Correlation of Computed Tomography of Colonic Wall Thickening with Colonoscopy

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Abstract

\textbf{Introduction:} Computed Tomography of abdomen frequently shows bowel wall thickening with different grades and characteristic of thickening. The correlation of bowel wall thickening (BWT) with endoscopic findings is not well described in Indian population. Therefore we did this study to determine the correlation of BWT with endoscopic findings.

\textbf{Methods:} Its Prospective single center study with 85 Consecutive patients with age group more than 12 years with CT scan abdomen showing bowel wall thickening were included in the study. Colonoscopy was done subsequently within a span of 15 days with appropriate bowel preparation. Colonoscopic correlation was done in relation to site, degree and characteristic of thickening. Biopsies were taken at the site of visible abnormalities on endoscopy and from normal appearing mucosa in case of strong suspicious of disease.

\textbf{Results:} Total of 85 (37 men) consecutive symptomatic patients with colonic wall thickening on computed tomography underwent colonoscopy. The mean age group was 34.2 (SD±17.35) years. Endoscopy was normal in 20 patients (24%) and abnormal in 65 patients (76.5%). Patients with mild thickening were more likely to have normal endoscopy than those with moderate/severe thickening (19 versus 1 patient; \( p<0.001 \)). The abnormality rate was similar across different bowel segments (left vs right side; 85.7% versus 76.5%, \( p<0.57 \)). Out of 65 patients with endoscopic abnormality, 41 (62.12%) had tuberculosis, 10 (15.16%) had malignancy. Most common cause of IC thickening was secondary to tuberculosis (n=40, 95.2%).

\textbf{Conclusion:} A proportion of patients with thickening on CT scan, especially mild, may have normal colonoscopy. Patients should be counseled about the same prior to colonoscopy. However, colonoscopy should be done to rule out abnormality even when CT shows mild thickening.

Introduction

Bowel wall thickening (BWT) is an increasingly recognized entity on Computed Tomography (CT) of abdomen. It could represent inflammatory, infectious, ischemic or neoplastic pathology or sometimes it may be normal.\textsuperscript{1} Clinicians often see patients with or without abdominal complaints with imaging showing bowel thickening. Based on imaging findings such patients are often referred for endoscopic evaluation. However there is always a dilemma for doing diagnostic endoscopy as there are no definite guidelines published on this issue. This dilemma arises in patients with low index of suspicion for sinister pathology or in the elderly patients in whom invasive procedure can cause high procedure related complications.

Some studies have tried to correlate CT reports of BWT with subsequent endoscopic findings.\textsuperscript{1,5-8} There is lack of published data from India. We conducted this study to determine whether a CT finding of BWT predicted a pathological findings on subsequent endoscopic evaluation of the reported site of BWT. We also sought correlation of degree and nature (regular versus irregular) of BWT on CT with endoscopic abnormalities.

\textbf{Methods} This was a prospective observational study conducted between 1st June 2017 and 30th October 2017 at the Lokmanya Tilak Municipal Medical College Sion, Mumbai. 85 Consecutive patients with age group more than 12 years with CT scan abdomen showing bowel wall thickening were included in the study. Colonoscopy was done subsequently within a span of 15 days with appropriate bowel preparation. Colonoscopic correlation was done in relation to site, degree and characteristic of thickening. Biopsies were taken at the site of visible abnormalities on endoscopy and from normal appearing mucosa in case of strong suspicious of disease.

Results Total of 85 (37 men) consecutive symptomatic patients with colonic wall thickening on computed tomography underwent colonoscopy. The mean age group was 34.2 (SD±17.35) years. Endoscopy was normal in 20 patients (24%) and abnormal in 65 patients (76.5%). Patients with mild thickening were more likely to have normal endoscopy than those with moderate/severe thickening (19 versus 1 patient; \( p<0.001 \)). The abnormality rate was similar across different bowel segments (left vs right side; 85.7% versus 76.5%, \( p<0.57 \)). Out of 65 patients with endoscopic abnormality, 41 (62.12%) had tuberculosis, 10 (15.16%) had malignancy. Most common cause of IC thickening was secondary to tuberculosis (n=40, 95.2%).

Conclusion A proportion of patients with thickening on CT scan, especially mild, may have normal colonoscopy. Patients should be counseled about the same prior to colonoscopy. However, colonoscopy should be done to rule out abnormality even when CT shows mild thickening.

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thickening were included in the study. Demographic data was collected for all patients. Patients with past history of gastrointestinal surgery for any bowel pathology, gastrointestinal malignancy, intestinal tuberculosis were excluded from the study. On CT BWT was graded as mild (3-5 mm), moderate (6-9 mm) and severe (>10 mm) in presence of satisfactory distention. For the purpose of correlation with endoscopy BWT on CT was categorized into following four segments (1) Right segment: which included ascending colon, IC valve, cecum and terminal ileum. (2) Left segment: which included descending and recto-sigmoid colon. (3) Transverse colon. (4) Combination of segments: which included involvement of more than 1 segment including hepatic or splenic flexure. All scans were reported by two senior consultant radiologists (with at least 10 years of experience) from the Department of Radiology, LTMGH, Sion Hospital, Mumbai. Colonoscopy after written informed consent from each patient was done subsequently within a span of 15 days with appropriate bowel preparation using low volume (2 litre) split dose regime of PEG 3350 powder. Standard white light direct-view endoscope with a series of Q150 L (Olympus CF, Tokyo, Japan) was used to perform the procedure. Biopsies were taken at the site of visible abnormalities on endoscopy and from normal appearing mucosa in case of strong suspicious of disease. Histopathological examination confirmed the diagnosis. This study has been approved by institutional ethics committee and is accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Statistical analysis

Continuous variables were presented as a mean with standard deviation while categorical variables were presented as proportions. Categorical variables were compared by Chi-square test and Fisher Exact Test. P value of less than 0.05 was considered statistically significant.

Results

Total 105 patients were assessed for eligibility. 85 patients met inclusion criteria who underwent colonoscopy after written informed consent for the same.

Total of 85 patients who fulfilled inclusion criteria were included in the study. Out of these 37 (43.5%) were male and 48 (56.5%) were female patients. Mean age group was 34.9 years (±SD of 17.3). Chief complaint was pain in abdomen seen in 74 patients (87%). Most common site of pain was right lower quadrant of abdomen followed by left lower quadrant. Other symptoms like fever, weight loss, bleeding per rectum and diarrhea seen in 28 (32%), 25 (30%), 13 (15.3%) and 12 (14.1%) respectively (Table 1).

On Computed Tomography scan 60 patients (69.5%) had right side colonic thickening. 14 patients (16.5%) had left side thickening and 8 patients (10.5%) had a thickening involving multiple colonic segments. While isolated transverse colon thickening was seen in only 3 (3.5%) patient which was least common affected site. Distribution of degree and characteristic of thickening is as shown in Table 2.

When we studied degree of BWT, 37 (43.5%) patients had mild (<5 mm), 38 (44.8%) had moderate (6-9 mm) and 10 patients (11.7%) had severe thickening (10 mm or more) on CT scan. Those with mild thickening 19 out of 37 patients (51%) had normal colonoscopy. Out of 19 patients with mild thickening involving IC region 15 had normal endoscopic findings (Figure 2). In moderate to severe thickening group only 1 patient out of 48 had normal colonoscopy. In severe thickening group 5 patients had large polypoidal lumen occluding growth which turned out to be malignancy on histopathology (Figure 3). This correlation of degree of thickening on CT with endoscopic was statistically significant (P<0.001) (Table 3).

Out of 65 patients, 42 had lesions involving IC region. In 40 patients (95.2%) IC thickening was secondary to tuberculosis (Figure 3). Only one patient had cecal malignancy and the other one had Crohns disease involving terminal ileum and IC junction. Out of 10 patients with rectosigmoid lesion on endoscopy 9 had malignancy (Figure 4) and one patient had tuberculosis of rectum. The frequency of the diseases diagnosed on histopathology is as shown in Table 4.
20

Table 4: Diagnosis on histopathology

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n=65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculosis</td>
<td>41 (62.12%)</td>
</tr>
<tr>
<td>Malignancy</td>
<td>10 (15.16%)</td>
</tr>
<tr>
<td>Crohn disease</td>
<td>3 (4.54%)</td>
</tr>
<tr>
<td>SRUS</td>
<td>2 (3.03%)</td>
</tr>
<tr>
<td>Nonspecific colitis</td>
<td>6 (10.6%)</td>
</tr>
<tr>
<td>Diverticular disease</td>
<td>3 (4.54%)</td>
</tr>
</tbody>
</table>

Table 5: Site of bowel wall thickening and positive endoscopic finding at the site

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of patients with BWT on CT</th>
<th>No. of patients with abnormal endoscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right segment</td>
<td>60</td>
<td>46 (76.7%)</td>
</tr>
<tr>
<td>Left segment</td>
<td>14</td>
<td>12 (85.7%)</td>
</tr>
<tr>
<td>Transverse colon</td>
<td>3</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Combination of thickening</td>
<td>8</td>
<td>4 (50%)</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>65 (76.5%)</td>
</tr>
</tbody>
</table>

Table 6: Correlation of characteristic of thickening with etiology

<table>
<thead>
<tr>
<th>CT findings</th>
<th>Diagnosis on histopathology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TB (n=41)</td>
</tr>
<tr>
<td>Regular</td>
<td>33 (80.49%)</td>
</tr>
<tr>
<td>Irregular</td>
<td>8 (19.5%)</td>
</tr>
</tbody>
</table>

Total 65 (76.47%) patients showed abnormal findings on endoscopy. 20 patients (23.53%) with BWT did not have any abnormality on endoscopy. The overall correlation of BWT on CT with endoscopic finding was seen in 65 patients (76.5%). It correlated more on left side compared to right side (85.7% versus 76.5%).

However this correlation was not statistically significant (P value < 0.57). Correlation of multiple sites thickening was observed in only 50% of patients. While this was 100% when CT showed thickening involving transverse colon (Table 5).

12 out of 14 cases of malignancy (83.3%) on CT showed irregular thickening with or without loss of fat planes. In patients with intestinal tuberculosis 19.5% (8 out of 41 cases) had irregular, thickening on CT scan (p<0.05) (Table 6).

Discussion

In this study correlation of BWT on CT with abnormal findings on colonoscopy correlated well on left side compared to right side (85.7% versus 76.7%). Overall this correlation of BWT on CT and abnormal endoscopy at the exact same site was seen in 76.5% patients. CT finding of BWT with evident pathology was seen with highest frequency involving IC region involving rectosigmoid region. There was good correlation for malignancy on CT in respect to site, degree and the characteristic of thickening compared to other abnormalities on endoscopy. In India so far the studies of correlation of bowel wall thickening with endoscopy findings have been done for etiological purpose and for differentiating intestinal tuberculosis from Crohn’s disease. However when CT shows BWT, there are no studies

Fig. 2: Mild IC thickening on CT scan and normal findings on subsequent endoscopy

Fig. 3: Moderate IC thickening on CT scan and its corresponding ulceronodular lesion involving IC on Endoscopy

Fig. 4: Rectal thickening on CT scan with corresponding rectal growth on endoscopy
for specific recommendation of further diagnostic evaluation. When there is low possibility of disease in presence of BWT on CT dilemma occurs for doing endoscopy. This study correlated BWT on CT with endoscopy in terms of site of thickening as well as characteristic and degree of thickening. This correlation was seen in 57.58% cases in a study by MM Uzzmann et al. Other studies done by Rockey et al, Moraitis et al and Wolff et al showed correlation in 67%, 72% and 74% cases respectively.6-8 These studies recommended endoscopic evaluation despite showing inconsistent correlation of BWT on CT with endoscopy and mostly dealt with malignant pathology. We showed that the correlation of BWT was better for left colonic pathology compared to right colon. Uzzmann et al also noticed the same observation.1 In his study it was 48.4% for right side compared to 62.4% on left side. Cai et al also showed an 81% correlation with rectosigmoid lesions but only 13% with cecal lesions.9 Similar findings were observed by Eskaros et al and Shin et al.10,11 Bowel wall thickness is measured as the distance from the outer colon wall edge (defined as interface between mesenteric fat and bowel wall) to the inner bowel edge which is demarcated by noting the interface between bowel wall and intestinal gas or contrast. Normal bowel wall thickness should measure approximately 3mm.9 The degree of BWT has been graded by Bharucha et al as mild (3-6mm), moderate (6-12mm) and severe (>12mm).1 In present study fifty percent of patients with mild thickening (less than 5mm) involving IC region had normal endoscopy. Most of these patients had nonspecific abdominal complaints. However in rest of the patients with mild thickening endoscopy has revealed some abnormalities. Thus despite inconsistent results of correlation as described by above mentioned studies colonoscopy should be done to rule out the abnormalities. Cai et al suggested that the relatively high mobility of cecum makes it more likely to collapse and give artifactual pictures. In addition the effects of contrast agents are likely to induce less distention on the right colonic wall compared with left side, predisposing to more false positive readings.9 Furthermore there are differences in venous drainage pathways, hydrostatic pressures and collateral formation that could explain the inconsistent correlations between right and left colonic segments.

**Conclusion**

This study shows the correlation of site of bowel wall thickening on CT scan as well as the degree and characteristic of thickening. Degree of thickening on CT has good correlation of finding abnormalities on endoscopy especially when BWT is more than 5mm on CT scan.

As this is single center data the findings should be validated by other centers. Endoscopy would pick up only mucosal abnormalities. For deeper pathology involving muscularis and serosal layer which is involved in few diseases full thickness biopsy would be necessary as endoscopic biopsy could miss the diagnosis.

**Abbreviations**


**References**


