.83%)
Abnormality present	25 (47.17%)
Small bowel abnormality	
Erosions and ulcers	17
Active bleeding	12
Angiodysplasia	2
Tumors/subepithelial lesions	6
Helminths	1
Stomach	
Normal	42 (79.25%)
Abnormality present	11 (20.75%)
Stomach abnormality	
Gastric erosions and ulcers	7
GAVE	3
PHG	1
Active bleeding	2

SD: Standard deviation, GAVE: Gastric antral vascular ectasia, PHG: Portal hypertensive gastropathy

Table 2: Findings in patients with suspected small bowel bleeding

Overt gastrointestinal bleeding Number of patients – 21		Occult gastrointestinal bleeding Number of patients – 24	
Small bowel cause of bleeding	14 (66.67%)	Small bowel cause of bleeding	9 (37.50%)
Ulcers and erosions	10	Ulcers and erosions	6
Angiodysplasia	1	Angiodysplasia	1
Tumors	3	Tumors	2
Non-small bowel cause of bleeding	1 (4.76%)	Non-small bowel cause of bleeding	2 (8.33%)
Gastric ulcers	1	Gastric ulcers	1
		GAVE	1
Overall diagnostic yield	15 (71.43%)	Overall diagnostic yield	11 (45.83%)

GAVE: Gastric antral vascular ectasia

cause of bleeding was found in 23 (51.11%) patients while small intestinal ulcers and erosions were the most frequently found abnormality in those patients (n=16, 35.56%). Previously undetected, non-small bowel or gastric cause of bleeding was found in 3 (6.67%) patients. Active bleeding was evident in 14 (31.11%) patients. Diagnostic yield was higher with those who presented with overt bleeding (71.43%) compared to occult bleeding (45.83%).

Most patients who were evaluated for unexplained abdominal pain had normal small bowel studies except for subepithelial nodular lesions suggestive of lymphoid follicular hyperplasia in one patient. Out of the three patients evaluated for chronic diarrhea, one patient had ulcers in small bowel suggestive of inflammatory bowel disease. Only one case was complicated with capsule retention which ultimately required endoscopy-assisted capsule removal.

DISCUSSION

Evaluation of small intestinal disease is a diagnostic challenge faced by many clinicians and numerous methods have been developed to overcome this challenge.[6] These include radiological studies such as CT/MRI enterography, barium studies, and enteroscopy. CE has revolutionized the evaluation of small bowel disease, particularly suspected small bowel bleeding due its ability to visualize the entire small bowel mucosa.[10] In fact, evaluation small bowel bleeding has been the most common indication for CE, and this was evident in our study as well.[11]

Evaluation of small bowel is indicated once the bidirectional endoscopy has failed to find the source of bleeding.[7] Even though all of our patients had OGD and colonoscopy before VCE, 3 patients (6.67%) were found to have gastric cause of bleeding which could have been detected during the OGD. This was in keeping with the findings of Innocenti et al., where a significant number of patients were found to have non-small bowel lesions which had been missed during initial bidirectional endoscopy.[12] This highlights the need to consider a second look endoscopy where doubt exists about the quality of initial endoscopy. This is particularly relevant in limited resource setting such as in ours due to the high cost associated with VCE.

The previous studies carried out mainly in the western population have shown variable diagnostic yields ranging from 38% to 83% for suspected small bowel bleeding.[2,6,10,13] A recent study involving 536 VCE studies has shown a diagnostic yield of 44% for obscure GI bleeding in real-world community setting.[11] Angiodysplasia has been the most commonly detected lesion in patients with suspected small bowel bleeding in western population.[2,11] This is in contrast to what we found as small intestinal ulcers and erosions were the most frequently found abnormality in our patient population. Even though we have achieved an overall diagnostic yield of 57.78%, it was much higher in patients with overt bleeding (71.43%). The low diagnostic yield in our study could have been due to multiple factors. One factor was the timing of CE study. It has been persistently shown that diagnostic yield is much higher when study has been performed close to an overt bleeding event.[6,10] In fact, one study has shown a VCE sensitivity of more than 90% with ongoing overt small intestinal bleeding.[14] In contrast, most of our patients did not have overt bleeding at the time of study and there could have been delays in performing the study due to system delays including delayed referral and limited resources. This highlights the need for rapid evaluation with endoscopy and referral for VCE where relevant.

Other factor which could have led to low diagnostic yield was inadequate bowel preparation as bowel cleanliness was fair or poor in a significant proportion of patients (45.28%). Bowel preparation for CE has been a controversial issue.[15] In early years, formal bowel preparation with purgatives was not required by the first manufacturer of CE apart from low-fiber diet on

the preceding day with clear liquids only in the evening and 12 h fast before the procedure. However, in their latest guideline issued in 2018, European Society of Gastrointestinal Endoscopy recommends a modified diet on the preceding day in combination with bowel preparation with 2 L of polyethylene glycol and also recommends antifoaming agents like simethicone before the procedure for better visualization.[15] Non-adherence to dietary instructions as well as relatively high-fiber content in local rice-based meals might have been the causes for inadequate bowel preparation in our patient group. This highlights the need of studies done in local setting to assess the adequacy of current recommendations on bowel preparation as well as proper patient preparation before the procedure as it is a high-cost procedure in our setting.

The use of VCE for patients with unexplained abdominal pain and diarrhea should be done after careful evaluation since the diagnostic yield has been low and this was evident in our study as well. A Greek multicenter study has shown a diagnostic yield of 21% in patients with unexplained chronic abdominal pain with normal inflammatory markers but a much higher detection rate (66.7%) in the presence of positive inflammatory markers.[16] Diagnostic yield has been even much higher in patients with abdominal pain, diarrhea, and positive inflammatory markers (90%) in the same study.

CONCLUSION

We find that CE is a useful investigation for the evaluation of small bowel bleeding. However, proper bowel preparation with patient involvement and timing of study as close as possible to an overt bleeding event is paramount since the cost associated with it is high. Utility of VCE for the evaluation of unexplained abdominal pain or diarrhea should be done after careful evaluation to maximize its diagnostic yield.

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DRP – Concept and design of the study. Acquired, analyzed, and interpreted the data. Prepared first draft of manuscript; **PR –** Data collection, analysis, and interpretation; **SA –** Concept, design, and revision of the manuscript. All authors approved the final version of manuscript submitted.

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