VOLUME - 11, ISSUE - 05, MAY - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Radio-Diagnosis

CT FINDINGS OF MALIGNANT NEOPLASTIC MASSES OF SMALL AND LARGE INTESTINE WITH HISTOPATHOLOGICAL CORRELATION: A CROSS SECTIONAL STUDY.

Dr. Ramesh Parate	M.D. Radiodiagnosis, Professor, Department Of Radiodiagnosis, Government Medical College, Nagpur, India.
Dr. Vijay R Solanke*	MBBS, M.D. Radiodiagnosis(Ongoing), Department Of Radiodiagnosis, Government Medical College, Nagpur, India. *Corresponding Author
Dr. Tilottama R. Parate	M.D Medicine, Associate Professor, Indira Gandhi Government Medical College Nagpur.

ABSTRACT

AIMS AND OBJECTIVES: To formulate an appropriate scanning protocol technique to evaluate malignant neoplasm of small and large intestine. To define various CT findings in malignant bowel neoplasm. To stage bowel neoplasm. To accurately characterize the tumour by histologic type as far as possible.

Materials And Methods: In our cross-sectional study, 76 cases of small and large bowel carcinoma were referred to radiology department. After taking informed consent, CECT abdomen of the patients was done. All these patients went for surgical excision of the neoplastic mass; and the mass were sent for HPE examination. Epidemiological data, clinical features, CECT abdominal features were correlated with HPE type of the mass were found out. P-Value < 0.05 was considered to be statistically significant.

Results: In Small bowel, ileum was the commonest site of involvement (5.26%), whereas sigmoid colon and rectum (18.42%) was commonest site of involvement in large bowel. Adenocarcinoma was the commonest histological subtype seen in 54 patients (71.05%), followed by lymphoma in 14 patients (18.42%), Mucinous Adenocarcinoma seen in 5 patients (57.5%). and gastrointestinal stromal tumor [GIST] seen in 3 patients(3.94%).

Conclusion: Common CT imaging features in malignant bowel neoplasm are bowel Wall thickening >2cm,short Segment Involvementand heterogeneous mixed pattern. Although CT has a high specificity for detection of a metastatic lymph nodes, sensitivity is low.Liver is the commonest site of distant metastasis in malignant bowel neoplasm. Helical CT is a noninvasive, reliable, and accurate technique for imaging the liver and should be considered as the standard preoperative work-up of hepatic metastases from bowel malignant.

KEYWORDS : Large bowel, Small bowel, Enhancement, Wall thickening, CT scan.

INTRODUCTION

The introduction of Computed tomography (CT) in 1970s heralded a new era in radiology, initially with application to head and later to chest and abdomen..Abdominal studies were originally confined to solid organs in retroperitoneum extending eventually into peritoneal cavity. Bowel details were not referred owing to slow data acquisition and lack of definition.[1]

Major improvement in computing science as well as development of spiral technique have now led to large volume data acquisition. Thus in recent times, CT enterography is noninvasive, easy to perform, and allows visualization of extraenteric structure as well as of bowel wall. Its usefulness detection of small bowel tumour is established. In addition, CT enterography with modified protocol has proved useful for detecting occult gastrointestinal tract bleeding in hemodynamically stable patients.[2]

Barium study and endoscopy remain method of choice in initial detection of most of alimentary tract disease.However both techniquesare limited to examination of mucosal surface, calibre and contour of bowel segment .They provide little and indirect information regarding intramural or extrinsic abnormalities.Leading the way in this trend is the progressive abandonment of the double-contrast barium enema in preference of computed tomographic colonography (CTC) which enables the entire lumen of the large bowel and the extra colonic organs to be visualised in one dataset with a higher sensitivity for cancer detection and an increased patient acceptability than barium enema.[4]

The development of multi-detector computed tomography (MD-CT) scanners with rapid acquisition of thin slices and multi-planar reconstructions allows a detailed investigation of intestinal loops [5]. In particular, non-contrast-enhanced CT scanning is replacing plain-film radiography in the evaluation of acute abdominal disease such as intestinal perforation or obstruction[6]. Intravenous contrast enhancement together with distension of the intestinal lumen by water or positive contrast agents is very useful in the detection of inflammatory and neoplastic intestinal pathologies (fistula, abscess, and phlegmon) as well as in the evaluation of extra-intestinal involvement (mesenteric lymph nodes)[7].

MD-CT colonography, also known as virtual endoscopy, is a new technique to study the large intestine that is able to detect colonic polyps greater than 6 mm with a similar accuracy to conventional colonography [8]. Similar to CT, it is also important in the detection of extra-colonic pathology and plays a very important role in evaluation of malignant bowel neoplasm .

CT is particularly useful in:

a) initial staging of bowel neoplasm —

- It gives extent of tumour.
- Invasion of contiguous mesenchymal tissues
- Invasion of adjacent organ or anatomic structures.
- Involved of regional lymph nodes
- Metastatic spread to distant organs.

b) To look for the complication such as obstruction, perforation, fistula and abscess.

c) To characterize the tumour by histological type as far as possible.

d) Detecting and staging postoperative recurrence of bowel neoplasm.

e) To assess the response to therapy.

MATERIALS AND METHODS

Ethics:

a. Approval from Institutional Ethics Committee (IEC) was sought. Informed written consent in Subject's vernacular language was taken before enrolment for study.

SELECTION OF PATIENTS:

This a cross sectional study where the included patients are:

Small and large bowel cancer patients who underwent CECT abdomen and underwent surgical excision followed by IHC examination of the sample.

Inclusion And Exclusion Criteria:

INCLUSION CRITERIA:

This across sectional study where the included patients are:
Patients presenting with following symptoms & referred by surgery department:

- Melena
- Constipation
- Diarrhea
- Alternate Diarrhea and Constipation
- Weight Loss
- Anorexia

Some patients were detected to have bowel thickening on USG who subsequently underwent CT abdominal examination.

EXCLUSION CRITERIA:

- Patients refusing consent to be included in the study.
- Patients with history foreign body(metal prosthesis) in the spine and pelvis region.

METHOD OF COLLECTION OF DATA:

a. Patients with suspicion orbital lesion referred to department of radiology at government medical college and hospital, Nagpur included in our study after written informed consent, explaining procedure in detail to the patient and obtaining clearance from ethical committee
b. On the day of CECT abdomen study, A detailed history was taken from eachpatient followed by clinical examination and findings were tabulated. Basic investigations like blood and urine analysis were done in all patients.
c. Study was carried out after approval from institutional ethics committee. A written informed consent taken from each subject after explaining them the nature of study.

CTABDOMEN PROTOCOL

Patients will be subjected to CT ABDOMEN after clinical evaluation, and properclinicalhistory ofthe patient would be done.

A)EQUIPMENT:MACHINEPHILIPSBRILLIANCEICT256SLICE

B)PROTOCOL: After performing the CECT ABDOMEN is imaged through out their course in axial, sagitta land coronal views.

Patient Preparation:

Allpatientsexceptinfantswereadvisedatleastthreehoursfastin gpriortoexamination.

A thorough clinical examination was done with particular attention to thelesion intheintestine.

Infantsandchildrenwhowerenotco-operativeweresedatedbyanesthetist.

Contraststudieswereperformedbyinjecting300mg/ml iohexolcalculatedatadoseof1to2mL/kgbodyweightasasingle bolusinjection.

Oral contrast: 2 ampoules of 60% iodinated contrast is mixed in 1 % liter of plain water and the patient is mode to drink 300 - 400m1 at 20-30 minutes intervals with 100 — 200ml of contrast to be given On CT table for adequate distension of stomach.

Rectal contrast: To opacify the rectum and distal colon 200-500cc of rectal contrast is given per rectally. In female married patients vaginal tampon is inserted in the vagina to delineate anatomic structures in pelvis.

Scanning Method

All patients were scanned in the supine position headfirst into the gantry. A preliminary to pogram was done in all patients. Axial section was taken by using the reeds base line as the reference plane employing 5 mm section and 5 mm table increment for contiguous scans.

Sagittal and coronal re-constructions were done in all cases. Both plain and contrast studies were conducted. Delayed scans were done in relevant cases.

Post intravenous contrast:

A bolus of 100 cc. 76% iodinated contrast was injected at 2.5 to 3.5ml per sec Via a pressure injector is injected.
Scan delay -46 - 50 seconds.
Reconstruction interval - 5mm
Phases of acquisition - single phase (porto-venous phase)
Dual phase, if needed(arterial+ porto-venous phase).
- from just above domes of diaphragm up to the symphysis pubis.

Delayed scans were obtained whenever it was deemed necessary. Multiplanar reconstruction and 3D volume rendering techniques can be used in problematic cases to better visualizecolonic anatomy and the location of the suspected mass or abnormality.If necessary, repeat imaging can be performed with the patient prone or after administration of more air or contrast material to distend collapsed segments of bowel.

- Scan time : 20 minutes. (taking in and taking out)
Bowel wall is well depicted adjacent to the low-attenuation fluid in the lumen. Enhancement is usually greater on the mucosal aspect of the bowel wall. This enhancement should not be mistaken for a disease process. Recognizing that the wall is not thickened and that no peri enteric inflammation is present will allow one to differentiate normal enhancement from a disease process.

Fat in mesentery has same attenuation as fat elsewhere in body

Major arteries and veins are identified as branching structures within mesenteric fat and do exceed 3 mm in diameter.

Mesenteric lymph nodes are occasionally observed in mesenteric fat and do not exceed 3mm.No soft tissue structure in mesentery exceed 4mm in normal individual .

DATA ANALYSIS:

Dataobtainedfromthestudywillbesubjectedtoappropriatestat isticalanalysissoa`s to facilitate interpretation.

Implications:

1. The aim of this study to evaluate the role of CT in evaluation of intestinal carcinoma.

2. To determine diagnostic validity of computed to mography to determine the site and extent of tumourin decision making including surgery whenever necessary.

Conflict ofinterest: -None

Risk factors:- None

Statistical Analysis

- Collected data was entered into Microsoft Excel software and coded
- Charts and tables were prepared using Microsoft word and excel software.
- Descriptive data was presented in frequency and percentage.
- The correlation between IHC findings, CECT abdomen findings; clinical history was performed by Chi2 test.
- P value <0.05 was considered as statistically significant.
- Statistical software SPSS 19.0v was used for data analysis.

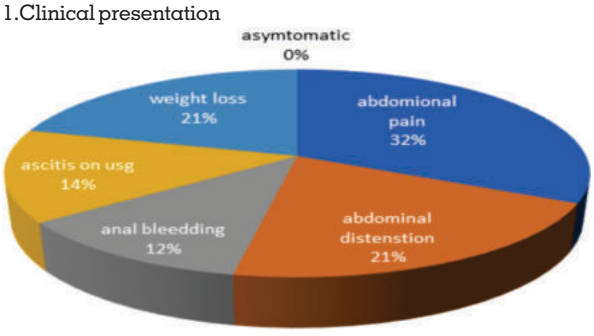
RESULTS AND DISCUSSION:

In our study of 76 patients of biopsy proven malignant bowel neoplasm, we evaluated the role of CT imaging in characterizing the CT features in malignant bowel neoplasm, initial staging of malignant bowel neoplasm viz. extent of lesion, involvement of surrounding structures, lymph nodes involvement, distant metastasis etc. Present study included 76 patients from age group of 13 to 82 yrs.Age group between 40-69 years formed the bulk of cases (72.36%).

- In Small bowel, ileum was the commonest site of involvement (5.26%), whereas sigmoid colon and rectum (18.42%) was commonest site of involvement in large bowel.
- Adenocarcinoma was the commonest histological subtype seen in 54 patients (71.05%), followed by lymphoma in 14 patients (18.42%), Mucinous Adenocarcinoma seen in 5 patients (57.5%). and gastrointestinal stromal tumor [GIST] seen in 3 patients(3.94%).
- Lymph nodal involvement was seen in 52 patients (68.42%).
- Metastasis to liver was seen in 08 patients (10.52%).
- Local extension with involvement of surrounding structures was seen in 28 patients (36.84%).

CHARTS AND TABLES:

1.Clinical presentation



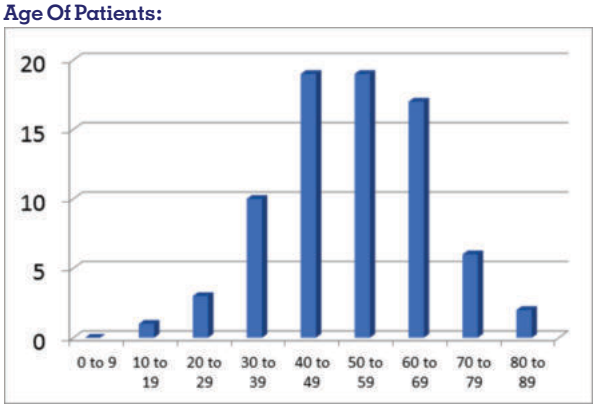
Graph 1- Clinical Presentation Of All Patients

Out of 76 patients of intestinal carcinoma came with complaints of Pain was in 65 patients (32%). 24 patients had anal bleeding (12%) , 42(21%) patients were present with abdominal distention which is represents bowel obstruction or ascites. few of them present with classic history of weight loss 42(21%). On USG correlation we found ascites , in term of mild, moderate and gross free fluid in the abdomen 29(14%) .

Table 1- Clinical Presentation Of All Patients

Clinical symptoms	No.	%(n=32)
Abdominal pain	65	32%
Abdominal distension	42	21%
Wight loss	42	21%
Anal bleeding	24	15.63%
Ascites on USG	29	15.63%

Age Of Patients:

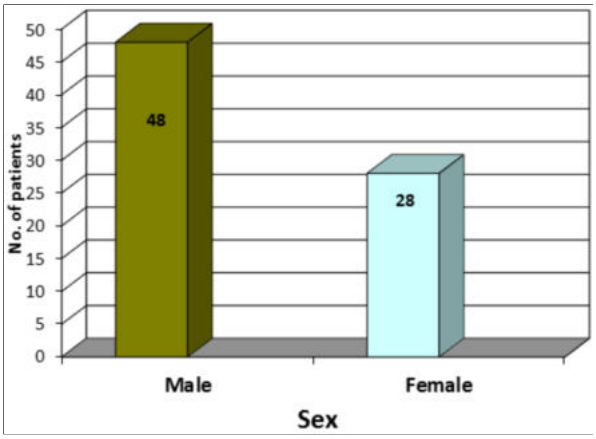


Graph 2- Age Distribution Of All Patients

Table 2- Age Distribution Of All Patients

Age in (yrs)	No.	%(n=76)
0-9	0	0
10-19	1	01.31
20-29	3	03.94
30-39	10	13.15
40-49	19	25.00
50-59	19	25.00
60-69	17	22.36
70-79	6	07.89
80-89	2	02.63

Sex Ratio Of Patients :-

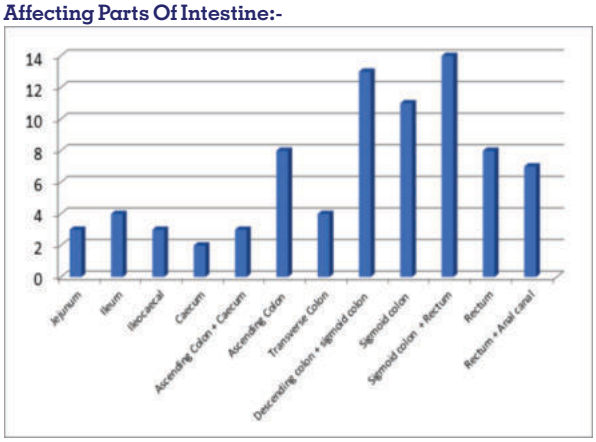


Graph 3- Gender Distribution Of All Patients

Table 3- Gender Distribution Of All Patients

Gender	No.	% (n=76)
Male	48	63.15
Female	28	36.84

Affecting Parts Of Intestine:-

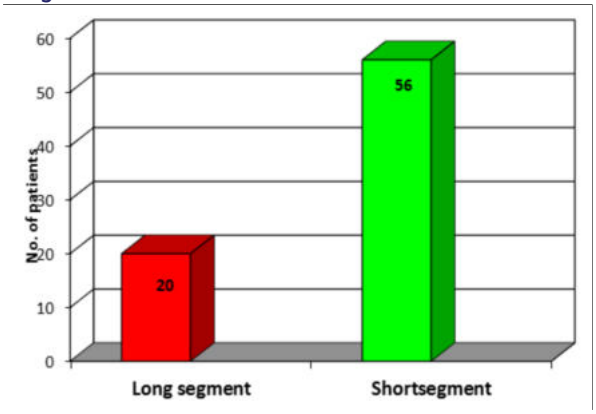


Graph 4- Parts Of Small And Large Intestine Of All Patients

Table 4- Parts Of Small And Large Intestine Of All Patients

PART OF INTESTINE	No.	% (n=76)
Jejunum	3	3.94
Ileum	4	5.26
Ileocaecal	3	3.94
Caecum	2	2.63
Ascending Colon + Caecum	3	3.94
Ascending Colon	8	10.52
Transverse Colon	4	5.26
Descending colon + sigmoid colon	13	17.10
Sigmoid colon	11	14.47
Sigmoid colon + Rectum	14	18.42
Rectum	8	10.52

Length Of Intestine:-

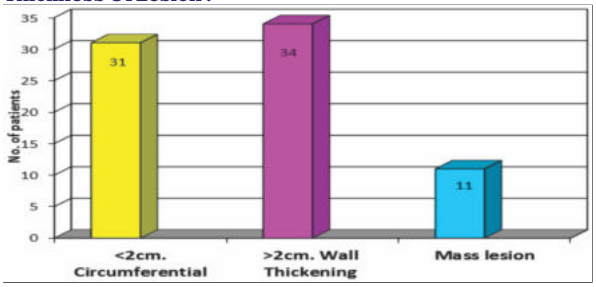


Graph 5- Affecting Short And Long Segment Of Intestine Of All Patients

Table 5- Affecting Short And Long Segment Of Intestine Of All Patients

Length of intestine	No.	% (n=76)
Short segment	56	26.31
Long segement	20	73.68

Thickness Of Lesion :-

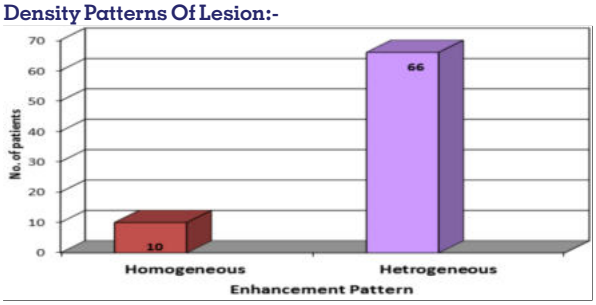


Graph 6- Affecting Bowel Wall Thickening Of All Patients

Table 6- Affecting Bowel Wall Thickening Of All Patients

Thickness of lesion	No.	% (n=76)
<2 cm circumferential	31	40.78
>2 cm circumferential	34	44.73
Mass lesion	11	14.47

Density Patterns Of Lesion:-

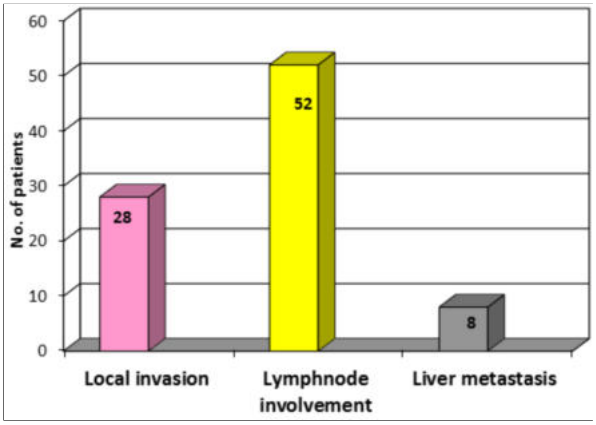


Graph 7- Enhancing Patterns Of Lesion Of All Patients

Table 7- Affecting Bowel Wall Thickening Of All Patients

Density patterns	No.	% (n=76)
Homogenous	10	13.15
Heterogeneous	66	86.84

Metastasis Of Lesion Of Patients:-

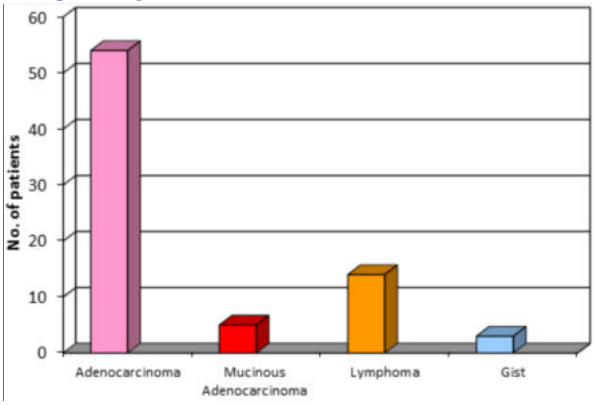


Graph 8- Metastasis Of Lesion Of All Patients

Metastasis	No.	% (n=76)
Local invasion	28	36.84
Lymphnode involvement	52	68.42
Liver metastasis	08	10.52

Graph 8- Metastasis Of Lesion Of All Patients

Histopathological Patterns Of Lesion:-



Graph 9- Histopathological Patterns Of Lesion Of All Patients

Table 9 - Histopathological Patterns Of Lesion Of All Patients

Histopathology pattern's	No.	% (n=76)
Adenocarcinoma	54	71.05
Mucinous Adenocarcinoma	05	6.57
Lymphoma	14	18.42
Gist	03	03.94

CASES

CASE 1:

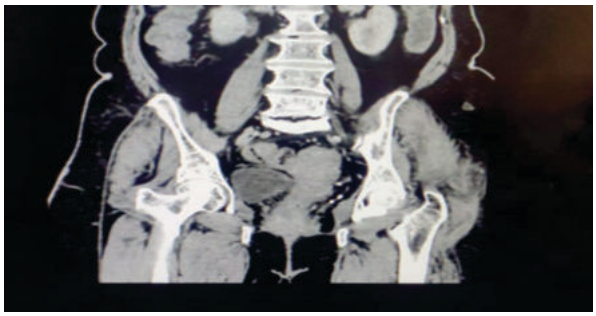


Image A: CT coronal image shows asymmetrical

heterogonous enhancing wall thickening seen at recto-sigmoid junction

Image B: CT sagittal image shows asymmetrical heterogonous enhancing wall thickening seen at recto-sigmoid junction

CASE 2:

Image A: CT coronal image shows asymmetrical heterogonous enhancing exophytic circumferential trans-mural wall thickening seen in sigmoid descending colon with large extra-luminal enhancing soft tissue associated with focal calcification within.

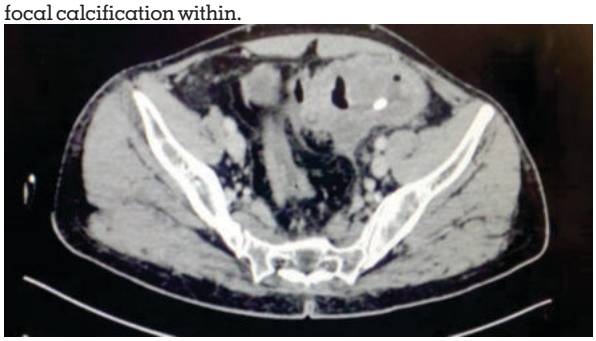


Image B: CT axial image shows asymmetrical heterogonous enhancing exophytic circumferential trans-mural wall thickening seen in sigmoid descending colon with large extra-luminal enhancing soft tissue associated with focal calcification within.

CONCLUSION:

Based on the results of our study of 76 patients, we concluded that,

1] Common CT imaging feature in malignant bowel neoplasm are

-. Bowel Wall Thickening >2cm.

- Short Segment Involvement.

- Heterogeneous Mixed Pattern More Common Pattern Homogenous Pattern Of Post Contrast Enhancement.

2] Although CT has a high specificity for detection of a metastatic lymph nodes, sensitivity is low.

3] Liver is the commonest site of distant metastasis in malignant bowel neoplasm. : Helical CT is a noninvasive, reliable, and accurate technique for imaging the liver and should be considered as the standard preoperative work-up of hepatic metastases from bowel malignant.

4] Aneurysmal dilatation of bowel is characteristic finding in lymphoma.

5] CT aids in the preoperative evaluation of patient with bowel neoplasms. It gives important information regarding size and extend of the lesion,status of surrounding structures, lymph nodal involvement and distant metastasis

6] It provides important clinical information that is useful for the surgeons for planning surgery.

7] Improves preoperative staging of metastatic disease.

8] Finally in most cases, a direct correlation between cross sectional imaging and histology can be found thus permitting tumor characterization.

REFERENCES:

1] Freeman A H. CT and bowel disease. BJR.200;47:4-14.

2] Hera AK, Walker FB, Silva AC, Leghton JA, Pre-liminary estimate of triphasic CT enterography performance in hemodynamically stable patients with suspected gastrointestinal bleeding. AJR Am J Roentgeonol 2009; 193(5): 1252-1260.

3] Balthazar EJ, Noordhoorn M, Megibow AJ, Gordon i Roentgenol. 1997 Mar; 1 68(3):675-80.

4] Taylor SA, Laghi A, Lefere P, Halligan S, Stoker J. ESGAR: consensus statement on CT colonography. EurRadiol 2007;17:575–9.10.1007/s00330-006-0407-y [PubMed] [CrossRef] [Google Scholar]

5] Aschoff AJ. MDCT of the abdomen. EurRadiol. 2006;16 Suppl 7:M54–M57. [PubMed] [Google Scholar]

6] Trésallet C, Renard-Penna R, Nguyen-Thanh Q, Cardot V, Chigot JP, Menegaux F. Intestinal obstruction by an enterolith from a perforated giant Meckel's diverticulum: diagnosis with CT reconstructed images. Int Surg. 2007;**92**:125–127. [PubMed] [Google Scholar]

7] Ryan ER, Heaslip IS. Magnetic resonance enteroclysis compared with conventional enteroclysis and computed tomography enteroclysis: a critically appraised topic. Abdom Imaging. 2008;33:34–37. [PubMed] [Google Scholar]

8] Blachar A, Sosna J. CT colonography (virtual colonoscopy): technique, indications and performance. Digestion. 2007;76:34–41. [PubMed] [Google Scholar]