



**Small Bowel Gastro-Intestinal Stromal Tumors Presenting as Obscure Gastrointestinal Bleeding – Importance of Contrast Enhanced Computed Tomography in Obscure GI Bleeds**

**First and Corresponding Author:** Dr Sanjith Kamath N, Post Graduate Trainee, Department of General Surgery, Justice K S Hegde Medical Academy, Deralakatte Mangalore, INDIA.

**Email:** [sanjithkamath34.sk@gmail.com](mailto:sanjithkamath34.sk@gmail.com)

**Second Author:** Dr Praveen Kumar R Bhat, Associate Professor, Department of Surgical Gastroenterology, Justice K S Hegde Medical Academy, Deralakatte Mangalore, INDIA.

**Email:** [drpraveenbhatmmc@gmail.com](mailto:drpraveenbhatmmc@gmail.com)

**Third Author:** Dr Santosh Kumar K Y, Professor, Department of Surgical Gastroenterology, Justice K S Hegde Medical Academy, Deralakatte Mangalore, INDIA.

**Email:** [santhosh.kumarm56@gmail.com](mailto:santhosh.kumarm56@gmail.com)

**Fourth Author:** Dr Rohith Holla, Assistant Professor, Department of General Surgery, Justice K S Hegde Medical Academy, Deralakatte Mangalore, INDIA.

**Email:** [hollarohith53@gmail.com](mailto:hollarohith53@gmail.com)

**Fifth Author:** Dr Prajwal Chandrashekhara, Assistant Professor, Department of General Surgery, Justice K S Hegde Medical Academy, Deralakatte Mangalore, INDIA.

**Email:** [prajwalcach@gmail.com](mailto:prajwalcach@gmail.com)

**ABSTRACT**

**Introduction, Materials and Methods:** When a patient presenting with gastrointestinal (GI) bleed has no source of bleeding found on upper GI endoscopy and colonoscopy it is called as obscure GI bleed. Small bowel lesions could potentially be the source of bleeding in these patients. Contrast enhanced CT (CECT) scan can identify source of obscure GI bleeds in 45-70% cases. CECT has a higher sensitivity to identify mass lesions of small bowel. Here we present a series of 6 cases of obscure GI bleed secondary to small bowel gastrointestinal stromal tumors (GIST) in whom CECT played an important role in diagnosis. These lesions were picked up on CT scan in all these patients and surgical resection was done in all the patients.

**Conclusion:** CECT scan should be done in all cases of obscure GI bleed before considering for discharge when the upper GI endoscopy and colonoscopy fail to show a source of bleeding.

**Key words:** Obscure GI bleeding; gastrointestinal stromal tumors(GIST); small bowel neoplasms; contrast enhanced CT enterography

**Introduction:** Bleeding originating anywhere from esophagus to anus is termed as gastrointestinal (GI) bleeding. Depending upon site, proximal or distal to ligament of Treitz, it is further subdivided into upper and lower GI bleed.<sup>1</sup> Prevalence of GI bleed is more in men compared to women and risk increases with advancing age.<sup>2</sup> Most common causes of upper GI bleed include erosive/ ulcerative lesions like peptic ulcer disease and variceal haemorrhage; that of lower GI bleed is diverticulosis and vascular malformations.<sup>3</sup>

Small intestinal bleed accounts for 5 % of all GI bleeding. The cause of bleeding from small bowel depends on age; most common cause in patients younger than 40 years is Meckel diverticulum or inflammatory bowel disease. In patients aged above 40 years vascular lesions like angioectasia, ulcerative lesions due to non-steroidal anti-inflammatory drugs (NSAIDs) are most common; small bowel neoplasms are rare causes.<sup>4</sup> Small bowel neoplasms constitute less than 3% of all GI tract cancers; among them 20 percent of small bowel neoplasms are Gastro-intestinal Stromal Tumors (GIST).<sup>5</sup>

The usual work-up in patients of GI bleed include upper GI endoscopy and colonoscopy.<sup>6</sup> If these studies don't show source of bleeding then small bowel could be source of bleed. Diagnosing an obscure GI bleeding has always been difficult. Diagnostic work-up include contrast enhanced CT scan (CECT), CT angiography, balloon enteroscopy, capsule enteroscopy among others.<sup>6</sup> Sensitivity of multislice CECT in diagnosis of source of obscure GI bleeds is 45 - 70%.<sup>7,8</sup> Sensitivity of CECT to diagnose neoplastic lesions of small bowel is 70-80%.<sup>9</sup> Since CECT scan is widely available now-a-days it should be done in obscure GI bleed after upper GI endoscopy and colonoscopy. Here we present a series of 6 cases of small intestinal GIST that presented with GI bleed and CECT played an important role in the diagnosis and management, highlighting the role of CT scan.

### **Cases:**

**Case 1-** 40 year male presented with complaints of haematochezia since 1 day. On examination he was pale and abdomen was soft, non-tender, no mass palpable. Blood tests showed hemoglobin of 7.5gm/dl; following which he underwent blood transfusion. Upper GI scopy and colonoscopy were done; both were normal. CECT abdomen and pelvis showed 26 x 31 mm enhancing lesion in proximal jejunum causing luminal obstruction suggestive of jejunal GIST. He underwent laparoscopy assisted resection and anastomosis of the jejunal segment (Picture 1). Histopathology and immunohistochemistry (IHC) confirmed the diagnosis.

**Case 2-** 60 year old male presented with complaints of intermittent haematochezia and intermittent episodes of colicky pain abdomen since 2 months. Examination findings and blood parameters were all normal. He underwent upper GI endoscopy and colonoscopy – both of which were normal. He then underwent CECT abdomen and pelvis which revealed 3.3 x 4.2 cm heterogenous enhancing lesion in the jejunum suggestive of neoplasm. He underwent laparoscopy assisted resection of the jejunal segment with anastomosis. Histopathology and IHC confirmed the diagnosis of GIST.

**Case 3-** 48 year old male presented with complaints of colicky pain abdomen associated with malena since 1 month. He was not pale and general and systemic examinations showed no significant abnormalities. Since he had malena, upper GI endoscopy was first done; which was normal. He then underwent colonoscopy; which did not reveal any source of bleeding. So CECT abdomen and pelvis was done, which showed features of solid tumour of 2.9 x 3.3 cm in size in the distal jejunum with mild dilatation of proximal small bowel loops. Laparoscopy assisted resection and anastomosis of involved segment of jejunum was done. Histopathology and IHC were reported as small bowel GIST.

**Case 4-** 38 year female presented with complaints of malena since 2 months. She had a history of giddiness and syncope; for which she was admitted at local hospital. There she was found out to be very pale and her hemoglobin was 4 gm%. She received transfusion of 4 units of packed red blood cells and then was referred to our centre for further evaluation and treatment. Upper GI scopy showed esophagitis and pan-gastritis; but no source of active bleeding. Colonoscopy was also normal. She then underwent CECT abdomen pelvis which showed 24 x 26 mm highly enhancing lesion in duodenal D2 segment; possibly neuro-endocrine tumor (Picture 2). Endo sonography was done after that, which revealed solid tumour in duodenal D2-D3 region in its lateral aspect. Fine needle aspiration biopsy (FNA) was done. She

underwent sleeve resection of duodenal D2 segment. Histopathology and IHC confirmed the diagnosis of GIST.

**Case 5**– 26 years old female patient, known case of Lupus nephritis on pulse steroid therapy, presented with colicky pain abdomen, distension of abdomen and haematochezia of 2 days duration. She had history of similar episodes 2 months back which subsided on its own. On examination she had distension of abdomen without guarding or rigidity. She was pale and had pedal oedema. Her haemoglobin was 9 gr%, serum albumen was 1.7 gr%. She underwent CECT abdomen which showed ileo-colic intussusception with an enhancing polypoidal lesion as lead point (Picture 3). She underwent an emergency right hemicolectomy with ileo-transverse anastomosis with diverging loop ileostomy. The histopathology of the specimen showed solid tumour with spindle shaped cells suggestive of GIST; which was confirmed on IHC.

**Case 6**– 52 years old male patient presented with recurrent episodes of colicky pain abdomen associated with distension of abdomen since 3 months. These episodes would resolve by conservative treatment at local hospital. Since the episodes were recurrent he was referred to us for further evaluation. On admission his clinical examination revealed no significant finding except for pallor. His hemoglobin was 7 gr% and occult blood in stools was positive; rest of the blood parameters were normal. Ultrasonography of abdomen showed no abnormality. So he underwent upper GI endoscopy and colonoscopy; both showed no source of bleeding. CECT abdomen and pelvis showed solid mass lesion 34 x 45 mm in size in proximal ileal loop. He underwent laparoscopy assisted resection and anastomosis of the ileal segment. The histopathology and IHC confirmed the diagnosis of small bowel GIST. Details of all cases given in Table 1.

## **Discussion**

The initial diagnostic evaluation of suspected GI bleeding is upper GI scopy or colonoscopy, as recommended by guidelines from the American College of Gastroenterology and the 2010 International Consensus Recommendations. If cause of bleed is not detected on these two modalities, then patient may present with a risk of re-bleed, considering the possibility of small intestinal bleed<sup>9</sup> and in such cases CECT holds a diagnostic significance, being available in most of the hospitals

Anatomically, small intestinal bleed it is defined as bleeding distal to ampulla of Vater and proximal to the ileocaecal valve.<sup>10</sup> The common causes of small intestinal bleeding are as shown in Table 2.<sup>11</sup> Small bowel neoplasms are uncommon cause of small bowel bleed.

Histologically, small bowel tumours are classified as adenocarcinoma (being the most frequent- 47%), carcinoid tumors (28%), GI lymphomas (12%), GI sarcomas (12 %).<sup>12</sup> The most common benign tumours of small intestine are adenoma (25%), followed by hemangioma (7-10%), lipoma (1-3%), leiomyoma (2 %).<sup>13</sup> 90% of small bowel neoplasms occur in people over the age of 40 and are more common in men compared to women.<sup>14</sup>

These neoplasms commonly present with colicky abdominal pain due to the underlying luminal obstruction, weight loss, nausea, and vomiting. Bleeding is more common with carcinomas, presenting as hematemesis or melena or haematochezia.<sup>15</sup>

Among sarcomas, GISTs are rare tumors, with an incidence estimated to be between 6.8 and 20 per million population; prevalence of less than 1 percent. They are usually found in stomach (60%), jejunum and ileum (30%), duodenum (5%), rectum (2–3%), and colon (1–2%) with a reported peak age between 50–60 years.<sup>16</sup>

Mazur and Clark were the ones to define this entity called GIST in 1983. KIT mutations are known to occur in GIST with a predilection for CD117 and CD 34 expression.<sup>17</sup> Interstitial cell of Cajal exhibiting neuronal and smooth muscle characteristic is believed to be the cellular origin of GIST.<sup>18</sup>

The clinical presentation of small bowel GIST includes abdominal pain with GI bleeding, presenting as haematochezia or melena; all patients in our series had GI bleed. Obstruction due to intussusception is a rare feature in GIST since most of them tend to grow in extraluminal fashion<sup>19</sup> One of our patients presented with intussusception and needed emergency surgery and two other patients had colicky pain, possibly due to luminal obstruction.

Since all our patients presented with GI bleed upper GI scopy and colonoscopy were done initially. In all our cases the cause of bleeding could not be diagnosed on endoscopy. Hence CECT scan was advised as part of diagnostic work up. Lesions in small intestine were picked up in all these cases on CECT. CECT abdomen can diagnose a source of obscure GI bleeding in 45-70% case<sup>8</sup> and has even higher sensitivity of 70-80% in diagnosing small bowel neoplasms.<sup>7</sup> Grassedonio E et al reported their experience of using multidetector row CECT with enteroclysis for diagnosis of source of obscure GI bleeding and reported 72% diagnostic yield<sup>20</sup>. Filippone A et in their paper opined that CECT should be done to rule-out neoplastic lesions and strictures of small bowel as source of bleeding in obscure GI bleeds prior to considering capsule enteroscopy.<sup>21</sup> The 2017 Japanese clinical practice guideline for enteroscopy also recommends to do contrast enhanced CT enterography before planning for capsule

enterography.<sup>22</sup> Ohmiya N in his review on this subject recommends that contrast enhanced CT enterography has the advantage of depicting luminal, intramural and extraluminal lesions; can prevent delay in the diagnosis of malignant tumors. When an abnormality is detected it can guide further deep enteroscopy when needed in the form of double balloon enteroscopy from either the mouth or anus.<sup>23</sup> 2015 guidelines of American College of Gastroenterology also recommends contrast enhanced CT enterography or magnetic resonance enterography in hemodynamically stable patients with recurrent obscure GI bleeding when the capsule enteroscopy is non diagnostic.<sup>24</sup> CECT also has the advantage of being a non-invasive investigation and widely available now-a-days in most centres.

Surgical excision is the treatment of choice in GIST. Gross resection of the tumour with intact pseudo capsule and negative microscopic margins without lymphadenectomy is the standard of surgical treatment.<sup>25</sup> All our patients underwent surgical resection as recommended. Four patients underwent laparoscopy assisted resection and anastomosis of small bowel. One patient had lesion in duodenal D2-D3 region. She underwent open surgery. Sleeve of duodenum was resected and primary closure was done. Another patient had intussusception and had to undergo emergency laparotomy and right hemicolectomy. Since she was suffering from lupus nephritis, she was having proteinuria. Her serum albumen level was 1.7 gr %. So primary ileo-transverse anastomosis and a diverging loop ileostomy was done.

The patient who had lupus nephritis had superficial surgical site infection and required prolonged hospital stay for 12 days. She underwent stoma reversal after 6 weeks. All others had smooth recovery and were discharged by post operative day 5. Once the histopathology reports and IHC were available, all patients were started on Imatinib 400 mg per day for 3 years.

CT abdomen and pelvis should be done every 3-6 months for 3-5 years following surgical resection for surveillance of metastases or recurrence. All our patients are under follow-up and none have any recurrence so far. Prognostic features include size of tumour and mitotic index; KIT exon 11 mutations having a worse outcome than KIT or PDGFRA mutations.<sup>26</sup>

## **Conclusion**

Patients presenting with GI bleed with no detectable source of bleed on upper GI scopy or colonoscopy should raise the suspicion of small intestinal bleed. Imaging modalities such as

balloon enteroscopy, capsule endoscopy, intravenous contrast-enhanced multidetector row CT (MDCT), CT angiogram may be used to assist in the diagnosis of bleeding from small intestine. Small intestinal neoplastic lesions could be the source of bleeding and can be easily diagnosed on CECT. Hence routinely available imaging modality, CECT should be done for all the patients before discharging to prevent the risk of re-bleed or complications in such suspected cases.

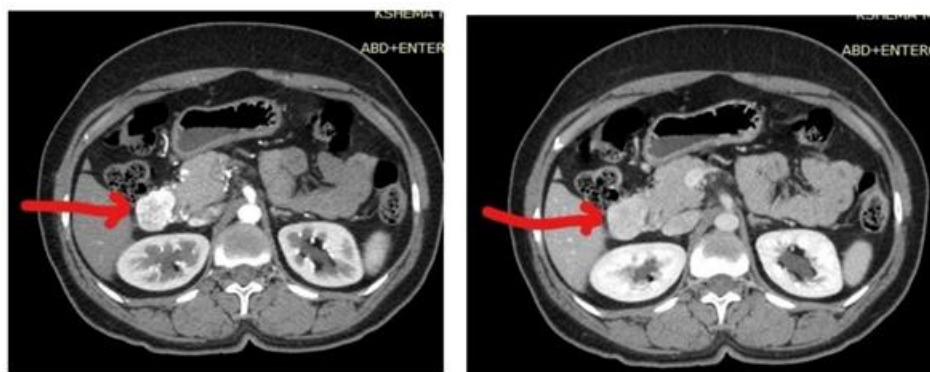
## References

1. Sánchez-Capilla AD, De La Torre-Rubio P, Redondo-Cerezo E. New insights to occult gastrointestinal bleeding: From pathophysiology to therapeutics. *World J Gastrointest Pathophysiol.* 2014 Aug 15;5(3):271-83.
2. Longstreth GF. Epidemiology of hospitalization for acute upper gastrointestinal haemorrhage: a population-based study. *Am J Gastroenterol* 1995; 90: 206-2
3. Lee EW, Laberge JM. Differential diagnosis of gastrointestinal bleeding. *Tech Vasc Interv Radiol* 2004; 7: 112-122
4. L.B. Gerson, J.L. Fidler, D.R. Cave, J.A. Leighton, ACG clinical guideline: diagnosis and management of small bowel bleeding, *J. Gastroenterol.* 110 (September (9)) (2015) 1265–1287, Epub 2015 Aug 25.)
5. M. Naef, M. Buhlmann, and H. U. Baer, “Small bowel tumors: diagnosis, therapy and prognostic factors,” *Langenbeck’s Archives of Surgery*, vol. 384, no. 2, pp. 176–180, 1999.
6. Zhang BL, Jiang LL, Chen CX, Zhong BS, Li YM. Diagnosis of obscure gastrointestinal Hemorrhage with capsule endoscopy in combination with multiple-detector computed tomography. *J Gastroenterol Hepatol.* 2010; 25:75–79.
7. J.E. Huprich, J.G. Fletcher, J.A. Alexander, J.L. Fidler, S.S. Burton, C.H. McCullough. Obscure gastrointestinal bleeding: evaluation with 64 section multi-phase CT enterography—initial experience *Radiology*, 246 (2008), pp.562-571
8. E. Amarteifio, C. Sohns, M. Heuser, M. Pusken, B. Lange, S. Obenauer. Detection of gastrointestinal bleeding by using multislice computed tomography: acute and chronic hemorrhages *Clin Imaging*, 32 (2008), pp.1-5
9. Pileup F, Pen gaud M, Milot L, Saurin JC, Chayvialle JA, Valette PJ. Possible small-bowel neoplasms: contrast-enhanced and water-enhanced multidetector CT enterocolitis. *Radiology.* 2006; 241:796–801. doi: 10.1148
10. Barkun AN, Bardou M, Kuipers EJ, Sung J, Hunt RH, Martel M, Sinclair P. International consensus recommendations on the management of patients with nonvariceal upper gastrointestinal bleeding. *Ann Intern Med* 2010; 152: 101-113
11. Gerson LB, Fidler JL, Cave DR, Leighton JA. ACG clinical guideline: diagnosis and management of small bowel bleeding. *Am J Gastroenterol.* (2015) 110:1265.
12. M. S. Talamonti, L. H. Goetz, S. Rao, and R. J. Joehl, “Primary cancers of the small bowel: analysis of prognostic factors and results of surgical management,” *Archives of Surgery*, vol. 137, no. 5, pp. 564–571, 2002
13. H. Kusumoto, I. Takahashi, M. Yoshida, et al., “Primary malignant tumors of the small intestine: analysis of 40 Japanese patients,” *Journal of Surgical Oncology*, vol. 50, no. 3, pp. 139–143, 1992.
14. Zhang BL, Chen CX, Li YM. Capsule endoscopy examination identifies different leading causes of obscure gastrointestinal bleeding in patients of different ages. *Turk J Gastroenterol.* 2012;23:220–5
15. Goh PMY, Lenzi JE. Benign tumors of the duodenum and stomach. In: Holzheimer RG, Mannick JA, editors. *Surgical Treatment: Evidence-Based and Problem-Oriented.* Munich: Zuckschwerdt; 2001.
16. F. Serour, G. Dona, S. Birkenfeld, M. Balassiano, and M. Krispin, “Primary neoplasms of

- the small bowel,” *Journal of Surgical Oncology*, vol. 49, no. 1, pp. 29–34, 1992.
17. Poveda A, Garcia Del Muro X, Lopez-Guerrero JA, et al. GEIS guidelines for gastrointestinal sarcomas (GIST). *Cancer Treat Rev.* 2017;55:107–1.
  18. Nishida T, Hirota S, Taniguchi M, Hashimoto K, Isozaki K, Nakamura H, Katakura Y, Tanaka T, Takabayashi A, Matsuda H, Kitamura Y: Familial gastrointestinal stromal tumours with germline mutation of the KIT gene. *Nat Genet* 1998, 19:323-324.
  19. Nilsson B, Bumming P, Meis-Kindblom JM, Oden A, Dortok A, Gustavsson B, Sablinska K, Kindblom LG: Gastrointestinal stromal tumors: the incidence, prevalence, clinical course, and prognostication in the preimatinib mesylate era—a population-based study in Western Sweden. *Cancer* 2005, 103(4):821–829.
  20. Grassetonio E, Di Fabio F, Cianci R, Filippone A (2005) Comparison between wireless capsule endoscopy and multidetector row CT enteroclysis for evaluating occult gastrointestinal bleeding and suspected small bowel pathology (abstr). *Radiological Society of North America scientific assembly and annual meeting program. Radiological Society of North America: Oak Book*, pp 378
  21. Filippone A, Cianci R, Milano A, Valeriano S, Di Mizio V, Storto ML. Obscure gastrointestinal bleeding and small bowel pathology: comparison between wireless capsule endoscopy and multidetector-row CT enteroclysis. *Abdom Imaging* 2008; 33: 398-406
  22. Yamamoto H, Ogata H, Matsumoto T, Ohmiya N, Ohtsuka K, Watanabe K, Yano T, Matsui T, Higuchi K, Nakamura T, Fujimoto K. Clinical practice guideline for enteroscopy. *Digestive Endoscopy.* 2017 Jul;29(5):519-46.
  23. Ohmiya N. Management of obscure gastrointestinal bleeding: Comparison of guidelines between Japan and other countries. *Dig Endosc.* 2020 Jan;32(2):204-218. doi: 10.1111/den.13554. Epub 2019 Nov 25. PMID: 31596970.
  24. Gerson LB, Fidler JL, Cave DR, Leighton JA, AGA Clinical Guideline: Diagnosis and Management of Small Bowel Bleeding. *Am J Gastroenterol* 2015; 110: 1265
  25. Sepe PS, Brugge WR. A guide for the diagnosis and management of gastrointestinal stromal cell tumors. *Nat Rev Gastroenterol Hepatol.* 2009;6(6):363-371.
  26. George D, Robert B, Charles B et al. NCCN Task Force Report: Management of Patients with Gastrointestinal Tumour (GIST) – Update of NCCN Clinical Practice Guidelines. *Journal of the National Comprehensive Cancer Network* 2007; 5 (2): 1-32.

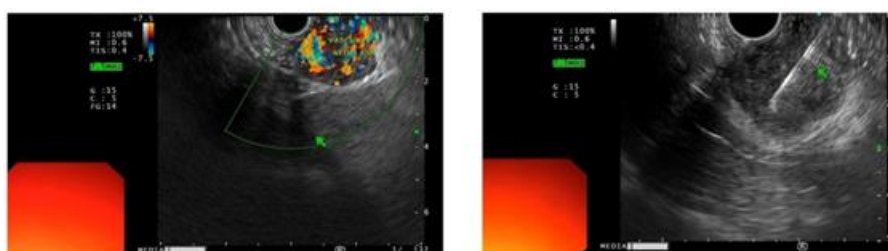


**Figure 1:** Intra-operative picture of laparoscopic assisted jejunal GIST resection 150x107mm (96 x 96 DPI)



CT Images showing enhancing lesion in duodenal D2

**Figure 2:** CT and Endo-sonography images of Duodenal GIST 196x146mm (300 x 300 DPI)



Endo-sonography of the same lesion

**Figure 3:** CT images of ileal GIST causing ileo-colic intussusception 255x115mm (300 x 300 DPI)

**Table 1**

Case No	Age	Sex	Presenting complaints	Investigations	Requirement of blood transfusion	Upper GI Scopy	Colonoscopy	CECT Abdomen findings	Final Diagnosis
1	40 years	M	Haematochezia since 1 day	Hemoglobin -7.5 g/dl Ultrasound Abdomen: Grade 1 fatty liver	Yes	No active bleed /sequelae till DJ flexure site.	Normal study till terminal ileum	Heterogeneously enhancing lesion arising from distal jejunum/proximal ileum measuring 26 mm x 31mm causing luminal obstruction	Jejunal GIST
2	60 years	M	Haematochezia since 2 months	Hemoglobin -13.6	No	Normal Study	Normal study	Ill-defined heterogenous enhancing lesion arising from jejunum measuring 3.3 cm x 4.2 cm likely GIST	Jejunal GIST

3	48 years	M	Abdominal pain with haematochezia since 2 months	Hemoglobin -15.8	No	Normal Study	Normal Study	Heterogeneously enhancing lesion in the intramural aspect of jejunum measuring 2.9 cm x 3.3 cm	Jejunal GIST
4	38 years	F	Haematochezia since 2 months.	Hemoglobin -13.6 Endosonography and FNA - spindle cell neoplasm favouring GIST	Yes	LA-Grade A Esophagitis Pangastritis	Normal study	Enhancing lesion of the d2 segment of duodenum measuring 24x26mm; likely neuroendocrine tumour	Duodenal GIST
5	26 years	F	Abdominal pain abdominal distension, Haematochezia since 2 days	Hemoglobin -9 g/dl Albumen – 1.7 gr/dl	-	-	-	Features suggestive of ileocolic intussusception with heterogeneously enhancing polypoidal lesion likely GIST. Distended proximal small bowel suggestive of obstruction. Ascites	Ileal GIST
6	52 years	M	Abdominal pain Abdominal distension since 3 months	Hemoglobin -7.0gm/dl Ultrasound Abdomen: Normal study	No	Normal Study	Normal study	Ill-defined heterogenous enhancing lesion arising from ileum measuring 34 x 45 mm likely GIST	Ileal GIST

**Table 2:** Causes of Small bowel bleeding

<b>In Young adults (20-40 years):</b>	<b>In Middle age people (41-64 years):</b>	<b>In older patients (aged &gt;65 years):</b>
Crohn's disease (34.55 %)	Vascular anomalies (34.82 %)	Vascular anomalies (54.35 %)
Small intestinal tumours (23.64 %)	Small intestinal tumours (31.25 %)	Small intestinal ulcer (13.04%)
Nonspecific enteritis (10.91%)	Nonspecific enteritis (9.82%)	Small intestinal Tumours (11.96 %)