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RESEARCH ARTICLE

CLINICAL AND INVESTIGATIVE PROFILE OF SMALL BOWEL BLEEDING IN SOUTH INDIA

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ABSTRACT

Background: Small bowel bleeding refers to patients presenting with a source of bleeding identified in the small intestine. It accounts for only 5-10% of all patients presenting with gastrointestinal bleeding. Patients present with either overt bleeding or occult bleeding manifesting as iron deficiency anaemia. Various modalities are used to diagnose the cause of small bowel bleeding which include imaging, video capsule endoscopy, enteroscopy. **Objectives :** Data on the small bowel bleeding in India is sparse. The aim of the present study is to identify the clinical profile of patients presenting with small bowel bleed and to evaluate the diagnostic accuracy of various modalities. **Methods:** Present study is prospective observational study conducted at tertiary care hospital in South India **Results:** Overall 56 patients with potential small bowel bleed were included in the study. 34(60%) patients presented with overt small bowel bleed and the remaining 22(40%) patients presented with occult small bowel bleed. 50 patients underwent capsule endoscopy and the mean capsule time was 10hr 1min ± 1hr 7min. Capsule endoscopic findings include vascular lesions in 10 (20%) patients, tumor in 4(8%), worm infestation in 4 (8%) patients, ulceration in 10(20%) patients. Balloon enteroscopy was performed in 39(70%) patients. Balloon enteroscopy findings include vascular lesions in 10 patients, crohns like picture in 8 patients, NSAIDS induced ulcers in 7 patients. Diagnostic yield of capsule endoscopy was 76% and enteroscopy was 77%. Overall 40 patients out of 56 have been identified with definite source of small bowel bleeding and were subjected to therapy. Out of 40 patients 20 had endotherapy, 9 patients underwent surgery, 6 patients diagnosed as crohns, 2 patients diagnosed as small bowel tuberculosis and remaining on conservative therapy. **Conclusions:** Small bowel bleeding accounts for 5-10% of GI bleeding. Contrary to western population infections are common cause, patients are two decades younger and overt GI bleeding was more common than occult bleeding. The diagnostic yield of capsule endoscopy in the present study is 76%. In the present study diagnostic yield of SBE/DBE combined was 77% and successful therapeutic intervention was performed in 50% of patients. Enteroscopy is slightly better than VCE and therapeutic intervention can be performed. Present study the rebleeding rate is 18% at the end of one year follow up. To our knowledge this is the first study comparing VCE and DBE/SBE with followup for one year.

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INTRODUCTION

Traditionally, Obscure gastrointestinal*(GI) bleeding was defined as bleeding from the GI tract that persists or recurs without an obvious etiology after esophagogastroduodenoscopy (EGD), colonoscopy, and radiologic evaluation of the small bowel such as small bowel follow-through or enteroclysis. It was categorized into obscure overt and obscure occult bleeding based on the presence or absence of clinically evident bleeding (Raju *et al.*, 2007). With the advent of capsule endoscopy and deep enteroscopy GI

bleeding was reclassified into three categories: upper-, mid- and lower GI bleeding. If the source of Gastrointestinal(GI) bleeding is between the ampulla of Vater and the terminal ileum, it is designated as mid-GI bleeding (Singh, 2013; Ell, 2016). According to ACG practice guidelines published in 2015 Small bowel bleeding refers to patients presenting with gastrointestinal bleeding with a source of bleeding identified in the small intestine. When patients present with melena or hematochezia then they are labeled as Overt small bowel bleeding. The term "occult small bowel bleeding" is reserved for patients presenting with iron-deficiency anemia with or

without guaiac-positive stools who are found to have a small bowel source of bleeding (Gerson *et al.*, 2015). The term “obscure GI bleeding” was reserved for patients not found to have a source of bleeding after performance of standard upper and lower endoscopic examinations, small bowel evaluation with video capsule endoscopy and/or enteroscopy, and radiographic testing. Small bowel bleeding accounts for only 5-10% of all patients presenting with gastrointestinal bleeding (Longstreth, 1997). The etiology of small bowel bleeding is different in various age groups. The lesions responsible for small bowel GI bleeding are vascular, tumours, inflammatory lesions, and medications, as well as some rare causes like haemobilia, haemosuccus pancreaticus and aorto-enteric fistula. Vascular lesions and small bowel lesions induced by non-steroidal anti-inflammatory drugs (NSAID) are the common causes of small bowel GI bleeding in the elderly, whereas tumours, Meckel’s diverticulum, Dieulafoy’s lesion and Crohn’s disease are the common causes in patients under 40 years of age (Gerson *et al.*, 2015; Zhang *et al.*, 2012) where as in the Asian patients with small bowel bleed are younger by almost 2 decades and gastrointestinal tract infections such as tuberculosis, typhoid and worm infestations form an important group (Sharma *et al.*, 2000; Kshaunish Das, 2010). Various other causes of small bowel bleeding include radiation enteritis, mesenteric ischaemia, and endometriosis (Pennazio, 2012).

Initial assessment of patients with small bowel bleed includes good clinical history and physical examination. Various modalities for visualization of small bowel includes capsule endoscopy(CE), deep enteroscopy which includes single balloon enteroscopy (SBE), double balloon enteroscopy(DBE), push enteroscopy and intraoperative enteroscopy. Various imaging modalities include CT or MR enterography, radionuclide scanning and conventional angiography. The small bowel bleeding can be managed by conservative, radiological, pharmacologic, endoscopic and surgical methods, depends upon the indications, expertise and availability. Data on the small bowel bleeding was sparse. The aim of the present study is to identify the clinical profile of patients presenting with small bowel bleed and to evaluate the diagnostic accuracy of various modalities.

MATERIALS AND METHODS

Study design: This prospective study was conducted from april 2014 to may 2017 at the department of Gastroenterology, King George Hospital(KGH), Visakhapatnam which was a tertiary referral centre in southern India. The study was approved by the institutional review board and written informed consent was obtained from all study patients.

Patients

Inclusion criteria: All patients who were attending to GE/medical/surgical OPDs & wards of KGH with potential small bowel bleeding were included in the study. Patients with hematozocia, melena, iron deficiency anemia with fecal occult blood test positive with normal upper GI endoscopy and colonoscopy were included in the study.

Exclusion criteria: Patients who are hemodynamically unstable, Generalized bleeding disorder, Severe psychiatric illness, Severe comorbid illness, Severe ongoing blood loss, Pregnancy.

A detailed medical history which included information regarding symptoms, drug usage, previous surgeries, blood transfusions, history of cirrhosis and other comorbidities were recorded. Physical examination with special emphasis on dermatological signs were performed and recorded in a structured proforma. All patients were subjected to routine blood investigations and were hemodynamically stabilized before proceeding further. Repeat upper GI endoscopy and colonoscopy were performed in cases when endoscopy was performed outside the institution,, prior endoscopy was incomplete due to poor preparation or poor tolerance of procedure. In patients with features of small bowel obstruction i.e pain abdomen, vomiting, constipation, hyperactive or absent bowel sounds, multiple air fluid levels on plain X-ray CT enterography was performed before capsule endoscopy to avoid capsule retention. Based on the CT enterography findings some patients were directly referred to surgery and some patients underwent enteroscopy without capsule endoscopy. Remaining patients with potential small bowel source of bleeding were subjected to capsule endoscopy. Depending on the findings patients were subjected to either single or double balloon enteroscopy or referred for surgery. The patients were offered specific treatment according to the results of evaluation or offered hematinics to patients if the results were non contributory. All patients were followed until one year and the need for further investigations/therapies, repeat blood transfusions were recorded.

Procedures: Capsule endoscopy was performed with Mirocam. Patients were prepared with a clear liquid diet and 2 L of polyethylene glycol– electrolyte solution the night before the procedure. Patients swallowed the capsule with a glass of water. They refrained from eating any solids during the time of the test, but were permitted to take clear liquids after 3 hours of capsule ingestion. Recording was continued for 10-12 hours, and data were downloaded to a computer loaded with software (Miroview) that allows the images to be analyzed. Images were read by at least 3 investigators.

Balloon Enteroscopy was performed with the patient in the left lateral decubitus, by using Single balloon enteroscope (SIF-Q180;Olympus) and a flexible silicon overtube (latex) or Double balloon enteroscope (Fujinon EN- 450 P5/20) with latex overtube. Balloon inflation was controlled with the electronic semi auto controlled inflation Balloon Pump Controller. DBE was performed by using the insertion technique described by Yamamoto by two senior endoscopists with a resident assisting in controlling the movement of the endoscope and overtube. A trained nurse monitored the patient with continuous pulse oximetry. Conscious sedation was achieved with titrated doses of midazolam and fortwin. Patients posted for oral route of enteroscopy was advised fasting for 8 hrs. Patients posted for anal route were prepared as for colonoscopy with a clear liquid diet and 2 L of polyethylene glycol– electrolyte solution the night before the procedure. In each session, enteroscopy was continued until a target lesion was seen or further progress was not possible. The route of insertion (ante grade/retrograde) was decided by the endoscopist based on capsule findings. The depth of insertion was semi quantitatively assessed by the number of loops that the enteroscope had formed beyond the pylorus, as seen on fluoroscopy, with the endoscope completely shortened and delooped, aided also by visual mucosal fold details of the intestinal segment seen.

RESULTS

Overall 56 patients with potential small bowel bleed both occult and overt were included in the study. The mean age of presentation was 42.16+/-4.89 years. Out of them 36 were males and 20 were females. Out of 56 patients 34(60%) patients presented with overt small bowel bleed and the remaining 22(40%) patients presented with occult small bowel bleed who has iron deficiency anemia with stool occult blood positive. Out of 56 patients 6 underwent CT enterography initially due to suspicion of small bowel obstruction. Out of them 3 patients underwent surgery and 3 patients underwent enteroscopy directly before capsule endoscopy.

Table 1. Capsule endoscopy findings

Capsule endoscopy finding	No of patients	Percentage (%)
Vascular lesions	10	20
Ulcerations	10	20
Worm infestation	4	8
Tumour	4	8
Varices	2	4
Visible blood with no source	8	16
Normal study	12	24
Total	50	

Table 2: balloon enteroscopy findings

Enteroscopy findings	No of patients	Percentage (%)
Vascular lesions	10	25
NSAID induce ulcers	7	18
Crohns like picture	8	20
Nonspecific ulcers	4	10
Submucosal ooze	2	5
Normal study	8	20
Total	39	

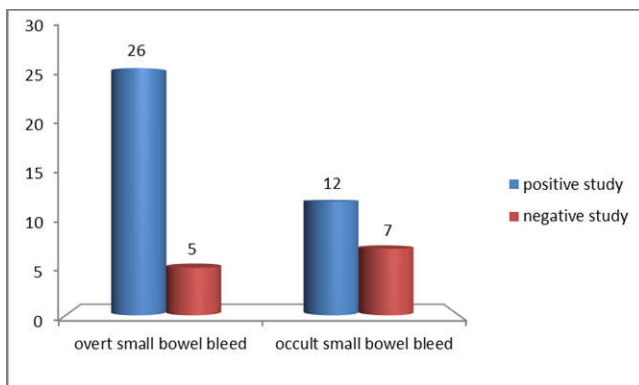


Fig. 1. Comparison of capsule yield in overt & occult small bowel bleed

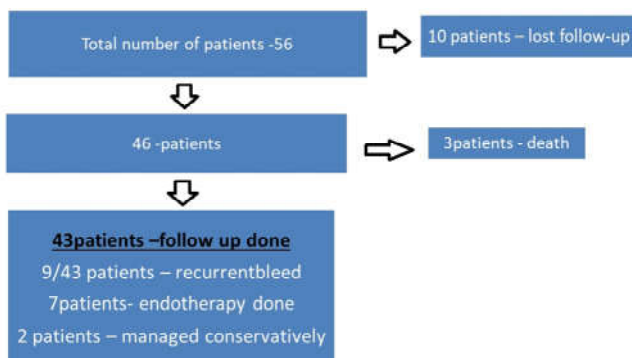


Figure 2. Follow up of patients and outcomes

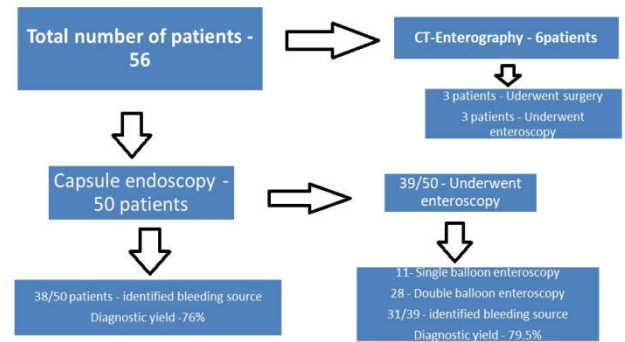


Figure 3. Patients undergoing capsule endoscopy and enteroscopy and outcomes

Out of 6 patients 3 patients diagnosed as crohns disease, 2 patients diagnosed as small bowel tuberculosis and one patient diagnosed as small bowel lymphoma. Remaining 50 patients underwent capsule endoscopy and the mean capsule time was 10hr 1min ± 1hr 7min. Average capsule retention time in stomach was 2hr 40min ± 42min. Capsule identified bleeding in 38 of 50 patients i.e. in 76% of cases. In 30 patients (60%) definite bleeding source was identified which helped in planning further management. Capsule identified bleeding in 26(86%) cases of overt small bowel bleed and in 12(60%) cases of occult small bowel bleed.(fig 1) sss In case of overt small bowel bleed out of 31 cases 16 cases underwent capsule endoscopy within 2 weeks of presentation and the remaining cases after 2 weeks.

The yield of capsule endoscopy was positive in 15 out of 16 cases in patients who underwent capsule endoscopy within 2weeks. Capsule endoscopic findings include vascular lesions in 10 (20%) patients, tumor in 4(8%), worm infestation in 4 (8%) patients, ulceration in 10(20%) patients, varices in 2(4%) patients, blood noted with no definite source in 8(16%) patients and Normal mucosal study in 12(24%) of capsule patients (Table 1). Based on capsule endoscopy and CT enterography findings, 39 patients were subjected to balloon enteroscopy out of which 4 patients with normal capsule endoscopy were included due to ongoing blood loss, 6 patients with tumour and varices were referred for surgery, 8 patients with normal capsule study were under observation.

Balloon enteroscopy was performed in 39(70%) of patients out of which 11 underwent double balloon enteroscopy and remaining 28 underwent single balloon enteroscopy. 26 patients underwent balloon enteroscopy through oral route, 9 patients through anal route and 4 patients by both oral and anal route. Balloon enteroscopy findings include vascular lesions in 10 patients, crohns like picture in 8 patients, NSAIDS induced ulcers in 7 patients, nonspecific ulcers in 4 patients, submucosal ooze in 2 patients and 8 patients has normal mucosal study (Table 2). Balloon enteroscopy identified 4 definite bleeding source which were not identified by capsule endoscopy. All vascular lesions identified during balloon enteroscopy were treated by endotherapy. Out of 10 vascular lesions 8 were treated with Argon Plasma Coagulation(APC), 1 treated with electro coagulation and 1 treated with mechanical clip. NSAIDS induced ulcers were treated with electrocoagulation and mechanical clips. Biopsy were taken from patients with crohns like picture and biopsy was positive in 5 cases and inconclusive in 3 cases. Patients with normal mucosal study were under follow up.

Overall 40 patients out of 56 have been identified with definite source of small bowel bleeding and were subjected to therapy. Out of 40 patients 20 had endotherapy, 9 patients underwent surgery, 6 patients diagnosed as crohns, 2 patients diagnosed as small bowel tuberculosis and remaining on conservative therapy. Diagnostic yield of capsule endoscopy was 76% and enteroscopy was 79%. Follow up of 12 months was done : out of 56 patients 10 patients lost to follow up. Out of 46 patients 3 patients died. One patient with small bowel tumor referred for surgery died of disseminated disease, one patient with small bowel varices died of uncontrolled bleeding even before surgery, one patient died of cause unrelated to bleed. Out of 43 patients 9 patients presented with recurrence of small bowel bleeding. Out of 9 patients 7 were managed by endotherapy and 2 were managed conservatively at initial presentation.

DISCUSSION

The present study is a prospective observational study on small bowel bleed carried over 3 years period april 2014 to may 2017 in a tertiary referral center from North coastal Andhra Pradesh. The study was undertaken to know about the epidemiology of small bowel bleed in this part of the country as there were no previous studies covering this population cohort. The demography and etiology of small bowel bleed may vary according to geography. Compared with the West and Japan, patients with small bowel bleed present at a younger age in the East.(9,10). In our study the mean age of presentation is 42.16+/-4.89 (mean \pm S.D) with male to female ratio of approximately 2:1. The mean age at presentation was almost 2 decades earlier when compared to the western population. It was also noted that patients with small bowel bleed from the East predominantly present with overt GI bleeding in contrast to the predominance of occult small bowel bleed in reports from the West. The etiological profile in the present study shows that the main cause of small bowel bleeding was ulcerations of multiple etiologies (crohns, NSAID induced, tuberculosis and nonspecific), vascular lesions (angiodysplasia, varices), tumours and worm infestations. The etiological profile of small bowel bleed is somewhat different from the west where vascular lesions are the most common cause whereas in India gastrointestinal tract infections such as tuberculosis, typhoid and worm infestations form an important group resulting in small bowel bleeding (Kshaunish Das *et al.*, 2010). The incidence of crohns and the use of NSAIDS and anticoagulants was also under raise. The Etiological profile of small bowel bleed in the present study is consistent with similar study by Kshaunish Das *et al* from West Bengal in 2010 (Kshaunish Das *et al.*, 2010).

The previous studies demonstrated that a high percentage of patients suspected as having "potential small bowel bleeding" were found to have missed lesions within reach of conventional upper and lower endoscopy with a diagnostic yields ranging from 2 to 25% in patients undergoing repeat upper GI endoscopy or repeat colonoscopy (Tang *et al.*, 2004). Recent studies done with capsule endoscopy and double balloon enteroscopy has confirmed these results(van Turenhout *et al.*, 2010; Tee, 2010). In order to eliminate that all patients in the present study underwent repeat upper GI endoscopy and colonoscopy when clinically indicated. Capsule endoscopy is currently regarded as the initial investigation of choice for the evaluation of small bowel bleeding (ASGE, 2010). Capsule endoscopy allows noninvasive visualization of the entire Small bowel in 79–90% of patients, with a diagnostic yield ranging

from 38–83% in patients with potential small bowel bleeding (Rondonotti *et al.*, 2007). The diagnostic yield of capsule endoscopy in the present study is 76%. Previous Studies have demonstrated that the yield of VCE and deep enteroscopy is higher for patients with overt bleeding compared with patients with occult bleeding. For patients with prior overt bleeding, the diagnostic yield was less than that for current overt bleeders, and decreased substantially with time (Raju *et al.*, 2007). In the present study the diagnostic yield of capsule endoscopy is high in overt small bowel bleed when compared with occult small bowel bleed and yield is less when performed after 2 weeks of presentation which is consistent with the previous studies. Although capsule endoscopy is a safe technique, capsule retention (defined as failure to pass the capsule within 2 weeks of the performance of the test) is the most feared complication that occurs in 1-2% cases (Li *et al.*, 2008).

In order to avoid the complication we have performed CT enterography in patients suspected of having small bowel strictures and excluded from the study. As a result there is no incidence of capsule retention in our study. The diagnostic yield of DBE ranges from 60 to 80% in patients with suspected small bowel bleeding and other SB disorders. Successful performance of endoscopic therapeutic interventions has been reported in 40–73% of patients(18). The diagnostic yield of single balloon enteroscopy in small bowel bleeding ranges between 65 and 74% (Zhu *et al.*, 2014; Manno *et al.*, 2013). In the present study the diagnostic yield of combined modalities was 77% and successful therapeutic intervention was performed in 50% of patients. The studies demonstrating the recurrence of small bowel bleed after endotherapy were sparse. A recent meta-analysis of 14 studies including 623 subjects with small bowel angioectasia treated with endoscopic therapy demonstrated a pooled rebleeding rate of 34% (95% CI: 27–42%) after a mean of 22 \pm 13 months. In the present study the rebleeding rate is 18% at the end of one year assuming that the patients lost to follow up have no recurrence.

Conclusion

Small bowel bleeding accounts for 5-10% of GI bleeding. Contrary to western population infections are common cause, patients are two decades younger and overt GI bleeding was more common than occult bleeding. The etiological profile in the present study is similar to previous studies in India. The incidence of crohns and the use of NSAIDS and anticoagulants was also under raise. VCE or SBE/DBE are usual tools used for diagnosis. The diagnostic yield of capsule endoscopy in the present study is 76%. Yield was higher in patients with overt bleeding and when VCE performed within 2 weeks of presentation. In the present study diagnostic yield of SBE/DBE combined was 77% and successful therapeutic intervention was performed in 50% of patients. Enteroscopy is slightly better than VCE and therapeutic intervention can be performed. Present study the rebleeding rate is 18% at the end of one year follow up. To our knowledge this is the first study comparing capsule and enteroscopy along with follow up. Future studies with large number and multiple centres are required.

Conflict of interest: Authors declare no conflict of interest

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