

CT Evaluation of Small Bowel Wall Lesions

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ABSTRACT

Introduction: MDCT has lead to vast improvement in depiction and characterisation of small bowel wall lesions especially differentiation of benign and malignant lesions.

Aim: To evaluate the role of MDCT in suspected small bowel lesions in patients referred to Radiology Department of a Tertiary Care Centre at Aurangabad district of Maharashtra in India.

Materials and Methods: Present observational study was done on 49 patients of suspected small bowel lesions referred for MDCT during November 2014-2016. Patients presenting with symptoms related to altered bowel habits, positive small bowel wall findings on plain CT, small bowel lesions detected on ultrasound, history of trauma undergoing CT-scan with small bowel wall thickening on USG/CT were included. Patients were followed up to therapeutic/biopsy/operative diagnosis. Histopathological reports helped in retrospective confirmation of provisional diagnosis on

MDCT.

Results: Duodenum was most common location for malignant lesions. Ileum (43.5%) was the most common location for benign lesions. The malignant lesions showed heterogeneous mixed attenuation (100%), marked thickening (66.7%) and asymmetric thickening (100%). Benign lesions showed homogenous attenuation (89.1%), mild thickening (93.5%) and symmetrical thickening (97.8%). Focal thickening was seen in most of the malignant lesions (66.7%) while segmental involvement was seen in most of benign lesions (93.5%). All malignant lesions were associated with adjacent fat stranding. Amongst benign lesions, surrounding fat stranding was absent in 71.7% cases.

Conclusion: MDCT imaging findings can provide very useful help in diagnosis of small bowel lesions along with clinical correlation especially for identification of benign or malignant nature of small bowel lesions.

Keywords: Attenuation, Neoplasm, Small bowel wall thickening

INTRODUCTION

Early detection of the neoplasm of small bowel is a highly desirable but a very challenging task for the clinicians as well as radiologists. Multidetector Computed Tomography (MDCT) has lead to a vast improvement in the depiction as well as characterisation of the small bowel wall lesions especially differentiation of benign and malignant lesions. Thickening of the bowel wall may present as a focal, segmental or diffuse thickening. Differential diagnosis of cases with focal thickening is narrowed down by the assessment of degree and symmetry of the bowel wall thickening and study of perienteric abnormalities. Malignant lesions are usually associated with focal thickening which is heterogeneous and asymmetric, whereas benign conditions and well differentiated tumours are usually associated with symmetric regular and homogeneous thickening [1-3].

MATERIALS AND METHODS

This observational study was conducted in the Department of Radiology at a Tertiary Care Centre in Aurangabad district of Maharashtra, India, between the period of November 2014-2016. A total of 49 patients of suspected small bowel lesions referred to the department were included in the study. Institutional Ethics Committee approved the study protocol and written informed consent was taken from all the study participants.

Inclusion criteria for the study were: (a) Patients presenting with symptoms related to altered bowel habits/abdomen; (b) Patients with positive small bowel wall findings on plain CT; (c) Patients with small bowel lesions detected on ultrasound; and (d) Patients with history of trauma undergoing CT-scan with small bowel wall thickening on USG/CT. Pregnant females

and patients with deranged renal function were excluded from the study.

Formal sample size calculation was not done. All patients attending the hospital during the study period and fulfilling the inclusion and exclusion criteria and willing to give consent were enrolled in the study. Age and sex distribution of cases, clinical presentation, location of lesions, presence of attenuation, degree, symmetry and extent of bowel wall thickening, presence of fat stranding, lymphadenopathy, obstruction and metastasis were the features studied and described.

Procedure and CT protocol for bowel imaging: Toshiba Aquillion CT scanner (16 slice) was used. Colon cleaning preparation was orally administered 12 hours prior to procedure and 1-1.5L of water/oral contrast was given shortly before scanning with or without rectal contrast (SOS). Standard CT scout imaging was used to assess the degree of distension of bowel. The criterion for the acceptability of image was the visualisation of all the colonic segments and in a well distended state [4].

Statistical data was presented in the form of percentages for malignant and benign lesions.

RESULTS

Age group of the subjects was from 10 to 70 years. Malignant lesions were mostly seen in later decades of life (51-70 years) and benign lesions were mostly seen in 21-40 years age group [Table/Fig-1]. Out of 49 patients, 29 were males and 20 were females [Table/Fig-2]. Abdominal pain, bleeding per rectum and weight loss was the most common presentation amongst malignant lesions. Abdominal pain, constipation, vomiting were the most common modes of presentation amongst all the benign lesions [Table/Fig-3]. Duodenum was the most common location for malignant lesions. Ileum was the most common location for all the benign lesions followed by jejunum [Table/Fig-4]. All of the malignant lesions showed heterogeneous mixed attenuation. Most of the benign lesions 41 (89.1%) showed homogenous attenuation [Table/Fig-5]. Marked thickening was seen in most of malignant lesions (66.7%). Mild thickening was seen in most (93.5%) of benign lesions [Table/Fig-6]. All of the malignant lesions showed asymmetric thickening while symmetric thickening was seen in most of the benign lesions (97.8%). Focal thickening was seen in most of the malignant lesions (66.7%) while segmental involvement was seen in most of benign lesions (93.5%). All

Age (in years)	Malignant	Benign	Total
10-20	0	2	2
21-30	0	14	14
31-40	0	11	11
41-50	0	7	7
51-60	1	7	8
61-70	2	5	7
Total	3	46	49

[Table/Fig-1]: Age distribution of the study group.

Sex	Female	Male	Total
Malignancy	1 (33.3%)	2 (66.7%)	3 (100.0%)
Benign	19 (41.3%)	27 (58.7%)	46 (100.0%)
Total	20 (40.8%)	29 (59.2%)	49 (100.0%)

[Table/Fig-2]: Sex distribution of cases.

of the malignant lesions were associated with adjacent fat stranding whereas it was noticed in only 28.3% of benign lesions. All of the malignant lesions were associated with enlarged lymph nodes whereas enlarged lymph nodes were noticed in only 19.6% of benign lesions. Obstruction was present in 66.7% malignant cases whereas, it was present in only 4.3% benign cases. Metastasis was present in 66.7% malignant cases and the site of metastasis was liver. [Table/Fig-7] shows CECT axial Image of circumferential bowel wall thickening involving distal ileal loops.

Clinical Features	Pain	PR Bleed	Constipation	Weight loss	Vomiting
Malignancy	100% (n=3)	66.66% (n=2)	0 %	100% (n=3)	0 %
Benign (Inflammatory/ Infective)	100% (n=46)	0 %	45.6% (n=21)	21.7% (n=10)	30.4% (n=14)

[Table/Fig-3]: Clinical features reported in study group.

Location of Lesion	Duo-de-num	Duode-num-Jejunum	Ileum	Ile-um-Jeju-num	Jeju-num	Total
Malignancy	66.7% (n=2)	0	0	0	33.3% (n=1)	100% (n=3)
Benign	8.7% (n=4)	8.7% (n=4)	43.5% (n=20)	6.5% (n=3)	32.6% (n=15)	100.0% (n=46)

[Table/Fig-4]: Location of lesions in study group.

Histopathology Findings	Homogenous Attenuation n (%)	Heterogeneous Stratified Attenuation n (%)	Heterogeneous Mixed Attenuation n (%)	Total n (%)
Malignancy	0 (0%)	0 (0%)	3 (100%)	3 (100%)
Benign	41 (89.1%)	5 (10.9%)	0 (0%)	46 (100%)
Total	41 (83.7%)	5 (10.2%)	3 (6.1%)	49 (100%)

[Table/Fig-5]: Presence of attenuation on CT in study groups.

Parameters		Mild Thickening	Marked Thickening	Total
Malignancy	Count	1	2	3
	Percentage	33.3%	66.7%	100.0%
Benign	Count	43	3	46
	Percentage	93.5%	6.5%	100.0%
Total	Count	44	5	49
	Percentage	89.8%	10.2%	100.0%

[Table/Fig-6]: Degree of bowel wall thickening on CT in study groups.



[Table/Fig-7]: CECT axial Image of circumferential bowel wall thickening involving distal ileal loops.

DISCUSSION

In our study, the number of patients with malignancy was low i.e., 3 out of 49 cases studied. All of them showed heterogeneous mixed attenuation whereas, most of the benign lesions showed homogenous attenuation (89.1%). Roccasalva F et al., study [5] and Balthazar EJ, study [6] has also observed that benign disease (infective/inflammatory) presentation on CT is that of homogenous attenuation while the malignant disease presentation on CT is that of heterogeneous attenuation.

In our study, asymmetric thickening on MDCT was found in all malignant lesions, while MDCT presentation amongst benign lesions was symmetrical thickening in almost all of the cases (97.8%). Karpagam B et al., have also mentioned in their review of imaging findings of bowel lesions that malignant lesions often presented with focal asymmetric wall thickening [7]. Similarly, Desai RK et al., study evaluated CT presentation with respect to symmetry of intestinal wall thickening and reported that malignant lesions often presented with focal asymmetric wall thickening whereas, benign lesions often presented with symmetric thickening [8]. Chou CK et al., mentioned in their study that small bowel wall thickening may be caused by a neoplastic or a non neoplastic pathology [9].

They further stressed that neoplasms usually present as short (except lymphoma), irregular, and asymmetric on CT. Macari M et al., have also reported that small bowel neoplasms typically present with heterogeneous enhancement and this finding is most commonly associated with adenocarcinoma and malignant gastrointestinal stromal tumours [10]. Many authors have highlighted the significance of CT investigation in small bowel tumours and it has been reported that around 90% of tumours of small bowel present with abnormalities demonstrated on CT [11-13]. Wittenburg J et al., have reported that attenuation pattern of intestinal wall lesions on CT can help in differentiation of benign and malignant nature of the tumours [14]. Buckley JA and Fishman EK also mentioned that with an extensive differential diagnosis, small bowel tumours still have certain characteristic features on CT that help in arriving at the final diagnosis [15]. Mak SY et al., and Qalbani A et al., mentioned in relation to small bowel obstruction due to adenocarcinoma that, at the transition point, the CT imaging findings usually seen is an asymmetric, pronounced and irregular mural thickening [16,17].

Thus, our study adds to the literature on radiological findings in small bowel lesions. It presents the data from our geographical region which has a clinical significance that it will help clinicians in better correlation with clinical findings while interpreting radiological findings among the patients from the region.

LIMITATION

Hospital based and observational study design, small sample size especially, very few cases with malignant lesions, among the study group were the limitations of our study.

CONCLUSION

MDCT imaging findings like presence of attenuation, degree, symmetry and extent of bowel wall thickening and associated parameters can provide very useful help in diagnosis of small bowel lesions along with clinical correlation especially for identification of benign or malignant nature of small bowel lesions.

REFERENCES

- [1] Sailer JA, Zacher JB, Schima W. MDCT of small bowel tumours. *Cancer Imaging*. 2007;7(1):224-33.
- [2] Megally HI, Elmalah HM, Gehan SS, Nisreen AA, Elamin HA. The diagnostic role of MDCT enterography in small bowel lesions. *The Egyptian Journal of Radiology and Nuclear Medicine*. 2015;46:01-08.
- [3] Fernandes T, Oliveira MI, Castro R, Araújo B, Viamonte B, Cunha R. Bowel wall thickening at CT: Simplifying the diagnosis. *Insights Imaging*. 2014;5(2):195-208.
- [4] Dahiphale DB, Sharma PK, Apte A, Suryawanshi A, Deore R, Choudhari S. CT Evaluation of large bowel wall lesions. *International Journal of Anatomy, Radiology and Surgery*. 2017;6:RO17-21.

- [5] Roccasalva F, Piccoli M, Palmucci S, Mauro LA, Cappello G, Ettorre GG. Catania/IT. The wall enhancement of bowel diseases observed on MDCT and MRI: a pictorial essay. Poster presented at: European Congress of Radiology; 2013 March 7-11, Vienna, Austria. DOI: 10.1594/ecr2013/C-1988.
- [6] Balthazar EJ. CT of the gastrointestinal tract: principles and interpretation. *Am J Roentgenol.* 1991;156(1):23-32.
- [7] Karpagam B, Indira D, Manoj Kumar P, Karthikeyan D. Imaging spectrum of large intestinal lesions: a pictorial essay. *Sch J App Med Sci.* 2015;3(3C):1238-51.
- [8] Desai RK, Tagliabue JR, Wegryn SA, Einstein DM. CT evaluation of wall thickening in the alimentary tract. *Radiographics.* 1991;11:771-83.
- [9] Chou CK, Wu RH, Mak CW, Lin MP. Clinical significance of poor CT enhancement of the thickened small-bowel wall in patients with acute abdominal pain. *Am J Roentgenol.* 2006;186(2):491-98.
- [10] Macari M, Megibow AJ, Balthazar EJ. A pattern approach to the abnormal small bowel: observations at MDCT and CT enterography. *Am J Roentgenol.* 2007;188:1344-55.
- [11] Minardi AJ Jr, Zibari GB, Aultman DF, McMillan RW, McDonald JC. Small-bowel tumors. *J Am Coll Surg.* 1998;186:664-68.
- [12] Paulsen SR, Huprich JE, Fletcher JG, Booya F, Young BM, Fidler JL, et al. CT enterography as a diagnostic tool in evaluating small bowel disorders: review of clinical experience with over 700 cases. *Radiographics.* 2006;26:641-57.
- [13] North JH, Pack MS. Malignant tumors of the small intestine: a review of 144 cases. *Am Surg.* 2000;66:46-51.
- [14] Wittenberg J, Harisinghani MG, Jhaveri K, Varghese J, Mueller PR. Algorithmic approach to CT diagnosis of the abnormal bowel wall. *Radiographics.* 2002;22:1093-107.
- [15] Buckley JA, Fishman EK. CT evaluation of small bowel neoplasms: spectrum of disease. *Radiographics.* 1998;18(2):379-92.
- [16] Mak SY, Roach SC, Sukumar SA. Small bowel obstruction: computed tomography features and pitfalls. *Curr Probl Diagn Radiol.* 2006;35(2): 65-74.
- [17] Qalbani A, Paushter D, Dachman AH. Multidetector row CT of small bowel obstruction. *Radiol Clin North Am.* 2007;45(3): 499-512.

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