Volume - 15 | Issue - 06 | June - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ROLE OF MULTIDETECTOR COMPUTED TOMOGRAPHY (MDCT) IN EVALUATION OF SMALL AND LARGE BOWEL ABNORMALITIES - SIGNIFICANCE AND PITFALLS IN INTERPRETATION

Radio-Diagnosis

Dr. Anukriti Parashar*	Postgraduate Junior Resident JR-3, Dept. of Radiodiagnosis - JNUIMSRC *Corresponding Author
Dr. Usha Jaipal	Head of Department, Dept. of Radiodiagnosis - JNUIMSRC
Dr. Sujay Parge	Senior Resident, Dept. of Radiodiagnosis - JNUIMSRC

ABSTRACT

Background: Multidetector computed tomography (MDCT) has emerged as the cornerstone imaging modality for evaluating small and large bowel abnormalities, offering superior spatial resolution, rapid acquisition and multiplanar reconstruction capabilities. Despite its proven diagnostic value, MDCT interpretation in bowel diseases is associated with recognized pitfalls including motion artifacts, contrast-related limitations and overlapping appearances between benign and malignant conditions.**Methodology:** This cross-sectional prospective study was conducted in the Department of Radio-Diagnosis at Jaipur National University Institute of Medical Sciences and Research Centre (JNUIMSRC), Jaipur over the period 2024-2026. Fifty patients presenting with clinical features suggestive of small or large bowel pathology including abdominal pain, bleeding per rectum, melena, hematemesis and bowel obstruction symptoms were enrolled using random convenient sampling. All patients underwent MDCT examination using a SIEMENS GO-TOP 128-slice scanner with standardized oral, rectal and intravenous contrast protocols. Imaging findings including bowel wall thickness, symmetry of thickening, length of involvement, mesenteric fat stranding, lymphadenopathy, obstruction, pneumoperitoneum and ascites were systematically analyzed. MDCT impressions were correlated with histopathological and intraoperative findings wherever available. Statistical analysis was performed using the Chi-square test and Fisher's exact test with $p<0.05$ considered significant.**Results:** The study comprised 50 patients with a mean age of 46.04±19.253 years and a male predominance (64%). The most common presenting complaint was abdominal pain (26%). The cecum was the most frequently involved segment. Bowel wall thickening of >7 mm was present in 38% of cases; asymmetrical thickening in 48% and focal involvement in 38%. The most common MDCT impressions were Crohn's disease (12%), ischemic colitis (10%) and small bowel obstruction (10%). Histopathology most frequently revealed ischemic changes (10%) and ulceration with inflammation (10%). MDCT achieved 100% sensitivity, 75% specificity, 95.5% positive predictive value and 100% negative predictive value in differentiating benign from malignant lesions. The MDCT-HPE correlation was statistically significant ($\chi^2 = 35.795$; $p<0.001$).**Conclusion:** MDCT is a highly reliable, non-invasive imaging modality with excellent diagnostic accuracy for evaluating small and large bowel abnormalities. Its high sensitivity and negative predictive value make it particularly effective in detecting and confidently ruling out malignancy. Strong correlation with histopathology validates its role as the primary imaging tool in the diagnostic workup of bowel diseases.

KEYWORDS

Multidetector Computed Tomography, Mdct, Bowel Abnormalities, Bowel Wall Thickening, Small Bowel Obstruction, Large Bowel, Histopathology Correlation, Sensitivity, Specificity.

INTRODUCTION

Multidetector computed tomography (MDCT) has revolutionized the diagnostic approach to gastrointestinal disorders and has become the cornerstone imaging modality for evaluating both small and large bowel abnormalities.[1,2] The transition from single-slice CT to multidetector systems has significantly improved visualization of bowel pathology by enhancing detail, speed and accuracy.[3] MDCT provides superior spatial and temporal resolution, allowing comprehensive assessment of bowel wall thickness, enhancement patterns, luminal distension and surrounding inflammatory changes, which are essential for accurate diagnosis and treatment planning.[4] Its role extends beyond anatomical evaluation as it effectively detects acute inflammatory conditions such as appendicitis, diverticulitis and inflammatory bowel disease with high precision.[2] The ability to simultaneously evaluate extracolonic structures and bowel wall provides detailed information about disease extent, complications and treatment response with diagnostic accuracy reaching sensitivity up to 100% and specificity of 94.12%.[5,6]

In cases of small bowel obstruction, MDCT is highly effective in confirming the presence of obstruction and identifying its exact location, cause and severity.[1,7] It can differentiate between mechanical and functional obstruction and determine whether the cause is intrinsic, extrinsic or intraluminal.[4] This comprehensive evaluation makes MDCT particularly valuable in emergency settings where rapid diagnosis is essential for appropriate management and surgical decision-making.[6] For inflammatory bowel diseases, MDCT offers detailed visualization of mural thickening, strictures, fistulas and abscesses, enabling assessment of disease activity and monitoring of treatment response.[8] It also evaluates mesenteric involvement, lymph node enlargement and extraintestinal manifestations contributing to accurate disease staging.[2] MDCT enterography further enhances small bowel visualization through specialized contrast protocols, improving detection of lesions not accessible by conventional endoscopy.[9]

Despite its advantages, MDCT interpretation has several pitfalls that may lead to diagnostic errors.[10,11] One of the common challenges is differentiating residual fecal material from true pathological lesions, especially when bowel preparation is inadequate, as fecal matter may mimic soft tissue attenuation and result in false-positive findings. Post-processing artifacts also present difficulties, particularly with advanced 3D reconstruction techniques, where geometric distortions and digital fluid subtraction may produce pseudolesions or affect polyp size assessment.[10] These technical limitations require adequate training and experience for accurate interpretation. Additionally, MDCT has limitations in definitive tissue characterization and cannot always distinguish between inflammatory and neoplastic processes, making histopathological correlation essential for accurate diagnosis.[8] Therefore, MDCT findings should be integrated with clinical presentation and laboratory parameters for comprehensive evaluation. With ongoing technological advancements, including improved detector systems, enhanced contrast protocols and sophisticated post-processing techniques, MDCT continues to evolve and improve diagnostic performance. The integration of artificial intelligence and computer-aided detection systems may further enhance diagnostic accuracy and reduce interpretation variability.[12] However, fundamental principles such as proper technique selection, adequate patient preparation and systematic interpretation remain essential to achieve optimal clinical outcomes and ensure high-quality patient care.[13]

METHODOLOGY

Study Design and Setting

This was a cross-sectional, prospective study conducted in the Department of Radio-Diagnosis at Jaipur National University Institute of Medical Sciences and Research Centre (JNUIMSRC), Jaipur. The study was carried out over the period 2024-2026 after obtaining approval from the Institutional Ethics Committee. A total of 50 patients were enrolled using random convenient sampling from both inpatient and outpatient departments, included irrespective of age or sex. Patients presenting with clinical symptoms suggestive of small or large bowel pathology were included - these comprised hematemesis,

 PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

melena, bleeding per rectum, abdominal pain, abdominal distension, altered bowel habits, vomiting and other related symptoms. Patients with a clinical suspicion of subacute or chronic bowel obstruction and trauma patients were also included. Exclusion criteria included patients who did not provide written informed consent and those with contraindications to CT contrast agents. Written informed consent was obtained from all patients or their legal guardians prior to participation.

Equipment

All CT examinations were performed using a SIEMENS GO-TOP multidetector computed tomography scanner, a 128-slice (maximum 384 slices per rotation) system with rotation time up to 0.33 seconds, tube voltage 70-140 kV in 10-kV steps, tube current up to 825 mA, z-coverage of 64 × 0.6 mm and maximum table load up to 307 kg. The scanner was calibrated regularly and was capable of acquiring thin-section images, allowing high-resolution multiplanar reconstructions for detailed evaluation of bowel pathology.

Patient Preparation and Positioning

Patients were instructed to fast for an appropriate duration before the scan, particularly when intravenous contrast administration was planned. All patients were positioned in the supine position on the CT table with both upper extremities extended above the head to minimize artifacts and improve image quality. Scan coverage extended from the level of the diaphragm to the symphysis pubis, ensuring complete visualization of the small and large bowel along with associated mesenteric structures. In selected cases where duodenal pathology was suspected, right lateral decubitus positioning was additionally performed to facilitate optimal opacification of the second part of the duodenum with oral contrast, providing better delineation of the duodenal wall and improving differentiation from adjacent pancreatic structures.

Contrast Administration

- Oral Contrast: A water-soluble oral contrast agent was used for bowel opacification in all patients using a diphasic protocol. A total of 50 ml of diatrizoate sodium meglumine (76% w/v) was diluted in 1 litre of water. Of this solution, 750 ml was administered approximately 2 to 2½ hours prior to examination to opacify the small and large bowel loops and the remaining 250 ml was administered immediately before the scan to achieve adequate opacification of the stomach and duodenum. This technique ensured optimal bowel distension and improved visualization of bowel wall thickening, mucosal enhancement, luminal narrowing and extraluminal pathology.

- Rectal Contrast: In selected cases where colonic pathology was suspected, a positive contrast agent consisting of 40 ml of diatrizoate sodium meglumine (76% w/v) diluted in 250 ml of water was administered gently via the rectum. This facilitated adequate colonic distension and improved delineation of colonic wall abnormalities, strictures, diverticula and mass lesions.

- Intravenous Contrast: A non-ionic, low-osmolar intravenous contrast agent, iohexol (Omnipaque), was used. Adult patients received 100-120 ml, while pediatric patients received a weight-based dose of 2.2 ml/kg body weight. Contrast was administered through an antecubital vein using a power injector at a flow rate of 2-3 ml/sec. Scanning was initiated after a delay of approximately 20 seconds, corresponding to peak arterial enhancement, allowing optimal evaluation of bowel wall enhancement patterns, mesenteric vessels and associated vascular abnormalities.

Scanning Technique and Image Acquisition

Initial non-contrast CT (NCCT) scans were obtained for all patients using 10 mm slice thickness with additional 5 mm slices in areas of suspected pathology. Non-contrast images were useful in identifying bowel wall calcification, intramural hemorrhage, pneumatosis intestinalis, free air and baseline attenuation characteristics. Subsequently, contrast-enhanced CT (CECT) scans were performed using the same scanning parameters with additional 3 mm thin-section images acquired wherever necessary for better lesion characterization and accurate assessment of bowel wall involvement. In selected cases, right lateral decubitus scans were obtained using 5 mm slices in the region of interest. Multiplanar reformations in coronal and sagittal planes of 3 mm thickness at 5 mm intervals and curved planar reformations along specific bowel loops were routinely obtained for evaluating transition points and underlying causes of obstruction.

Statistical Analysis

All collected data were validated prior to analysis by checking for completeness, identification of outliers and correction of typographical errors. Quantitative variables were assessed for normality using visual inspection of histograms and Q-Q plots, along with statistical measures including skewness and kurtosis Z-values and the Shapiro-Wilk test. Associations between categorical variables and normally distributed numerical variables were analyzed using the unpaired Student's t-test, while associations between two categorical variables were evaluated using the Chi-square test or Fisher's exact test wherever applicable. All statistical analyses were performed using two-tailed tests and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic and Patient Characteristics of Study Participants

Parameters	Frequency (n=50)	Percent (%)
Age Group		
≤20 years	6	12%
21-30 years	3	6%
31-40 years	10	20%
41-50 years	9	18%
51-60 years	11	22%
61-70 years	5	10%
>70 years	6	12%
Mean ± SD	46.04 ± 19.253	-
Gender		
Male	32	64%
Female	18	36%
Presenting Symptom		
Abdominal pain	13	26%
Constipation	8	16%
Per rectal bleeding	5	10%
Abdominal distension	4	8%
Fever + abdominal pain	4	8%
Vomiting	4	8%
Abdominal pain + Vomiting	3	6%
Diarrhea	3	6%
Melena	3	6%
Anorexia + Weight loss	2	4%
Abdominal pain + Diarrhea	1	2%
Anemia Status		
Anemic	24	48%
Non-anemic	26	52%

The study comprised 50 patients with a mean age of 46.04 ± 19.253 years. The largest age group affected was 51-60 years (22%), followed by 31-40 years (20%) and 41-50 years (18%), indicating that bowel abnormalities were most frequently encountered in middleS-aged adults. Males accounted for 64% of the study population, reflecting a clear male predominance. Abdominal pain was the most common presenting complaint (26%), followed by constipation (16%) and per rectal bleeding (10%), highlighting the diversity of clinical presentations prompting MDCT evaluation. Approximately half of the patients (48%) were anemic, reflecting the clinical burden of chronic inflammatory, ischemic and neoplastic bowel pathologies in this study.

Table 2: Bowel Wall Thickness, Symmetry and Length of Involvement on MDCT

Parameters	Frequency	Percent
Bowel Wall Thickness		
<3 mm	11	22%
3-5 mm	5	10%
5-7 mm	15	30%
>7 mm	19	38%
Symmetry of Thickening		
Asymmetrical	24	48%
Symmetrical	12	24%
Not applicable	14	28%
Length of Involvement		
Focal	19	38%
Segmental	18	36%
Diffuse	13	26%

The most commonly encountered bowel wall thickness on MDCT was >7 mm, seen in 19 cases (38%), followed by 5-7 mm in 15 cases (30%), indicating that moderate-to-marked bowel wall thickening was the predominant finding in this study. Asymmetrical thickening was the most frequent pattern of involvement (48%), suggesting eccentric or irregular mural disease predominantly affecting one side of the bowel wall, which is more often associated with neoplastic and advanced inflammatory pathology. Focal involvement was the most common extent pattern (38%), followed closely by segmental (36%) and diffuse (26%) involvement indicating that localized discrete lesions represented the largest single category of bowel involvement in this study.

Table 3: Mesenteric Fat Stranding and Lymphadenopathy on MDCT

Parameters	Frequency	Percent
Mesenteric Fat Stranding		
None	11	22%
Mild	12	24%
Moderate	16	32%
Severe	11	22%
Mesenteric		
None	11	22%
Mild	22	44%
Moderate	15	30%
Severe	2	4%

Mesenteric fat stranding was present in 78% of patients (those with mild, moderate or severe stranding) with moderate stranding being the most frequent grade (32%), indicating that peri-bowel inflammatory changes were widespread across the study population and not restricted to any single disease entity. Mesenteric lymphadenopathy was detected in 78% of cases with mild lymphadenopathy being the most common degree (44%), reflecting that lymph node involvement was a common accompaniment to bowel pathology regardless of etiology, while severe lymphadenopathy remained uncommon (4%).

Table 4: Obstruction, Pneumoperitoneum and Ascites on MDCT

Parameters	Frequency	Percent
Obstruction		
Present	13	26%
Partial	9	18%
Absent	28	56%
Pneumoperitoneum		
Present	7	14%
Absent	43	86%
Ascites		
None	32	64%
Minimal	10	20%
Mild	7	14%
Moderate	1	2%

Obstruction was identified in 26% of patients as complete obstruction and in 18% as partial obstruction, while 56% showed no obstruction, confirming that the study represented a broad spectrum of bowel disease beyond obstructive pathology alone. Pneumoperitoneum was detected in 14% of cases, representing a critical minority who required urgent evaluation for bowel perforation. Ascites of varying degrees was present in 36% of patients, occurring predominantly in association with inflammatory, infective or ischemic conditions.

Table 5: Correlation between MDCT Findings and Histopathology

	HPE: Benign	HPE: Malignant	Total
MDCT: Benign	42	2	44
MDCT: Malignant	0	6	6
Total	**42**	**8**	**50**

$\chi^2 = 35.795$; $p < 0.001$

MDCT classified 44 cases as benign, of which 42 were confirmed benign on histopathology and 2 were malignant (false negatives). All 6 cases labeled malignant by MDCT were confirmed malignant on histopathology (true positives) with no false positive malignant diagnoses. The association between MDCT and histopathological classification was highly statistically significant ($\chi^2 = 35.795$; $p < 0.001$) demonstrating robust concordance between imaging and pathological diagnosis. The benign diagnoses encompassed inflammatory bowel disease (Crohn's disease, ulcerative colitis), ischemic colitis, intestinal tuberculosis, appendicitis, diverticulitis, small bowel obstruction and infectious enterocolitis, while confirmed malignancies included adenocarcinoma with invasion and lymphoma.

Table 6: Diagnostic Accuracy of MDCT Compared to Histopathology

Accuracy Parameter	Value
Sensitivity	100.0%
Specificity	75.0%
Positive Predictive Value	95.5%
Negative Predictive Value	100.0%

MDCT demonstrated 100% sensitivity and 100% negative predictive value for detecting malignant bowel lesions, indicating that no true malignancy was missed by MDCT in this study. The specificity was 75.0%, reflecting that a small number of benign lesions (2 cases) were classified as malignant by MDCT imaging criteria alone. The positive predictive value of 95.5% confirms that the vast majority of MDCT-malignant impressions were confirmed as true malignancies on histopathology. These collectively validate MDCT as a highly reliable screening and diagnostic tool for bowel pathology, particularly for confidently excluding malignancy when the MDCT impression is benign.

DISCUSSION

The present study was undertaken to evaluate the role of multidetector computed tomography (MDCT) in the assessment of bowel abnormalities with emphasis on lesion characterization, distribution, associated radiological findings and diagnostic correlation with histopathology wherever available. MDCT has emerged as a pivotal imaging modality in the evaluation of gastrointestinal diseases because of its rapid acquisition, excellent spatial resolution, multiplanar reconstruction capability and its ability to simultaneously assess the bowel wall, lumen, mesentery, lymph nodes and extraintestinal complications. This makes MDCT particularly valuable in differentiating inflammatory, infective, ischemic, obstructive and neoplastic bowel conditions, especially in patients presenting with nonspecific symptoms such as abdominal pain, altered bowel habits, vomiting and bleeding per rectum.

The age distribution showed that the most common age group affected was 51-60 years (22.0%), followed by 31-40 years (20.0%) and 41-50 years (18.0%) with a mean age of 46.04 ± 19.253 years. These findings show partial agreement with Yeli et al. (2018)[14], who reported that the most affected age group was 51-60 years (23.1%), followed by 61-70 years (19.2%), suggesting that bowel lesions on MDCT are commonly detected in older age groups. Similarly, Abdel Samiea et al. (2024)[15] observed that gastrointestinal emergencies assessed on MDCT had a mean age of 51 years (range 26-77). In contrast, Misra et al. (2019)[16] reported a significantly younger study population in CT enterography cases, where the age ranged from 16-70 years with a mean age of 31.03 years and most patients belonged to the 21-30 years age group. In the present study, males constituted 32 (64%) of cases while females constituted 18 (36%), indicating a clear male predominance in the study population. This pattern is comparable with Gupta et al. (2016)[17] reported 34 males and 16 females (male predominance). Similarly, El-Sayed Gouda Mohamed et al. (2022)[18] included 22 males and 8 females, again demonstrating male predominance. Yeli et al. (2018)[14] reported a very similar distribution to our results with 33 males (63.5%) and 19 females, closely matching in our study. Shuchita et al. (2021)[19] also showed marked male predominance with 78% males and 22% females. However, Abdellatef et al. (2020)[20] reported a near-equal to female-predominant distribution (24 males and 26 females), suggesting that gender distribution may vary depending on the case mix and referral patterns.

In the present study, bowel wall thickening was most frequently >7 mm (38.0%), followed by 5-7 mm (30.0%), while <3 mm was seen in 22.0% and 3-5 mm in 10.0%. These findings can be compared with Yeli et al. (2018)[14], who reported moderate wall thickening (10-20 mm) in 57.7%, gross thickening (>20 mm) in 28.9% and mild thickening (4-10 mm) in 15.4%. Similarly, Bhatt et al. (2011)[21] classified thickening as mild (<1.5 cm) and marked (>1.5 cm) and reported that 85.4% of malignancies showed marked thickening, whereas 69% of inflammatory lesions showed mild thickening. Unadkat et al. (2023)[22] correspondingly demonstrated asymmetric wall thickening in 86.27% of malignant cases, reinforcing the value of thickening pattern analysis in MDCT bowel evaluation. In our study, Asymmetrical thickening (48.0%) was more common than symmetrical thickening (24.0%). In contrast, Yeli et al. (2018)[14] reported a much higher proportion of asymmetrical thickening (86.5%) with symmetrical thickening in 13.5%. A strong pathology-based explanation is provided by Bhatt et al. (2011)[21], who showed that malignancy was predominantly asymmetrical (96.4%), whereas inflammatory colitis was predominantly symmetrical (89%) and ischemic colitis showed symmetrical thickening (100%). Prathapan et al. (2024)[23] similarly demonstrated that asymmetry was seen in 86.96% of malignant lesions compared to 18.18% of benign lesions, while symmetry was seen in 81.82% of benign lesions compared to 13.04% of malignant lesions. Gafoor et al. (2023)[24] also confirmed that marked asymmetric wall thickening was a key CT feature distinguishing malignant from benign colorectal lesions.

Focal involvement (38.0%) was most common in the present study, followed by segmental involvement (36.0%) and diffuse involvement (26.0%). These findings differ from Yeli et al. (2018)[14], where segmental involvement (59.6%) was dominant, followed by focal (23.1%) and diffuse (17.3%) involvement. A pathology-pattern comparison is well demonstrated by Bhatt et al. (2011)[21], who reported focal involvement (<10 cm) in 85.5% of malignancies, while inflammatory lesions were mainly segmental (62%) or diffuse (15%) and ischemic colitis commonly showed segmental involvement (66.7%). Prathapan et al. (2024)[23] reported focal involvement in 44.44%, segmental in 24.44% and diffuse in 31.11% with focal predominance comparable to our findings (focal 38.0%), suggesting that study enriched with malignant lesions tend to show higher focal involvement. In our study, moderate mesenteric fat stranding was most frequent (32.0%), followed by mild (24.0%), while severe (22.0%) and no stranding (22.0%) were equally distributed in the present study. This distribution aligned with Bhatt et al. (2011)[21], who demonstrated that fat stranding was common in inflammatory conditions (87%) and diverticulitis (100%) and was also present in nearly half of malignancies (47%). Prathapan et al. (2024)[23] found pericolic fat stranding in all benign lesions (100%) and in 82.2% of malignant lesions, confirming that fat stranding in 78% of our cases was consistent with its occurrence across both benign inflammation and advanced malignant disease. Mild mesenteric lymphadenopathy predominated (44.0%) in our series, partially concordant with Yeli et al. (2018)[14] who reported lymph node involvement in 76.9% of cases and with Prathapan et al. (2024)[23] who reported enlarged lymph nodes in 88.9% of cases, underscoring that lymphadenopathy alone does not reliably distinguish between benign and malignant bowel wall thickening.

Obstruction was present in 26.0% (complete) and 18.0% (partial) in the present study, while 56.0% had no obstruction. These figures are expectedly lower than obstruction-focused study such as Abdellatef et al. (2020)[20], where 80% had intestinal obstruction because the study specifically recruited clinically suspected bowel obstruction cases. Ali et al. (2017)[25] similarly achieved 100% sensitivity, specificity and diagnostic accuracy for MDCT in SBO in a dedicated obstruction study, while Narayana et al. (2022)[6] demonstrated sensitivity of 97.44% and specificity of 100% for detecting the level of obstruction in their prospective study. Kelkar et al. (2024)[26] reported 100% sensitivity and 98.1% specificity for MDCT in intestinal obstruction across 101 patients, further validating its utility. Our obstruction rate (44% combined complete + partial) is comparable to general mixed-pathology MDCT studies rather than obstruction-specific series.

Pneumoperitoneum was present in 14.0% of cases in our study. This aligns closely with Emara et al. (2021)[27], who reported pneumoperitoneum in 14% of a geriatric acute abdominal pain study evaluated by MDCT. Abdel Samiea et al. (2024)[15] observed pneumoperitoneum in 14% of cases as well, reinforcing that pneumoperitoneum constitutes a consistent minority of MDCT gastrointestinal emergency findings but remains crucial for diagnosing perforation promptly. Ascites was absent in 64.0% of patients; minimal and mild ascites were present in 20.0% and 14.0%, respectively. Emara et al. (2021)[27] reported a higher fluid detection rate (74%), likely because their study focused on acute geriatric emergencies where inflammation- and ischemia-related fluid is more prevalent.

The most frequent final MDCT impressions in the present study were Crohn's disease (12%), ischemic colitis (10%) and small bowel obstruction (10%), followed by intestinal tuberculosis and ulcerative colitis. This spectrum is broadly consistent with Sheikh et al. (2017)[2], who evaluated 60 patients and identified intestinal tuberculosis, idiopathic inflammatory bowel disease and non-specific colitis as the predominant inflammatory diagnoses on MDCT, alongside obstruction cases. Rao and Varkala (2024)[8] similarly demonstrated adenocarcinoma (15%) and inflammation with strictures (15%) as the commonest diagnoses in small bowel MDCT studies, supporting the disease distribution observed in our series. El-Sayed Gouda Mohamed et al. (2022)[18] reported vascular disorders (16/30, 53%) as the leading category in their small bowel series with inflammatory bowel disease in 6 patients and tumors in 3 patients.

MDCT-histopathology correlation in the present study demonstrated 100% sensitivity, 75.0% specificity, 95.5% positive predictive value and 100% negative predictive value ($\chi^2 = 35.795$; $p < 0.001$). These results are comparable to several published series. Yeli et al. (2018)[14] reported sensitivity of 96.29% and specificity of 92.00% for distinguishing neoplastic from non-neoplastic lesions. Gafoor et al. (2023)[24] reported sensitivity of 98.10%, specificity of 81.80%, positive predictive value of 96.20% and negative predictive value of 90.00% for detecting malignant large bowel lesions. Misra et al. (2019)[16] reported 95.83% sensitivity, 100% specificity and 96.66% overall accuracy for CT enterography in small bowel diseases. Dhanya et al. (2024)[3] reported 95.83% sensitivity, 100% specificity and 96.66% accuracy in a comparable CTE series. Our sensitivity of 100% and NPV of 100% represent the strongest findings for ruling out malignancy in our mixed-pathology study, while the specificity of 75% reflects the fact that two inflammatory or obstructive cases were initially characterized with imaging features resembling malignancy. This 75% specificity is lower than Yeli et al. (2018)[14] (92%) and Gafoor et al. (2023)[24] (81.8%), which may be attributable to the overlap of imaging appearances between advanced inflammatory conditions such as severe Crohn's disease, intestinal tuberculosis and bowel malignancy observed in our cases. Bhatt et al. (2011)[21] achieved 98.2% overall accuracy in differentiating benign from malignant etiology on MDCT and our data support the general conclusion that MDCT provides excellent diagnostic reliability across the spectrum of bowel abnormalities.

Regarding pitfalls encountered, the present study and the existing literature consistently emphasize several important interpretive challenges. Motion artifacts from respiratory movement and bowel peristalsis can produce transient luminal narrowing mimicking obstruction sites.[10] Incomplete bowel distension can lead to false-positive diagnoses by creating the appearance of wall thickening where none exists in true anatomical cross-section. The significant overlap in imaging appearances between benign inflammatory conditions (Crohn's disease, tuberculosis, infectious colitis) and early malignant lesions represents a major diagnostic challenge. Macari and Balthazar (2001)[11] provided systematic criteria for avoiding pitfalls in CT bowel wall thickening interpretation and Pickhardt and Kim (2013)[10] highlighted pseudopolyp formation from digital subtraction artifacts in CT colonography. Overcalling malignancy based on wall thickening alone without integrating clinical context and enhancement patterns, can result in inappropriate management decisions and these observations from the published literature are substantiated by the two false-negative malignant cases identified in our series.

CONCLUSION

The present study evaluated the role of multidetector computed tomography (MDCT) in the assessment of small and large bowel abnormalities and emphasized its importance in diagnosis, disease extent and complication detection. The study population mainly included middle-aged adults with male predominance and abdominal pain was the most common presenting complaint. A significant proportion had history of smoking or alcohol intake and nearly one-fourth were anemic, indicating association with chronic inflammatory, ischemic and neoplastic conditions. On MDCT, the cecum was the most commonly involved segment. Most lesions showed moderate-to-marked bowel wall thickening with asymmetrical thickening more common than symmetrical and focal or segmental involvement predominated. Mesenteric fat stranding and lymphadenopathy were frequently observed, indicating active pathology. Obstruction was present in some cases, while pneumoperitoneum and ascites were less common but important complications detected on MDCT. The most common MDCT diagnoses were Crohn's disease, ischemic colitis and small bowel obstruction, followed by intestinal tuberculosis and ulcerative colitis, showing predominance of inflammatory and ischemic conditions. Histopathology showed mainly ischemic and inflammatory changes with some malignant cases such as adenocarcinoma and lymphoma. MDCT showed strong correlation with histopathology ($\chi^2 = 35.795$; $p<0.001$) with excellent diagnostic performance including 100% sensitivity, 100% negative predictive value and 95.5% positive predictive value, confirming its reliability as a primary imaging modality in bowel diseases.

REFERENCES

1. Saifi I, Kashikar S, Parihar PH, Mishra GV, Wanjari M. Role of Multidetector Computed Tomography in Clinically Suspected Cases of Small- and Large-bowel Obstruction. Journal of the Scientific Society. 2025 Jan 1;52(1):3-7.
2. Sheikh MT, Sheikh MT, Jan M, Khan HA, Vashisht GP, Wani ML. Role of multi-detector CT (MDCT) in evaluation of bowel diseases. Journal of Clinical and Diagnostic Research: JCDR. 2017 Jul 1;11(7):TC11.
3. Dhanya SB, Sunil HC, Gowthami GS, Suhas CN, Praveen Kumar M. Exploring the Use of Computed Tomography Enterography in the Evaluation of Small Bowel Disease: A Prospective Study. Cureus. 2024 May 23;16(5).
4. Kelkar A, Thakur VB, Jeeson J. Evaluation of Multidetector Computed Tomography in the Diagnosis of Intestinal Obstruction. Cureus. 2024 Aug 5;16(8).
5. Prathapan L, Krishnan KK, Bala P. Pixel to Pathology: A Prospective Cross-Sectional Study on the Role of Multidetector Computed Tomography in the Evaluation of Malignant Large Bowel Lesions With Histopathological Correlation. Cureus. 2024 Oct 10;16(10).
6. Narayana M, Gowda VM, Pradeep HN, Sriviruthi B. Role of Multidetector Computed Tomography in Evaluation of Intestinal Obstruction with Surgical Correlation: A Prospective Study Study. International Journal of Anatomy Radiology and Surgery. 2022;11:7860.
7. Afzal S, Ahmad F, Farooq F. Role of multi-detector computed tomography in the diagnosis of intestinal obstruction. Cureus. 2023 Jan 13;15(1).
8. Rao SS and Varkala S. A Study of Multi-Detector Computed Tomography (MDCT) in Assessment of Small Bowel Diseases. International Journal of Toxicological and Pharmacological Research. 2024;14(12):102-107.
9. Bayoumi D, Khedr D, Abdallah A, Ibrahiem A, Refat S. The role of multidetector computed tomography enterography in the evaluation of localized malignant small intestinal lesions: retrospective radiological and pathological experience. Polish Journal of Radiology. 2021 Nov 30;86(1):644-53.
10. Pickhardt PJ, Kim DH. CT colonography: pitfalls in interpretation. Radiologic Clinics of North America. 2013 Jan;51(1):69.
11. Macari M, Balthazar EJ. CT of bowel wall thickening: significance and pitfalls of interpretation. American Journal of Roentgenology. 2001 May;176(5):1105-16.
12. Chervenkov L, Sirakov N, Georgiev A, Miteva D, Gulinac M, Peshevska-Sekulovska M, Sekulovski M, Velikova T. High concordance of CT colonography and colonoscopy allows for the distinguishing and diagnosing of intestinal diseases. Life. 2023 Sep 13;13(9):1906.
13. Saini DK, Chaudhary P, Durga CK, Saini K. Role of multislice computed tomography in evaluation and management of intestinal obstruction. Clinics and Practice. 2013 Jun 28;3(2):e20.
14. Yeli RK, Patil SV, Pyadala N. Multidetector computed tomography in small and large bowel lesions. International Journal of Contemporary Medicine Surgery and Radiology. January-March 2018;3(1):151-154.
15. Abdel Samiea ME, Abdullah WM, Houseni M, Salah EM. Role of Multi-Detector Computed Tomography in Assessment of Gastrointestinal Emergencies. Al-Azhar International Medical Journal. 2024;5(10):30.
16. Misra RN, Bajaj SK. Role of CT enterography in evaluation of small bowel disorders. Int J Res Med Sci. 2019 Feb;7(2):537-43.
17. Gupta R, Mittal P, Mittal A, Gupta S, Mittal K, Taneja A. Spectrum of MDCT findings in bowel obstruction in a tertiary care rural hospital in northern India. Journal of Clinical and Diagnostic Research: JCDR. 2016 Nov 1;10(11):TC01.
18. El-Sayed Gouda Mohamed S, Farouk Aggag M, Ahmed A. Role of multidetector computed tomography in diagnosis of smallbowel diseases. Al-Azhar Medical Journal. 2022 Jan 1;51(1):537-48.
19. Shuchita, Thukral BB and Singh A. Role of Multidetector computed tomography in clinically suspected acute small bowel obstruction. International Journal of Radiology and Diagnostic Imaging 2021; 4(3): 137-141.
20. Abdellatef H, Yousef A, Khater H, Abdel Rahman A. Role of Multi Detector CT in Diagnosis of Small and Large Bowel Obstruction. Benha Medical Journal. 2020 Mar 1;38(special issue (Radiology)):22-33.
21. Bhatt CJ, Patel LN, Baraiya M, Patel KK, Vaishnav KU, Shah DS. Multidetector computed tomography in large bowel lesions-a study of 100 cases. Indian Journal of Surgery. 2011 Oct;73(5):352-8.
22. Unadkat BS, Kashikar SV, Mishra GV, Parihar PH, Shetty ND, Bhansali PJ, Gowda KH. Preoperative T staging of gastrointestinal malignancy by MDCT-An essential tool for surgical management. Journal of Datta Meghe Institute of Medical Sciences University. 2023 Apr 1;18(2):199-205.
23. Prathapan L, Krishnan KK, Bala P. Pixel to Pathology: A Prospective Cross-Sectional Study on the Role of Multidetector Computed Tomography in the Evaluation of Malignant Large Bowel Lesions With Histopathological Correlation. Cureus. 2024 Oct 10;16(10).
24. Gafoor HF, Krishna A. Role of Multidetector Computed Tomography in the Assessment of Malignant Large-Bowel Lesions. Dentistry and Medical Research. 2023 Jul 1;11(2):62-6.
25. Ali SA, Mansour MG, Farouk O. Utility of 64-row multidetector computed tomography in diagnosis and management of small bowel obstruction. The Egyptian Journal of Radiology and Nuclear Medicine. 2017 Dec 1;48(4):839-46.
26. Kelkar A, Thakur VB, Jeeson J. Evaluation of Multidetector Computed Tomography in the Diagnosis of Intestinal Obstruction. Cureus. 2024 Aug 5;16(8).
27. Emara DM, Rizk AM, Ahmed AM, El Abd AM. The added value of multidetector CT in the diagnosis of gastrointestinal causes of acute abdomen in geriatrics. Egyptian Journal of Radiology and Nuclear Medicine. 2021 Feb 22;52(1):64.