

To evaluate the role of MDCT enterography in diagnosis of small bowel diseases.

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Abstract:

Patients And Methods:

39 patients who were suspected to have small bowel disease were examined with MDCT enterography.

Results: MDCT enterography easily diagnosed the small bowel disease, than it was confirmed with pathological report, operative data and follow up.

Conclusion:

MDCT can be used as a first line of modality for detection of small bowel disease, however biopsy would be confirmative method.

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I. Introduction:

Imaging of small bowel is a challenging technique as small bowels are long & serpentine, large field of view is required to display it entirely. In addition small bowel diseases have a low incidence, their appearance is less well known so there is increased risk of missing them. In small bowel disease, early changes are usually subtle, so making their diagnosis very difficult. Small bowel follow through and enteroclysis are also used for small bowel imaging, however these provides only indirect information. USG is also used for detection of bowel disease but it is operator dependent & often limited by overlying bowel gas. Enteroscopy is also used for evaluation of small bowel disease but it is invasive study and cannot explore totality of small bowel disease. Recently MRI can also be used, but it is less sensitive than CT scan in detection of bowel wall thickening, abnormal bowel wall enhancement and adenopathy. Currently MDCT is used widely for proper evaluation of small bowel disease. It can also used for diagnosis of mesenteric injuries that require surgical repair in patients with blunt abdominal trauma.

II. Patients And Methods :

The study included 39 patients (25 male and 14 female), their age ranges from 5 to 75 yrs, who were suspected to have small bowel disease, presented with abdominal pain, loss of weight, malena and intestinal obstruction.

METHODS: All patients were examined by 16 slice MDCT scanner (Siemens). Intravenous contrast enhancement is essential on performing CT enterography so that the bowel wall is well visualised. A 20 gauge cannula was inserted into the arm vein & 1.5 ml/kg of iodinated contrast material was injected at rate of 4 ml/sec using automated power injector. Three phases are taken, first - plain, second at 25 sec to achieve arterial phase and 60 sec for the delayed phase (known as enterography phase where small bowel enhancement was optimum). Images were taken from the dome of the liver to the lower margin of symphysis pubis.

Patient had a low residue diet, laxative the day before the examination. Kept them 4 hr fasting stage before the examination. On arrival the patient was given 1000 ml of neutral oral contrast (water) so the degree and pattern of small bowel enhancement can be well analyzed. Asked patients to complete the oral contrast within an hour. After that the scan was done. On entering the scanning room the patient was asked to drink 200 ml water to distend the stomach and duodenum. Thin slices were taken for each study.

IMAGE ANALYSIS: All small bowel abnormalities were based upon 7 criteria: Pattern of enhancement, degree of thickening, length of involvement, whether the thickening is symmetrical or asymmetrical, location of the lesion along the course of the small bowel, location of the lesion in the wall of the small bowel and associated abnormalities in the mesentery & vessels.

VERIFICATION OF DATA: In 20 patients, results of upper endoscopy with biopsy or biopsy from a mass or enlarged abdominal lymphadenopathy were obtained.

III. Results

They were divided into 2 groups according to MDCT findings and pathological reports. In these study 17 (43.5 %) patients had neoplastic disease and 22 (56.4 %) had non neoplastic disease. The neoplastic group included 17 patients (12 male and 5 female) with suspected small bowel neoplasm and proved to be malignant by histopathological reports.

MDCT CRITERIA IN NEOPLASTIC GROUP:

The common MDCT criteria found in 17 patients of neoplastic group had segmental asymmetrical marked wall thickening, homogeneous enhancement involving the mucosa and submucosa of the ileum and enlarged mesenteric nodes.

Segmental wall thickening was found in 14 patients, asymmetrical wall thickening in all patients, marked wall thickening was found in 13 patients, homogeneous wall enhancement in 9 patients. The submucosa of small bowel involved in all patients. The ileum was involved in 7 patients and associated enlarged mesenteric nodes found in 11 patients.

MDCT diagnosis :	NO OF PATIENTS
Lymphoma	12
GIST	3
Duodenal adenocarcinoma	1
Metastasis	1

MDCT CRITERIA IN NON-NEOPLASTIC GROUP:

The common MDCT criteria found in 22 patients of non neoplastic group had segmental symmetrical mild/moderate wall thickening, homogeneous enhancement involving the mucosa and submucosa of the ileum and/or jejunum and associated enlarged mesenteric nodes and/or changes in mesenteric vessels. Segmental wall thickening was found in 10 patients (45.5%), symmetrical wall thickening in 18 patients(81.8%), mild/moderate wall thickening was found in 18 patients(81.8%), homogeneous wall enhancement in 12 patients(54.5%). The submucosa of small bowel involved in 19 patients(86.4%). The ileum and jejunum were involved in 20 patients (90.9%). Associated enlarged mesenteric nodes found in 7 patients (31.8%) and mesenteric vessels changes (vasa recta, superior mesenteric artery/vein thrombosis) were found in 9 patients (40.9%).

MDCT diagnosis :	NO OF PATIENTS
Tuberculous enteritis	5
Crohn's disease	5
Small bowel obstruction	3
Mesenteric ischemia	8
Bowel trauma	1

IV. Discussion

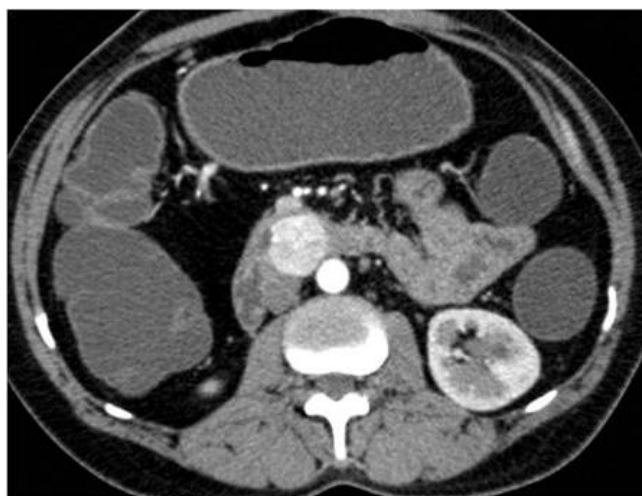
In our study , MDCT enterography was performed to determine the abnormal pattern of small bowel disease relevant to patient's complain. Main advantage of CT enterography over routine abdominal CT is its ability for detailed study of bowel wall & mucosal pathology. The target is achieved through 2 main factors: Bowel loop distension, and neutral luminal contrast. The thinner collimation possible with MDCT along with oral administration of water and intravenous bolus of contrast material may improve the sensitivity of CT for evaluation of small bowel tumors as it has the potential to demonstrate intraluminal, mural and extra intestinal abnormalities. In present study, circumferential and symmetric bowel wall thickening are found in non neoplastic group while irregular asymmetrical bowel wall thickening found in neoplastic group. Here the criteria should be used to differentiate between focal (<5 cm of extension), segmental (6-40 cm) or diffuse (>40 cm) involvement of small bowel by pathology.

The MDCT features of **lymphoma** (which is most common tumor in our study) were marked asymmetric segmental wall thickening with homogeneous bowel wall enhancement, most commonly involving the mucosa and submucosa of the ileum & associated with enlarged mesenteric nodes. Lymphoma is more likely to involve multiple and longer segments of gut and is less likely to cause bowel obstruction. This was confirmed in our study as all patients of lymphoma showed a mass formation without obstruction & most of them were associated with adjacent lymphadenopathy.



Small bowel lymphoma, marked asymmetric segmental wall thickening with homogeneous bowel wall enhancement.

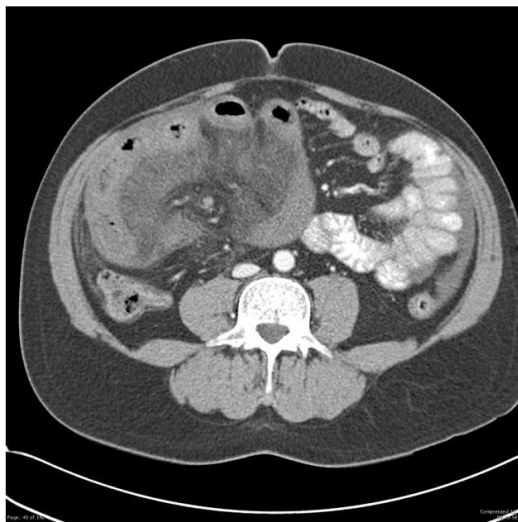
Gastrointestinal stromal tumor (GIST) is a common mesenchymal tumor of GI tract, primarily located in the stomach. MDCT features in our study showed marked asymmetrical segmental wall thickening with heterogeneous enhancement (with necrosis), most commonly involving the submucosa of the jejunum (2 patients) and ileum (1 patient) with enlarged mesenteric nodes in 1 patients.



Duodenal GIST with heterogeneous contrast enhancement.

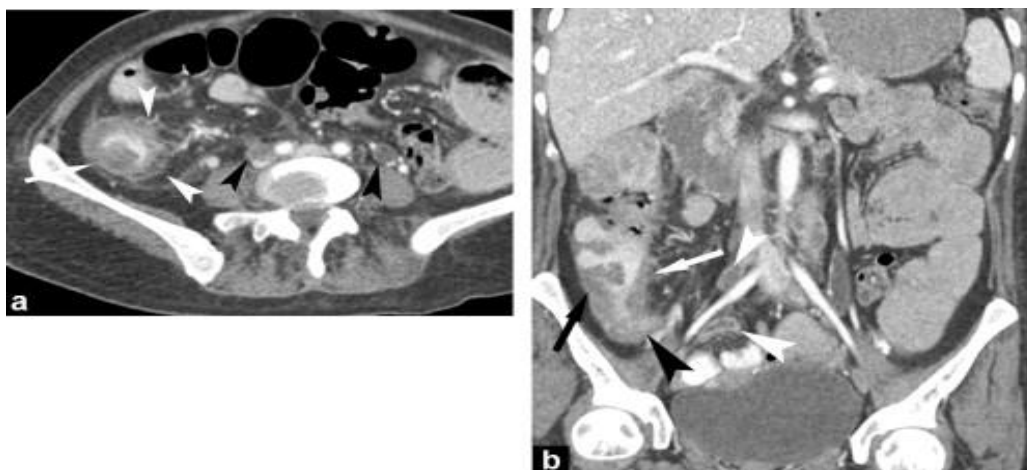
Adenocarcinoma of the small bowel, most commonly seen in proximal small intestine. Duodenum is most commonly involved site in advanced stages of pancreatic, biliary or colonic malignancy.

Mesenteric ischemia, MDCT shows bowel wall thickening, oedema, submucosal haemorrhage, increased or decreased enhancement of bowel wall, mesenteric stranding / fluid and pneumatosis. CT can also help to determine the cause of ischemia by allowing evaluation of the mesenteric vasculature for atherosclerosis, thrombus, occlusion, compression or invasion by tumor and trauma. These were consistent with our study, MDCT findings included filling defect in mesenteric veins/arteries in 6 patients. The characteristic small intestinal infarction feature pneumatosis intestinalis (thinning of wall of small bowel loops due to necrosis) was seen in 2 patients, with air seen in the portal radicles in one of these two patients in our study.



Mesenteric ischemia, shows bowel wall thickening with mesenteric stranding.

In tuberculous enteritis circumferential homogeneous bowel wall thickening is seen (5 patients in our study). The ileum was the more commonly involved segment than jejunum as Peyer's patches are seen in distal & terminal ileum. All other associated extraintestinal manifestations of tuberculosis like psoas abscess, pleural effusion and mesenteric nodes enlargement were useful findings for supporting the diagnosis.



Tuberculous enteritis, homogeneous thickening of terminal ileum wall.

In Crohn's disease, terminal ileum is the most common site for involvement however any segment of the bowel wall can be involved. In our study all 5 patients show involvement of jejunum and ileum. All show skip lesions, transmural involvement, enlarged mesenteric nodes and segmental symmetrical wall thickening. MDCT shows segmental homogeneous mural hyperenhancement that correlates with active Crohn's disease. CT enterography also shows perienteric inflammation and vascular engorgement of the vasa recta that suggest the disease is clinically active.



Crohn's disease shows symmetrical segmental bowel wall thickening with hyperenhancement of bowel wall.

MDCT enterography detected the site of **bowel obstruction** and cause of the obstruction .In our study 2 patients had neoplastic lesion , 1 had tuberculous enteritis , 1 had inguinal hernia that caused intestinal obstruction.

V. Conclusion

MDCT enterography has the potential to be used as first line imaging modality for detection of small bowel diseases. However biopsy is still the confirmative diagnostic method. It is also widely used , as it narrows down the differential diagnosis of small bowel pathologies.

References

- [1]. Macari M, Megibow A, Balthazar E. A pattern approach to the abnormal small bowel: observations at MDCT and CT enterography. *AJR* 2007;188:1344–55.
- [2]. Patak MA, Morteke KJ, Ros PR, et al. Multidetector row CT of the small bowel. *Radiol Clin N Am* 2005;43:1063–77.
- [3]. Hong SS, Kim AY, Byun JW, et al. MDCT of small-bowel disease: value of 3D imaging. *AJR* 2006;187:1212–21.
- [4]. Bradbury MS, Kavanagh PV, Bechtold RE, et al. Mesenteric venous thrombosis: diagnosis and noninvasive imaging. *Radiographics* 2002;22:527–41.
- [5]. Boudiaf M, Jaff A, Soyer P, et al. Small-bowel diseases: prospective evaluation of multi-detector row helical CT enteroclysis in 107 consecutive patients. *Radiology* 2004;233:338–44.

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