Original Research Article

Endoscopic significance of large bowel wall thickening on abdominal computed tomography scan (CT scan) of patients with no prior history of gastrointestinal disease

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Abstract

Background: In many abdominal cases computed tomography (CT) scan is used as a diagnostic modality. Bowel-wall thickening (BWT) is a widely documented finding in patients with no history of gastroenterologic disease on the examination of abdominal computed tomographies (CT). It is not clear what significance this nonspecific finding has. **Aim:** To study the significance of large bowel thickening in the CT scan by comparing it with colonoscopic diagnosis. **Methods:** All patients with age > 20 with CECT abdomen finding of thickened large bowel wall who had undergone colonoscopy within 30 days of CT scan were included in this study. Colonoscopy was performed by experts after standard bowel preparation in all. The findings were noticed and biopsy was taken whenever necessary. Patients with known history of gastrointestinal disease such as colon cancer, IBD, Tuberculosis, infectious colitis, or diverticulitis and ascites were excluded. **Results:** 173 patients with colonic thickening in CECT were included in the study. 112 (64.73 %) patients had abnormal colonoscopy findings and 61 (35.26 %) with normal colonoscopy. 76 (43.07 %) were males and 97 (56.07 %) were females. Abdominal pain was the most common indication for CECT, 107 patients (61.84 %). 47 had bleeding per rectum (27.16 %). Mean Haemoglobin was 10.8 g /dl and 76 (43.07 %) patients had Hb < 10 g/dl. Mean ESR was 31.4 mm in and mean WBC count was 9360 /mm^3. Elevated CEA was noticed in 60 patients (34.68 %) and elevated CRP in 51 patients (28.90 %). Mean time period between CECT and colonoscopy was 14 days ± 6. **Conclusion:** Bowel wall thickening on computed tomography (CT) scan has high predictive value for abnormal colonoscopic findings which includes serious conditions like colorectal malignancy, inflammatory bowel disease and intestinal tuberculosis in patients without pre-existing gastrointestinal disease. CECT findings like Focal wall thickening and Colonic wall thickening > 7 mm and laboratory parameter of haemoglobin < 10 g /dl predict positive findings during colonoscopy in patients with colonic thickening in CECT. Colonic wall thickness of > 7 mm in CECT has a sensitivity of 60.7% and specificity of 54.1% to predict abnormal colonoscopic finding

Keywords: Colonoscopy, Bowel-wall thickening, Abdominal computed tomography

Introduction

Computer tomography (CT) is readily available and commonly used to diagnose patients with abdominal pain of unknown etiology who present in the emergency department[1]. Bowel-wall thickening (BWT) on abdominal-pelvic CT is a fairly common finding, especially in patients with abdominal pain. CT parameters used to evaluate a thickened colonic wall include: degree of thickening, attenuation pattern, symmetry, focal or diffuse involvement, and related extraluminal anomalies, such as adjacent fat stranding or lymphadenopathy[2,3]. BWT results on CT are a regular cause for gastroenterological consultation at our institution and demand for endoscopic evaluation. As a result, BWT also results in colonoscopy, which exposes patients to quantifiable risks and thus affects the quality of health care. In addition, the clinical significance of BWT has not been clearly identified, and these results are currently not recognized by the American Society of Gastrointestinal Endoscopy as an indicator for colonoscopy. In India there are no clear guidelines for the colonoscopic examination found on CT of patients with colonic-wall thickening. Previous reports evaluating the clinical relevance of colonic thickening recorded in CT is constrained by small numbers of patients and heterogeneous populations of patients[1,4-6].Most of these studies evaluated BWT as an incidental finding on CT and did not assess symptomatic patients. BWT has been

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reported to mainly reflect inflammatory bowel disease (IBD), bowel ischemia, or colorectal carcinoma[7-9].

However, depending on the degree of bowel distension the usual thickness of the colonic wall can vary significantly. The wall will be less than 3 mm thick, with the colon distended. In setting the bowel collapse or partial distension, BWT may be stated erroneously as an irregular on CT. Also, BWT can be difficult to determine due to blood, fecal content or redundant colon. Some researchers have used a 2-3 mm scale as the upper limit of normal bowel-wall thickness,[10,11] whereas others have suggested the presence of any perceptible thickening as abnormal[12].

To our knowledge, in the recent literature, only 1 broad study discusses the management and clinical effect of BWT found on CT[13]. Our study aims to study the significance of large bowel thickening in the CT scan by comparing it with colonoscopic diagnosis.

Material and method

A retrospective chart review was conducted using electronic medical records to extract data from radiological, endoscopic, and pathological studies.

Inclusion criteria: All patients with age > 20 with CECT abdomen finding of thickened large bowel walls who had undergone colonoscopy within 30 days of CT scan were included in this study. Colonoscopy was performed by experts after standard bowel preparation in all. The findings were noticed and biopsy was taken whenever necessary.

Exclusion criteria: Patients with known history of gastrointestinal disease such as colon cancer, IBD, Tuberculosis, infectious colitis, or diverticulitis and ascites were excluded.

Colonic wall thickening: Measured from the outer colon wall edge to inner wall edge

Grading of colonic wall thickening in CECT:

Table 1: Grading of colonic wall thickening in CECT

Grading	Wall thickness
Mild	4-6 mm
Moderate	7-12 mm
severe	> 12 mm

Other parameters also noticed:

1. Symmetric 2. Asymmetric

Colonic segment:

1. Focal - Only few centimetres 2. Segmental -10-30 cm 3. Diffuse - > 30 cm

Associated perienteric abnormalities:

1. Regional lymphadenopathy 2. Pericolic stranding

Results

Table 2: Comparison of demographic characteristics of patients with Abnormal and normal colonoscopy findings

Characteristics	Patients with Abnormal Colonoscopy (112)	Patients with Normal colonoscopy (61)
Male : female ratio	48 : 64 = 0.75	28 : 33 = 0.85
Mean age	57.30 ± 8.61	52.56 ± 10.42
Abdominal pain	68 (60.71%)	39 (63.93%)
Bleeding PR	34 (30.35%)	13 (21.31%)
Mean Hemoglobin	9.5 g/dl ± 3.2	11.1 g/dl ± 4.2
Hb < 10 g/dl	58 (51.78 %)	18 (29.50 %)
ESR	34 ± (8.7)	23 ± (11.2)
Total WBC	9610 ± (612)	8700 ± (780)
Serum albumin	3.6 ± (0.9)	3.9 ± (0.8)
Elevated CEA	42 (37.5%)	18 (29.50 %)
Elevated CRP	32 (28.57 %)	18 (29.50 %)

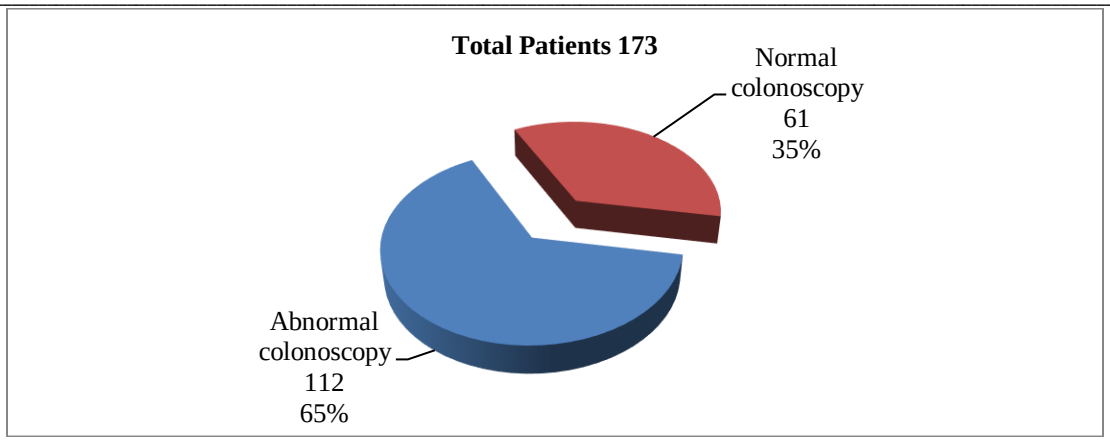

Fig 1: Distribution of patients with Abnormal and normal colonoscopy

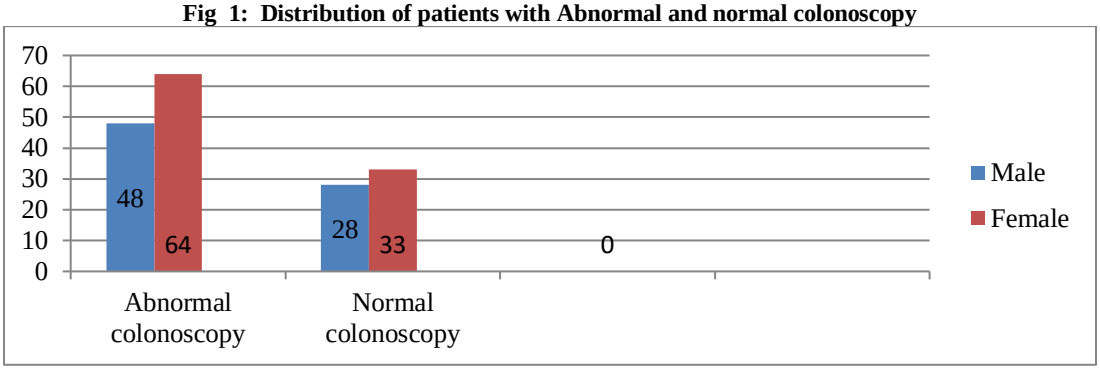

Fig 2: Sex-wise distribution of patients with Abnormal and normal colonoscopy

Total 173 patients with colonic thickening in CECT were included in the study. There were 76 (43.07 %) males and 97 (56.07 %) were females. Mean age was 56.8 ± 4.2. (Figs. 1 and 2) All the patients were typically with abdominal pain and underwent CT and colonoscopy for further analysis: 65% of patients were found to have abnormal colonoscopy, whereas only 35% had a "normal" colonoscopy. Abdominal pain was the most common indication for CECT, 107 patients (61.84 %). Mean ESR was 31.4 mm in and mean WBC count was 9360 /mm3. Elevated CEA was noticed in 60 patients (34.68 %) and elevated CRP in 51 patients (28.90 %). (Table 2)

Table 3: Comparison of CECT findings in patients with Abnormal and normal colonoscopy findings

Characteristics	Patients with Abnormal Colonoscopy (n = 112)	Patients with Normal colonoscopy(n = 61)	Total (n = 173)
(A) Focal thickening	51 (45.53 %)	20 (32.78 %)	71 (41.04 %)
Segmental thickening	38 (33.92 %)	16 (26.22 %)	54 (31.21 %)
Diffuse thickening	23 (20.53 %)	25 (40.98 %)	48 (27.74 %)
(B) Asymmetrical	67 (59.82 %)	31 (50.81 %)	98 (56.64 %)
Symmetrical	45 (40.17 %)	30 (49.18 %)	75 (43.35 %)
(C) Wall thickness 4-6 mm	35 (31.25 %)	29 (47.54 %)	64 (36.99 %)
7-12 mm	46 (41.07 %)	23 (37.70 %)	69 (39.88 %)
> 12 mm	31 (27.67 %)	9 (14.75 %)	40 (23.12 %)
Pericolic lymphadenopathy	40 (35.71 %)	9 (14.75 %)	49 (28.32 %)
Pericolic fat stranding	26 (23.21 %)	15 (24.59 %)	41 (23.69 %)

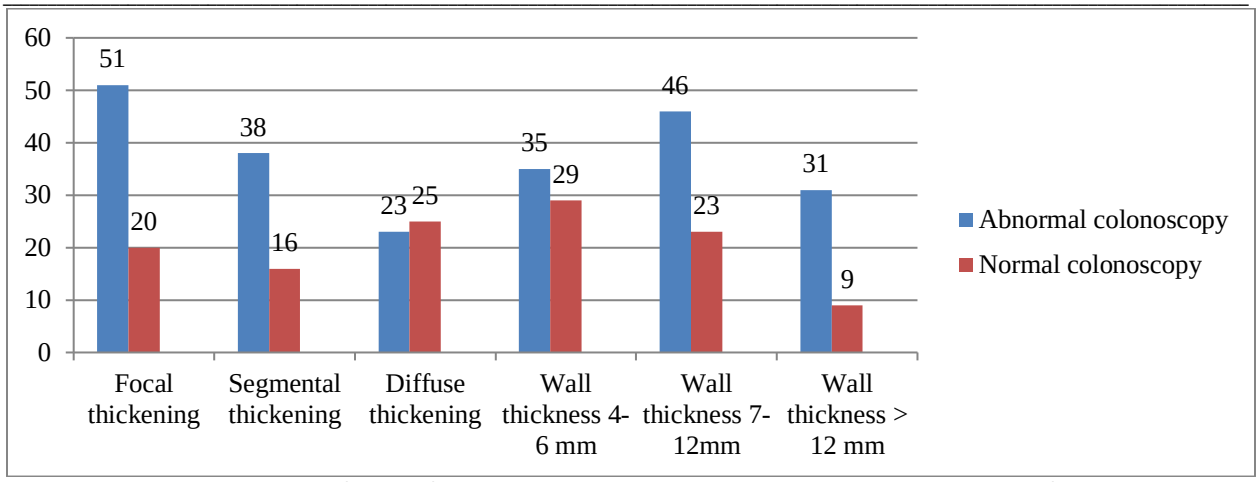

Fig 3: Comparison of CECT findings in patients with Abnormal and normal colonoscopy findings

Bowel wall thickening on computed tomography (CT) scan has high predictive value for abnormal colonoscopic findings which includes serious conditions like colorectal malignancy, inflammatory bowel disease and intestinal tuberculosis in patients without pre-existing gastrointestinal disease (Table 3 and Fig. 3).

Table 4: The Colonic wall thickening characteristics in CECT

Segments	Abnormal colonoscopy (112)	Normal colonoscopy (61)	Total (n-173)
Ascending colon	19 (16.96 %)	8 (13.11 %)	27 (15.60 %)
Transverse colon	11 (9.82 %)	7 (11.47 %)	18 (10.40 %)
Descending colon	23 (20.53%)	10 (16.39 %)	33 (19.07 %)
Sigmoid colon and rectum	34 (30.35%)	13 (11.60 %)	47 (27.16 %)
Diffuse involvement	23 (20.53 %)	25 (40.98 %)	48 (27.75 %)

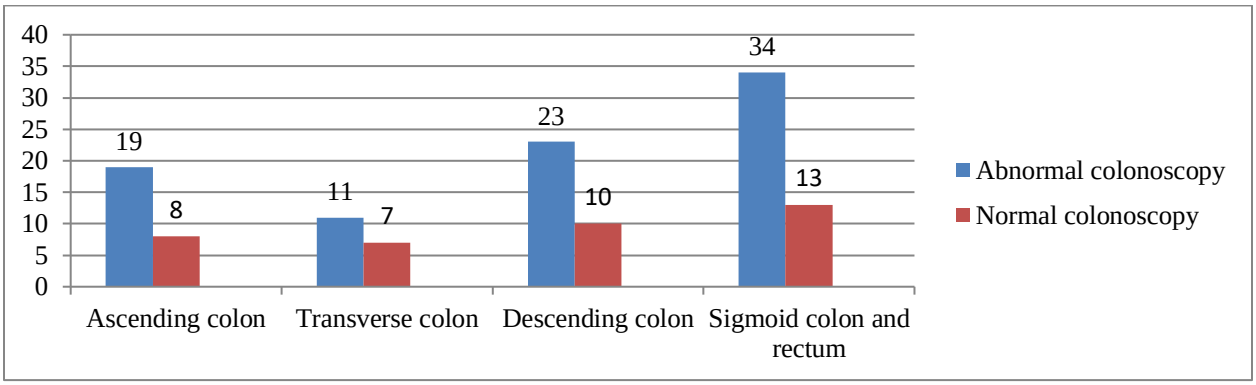

Fig 4: The Colonic wall thickening characteristics in CECT

Table 3 and Figure 4 shows the Colonic wall thickening characteristics in CECT. 47 had bleeding per rectum (27.16 %).

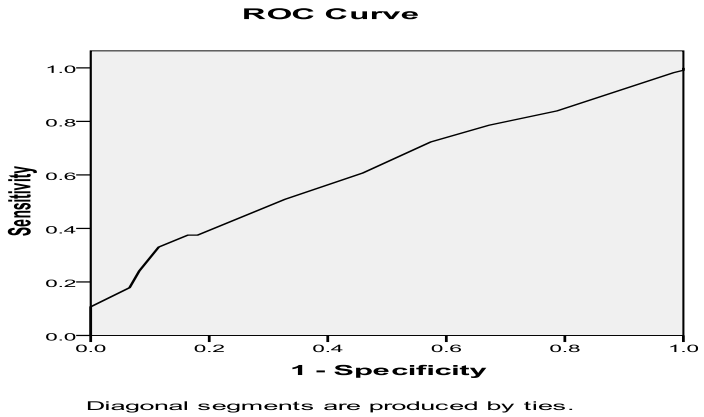

Fig 5: ROC curve to determine the cut off value of colonic wall thickening to predict abnormal colonoscopic diagnosis

A Wall thickness of 7.0 mm was associated with a sensitivity of 60.7%, and specificity of 54.1% and an area under an ROC curve (AUROC) of 0.623. (Fig. 5)

Table 5: Univariate analysis to detect association between abnormal colonoscopy finding in patients with Colonic wall thickening in CECT

Variables	P value	OR	95 % CI
Lymphadenopathy	0.003	3.210	1.433-7.189
Hemoglobin < 10 g/dl	0.017	2.224	1.146-4.318
Focal thickening	0.004	2.687	1.353-5.336
Segmental wall thickness	0.030	2.137	1.068-4.277
Wall thickness > 7mm	0.046	1.941	1.008-3.736

CECT findings like Focal wall thickening and Colonic wall thickening > 7 mm and laboratory parameter of haemoglobin < 10 g /dl predict positive findings during colonoscopy in patients with colonic thickening in CECT (Table 5)

Table 6: Binary logistic regression analysis

Variables	Significance
Lymphadenopathy	0.086
Haemoglobin < 10 g/dl	0.034
Focal thickening	0.005
Wall thickness > 7mm	0.008
Segmental wall thickness	0.283

Variables independently associated with abnormal colonoscopic finding in patients with colonic thickening in CECT abdomen are:

- Focal wall thickening
- Colonic wall thickening > 7 mm
- Hemoglobin < 10 g/dl

Colonic wall thickness of > 7 mm in CECT has a sensitivity of 60.7 % , and specificity of 54.1 % to predict abnormal colonoscopic findings. Mean Haemoglobin was 10.8 g /dl and 76 (43.07 %) patients had Hb < 10 g/dl (Table 6).

Table 7: Final diagnosis in patients with colonic thickening in CECT abdomen

Diagnosis	Total No.	Percentage
Colonic polyps	24	13.87%
Adenocarcinoma colon	22	12.71%
Tuberculosis	14	8.09%
Inflammatory bowel disease	14	8.09%
Diverticulosis	12	6.93%
Non specific colitis	11	6.35%
Ischemic colitis	10	5.78%

Others	5	2.89%
Normal study	61	35.26%

Colonic thickening in the CECT abdomen has abnormal colonoscopic findings which includes serious conditions like colorectal malignancy, inflammatory bowel disease and intestinal tuberculosis in patients without pre-existing gastrointestinal disease. Colonic polyps and Adenocarcinoma colon were the most common diagnoses and represented 13.87% and 12.71% of findings, respectively (Table 7).

Discussion

To date, no prospective trials have been conducted or clinical guidelines have been proposed to examine the issue of a BWT clinical report on radiological abdominal CTs in relation to endoscopic findings on colonoscopy follow-up. Several studies investigated the reported clinical significance of BWT on an abdominal CT. A research performed by Rockey et al [6]found that BWT is associated with severe colonoscopy pathology in around 67 per cent of patients. Similarly, a retrospective review of 40 patients by Moraitis et al[1] found that 23 percent of BWT patients had colonic neoplasia and suggested colonoscopy for further examination, although most patients in this study had no pathology. Another retrospective study conducted in community hospitals found a correlation rate of 64 per cent between BWT and abnormal colonoscopy with non-specific colitis as the most common cause of colonoscopic patients[14]. More recently, a study of 107 patients with abdominal pain reported similar results to ours in an American teaching hospital, with just 26% having regular colonoscopies and the majority getting IBD (9.3%), ischemic colitis (36.4%), infectious colitis (15%), and cancer (7.4%), with a small minority getting other miscellaneous endoscopic findings[13].The results of our analysis support many of the findings from previous studies, although we limited our study to patients who had no gastrointestinal disease diagnosis prior to a CT. While normal colonoscopy was a common finding, abnormal colonoscopy was reported in 65% of patients, which has implications for subsequent management in Colonic polyps, Adenocarcinoma colon, Tuberculosis and Inflammatory bowel disease.

Conclusion

From our findings, we have concluded that BWT's CT finding is helpful in gastrointestinal pathology diagnosis and guides further diagnostic and therapeutic management plans.Bowel wall thickening on computed tomography (CT) scan has high predictive value for abnormal colonoscopic findings which includes serious conditions like colorectal malignancy, inflammatory bowel disease and intestinal tuberculosis in patients without pre-existing gastrointestinal disease. CECT findings like Focal wall thickening and Colonic wall thickening > 7 mm and laboratory parameters of haemoglobin < 10 g/dl predict positive findings during colonoscopy in patients with colonic thickening in CECT. Colonic wall thickness of > 7 mm in CECT has a sensitivity of 60.7 % and specificity of 54.1% to predict abnormal colonoscopic finding

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Conflict of Interest: Nil
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