ABSTRACT

Background
The small intestine is the most difficult part of the intestine to examine. Video capsule endoscopy has revolutionized the study of the small intestine. Since its availability, no local data are available to optimize the use of this valuable diagnostic procedure.

Objectives
To review the indications, diagnostic yield and safety of video capsule endoscopy in a tertiary referral center.

Patients and Methods
This retrospective descriptive study was done in Kurdistan Center for Gastroenterology and Hepatology in Sulaimani City from June 2009 to February 2012. A total of 43 patients underwent video capsule endoscopy during this period (18 females, 25 males) with their age ranging from 9 years to 87 years (mean=37 years).

Results
Indications of video capsule endoscopy were obscure gastrointestinal hemorrhage (N.=20, diagnostic yield=70%), suspicion of Crohn's disease (N.=11, diagnostic yield=64%), chronic abdominal pain (N.=8, diagnostic yield=50%), small intestinal polyposis syndrome (N.=2, diagnostic yield = 100%) and chronic unexplained diarrhea (N.=2, diagnostic yield=0%). The most common finding was gastrointestinal erosions and/or ulcers (N. = 21, 48.9%). No capsule retention has been recorded.

Conclusion
Video capsule endoscopy is safe and has an acceptable diagnostic yield in obscure gastrointestinal hemorrhage, Crohn's disease and small intestinal polyposis syndrome. However, more studies are warranted to establish the impact of these diagnostic yields on patient outcome rates.

Keywords: Video capsule endoscopy, Small intestine, Sulaimani.
INTRODUCTION

The small intestine is the most difficult part of the intestine to examine owing to the technical difficulty in reaching it through the mouth or anus (1). Video capsule endoscopy (VCE) has revolutionized the study of the small intestine because it is simple, safe, non-invasive, reliable, well accepted and tolerated by the patient (2,3). In VCE, the patient ingests a pill camera that transmits images of the small intestine over the course of approximately eight hours (4). The capsule is able to detect lesions as small as 0.1 mm (5).

Currently, VCE is recommended as a third stage examination, after negative gastroscopy and colonoscopy in patients with obscure gastrointestinal (GI) hemorrhage. Also it is recommended in other clinical situations, such as detection of small intestine lesions in Crohn’s disease, non steroidal anti-inflammatory drug enteropathies, celiac disease, small intestine polyposis syndromes and small intestine tumors (3).

VCE is contraindicated in patients with GI obstruction, known strictures or swallowing disorders (6). Retention of VCE is the main complication of the procedure and is defined when VCE remains in the digestive tract for a minimum of 2 weeks (7). The frequency of this problem ranges from 0% in healthy subjects to 5-13% in patients with suspected Crohn’s disease (8).

Limitations of VCE include inferior image quality than classic endoscopy, inability to take biopsies or provide endoscopic therapies (4,9), problems in sizing and locating small intestine lesions (3), false-negative result (global miss rate is about 11%), and the fact that sometimes we can get findings of uncertain relevance in healthy subjects (9).

The use of VCE in general has been approved only about a decade ago, the available knowledge about this investigation is still preliminary and in many situations contradictory. The lack of local data urged us to review the indications, diagnostic yield and safety of VCE so that we can optimize the use of this investigation in our locality.

PATIENTS AND METHODS

This retrospective descriptive study was done from June, 2009 to February, 2012. The files of the patients that underwent VCE in KCGH were reviewed. A total of 43 patients underwent VCE during this period (18 females, 25 males). The age ranged from 9 years to 87 years with a mean of 37 years (95% confidence interval (CI) = 32-43 years).

KCGH serves as a tertiary referral center for patients from Sulaimani governate and other governorates in Iraqi Kurdistan Region and North of Iraq. It has been established in 2006 to provide diagnostic and therapeutic services for patients as well as training of postgraduate candidates in the field of gastroenterology and hepatology.

Patients were interviewed before arrangement of the procedure to document the demographic and clinical data and the indication of procedure. Patients with obscure GI hemorrhage were those who had negative upper endoscopy and colonoscopy (6). Suspicion of Crohn's disease was defined as any patient who has a combination of symptoms of abdominal pain, diarrhea, weight loss, or investigational findings including iron deficient anemia and an acute phase response (10).

All patients had Barium follow through to exclude GI strictures. Informed consent was taken from every patient before the procedure.

Patient preparation included instructions to consume only clear drinks the day before VCE with the use of a laxative (polyethylene glycol containing compound), a prokinetic agent (domperidone tablet) and an anti-foaming agent (simethicone syrup) (4).

In all patients, we used Olympus Endocapsule from Olympus (Tokyo, Japan). After capsule ingestion, the patient was allowed to drink after 2 hours and eat after 4 hours. The data recorder was removed after 8 hours (7, 11). On completion of the procedure, the data from the recorder were downloaded onto a computer workstation which allowed images to be viewed as a video.

Analysis of data using Statistical Package for the Social Sciences (SPSS) program version 19.0 for windows was done. Statistical analysis was conducted to calculate the P-value using χ² (or Fisher’s exact test if an expected number in any cell was less than 5). For the associations or
differences to be significant, the P-value should have been less than 0.05 (12).

RESULTS

The most common indication for VCE was obscure GI hemorrhage (N.=20, 46.5%) followed by suspicion of Crohn's disease (N.=11, 25.6%) and chronic abdominal pain (N=8, 18.6%). Two patients had chronic unexplained diarrhea (4.6%) and two patients were referred as cases of suspected small intestinal polyposis syndrome (4.6%).

VCE detected abnormal findings in 27 out of 43 patients (diagnostic yield = 63%). A lesion was detected in 14 out of 20 patients who had obscure GI hemorrhage (diagnostic yield = 70%). Findings were GI erosions & / or ulcers in 12 patients & angiectasia in 2 patients. Thirteen out of 20 patients who had obscure GI hemorrhage presented with melaena (overt - obscure GI hemorrhage) and in 10 patients, a lesion was detected on VCE making the diagnostic yield 77% which was higher than the diagnostic yield of VCE in patients presented with iron deficiency anemia (occult - obscure GI hemorrhage) in whom 4 out of 7 patients had a lesion on VCE (diagnostic yield = 57%).

Findings consistent with Crohn's disease (small intestinal erosions and ulcers) were detected in 7 out of 11 patients referred for suspicion of Crohn's disease (diagnostic yield = 64%).

VCE also showed an abnormality in 4 out of 8 patients presented with chronic abdominal pain (diagnostic yield = 50%) in the form of gastroduodenal ulcers (N.=2) and single small intestinal polyps (N.=2). VCE was normal in the 2 patients presented with chronic unexplained diarrhea (diagnostic yield = 0%).

Both of the two patients referred as suspected cases of small intestinal polyposis syndrome had findings consistent with this diagnosis (diagnostic yield=100%). The probability that an indication will be associated with the detection of an abnormal finding was not statistically significant for all the indications of VCE (P-value >0.05). This is shown in table-1.

Gastro-intestinal erosions &/or ulcers were the most common finding which were detected in 21 patients (48.9%) (Fig. 1). Each of angiectasia (Fig. 2), single small intestinal polyp (Fig. 3) and multiple small intestinal polyps (Fig. 4) were detected in 2 patients while 10 (23.3%) studies were normal and 6 (14%) studies were inconclusive due to bad preparation (N.=4).

This is shown in table-2. The capsule reached the caecum in 35 patients (cecal visualization rate = 81%). Sex, age or indications of VCE were not correlated with the likelihood that the capsule will reach the cecum (P-value >0.05). The mean time of recordings was 8 hours and 22 minutes (95% CI= 7 hours and 28 minutes to 9 hours and 16 minutes). None of the patients had retention of the capsule.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Frequency (%)</th>
<th>Findings</th>
<th>No findings</th>
<th>Diagnostic yield</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obscure gastrointestinal hemorrhage</td>
<td>20 (46.5%)</td>
<td>14</td>
<td>6</td>
<td>70%</td>
<td>0.27</td>
</tr>
<tr>
<td>Suspicion of Crohn's disease</td>
<td>11(25.6%)</td>
<td>7</td>
<td>4</td>
<td>64%</td>
<td>0.62</td>
</tr>
<tr>
<td>Chronic abdominal pain</td>
<td>8 (18.6%)</td>
<td>4</td>
<td>4</td>
<td>50%</td>
<td>0.33</td>
</tr>
<tr>
<td>Small intestinal polyposis syndrome</td>
<td>2 (4.6%)</td>
<td>2</td>
<td>0</td>
<td>100%</td>
<td>0.38</td>
</tr>
<tr>
<td>Chronic unexplained diarrhea</td>
<td>2 (4.6%)</td>
<td>0</td>
<td>2</td>
<td>0 %</td>
<td>0.13</td>
</tr>
<tr>
<td>Total</td>
<td>43 (100%)</td>
<td>27</td>
<td>16</td>
<td>63%</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Findings of video capsule endoscopy in the study population (N.=43).

<table>
<thead>
<tr>
<th>SN</th>
<th>Findings</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gastro-intestinal erosions &amp;/or ulcers</td>
<td>21 (48.9%)</td>
</tr>
<tr>
<td>2</td>
<td>Angiectasia</td>
<td>2 (4.6%)</td>
</tr>
<tr>
<td>3</td>
<td>Single small intestinal polyp</td>
<td>2 (4.6%)</td>
</tr>
<tr>
<td>4</td>
<td>Multiple small intestinal polyps</td>
<td>2 (4.6%)</td>
</tr>
<tr>
<td>6</td>
<td>Normal</td>
<td>10 (23.3%)</td>
</tr>
<tr>
<td>7</td>
<td>Inconclusive</td>
<td>6 (14%)</td>
</tr>
</tbody>
</table>

Figure 1. Gastro-intestinal erosions.

Figure 2. Angiectasia.

Figure 3. Single small intestinal polyp.

Figure 4. Multiple small intestinal polyp.
DISCUSSION

The lack of a safe and reliable method for investigation of suspected small intestine diseases has fueled a tremendous amount of interest and growth in research for VCE (13). The introduction of VCE into the clinical practice at KCGH in 2009 was a new method in the investigation of patients presenting with clinical features that may be attributed to small intestine diseases.

In our study, the most common indication was obscure GI hemorrhage and the diagnostic yield of VCE in obscure GI hemorrhage was 70%. Studies have shown that the diagnostic yields of VCE for obscure GI hemorrhage ranges between 44–92% depending on patient selection and timing of VCE (13). A meta-analysis of 14 studies on patients with obscure GI hemorrhage reported yields of 63% for VCE (14). In another study, it was shown that VCE detected a source of hemorrhage in a greater proportion of patients (72%), than computed tomographic 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 (15).

Several studies have found that the diagnostic yield of VCE increases in the setting of overt GI hemorrhage (16-18). In a study from Greece, patients with overt GI hemorrhage, and negative upper endoscopy and colonoscopy results, and who underwent an urgent VCE endoscopy study while still in the hospital, the diagnostic rate was 92% (19). By contrast, the same researcher group from Greece found that the diagnostic yield of VCE endoscopy in patients with obscure occult hemorrhage was 57% (20). In our study, the diagnostic yield for overt- obscure GI hemorrhage was 77% which was higher than the diagnostic yield of VCE in occult - obscure GI hemorrhage (57%) although it was less than that in the Greece studies and this difference could be due to the delay in the referral of patients with obscure GI hemorrhage for VCE in our center.

Suspicion of Crohn's disease was the second most common indication for VCE in our study and the diagnostic yield was 64%. This was also comparable to most of the published series to date in which the diagnostic yield for this indication ranges from 43% to 71%, and according to many studies VCE was superior to push enteroscopy and enteroclysis (13). There are still a few issues to be resolved regarding the use of VCE in Crohn's disease. Firstly, the rate of false– positive and false–negative results with VCE has not yet been addressed (13). Secondly, from a technical point of view, VCE does not offer the option of tissue sampling for these patients and they may ultimately need enteroscopy for tissue sampling (13). Thirdly, the gold standard test to compare with VCE is not yet ideal since, so far, VCE has been proved superior to these conventional tests in terms of diagnostic yield (13). Lastly, the interobserver reading variability may be a source of bias for some cases (13).

In our study, VCE showed an abnormality in half of patients presented with chronic abdominal pain. The pathologies were gastroduodenal ulcers, which may have been missed on initial upper endoscopy, and single small intestinal polyps which may be the cause of the abdominal pain or may be unrelated incidental finding. The use of capsule endoscopy for abdominal pain alone is less clear. Yet, there are no much published articles on the role of VCE in the diagnosis of chronic abdominal pain, however, some researchers have found the diagnostic yields to be low at 4 to 11%, while others found the yield to be as high as 54% (21-23). This difference is probably due to the heterogeneity of this patient selection, and further studies are needed to determine the utility of capsule endoscopy in these patients (2).

Both of the two patients referred as suspected small intestinal polyposis syndrome had findings consistent with this diagnosis (diagnostic yield=100%). A small series showed that VCE is more effective than Barium contrast studies in detecting small-bowel polyps in patients with familial adenomatous polyposis or Peutz–Jeghers syndrome (PJS) (24). Its accuracy has been shown to be equal to that of MRI for detecting small-bowel polyps larger than 15 mm, but the detection rate for polyps 5–15mm in size was much higher for VCE and polyps smaller of 5mm were visualized only by VCE; however, it provided only partial views of large polyps, while MRI provide a better estimation of the site and the size of the detected polyps (25). Available published data suggest that now VCE may replace enteroclysis for surveillance in PJS patients (26).

The use of VCE in malabsorption has been based on the evidence from a few studies which showed that VCE may be useful in the diagnosis of celiac disease (27). The sensitivity and specificity of VCE in detection of villous abnormalities can be high when an experienced capsule endoscopist analyzes the data (27). There are no data comparing
VCE with conventional endoscopy in diagnosing celiac disease in a low prevalence setting, but, in general, magnification endoscopy is better than conventional endoscopy for such types of diagnosis. Our study failed to show any abnormality in the two patients presented with chronic unexplained diarrhea (diagnostic yield = 0%). The reason for this may be in the small number of patients referred with this complaint and the lack of adequate experience for identifying villous abnormalities on VCE.

The probability that an indication will be associated with the detection of an abnormal finding was not statistically significant for all the indications of VCE. This could be due to the small sample size and a larger sample size is needed to detect significant statistical differences.

In our study, the use of VCE was safe and none of the patients had retention of the capsule. The cecal visualization rate (CVR) was 81%, which was comparable to what has been shown in some studies in which the CVR was 85%. The overall diagnostic yield of VCE in our study was 63%. The reported overall diagnostic yield of VCE varies between 38% and 83%. Despite the use of bowel preparation, which is still a controversial issue, the cecal visualization rate and the overall diagnostic yield of VCE in our study were not generally higher than those from other studies as discussed previously. The current literature broadly suggests that bowel preparation achieves a better quality of small bowel cleanliness; however, the optimal type of preparation, dosage and time of administration remains to be determined and further studies are recommended.

Although the general consensus is that VCE has a higher diagnostic yield for small intestine lesions compared to other modalities, it is unclear whether the findings from VCE and subsequent VCE directed management actually improves patient outcome. Several recent studies have attempted to answer these questions, but the results have been contradictory and further larger trials are needed to answer the reflection of these diagnostic yields on patient outcome rates. Another issue is the extent of satisfaction of gastroenterologists by the VCE findings to be the cause of presentation in a particular patient which is not clear from the current literature and is important to be addressed in large scale studies.

In conclusion, VCE is safe and has an acceptable diagnostic yield in obscure GI hemorrhage, Crohn's disease and small intestinal polyposis syndrome. However, more studies are warranted to establish the impact of these diagnostic yields on patient outcome rates.

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REFERENCES


