



Radiodiagnosis

USE OF COMPUTED TOMOGRAPHY IN EVALUATION OF BOWEL WALL PATHOLOGIES

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ABSTRACT Aims & objectives:-

1) To differentiate non neoplastic and neoplastic causes of bowel wall thickening on CT examination.

2) To characterize different neoplastic causes of bowel wall thickening

Materials and Methods:-

This prospective study of 80 patients suspected to have bowel pathology were evaluated with two slice spiral CT scanner, somatom, Siemens (Germany) at Tertiary care centre, from December 2016 to August 2018.

Result:-

1) Bowel wall thickening involved large bowel (46%) more commonly than small bowel (31%) and in 23% cases both large and small bowel involved..

2) Neoplastic causes were most common cause for bowel wall thickening accounting 52% cases.

3) Tuberculosis was second common cause of bowel wall thickening (18%).

4) Inflammatory, edematous and vascular causes constitute 11%, 5%, 4% cases respectively.

KEYWORDS : Bowel wall thickening, Malignancy**INTRODUCTION**

The computed tomography (CT) has become a versatile tool in assessing the gastrointestinal tract due to ability to provide accurate information about the bowel wall as well as surrounding structures. CT acquired after luminal distension through the administration of high volumes of neutral contrast material (1,500-2,000 ml of water, water-methylcellulose solution, mannitol) is helpful in displaying the thickness and enhancement of the small bowel wall. A wide spectrum of intestinal wall morphologic and enhancement abnormalities can be seen with bowel disorders which include normal variants, inflammatory conditions and neoplastic disease. Once an abnormality is detected the radiologist needs a systematic approach for determining the specific cause of the intestinal abnormality.

The aim of study was to differentiate benign and malignant conditions of bowel wall thickening taking into consideration bowel wall thickness, extent of lesion (short, medium, diffuse), symmetry of lesion and pattern of attenuation and enhancement. Aim & objectives:

- 1) To differentiate non neoplastic and neoplastic causes of bowel wall thickening on CT examination.
- 2) To characterize different neoplastic causes of bowel wall thickening

MATERIAL AND METHODS

This prospective study of patients suspected to have bowel pathology on ultrasound, barium or endoscopic examination from December 2016 to August 2018. The series consists of 80 patients evaluated with two slice spiral CT scanner, somatom Siemens (Germany) at Tertiary care centre. CT acquired after luminal distension through the administration of high volumes of neutral contrast material (1, to 1.5 liter of water, water-methylcellulose solution, and mannitol). Patients with suspected bowel obstruction did not require oral contrast because they usually have air and fluid within the bowel to provide negative contrast. Positive contrast agents containing 76% w/v iodine diluted in one liter of water were administered via rectum in cases suspected for colonic pathology. Findings were analyzed by two different radiologists for the degree of wall thickening, length of involvement (short, ≤ 15 cm; medium, 16–30 cm; or long, >30 cm), symmetrical or asymmetrical and pattern of attenuation. or in patients with unopacified bowel loops in pelvis. Non-ionic iodinated contrast materials were preferred for IV administration. The diagnosis as benign or malignant lesion was confirmed by cytology or histopathology of any biopsy or surgical specimen. However, in cases where surgery was not done, diagnosis was confirmed by clinical

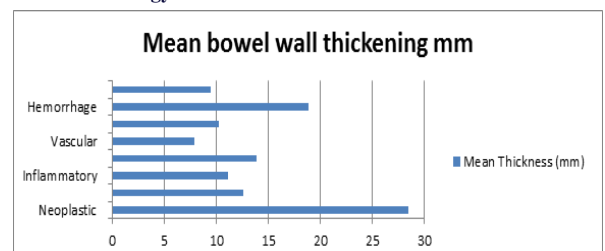
response to medical treatment. The imaging characteristics were recorded in all patients and their management and final diagnosis documented. Consensus interpretation of the scans was performed as consensus evaluation was more likely to resolve any ambiguity in the estimation of this parameter

RESULTS

Out of total 80 patients 50 (63%) were male and 30 (37%) were female. The peak incidence was between 31 years to 50 years. Of the total 80 cases, 14 cases involved the stomach, in 27 cases there was small bowel involvement while in 39 cases there was involvement of the large intestine. Lesions involving the terminal ileum and cecum were classified into large bowel category.

Most of the neoplastic cases had marked (38 cases out of 42 cases) bowel wall thickening (mean thickness 28.4 mm).

Infectious pathology had average wall thickness of 12.6 mm & all other pathologies had average wall thickness around 10 mm except for haemorrhaging bowel where average thickness was 19.6 mm. Marked thickening (cut of considered 20 mm) of bowel wall was a specific (95%) as well as sensitive (100%) Mild bowel wall thickening was also sensitive & specific indicator on the other hand for benign lesion.

Chart I: Bar Graph Showing Mean Bowel Wall Thickening In Various Aetiology

Among the neoplastic cases, length of involvement was short segments in 32 patients and medium in 10 patients; Among the 13 patients with infective etiology, involvement was short segments in 7 patients and medium in 6 patients. Diffuse length of involvement was seen in vascular cause. The two patient groups (neoplastic and non neoplastic) were not significantly different in terms of length of involvement.

Table 1 : Showing Length Of Involvement In Various Aetiology

	Short	Medium	Long	Total
Neoplastic	32	10	0	42
Infectious	7	6	0	13
Inflammatory	7	2	0	9
Edematous	4	0	1	5
Vascular	1	2	1	4
Intussusceptions	2	1	0	3
Hemorrhage	1	2	0	3
Perforation	1	0	0	1
Total	55	23	2	80

Among the 42 neoplastic cases, 41 cases had asymmetric bowel wall thickening, whereas 4 patients of infection, 3 of inflammation and 1 of intramural hemorrhage had asymmetric bowel wall thickening. One case with jejuna lymphoma showed symmetric bowel wall thickening; Rest all the non-neoplastic cases had symmetrical bowel wall thickening. Asymmetrical bowel wall thickening, was having good sensitivity (97%) and specificity (79%) for malignancy

Gray attenuation pattern was seen in total 33 cases, with 26 cases lying in the malignant group and remaining 7 in the benign group. We found white attenuation pattern in 3 patients, one in each in inflammatory, edematous and vascular group. The black attenuation is seen 6 patients out of which 3 patients were in ischemia and 1 patient with sigmoid diverticulitis, perforation. The only malignant etiology showing black attenuation was adenocarcinoma of rectum. The water halo sign was seen in idiopathic inflammatory bowel diseases, edematous and infectious diseases. None of malignant etiology showed water halo sign. The fat halo sign is seen patients with in crohn's disease in small intestine and ulcerative colitis in the colon. In 26 patients combination of pattern was seen.

Table 2 : Showing Attenuation Pattern In Various Aetiology

Attenuation	White ation	Gray Attenuation	Black aattenuation	Water halo sign	Fat halo sign	Comb. nation	Total
Neoplastic		26	1			15	42
Infectious		3	1	4		5	13
Inflammatory	1	1		2	2	3	9
Edematous	1			4			5
Vascular	1		3				4
Intussusception		3					3
Hemorrhage						3	3
Perforation			1				1
	3	33	6	10	2	26	80

Neoplastic Diseases

Among the 42 neoplastic cases, we had a histo-pathological correlation in all the cases. Primary adenocarcinoma was most common cause (n=27, 65%) of malignant pathology. Recurrent adenocarcinoma was seen in 6 cases (14%) with Lymphoma (n=5, 12%) and GIST (n=3, 7%) One case of carcinoid tumor (2.3%) was also encountered.



Figure 1 Showing Asymmetric Thickening Of Pylorus, With Nodes, Histopathology S/o Adenocarcinoma



Figure 2 showing asymmetric thickening of ascending colon, Histopathology s/o adenocarcinoma



Figure 3 showing recurrent adeno-carcinoma involving jejunum.



Figure 4 Showing Nearly Symmetrical Thickening Of Rectum, Mucinous Adeno-ca. On Histopath.

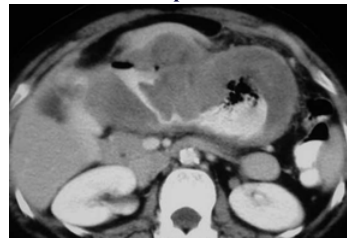


Figure 5 Showing Asymmetric Thickening Of Stomach Histopathology S/o Lymphoma



Figure 6 Due To Aneurismal Dilatation On Imaging Lymphoma Suggested, On Histopathology, Turned To Be Adenocarcinoma.

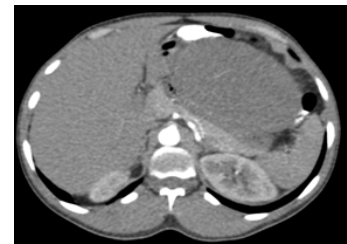


Figure 7 Showing Large Exophytic Growth From Posterior Wall Of Stomach Histopathology S/o Gist.



Figure 8 Enhancing Nodular Thickening Of Jejuna Loop With Surrounding Desmoplastic Reaction, Histopathology S/o Carcinoid

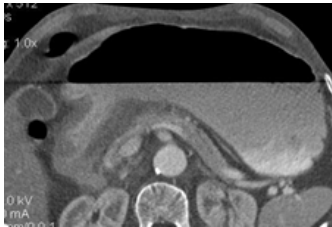


Figure 9 Showing Thickening Of Pyloric End Thought To Be Malignant, Turned Out To Be Hypertrophic Gastritis.

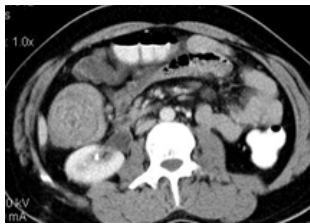


Figure 10 Showing Intussusceptions With Lipoma (not Seen Image) As A Leading Point.

DISCUSSION

Bowel wall thickness of 2 cm and less than 2 cm was considered as mild while thickness of more than 2 cm was considered as marked. It was observed that in our study, 32 out of total 39 cases were correctly diagnosed as benign on CT. Also, out of the total 42 malignant cases, 35 cases were having bowel wall thickening more than 2 cm & correctly diagnosed on CT as a malignant. We encountered a case of abnormal thickening of pyloric region of stomach, thought to be malignant, turned out to be hypertrophic gastritis (fig.9) Erik K. Insko et al, [10] in their study of 38 patients of abnormal bowel wall thickening had taken into account 14 malignant and 24 benign cases. Like in our study where bowel wall thickness of more than 2cms had sensitivity and specificity of 69% and 93% respectively; the sensitivity and specificity in the study conducted by Erik K. Insko et al., were 50% and 88% respectively [10]. However, in our study we had divided the lesions into three categories taking into account the length of involvement as short, ≤ 15 cm; medium, 16–30 cm; or long, >30 cm. If we take the cases segregated as short segment involvement, the sensitivity and specificity for labelling a lesion as malignant are 97.1% and 40% respectively [Table/Fig-3] which is similar to the distribution shown in the study done by Erik K Insko et al. In the study by Erik K Insko et al., where there were 71% and 29% of the malignant cases showing asymmetrical and symmetrical bowel wall involvement respectively, in our study the corresponding figures were 83% and 17% respectively. For the benign cases, asymmetrical and symmetrical bowel wall involvement respectively were 25% and 75% in the study done by Erik K Insko et al., and the percentage involvement in our study were 33% and 67% respectively.

The various other parameters apart from marked bowel wall thickening like heterogeneous pattern of enhancement (sensitivity 57%, specificity 80%) asymmetrical bowel wall thickening (sensitivity 82.8%, specificity 66.7%), and gray attenuation (sensitivity 40%, specificity 73%) are also useful in characterising a lesion as malignant. Finally, in our study, CT showed a sensitivity of 97% and specificity of 93% in differentiating between a benign and malignant etiology of abnormal bowel wall thickening, which was similar to the conclusion reached by Erik K Insko et al., in their studies.

It was observed that in our study, 14 (93.3%) out of total 15 cases were correctly diagnosed as benign on CT. Also, out of the total 35 malignant cases, 33 (94.3%) cases were correctly diagnosed on CT. Out of these, one case whose probable diagnosis was kept as lymphoma turned out to be adenocarcinoma [Table/Fig-8] and another case of abnormal thickening of pyloric region of stomach, thought to be malignant, turned out to be hypertrophic gastritis.

Erik K. Insko et al., [10] in their study of 38 patients of abnormal bowel wall thickening had taken into account 14 malignant and 24 benign cases. Like in our study where bowel wall thickness of more than 2 cms had sensitivity and specificity of 69% and 93% respectively; the sensitivity and specificity in the study conducted by Erik K. Insko et al., were 50% and 88% respectively [10]. However, in our study we had divided the lesions into three categories taking into account focal, segmental and diffuse involvement of the bowel wall. It is important to determine if the bowel wall thickening is focal (a few centimetres), segmental (10-30 cm), or diffuse (involving most of the small bowel or colon) [8]. If we take the cases segregated under the segmental distribution as focal involvement, the sensitivity and specificity for labelling a lesion as malignant are 97.1% and 40% respectively, which is similar to the distribution shown in the study done by Erik K Insko et al. Similar to the study by Erik K Insko et al., where there were 71% and 29% of the malignant cases showing asymmetrical and symmetrical bowel wall involvement respectively, the congruent figures in our study turned out to be 83% and 17% respectively. For the benign cases, the corresponding figures were 25% and 75% in the study done by Erik K Insko et al., and the percentage involvement in our study were 33% and 67% respectively.

The various other parameters like heterogeneous pattern of enhancement (sensitivity 57%, specificity 80%), asymmetrical bowel wall thickening (sensitivity 82.8%, specificity 66.7%), and gray attenuation (sensitivity 40%, specificity 73%) are also useful in characterizing a lesion as malignant. Finally, in our study, CT showed a sensitivity of 97% and specificity of 93% in differentiating between a benign and malignant etiology of abnormal bowel wall thickening, which was similar to the conclusion reached by Erik K Insko et al.,

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