Capsule Endoscopy: Single Center Experience

Abdullah Alyouzbaki[1], Doaa Khadomi[2], Sara Haj Ali[2], M. Amer Khatib[2], Mustafa M. Shennak[2], Awni Abu sneineh[2]*

Abstract

Objective: Capsule endoscopy (CE) has revolutionized the evaluation of small bowel disorders, particularly obscure gastrointestinal bleeding (OGIB). The aim of this study was to determine the findings and the diagnostic yield of CE in a large series of patients with suspected small bowel disease mainly OGIB; as well as to compare our results to that of other reported centers.

Methods: Data on 230 patients who underwent capsule endoscopy for suspected small bowel related symptoms and/ or signs mainly overt (81 patients) or occult (66 patients) OGIB were obtained by retrospective chart review and review of an internal computer database of capsule endoscopy patients. Data presented as percentages, p value used to show differences whenever relevant.

Results: Out of 230 patients investigated for small bowel related symptoms and /or signs, 7 patients excluded mainly due to improper preparation, of the remaining 223, 128 (57.3%) had some lesion detected by CE,80 (35.8%) had definite lesions detected that could unequivocally explain patients' complaints. Patients with overt GI bleeding had the highest diagnostic yield (64.1%), this was significantly greater ($P < 0.001$) compared to that in patients with occult bleeding (43.9%) as well as those with abdominal pain and/or diarrhea (33.3%). Angiodysplasia is the most common cause of OGIB (26.5%).

Conclusions: The yield of clinically important findings on CE in patients with OGIB is 55% and is greater in patients with obscure-overt than obscure-occult GI bleeding. Angiodysplasia account for the majority of significant lesions in both groups.

Keywords: Capsule endoscopy, Gastrointestinal bleeding.

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Introduction

Historically the small bowel was considered technically difficult to examine because of its length, location and tortuosity.

Obscure gastrointestinal bleeding (OGIB) is defined as bleeding from the GI tract that persists or recurs without an obvious etiology after esophagogastroduodenoscopy (EGD), Colonoscopy, and radiological evaluation of the small bowel such as small bowel follow-

1. College of Medicine, University of Mosul, Mosul, Iraq.
2. Department of Gastroenterology and Hepatology, Jordan University Hospital, Amman11942, The University of Jordan, Jordan.
**** Correspondence should be addressed to:***
E-mail: a_alyouzbaki@yahoo.com
P. O. Box: 41002, Mosul, Iraq.

through or enteroclysis. It could be categorized into obscure overt bleeding, defined as manifest bleeding visible as melena, hematemesis or hematochezia and obscure occult bleeding, presenting as a persistent iron deficiency anemia (IDA) or a positive fecal occult blood test (FOBT)[1].

OGIB is a common problem encountered by gastroenterologists and it accounts for approximately 5%of all GI bleeding and is frequently due to a lesion in the small bowel[2].

Distinguishing between obscure-overt and obscure occult bleeding is important as the two conditions may have a different clinical course.

Capsule endoscopy (CE) is a procedure for the investigation of the mucosa of the small intestine and is applicable for the evaluation of several clinical conditions such as OGIB, Crohn's disease, celiac disease and small bowel tumors[3].

Since capsule endoscopy (CE) was approved by the Food and Drug Administration (FDA) in United States of America (USA) in August 2001, the small bowel no longer appears mysterious territory.

Video capsule endoscopy provides visualization of the GI tract by transmitting images wirelessly from a disposable capsule to a data recorder worn by the patient. Over subsequent years, this technology has been refined to provide superior resolution, increased battery life, and capabilities. CE is a unique tool in that it allows for visualization of mucosa throughout the entire small bowel.

CE has been shown to be superior to push enteroscopy[4,5], small bowel follow-through[6], computed tomography (CT) scan[7] and it has a comparable[8] or superior[9-12] diagnostic yield as a double balloon endoscopy in detecting bleeding lesions in the small intestine. Early reports found that CE had a diagnostic yield of 45–66% in patients with OGIB[5, 6, 13].

The aims of this study were to determine the findings and the diagnostic yield of CE in a large series of patients with small bowel related symptoms mainly OGIB from a single institution and to determine whether our results are comparable to that of other reported centers.

MATERIALS AND METHODS

Cases

In this retrospective study, data of 230 CEs performed from January 2008 until February 2014 at the gastroenterology department, Jordan university hospital were analyzed.

The mean age of the patients was 49.95 year (range 9-81 year), of whom 114 (49.3%) were male with mean age (51.5 year) range (12-80 year) and 116 (50.6%) were female with mean age (47.05 year) range (9-81 year).

Methods

All patients with symptoms and/or signs appear to be related to small bowel diseases underwent EGD and colonoscopy before referral for CE. A subgroup of patients was subjected to other investigations, including magnetic resonance (MR) enteroclysis, small bowel follow-through or CT abdomen. When all these investigations did not explain the patients' complaint, they were subjected to capsule endoscopy.

Standard preparation of the small bowel was done the day before procedure by:

1. Ingestion of 4 litres of polyethyleneglycol and electrolytes (Fortrans ®, Ipsen, France) taken between 11am and 3pm.
2. 10 tablets of bisacodyl (Dulcolax®, Boehringer Ingelheim, Germany) taken 5 tablets at 9 am and other 5 tablets at 4 pm.
3. Clear liquids and overnight fasting.

The preparation for CE suggested by manufacturers of capsule endoscopy systems consists only of a clear liquids diet and an 8-hour fast. However, two factors that impair the diagnostic yield of CE are first, the presence of food residue, air bubbles and turbid or green viscous intraluminal fluid, and secondly failure of the capsule to visualize all of the small-bowel due to delayed gastric or small-bowel transit times. A recent meta-analysis has shown that small-bowel purgative preparation (polyethylene glycol solution or sodium phosphate) improves the diagnostic yield of the examination [(14)].

Since both exercise and bed rest may influence CE transit time, patients were advised to adhere to a daily routine during the investigation without excessive exercise. To prevent interfering with data processing from the video capsule to hard disk, patients were told to stay away from shoplifting detection fences, MRI and other electromagnetic fields.

Contraindications for CE examination were known or suspected intestinal obstruction or strictures. Relative contraindications were a cardiac pacemaker, pregnancy and diabetic gastroparesis. All patients were told to check their stools carefully for evacuation of the capsule.

After the capsule ingestion, patients were allowed to drink 2 hours later and to eat a light snack 4 hours later, while continuing their usual activities. The recorder was disconnected approximately 8 hours after the start of the exploration. All patients were interviewed after completing the study to evaluate their tolerance or complications.

Outcome variables

Retrospectively, diagnostic reports were scored for angiodysplasia (angioectasia or vascular ectasia), erythematous mucosa, erosions, ulcers, aphthae, blood or clots, polyps, diverticula, abnormal villi, tumors and stenosis, according to the Capsule Endoscopy Structured Terminology (CEST) nomenclatur [(15)]. As no gold standard exists for small bowel evaluation, sensitivity and specificity could not be determined. Therefore, investigators scored findings as a ´definite´ explanation, a ´probable´ explanation, or as a ´definite negative´ explanation for the indication. The diagnostic yield of CE was defined positive when definite or probable cause(s) were found.

Diagnostic imaging system of CE

The OMOM CE (Jinshan Science and Technology Company, Chongqing, China) was used in all patients. This system is made up of three parts: a disposable CE, an image recorder and an image workstation; the pill measures 13 mm×27.9 mm, and weighs <6 g; image features include a 140° field of view and a resolution of 0.1 mm. CE has a battery life of approximately 6~8 hours, and is propelled by peristalsis, the pictures are taken at a rate of two per second (table 1). The acquired images are transmitted to the image recorder. The recorder is later connected to the workstation, in which the images are processed using a specifically designed software package. The trait of OMOM CE is similar to that of Pillcam CE.

Table 1. Technical specification of OMOM capsule endoscopy

Length. Mm	**27.9**
Diameter, mm	13
Weight, g	6
Frame rate, frames/second	0.5-2
Image sensor	CCD
Field of view	140°
Illumination	NA
Antennas (body leads), n	14
Real-time (RT) view	RT monitoring
Recording time, hours	7-9

CCD, charge-coupled device; NA, not applicable

Image Interpretation

Pictures were pre-screened by a trained specialized technician and subsequently by a gastroenterologist. The review time by the investigators was in general one hour. In case of discrepancy between the two reviewers, data were discussed in an expert panel.

The findings were categorized as definite, probable or definite not as follows: (1) definite: A definite explanation for the indication was given when the diagnostic report showed a concrete answer for small bowel related symptoms or sign (e.g., angiodysplasia (figure1b), ulcer(figure 1c), blood(figure 1e), clot, or based on the interpretation of the investigator); (2) probable: mucosal lesions identified(e.g. erythematous mucosa, small red spots, superficial aphthae or abnormal villi) but the findings could not be conclusively attributed to them, or blood was seen in the small intestine without any definite lesion being identified; and (3) negative: If the results were normal(figure 1a) or clinically irrelevant, it was scored as definite not.

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 antituberculous therapy, or anthelminthic therapy), surgical therapy (for tumors or bleeding ulcers) or enteroscopic evaluation (ulcers, polyps, or bleeding angiodysplasia), depending on the CE results. Those with negative CE were followed up with expectant treatment or surgery with few patients underwent double balloon enteroscopy.

When CE did not show clear pictures of the intestine because of contamination and did not reveal abnormalities, the procedure was scored as failed and these cases excluded. However, when the recorded images were not optimal for inspection but did show abnormalities which may explain the indication, this procedure was scored as succeeded and scored as a definite or probable explanation.

Macroscopic signs of significant gastritis (including erosions and/ or hematin) were considered a probable explanation for OGIB if no other abnormalities were found.

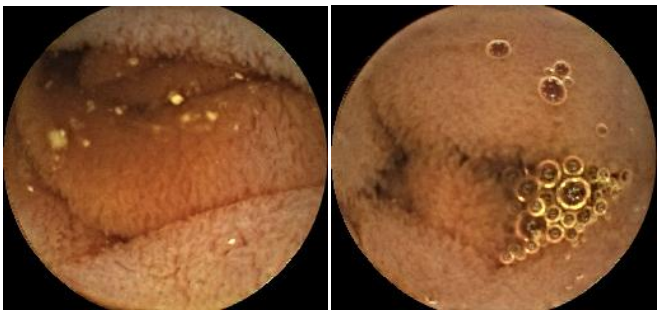
Results:

Procedural aspects and safety

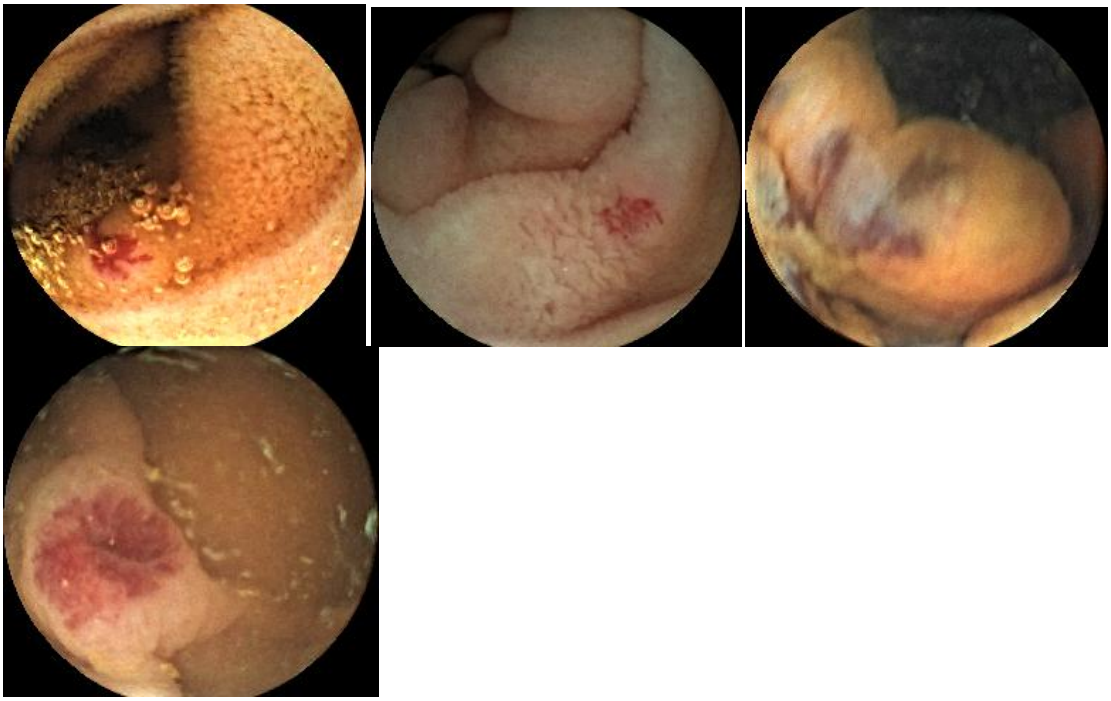
From January 2008 until February 2014 CE was performed in 230 patients. The maximum recording time of 480 minutes was reached in the majority of patients. Among the CE procedures, 7 patients (3.03%) were excluded.

The reasons for failure are shown in Table 2. The completion rate of small bowel visualization is 97% which is higher than that reported in other literatures (14).

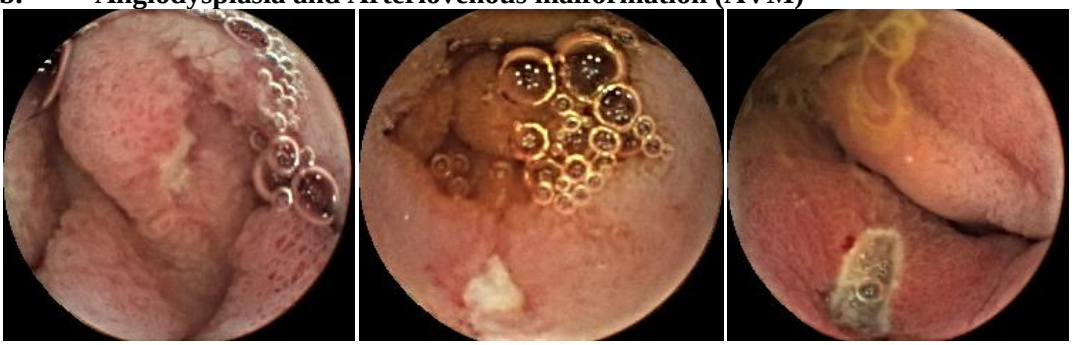
Figure 1: Videocapsule endoscopy findings:a: normal, b: angiodysplasia and arteriovenous malformation, c: ulcer, d: polyp(s), e: melena. (By OMOM CE, Jinshan Science and Technology Company, Chongqing, China)



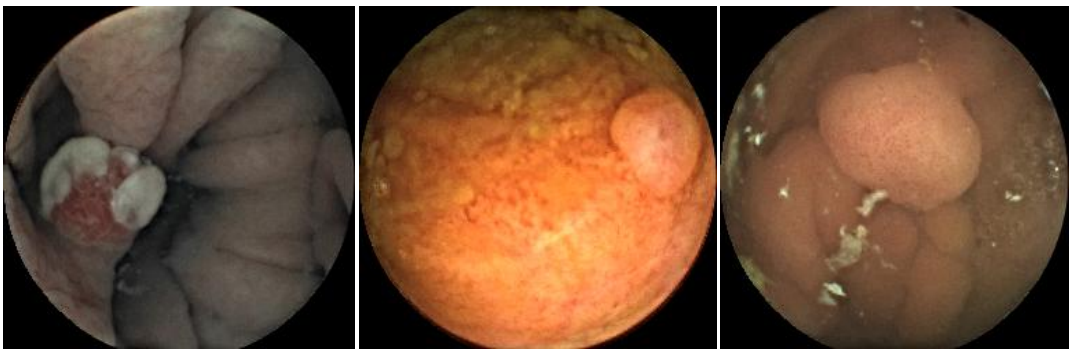
a. Normal

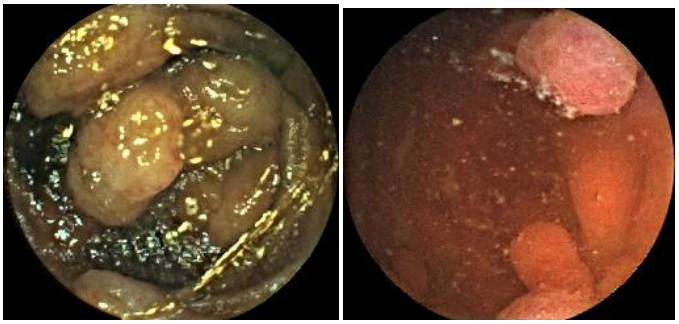


b. Angiodysplasia and Arteriovenous malformation (AVM)

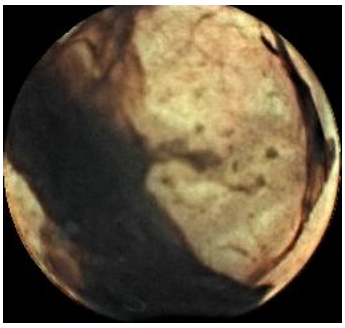


c. ulcer





d. polyp(s)



e. Melena

Table 2. Failed CE procedures

Reasons for CE failure (N=7)	Number of patients
Insufficient bowel preparation; evaluation blurred by fluids	**5**
Technical disturbance or software problems	**1**
Report and photos missed	**1**

In 2 patients, the capsule was not spontaneously released with the stools. The indications to perform CE in these cases were Crohn's disease and undiagnosed stricture in the jejunum. In the 2 cases, the entrapped CE was successfully retrieved by surgery.

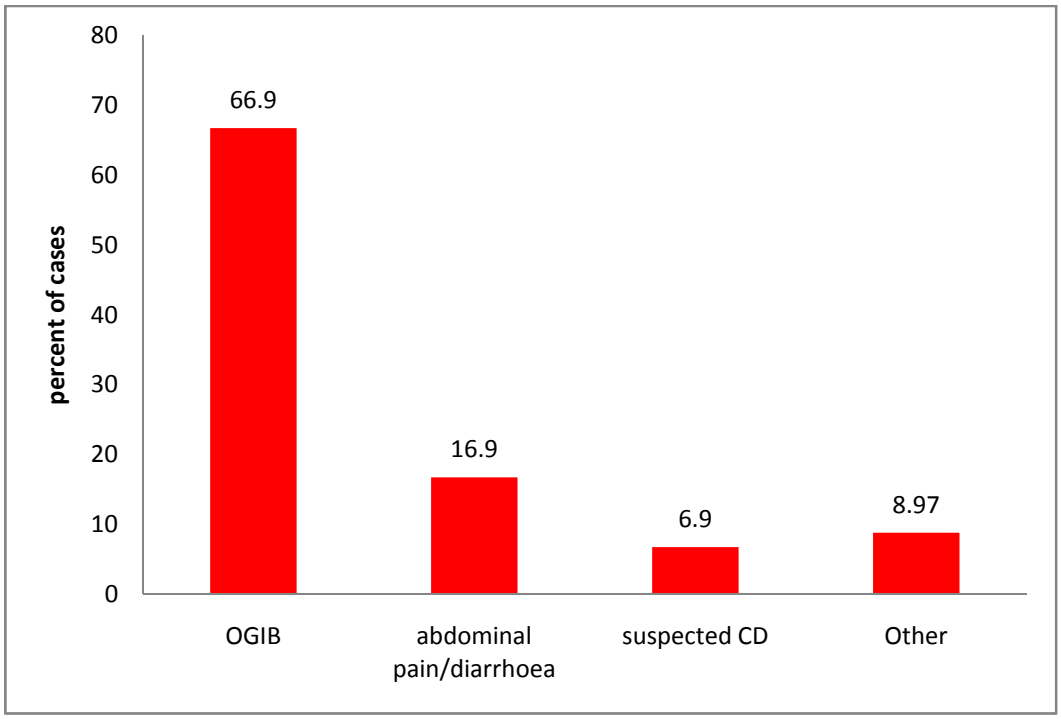
Diagnostic yield

OGIB was the commonest (66.9%) indication for CE during the study period (Figure 2, Table 3). Out of the 154 patients with OGIB, 7 were excluded. The remaining 147, 74 (50.3%) were male and73 (49.7%) were female; of these patients 60 (40.8%) had a normal examination (29male and 31 female).

Table 3. Indications for capsule endoscopy (CE)

Indication of patients for CE	Number (%)
Obscure gastrointestinal bleeding (OGIB)	154 (66.9)
Abdominal pain and/or diarrhea	39 (16.9)
Suspected Crohn's disease (CD)	16 (6.9)
Small bowel polyps or tumor	6 (2.6)
Partial intestinal obstruction	1 (0.4)
Weight loss	3 (1.3)
Hypoproteinemia	2 (0.87)
Constipation	4 (1.7)
Abnormal barium follow through	1 (0.4)
Unreported indications	4 (1.7)
Total patients	230

Figure 2: Percentage of indications of CE



A plausible explanation is hereby defined as findings that were interpreted by the physician who reviewed the video as a 'definite' or 'probable' explanation (Table 4).

Table 4. Explanations found by CE in patients with obscure-occult, obscure-overt gastrointestinal bleeding and abdominal pain/diarrhea

Explanation	OGIB (total)	Obscure-occult GI bleeding	Obscure-overt GI bleeding	Abdominal pain/diarrhea
	No (%)	No (%)	No (%)	No (%)
Definite	58(39.4%)	16(24)	42(51.8)	7(17.9)
Probable	23(15.6%)	13(19.7)	10(12.3)	6(15.4)
Definite not	66(45%)	37(56)	29(35.8)	26(66.6)
Total	147	66	81	39

Table 5. Diagnostic yield of CE

	Diagnostic yield (definite and probable lesions)	P value*	Definite lesion	P value*
OGIB (overt)	52 (64.1%)	0.001**	42(51.8%)	0.06***
OGIB (occult)	29 (43.9%)		16(24.2%)	
Abdominal pain and/or diarrhea	13 (33.3%)		7(17.9%)	

*Chi square test, ** highly significant, *** Z test not significant

Table 6. Number and percentage of lesions detected in patients with OGIB

Abnormalities found in the small intestine	Number of patients with obscure-occult GI bleeding (n=29)	Percentage of positive CEs	Number of patients with obscure-overt GI bleeding (n = 52)	Percentage of positive CEs
Angiodysplasia	12	41	27	51.9
Ulcer(s)	4	13.8	9	17.3
Erosion(s)	6	20.7	6	11.5
Blood or clot	2	6.9	2	3.8
Others	5	17.2	8	15.4

In 66 (44.8%) patients, no explanation was found for the OGIB i,e definite not related.

Subsequently, we analyzed the 81 patients who underwent CE because of overt OGIB (i.e. hematemesis, rectal blood loss or melena). In this group of patients, the diagnostic yield of CE was somewhat higher (64%; n=52) in comparison to that of occult OGIB (43.9%; n=19) and those with abdominal pain and/or diarrhea (33.3%; n=13) as shown in Table 4.

According to the American gastrointestinal association (AGA) guidelines, both gastrointestinal bleeding and IDA are considered a cause of OGIB[16]. Therefore, in our study when figures are combined, the detection ratio for OGIB by using CE is 55.7% while for patients with abdominal pain and/or diarrhea is 33.3%.

The diagnostic yield of our capsule endoscopy were 64%, 29% and 33.3% for those with overt OGIB, occult OGIB and those with abdominal pain and/or diarrhea respectively. There is a statistically significant difference (P value <0.001) in the diagnostic yield between our 3 main groups (overt OGIB, occult OGIB and diarrhea and/or abdominal pain groups).

Although definite lesions were detected in 51.8% of patients with overt OGIB and 24.2% of patients with occult OGIB , but there is no statistical differences(P value =0.06) in the detection of definite lesions between these 2 groups most probably due to small size samples (table 5) .

The capsule used in this study is primarily developed to visualize the small bowel, and all patients who underwent CE for OGIB had been subjected to prior EGD and colonoscopy, with negative results. However, in 11(4.9%) patients with OGIB (9 of them had overt OGIB) CE revealed abnormalities that were considered to be the most likely explanation for the indication, these findings not located in the small bowel but in the stomach in spite of negative initial EGD .

As well as in addition to the lesions seen in stomach, 6 patients with OGIB had lesions in first part of duodenum, so 17 (11.6%) patients with OGIB had lesions in the stomach and duodenum that are within the reach of upper endoscopy.

Also among patients with diarrhea and /or abdominal pain, 4 (10.2%) patients had lesions in first or second part of duodenum which could be relevant to their complaints.

During our review, no isolated colonic lesion was detected that could explain the patients' complaint.

When the findings in stomach excluded, detection ratios for OGIB using CE in the small intestine are consequently somewhat lower (55.1vs 48.3%).

The commonest lesions detected in our patients were small-bowel angiodysplasia 26.5%, ulcer(s) (8.8%), followed by erosion(s) (8.2%) table 6.

Half of our patients with OGIB aged more than 60 years and 57.4% of patients older than 60 yearshad underlying angiodysplasia (figure 3 and 4), which is expected as angiodysplasia is a disease of old age[17,18].

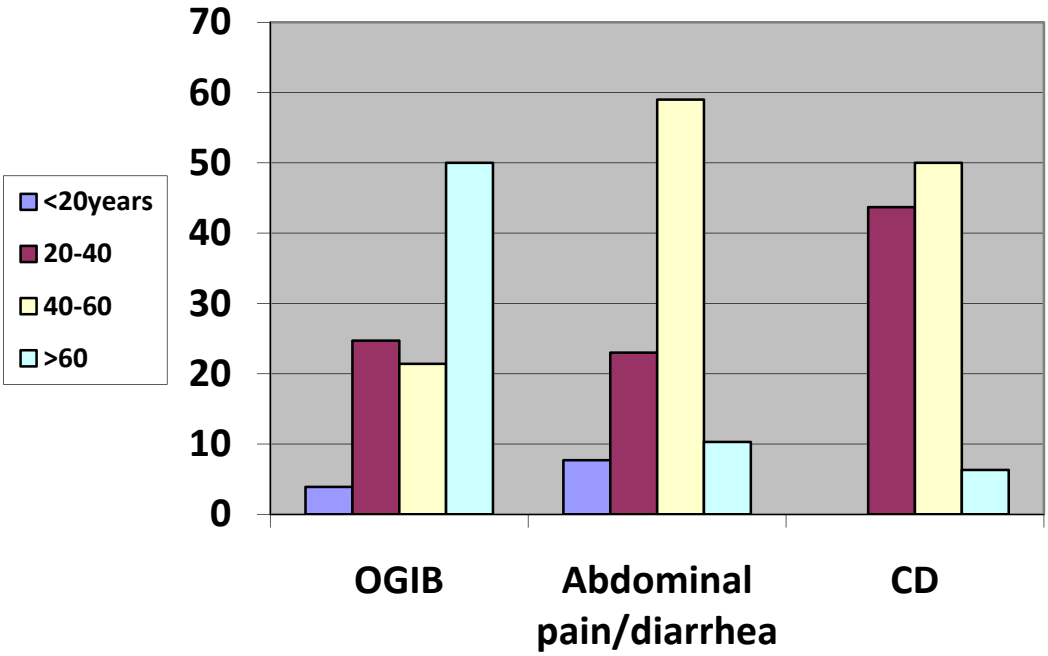


Figure 3: Age distribution (in percentages %) of patients with OGIB, abdominal pain/ diarrhea and Crohn's disease (CD)

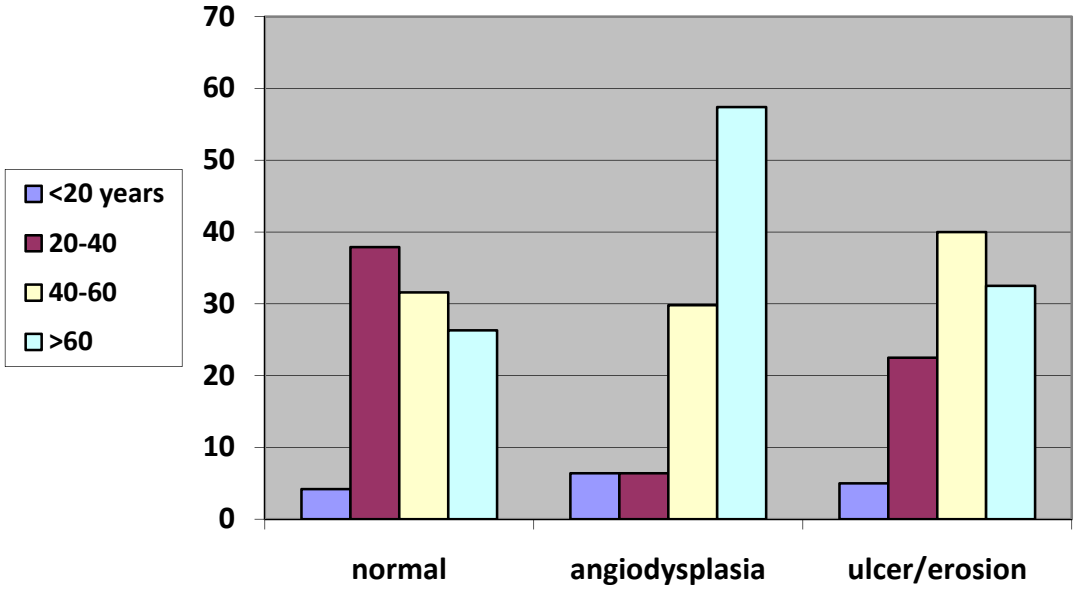


Figure 4: Age distribution (in percentages %) according to the finding on CE

DISCUSSION

CE has gained widespread clinical acceptance in the diagnostic algorithm of OGIB[19, 20]. 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,

computed tomography (CT) angiography and standard 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 as well as CE has been considered a cost-effective investigation in patients with OGIB [21].

Several prospective studies and a meta analysis have compared CE with push enteroscopy (PE) in the evaluation of patients with OGIB. They have shown a significantly better yield for CE (63%) compared with push enteroscopy (23%) [22]. In a recent randomized study, CE and push-enteroscopy were used for first line exploration of OGIB and identified a bleeding source in 50%vs. 24%, of patients, respectively (P = 0.02) [23].Furthermore, in another study, it was shown that CE detected a source of bleeding in a greater proportion of patients (72%), than computed tomography (CT) angiography (24%), or standard angiography (56%) and gave positive findings in more than half of the cases that were negative at computed tomography or angiography (24). When compared with intra operative endoscopy as reference, CE had sensitivity, specificity and positive and negative predictive values of 95%, 75%, 95%, and 86%, respectively [25].

Recently, Double Balloon Enteroscopy (DBE) has been used in several centers for diagnosis of OGIB. However, diagnostic yield of CE has been found to be significantly higher compared to DBE examination done via the oral or anal route [10-12].

These two techniques may be considered complementary. However, DBE may permit endoscopic treatment of the bleeding lesion[21,25].

The reported yield of CE in OGIB varies widely. Previous studies have shown that detection rates for the source of bleeding vary from 38% to 93%, and are in the higher range for those with overt OGIB [19, 20]. This is further influenced by subjective interpretation of positive findings.

The overall diagnostic yield in our study was 50.7% for the all indications and 55.1% for OGIB.

A recently published study by Hindryckx *et al.* [27] which considered CE to be positive only when lesions with sufficient bleeding potential were detected, reported a similar diagnostic yield of 59.8%.

It is well established that patient selection and timing of the CE procedure largely influence outcome percentages [28-30].

Bresci et al[28] showed a detection rate of 92% when CE was performed within 15 days after diagnosing OGIB, compared to only 34% when CE was conducted more than 15 days after diagnosis. In the present study, referral time is variable which may linked to a lower detection rate of our CE.

When these factors are taken into consideration, it is to be expected that the diagnostic yield of CE found in the present study may further increase when it is performed earlier in the diagnostic process of a patient with OGIB.

Recent studies have indicated that the optimum timing of CE in OGIB is within the

first few days, with acceptable maximum duration of 2 week [28, 31-33]. In a recently reported series of 260 patients from Mayo clinic with OGIB, the yield was 87% in patients with ongoing overt OGIB, 60% in patients with chronic overt OGIB and 46% in those with occult OGIB[29], this is in concordance with our results (the diagnostic yield was 64.5% for overt and 44.5% for occult OGIB).

In our patients, a definite lesion could be detected in 51.8% of patients with overt OGIB compared to 24.2% in patients with occult OGIB.

Pennazio *et al.* [31]also have found the highest yield in patients with ongoing GI bleeding, and therefore have recommended ordering CE earlier in the setting of overt OGIB. There have been concerns in the past regarding the possibility of blood obscuring proper visualization of the mucosa in patients who are actively bleeding. A recent study that has compared massively bleeding patients with chronic overt OGIB has found a similar positive yield in both groups (59.18% (29/49) and 52.69% (137/260), respectively) [34]. These results demonstrate that, for optimum diagnostic efficacy, CE should be done within 48 h of bleeding in patients with OGIB.

The definition of a positive finding on CE continues to be ambiguous. For the purpose of this study, nonspecific mucosal changes such as red spots, focal erythema and fold thickening, were not considered to be clinically significant. Ulcers, erosions, angiodysplasia and active bleeding were included as positive findings in this series if they could completely or partially account for the GI bleeding.

CE is also a valuable tool for the diagnosis of obscure small bowel Crohn's disease (CD), and can also be used for monitoring of disease activity in patients with established small-bowel CD, detection of complications such as obscure bleeding and neoplasms, evaluation of response to anti-inflammatory treatment and postoperative recurrence following small bowel resection. CE could also be an important tool in the management of patients with unclassified inflammatory bowel disease, potentially resulting in reclassification of these patients as having CD.CE has been compared with other radiologic studies for the diagnosis of Crohn's disease with somewhat disparate results.

Overall, most studies suggest that CE has a superior sensitivity for the detection of small bowel Crohn's disease compared with other radiologic studies, with variable specificity[35-38].

In our study 17 patients with suspected or established CD underwent CE; the diagnostic yield is 64.7%.

Regarding the use of CE in patients with chronic abdominal pain and/or diarrhea, there is a controversy in the published literatures, some found that CE is an effective tool for those with abdominal pain [39, 40] other are not [41].The diagnostic yield of CE in our study is 33.3% and most patients (6 out of 7) with definite lesions had small bowel ulcers or erosions.

The current study has several limitations. First, it is a retrospective single-center study and the fact that our hospital is a tertiary hospital for many surrounding clinics. However, data was obtained from forms filled at the time of CE, thereby minimizing data

collection bias. Second, this study does not offer long-term follow-up of patients and hence makes it impossible to draw a strong conclusion as to the fate of CE-negative OGIB. Moreover,a large proportion of ulcers/erosions could not be characterized due to inherent difficulty of obtaining small bowel mucosal biopsies.

However, this study enabled us to analyze positivity rates and nature of lesions defined by CE in a relatively large cohort of subjects comprising of a heterogeneous population of patients with OGIB.

CONCLUSIONS

This study supports the importance of CE for the detection of causes of small bowel disease in particular OGIB with a diagnostic yield of 55.1% in a large tertiary study population using a structured scoring system.

Angiodysplasia is the most common (26.5%) cause of OGIB. CE is suggested to be a valuable diagnostic modality after EGD and colonoscopy. Careful patient selection and timing of CE might be helpful in increasing diagnostic rates; repeating EGD and colonoscopy before CE might be preferred.CE had a high diagnostic yield (64.7%) in the diagnosis and evaluation ofCrohn's disease.

In patients with obscure abdominal pain and/or diarrhea, CE is still valuable with diagnostic yield of 33.3%.

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التنظير بالكبسولة: تجربة مركز واحد

عبدالله اليوزبكي[1]، دعاء قدومي[2]، ساره حاج علي[2]، محمد عامر الخطيب[2]، مصطفى الشناق[2]، عوني ابو سنينه[2]

1– كلية الطب، جامعة الموصل، الموصل، العراق؛ 2– مستشفى الجامعة الأردنية، الجامعة الأردنية.

الملخص

الهدف: إن التنظير بالكبسولة قد احدث ثورة في تقييم اضطرابات الأمعاء الدقيقة ولاسيما حالات النزيف المعوي غامضة السبب.الهدف من هذه الدراسة هو تحديد النتائج والعائد التشخيصي من التنظير بالكبسولة في سلسلة كبيرة من المرضى المشتبه بإصابتهم بأمراض الأمعاء الدقيقة وبالأخص مرضى نزيف الجهاز الهضمي غامض السبب وكذلك لمقارنه النتائج المستحصلة من هذه الدراسة مع نتائج مذكورة لمراكز أخرى.

الطريقة: تم مراجعة بيانات عن 230 مريضا خضعوا للتنظير بالكبسولة للاشتباه بأعراض أو علامات مرتبطة بالأمعاء الدقيقة بأثر رجعي وبالأخص 81 مريضاً يعاني من نزيف معوي علني غامض المصدر و66 مريضاً يعاني من نزف معوي خفي غامض المصدر. تم الحصول على بيانات المرضى من خلال مراجعة ملفات واستعراض قاعدة بيانات الكمبيوتر الداخلية للمرضى. تم تقديم البيانات كنسب مئوية واعتماد قيمه P لإظهار الاختلافات حيثما كان ذلك مناسباً.

النتائج: من أصل 230 مريضاً تم التحقق منهم لوجود علامات أو أعراض متعلقة بالأمعاء الدقيقة، استثني من الدراسة 7 مرضى بسبب عدم التحظير للتنظير بشكل جيد، المتبقي 223: منهم 128 (57.3%) مريضاً لديهم بعض الآفات كشف عنها بوساطة التنظير بالكبسولة، 80 (35.8%) مريضاً لديهم آفات مؤكدة تفسر بشكل لا لبس فيه شكوى المريض.

إن المرضى الذين يعانون من نزف معوي علني لديهم أعلى عائد تشخيصي (64.1%) وكان هذا أكبر بكثير (P<0.001) مقارنة بما كان عليه في المرضى الذين يعانون من نزيف معوي غامض (43.9%) وكذلك الذين يعانون من آلام في البطن و/ أو الإسهال (33.3٪). إن تشوهات الأوعية الدموية هي السبب الأكثر شيوعاً في مرضى النزيف المعوي غامضة السبب (26.5%).

الاستنتاجات: من خلال التنظير بالكبسولة تم اكتشاف علامات مهمة سريرياً في 55% من مرضى نزف الجهاز الهضمي غامض السبب، وكان العائد التشخيصي أعلى في مرضى النزف المعوي العلني منه بالمقارنة مع مرضى النزف المعوي الخفي. كانت تشوهات الأنسجة الوعائية هي المسؤولة عن أغلب الآفات في حالات نزف الجهاز الهضمي العلني والخفي.

الكلمات الدالة: التنظير بالكبسولة، نزيف الجهاز الهضمي.