



Radiodiagnosis

DIAGNOSTIC ACCURACY OF MULTIDETECTOR COMPUTED TOMOGRAPHY SCAN IN COLORECTAL LESIONS ASSUMING HISTOPATHOLOGICAL FINDINGS AS GOLD STANDARD-A PROSPECTIVE STUDY

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ABSTRACT MDCT is invaluable tool for assessment of colorectal lesion having great accuracy for differentiating benign from malignant colorectal rectal lesion which is difficult to differentiate clinically because of overlapping features. In our study Ct showed Sensitivity of 88.90% Specificity of 100% Positive predictive value- 100% and Negative predictive value- 97.30% in diagnosis of benign lesions. Ct showed Sensitivity of 100% ,Specificity of 88.90% Positive predictive value- 97.30% & Negative predictive value- 100% in our study for diagnosis of malignant colorectal lesions.

Aims and Objectives:

1. To Assess the diagnostic accuracy of MDCT in the characterization of colorectal lesions.
2. Effectiveness of MDCT in differentiating neoplastic from non neoplastic lesions with histopathological correlation.

KEYWORDS : MDCT, histopathology, colon

I. Introduction: Technological advances in CT have changed the practice of gastrointestinal radiology. With the development of high resolution scanners, technical refinements in obtaining better quality studies, and the accumulated clinical experience leading to better interpretation, the role, indications, and accuracy of CT of the gastrointestinal tract have dramatically improved [1].

CT is an increasingly useful technique in the evaluation of intestinal disease, allowing the evaluation of bowel disease as well as extra-intestinal disease. CT also provides an excellent assessment of the perienteric abnormalities that frequently accompany bowel disease (adenopathy, ascites,

fat stranding, presence of abscesses and fistulas) and improves specificity in diagnosis [2]. Conventional barium examinations remain superior to CT for evaluating intra-luminal and mucosal disease, but CT is far more accurate for evaluating the intramural and extra-intestinal components, including involvement of the mesentery, peritoneal cavity, retroperitoneum, and solid organs & lymph nodes [3]. Detection of colorectal carcinoma before the malignancy has invaded into or extended through the muscularis propria and before lymph node metastases have occurred offers the best prognosis for the patient and the option of more limited surgery [4-5]. Accurate preoperative staging is essential for the planning of optimal therapy. The role of conventional CT in patients with colorectal tumors is limited: Preoperative staging accuracy has been disappointing, ranging between 48% and 77% [6].

II. Methodology and procedural details:

Total of 45 patients participated in study at our hospital from a period of 2 yr November 2015 to November 2017. All relevant clinical information and details of laboratory investigation was recorded. MDCT evaluation and correlation with pathological findings was done in all cases. In this study, patients with wall thickening involving the colon and rectum on MDCT were included. MDCT was performed using 128 slice Philips Ingenia CT scanner.

Slice thickness 1.5mm and inter slice interval of 0.75mm was used for total exposure time 7.5 second for whole abdomen. Patients are placed

in the supine position on the CT table, and a rectal tube was inserted. Iodinated contrast (1500 ml to 2000ml) was gently infused into the rectum & colon via tube to get adequate colonic distension. For IV 100 to 150 ml non ionic contrast (iohexol) was used. For Oral route, contrast was given 2 to 3 hr before and CT acquisitions were performed in the arterial phase (start delay of 25-35 seconds) and in the portal venous phase (start delay of 50-70 seconds). Based on MDCT findings and available clinical profile provisional diagnosis was assigned and which was correlated with histopathological diagnosis.

Inclusion

- Patients of both sex of any age group clinically suspected to have colorectal lesion
- Abnormal lower Gastrointestinal findings on barium studies

– Exclusion-

- Patients who have history of hypersensitivity to intravenous contrast agents
- Impaired renal function
- Pregnant women

RESULTS –

In this study 45 patients with bowel wall thickening involving the colon and rectum on CT were observed. Of these 25 (56%) were males while 20 (44%) were females. Most of the patients with colorectal lesions in our study were in the age group of 61-70 yrs (22.2%) Patients below 30 yrs were the least affected. Of the 45 patients with colorectal lesions on CT 36 lesions (80%) were diagnosed as neoplastic and 9 lesions (20%) were diagnosed as non-neoplastic on histopathology. Loose stools (44.4%) was the commonest symptom in patients with inflammatory/infective disease of the colon. There was involvement of the entire length of the caecum, ascending colon, transverse colon, descending colon and sigmoid colon in 22.3% of the cases and involvement of the entire length of the rectum in 22.2% of the cases. In patients with malignant lesions of the colon the commonest presenting complaint was bleeding per rectum (44.4%) and constipation (22.2%) Rectum was the most common region to be involved by malignant process (50%) followed by the sigmoid colon (22.2%). Four lesions showed involvement of both the sigmoid colon and the rectum (11.1%)

and one lesion showed involvement of both the caecum and the ascending colon (2.8%). Of the 45 cases with thickening of the bowel wall on CT 35 cases (77.80%) had a heterogeneous mixed attenuation. Of the 9 non-neoplastic cases, 8 cases (88.90%) had homogenous attenuation and 1 case (11.10%) had heterogeneous stratified attenuation. Of the 45 cases 10 cases (22%) had mild wall thickening and 35 cases (78%) had marked wall thickening on CT. Of the 10 cases with mild wall thickening 8 were non-neoplastic and 2 were neoplastic. Of the 35 cases with marked wall thickening 34 were neoplastic and one was non-neoplastic. Enlarged lymph nodes were present in 28 cases of malignancy (78%). Enlarged lymph nodes were present in 7 benign cases (78%). Pericolonic fat stranding was seen in all Non-neoplastic lesions (100%). Pericolonic fat stranding was present in 22 cases (61%) of malignant processes. Of the 36 neoplastic cases metastases was seen in 11 cases (30%). Of the 11 cases with metastases, liver metastases was seen in 3 cases (28%) [Image 1], peritoneal deposits in 3 cases (27%). There were 37 cases with asymmetrical wall thickening and 8 cases with symmetrical wall thickening.

Of the 37 cases with asymmetric wall thickening 36 were neoplastic and 1 was non-neoplastic. All the cases with symmetric wall thickening were non-neoplastic [Image II].

DISCUSSION . In our study 45 patients with wall thickening involving the region of the colon and rectum were studied. Out of these 45 patients, 25 were males and 20 were females. The age group commonly affected were those in the age group of 61-70 yrs (22.7%). These are in concordance with the study done by Rajesh et al [7]. They studied the pattern of colorectal lesions in 54 patients and found that males were more commonly affected (53.71%) and most of the patients were in the age group of 61-70 yrs (24.07%). Among the 45 cases, 36 cases were histopathologically proved to be neoplastic and 9 cases were proved to be non-neoplastic. Loose stools was the commonest symptom in patients with benign lesions of the colon. Bleeding per rectum was the commonest symptom in patients with malignant lesions of the colon and rectum. Abdominal pain was the second most commonest symptom in these patients.

Most of the patients with benign lesions of the colon had contiguous involvement of the caecum, ascending colon, transverse colon, descending colon and the rectum. Rectum was the commonest site for malignant lesions (50%). This is in agreement with the study done by Rajesh et al. In their study there was involvement of the rectum in 53.71% of the cases.

Among the 9 benign cases, 8 cases (88.90%) had homogenous attenuation and 1 case (11.10%) had heterogeneous stratified attenuation. Of the 36 malignant cases 35 cases (97.20%) had heterogeneous mixed attenuation and 1 case (2.80%) had homogenous attenuation on CT.

This is in agreement with studies done by Emil et al [1] and Michael et al [4] who concluded that homogenous attenuation is a feature of benign disease (inflammatory/infective) and heterogeneous attenuation is a feature of malignancy (adenocarcinoma). Mild wall thickening had a sensitivity of 88.9%, specificity of 94.4%, positive predictive value of 80% and a negative predictive value - 97.1% in the diagnosis of benign lesions of the colon.

Symmetric wall thickening had a sensitivity of 88.9%, specificity of 100%, positive predictive value of 100%, and a negative predictive value of 97.3%. This is in concordance with the study done by Jorge ahuhall [8] who described symmetric wall thickening as a feature of benign intestinal lesion.

Asymmetric wall thickening had a sensitivity of 100%, specificity of 88.9%, positive predictive value of 97.3% and a negative predictive value of 100%. Nina et al [9] in their study have found that asymmetric wall thickening is a feature of malignancy which is similar to the pattern of thickening observed in our study. Among the 36 malignant cases, 30 cases (83.33%) had focal involvement of the bowel and 6 cases (16.67%) had segmental involvement of the bowel. Of the 9 benign cases 3 cases (33.33%) had focal involvement of the bowel, 3 cases (33.33%) had segmental involvement of the bowel and 3 cases (33.33%) had diffuse involvement of the bowel. Emil et al and Michael et al in their study have found that focal involvement of bowel is a feature of malignancy which is in concordance with our

study. They also found that diffuse involvement of the bowel is a feature of inflammatory/infective etiology which is again in agreement with our study. However 6 cases of malignancy had segmental involvement of the colon, which according to their study is a feature of benign lesions. Only 33.33% of the benign cases in our study had segmental involvement of the colon. Hence according to our study segmental involvement of the colon is not a reliable indicator in differentiating benign from malignant lesions of the colon.

All the benign lesions had evidence of pericolonic fat stranding. Pericolonic fat stranding was present in 22 cases (61%) of malignancy. Pericolonic fat stranding was absent in 14 cases (39%) of malignancy. Filippone et al in their study have found that pericolonic fat stranding adjacent to a malignant lesion is a feature of invasion of pericolonic fat and hence is a feature of T3 lesions.

However it is not a reliable criteria and may result in overstaging of lesions as T3. Pereira et al [10] have described that pericolonic fat stranding is a common finding seen in inflammatory conditions of the colon.

Karen et al [11] in their study have described that liver is the predominant organ to be involved with metastases from colorectal cancer. Similar results were also present in our study. Among the 37 lesions identified as malignancy on CECT,

histopathology confirmed neoplastic lesions in 36 cases. 1 case diagnosed as neoplastic on CECT was confirmed as inflammatory on histopathology.

Hence in our study CECT had a sensitivity of 100%, specificity of 88.90%, positive predictive value of 97.30% and a negative predictive value of 100% in the diagnosis of neoplastic lesions [Table 1]. All the cases diagnosed as non-neoplastic on CECT were confirmed as non-neoplastic on histopathology. 1 case diagnosed as neoplastic on CECT was confirmed as inflammatory on histopathology. Hence in our study CECT had a sensitivity of 88.90%, specificity of 100%, positive predictive value of 100% and a negative predictive value of 97.30% in the diagnosis of benign lesions [Table 1]

CONCLUSION. MDCT is an excellent modality in the diagnosis and differentiation of non-neoplastic and neoplastic lesions of the colon and rectum, since it has the advantage of providing thinner sections, faster acquisition and multi planar reformatted images. MDCT is also useful in the staging of malignant lesions which helps in proper planning of surgery and further management of the patient. MDCT with its axial and reformatted images is a useful tool to differentiate early colorectal carcinoma and advanced cancer

Table I showing correlation of CT diagnosis with histopathologic diagnosis

			Histopathology		Total
			Adenocarcinoma	Inflammatory/ Infective	
CT Impression	Neoplastic	Count	36	1	37
			97.30%	2.70%	100.00%
	Non-neoplastic (Inflammatory/ Infective)	Count	0	8	8
			0.00%	100.00%	100.00%
Total		Count	36	9	45
			80.00%	20.00%	100.00%
			100.00%	100.00%	100.00%

Image I. Coronal CECT sections of abdomen showing heterogeneously enhancing asymmetric wall thickening involving the ascending colon (arrow) with multiple liver metastasis (arrow) which is reported as a neoplastic thickening on basis of CT finding and proved to be adenocarcinoma on Histopathology



Image II Coronal CECT sections showing diffuse asymmetric wall thickening involving terminal ileum, caecum and the ascending colon (arrow) which on histopathology showed features of tuberculosis



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