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Original Research Article

A Study on CT Evaluation of Colorectal Lesions, Correlation with Histopathology

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Abstract

Introduction: In developed nations, colorectal cancer ranks second in cancer-related mortality, emphasizing its public health impact. Early detection and advanced treatment are vital for mortality reduction. CT scans, increasingly preferred for diagnosis, aid in assessing colorectal cancer (CRC). Histopathological examination (HPE) complements this by confirming diagnosis, guiding treatment, and correlating CT staging with histopathological examination results.

Methods: In a cross-sectional study, patients referred to radiology with symptomatic etiology, suspected large bowel lesions, or high-risk factors were included. Exclusion criteria encompassed contraindications to CT, absence of HPE correlation, biopsy refusal, or abnormal renal parameters. Preparatory procedures included fasting, medical history review, hydration, and contrast administration with subsequent imaging.

Results: Thirty participants (mean age: 55.37 ± 15.82 years; male-female ratio: 1.15) were included. Abdominal pain was the predominant clinical presentation in benign and malignant cases, with common rectal involvement. Significant differences in attenuation pattern, thickness, and length correlated with histopathological examination. CT diagnosis effectively distinguished between benign and malignant lesions.

Conclusion: CRC poses a significant global health burden, with an increasing incidence in India. Recent advancements in diagnosis include genetic studies and imaging techniques. CRC predominantly affects individuals aged 50 and above, with symptoms varying between benign and malignant lesions. CT demonstrates high sensitivity and specificity in detecting CRC, aiding in accurate diagnosis and treatment planning.

Key words: Colorectal Cancer, Incidence, Diagnosis, CT, Specificity.

Introduction

In developed nations, colorectal cancer (CRC) ranks as the second leading cause of cancer-related mortality. [1] This statistic underscores the significant public health burden posed by the disease. Early detection through screening programs and advances in treatment modalities are essential to reduce mortality rates and improve patient outcomes. [2]

While colonoscopy and air-barium enema are common for initial diagnosis, CT scans are increasingly the first choice for diagnosing colon cancer, with radiologists often identifying potential malignancies based on CT findings. CT has emerged as the primary imaging tool for assessing various gastrointestinal symptoms. Bowel wall thickening is the predominant abnormality in colorectal lesions on CT scans, presenting various differential diagnoses. [3] Radiologists analyze specific CT imaging criteria to characterize thickening, distinguishing between focal, segmental, and diffuse involvement. Features such as degree of thickening, symmetry, contour irregularities, and enhancement patterns aid in assessment. These parameters are crucial for accurate diagnosis and subsequent management decisions regarding colorectal lesions detected via CT imaging.

Histology plays a vital role in colorectal cancer by providing microscopic examination of tissue samples. [4] It confirms diagnosis, identifies cancer

type, grade, and molecular characteristics. Histological analysis guides treatment decisions, predicts prognosis, and assesses response to therapy, essential for personalized patient management and improving outcomes. The aim was to evaluate the role of CT in staging malignant lesions, correlating findings with histopathological examination (HPE) results. This involved assessing CT's effectiveness in determining tumor extent and connecting these findings with HPE findings.

Methods

It was a cross-sectional study, conducted in the department of Radiodiagnosis, GSL Medical College, Rajahmundry. Study was conducted between January 2021 to June 2022. Study protocol was approved by the Institutional Ethics Committee. Informed written consent was taken from the study members.

The inclusion criteria comprised patients referred to the radiology department due to symptomatic etiology, suspected large bowel lesions, or high-risk factors. Additionally, patients were included if correlations between radiological and histological findings were feasible. Patients were excluded if they had contraindications to CT, lacked HPE correlation availability, declined biopsy consent, or presented with abnormal renal parameters. These criteria ensured the integrity and safety of the study population and the reliability of the correlation between CT findings and HPE results.

Preparation and procedures involved fasting for four hours, patients changing into gowns and pants, removal of all metallic accessories, and thorough medical history inquiry including diabetes, renal dysfunction, allergies, and asthma. Patients were adequately hydrated before and after contrast administration. Blood creatinine levels were ensured within normal limits (0.6-1.5 mg/dl for males, 0.5-1.2 mg/dl for females), and blood urea levels ranged between 9 to 42 mg/dl. Signed informed consent from patients or their close relatives was obtained. Sedation was administered for irritable/uncooperative and pediatric patients. Patients were briefed on the necessity of contrast enhancement. Intravenous administration of approximately 100 ml of contrast (using 300 mg I/ml) was performed. Arterial phase imaging commenced 30 seconds post-contrast injection, while portal venous phase imaging began 60 seconds thereafter. Multiplanar images were acquired in axial and coronal views for comprehensive evaluation.

Statistical Analysis: All statistical analyses were conducted using SPSS software trial version 20.0 and MS Excel-2010. The Chi-square test was employed to evaluate associations among categorical variables. A p-value of <0.05 was deemed statistically significant, indicating meaningful associations between variables.

Results

Total 30 members were included, 55.37 ± 15.82 was the mean age, male female ratio was 1.15. Pain abdomen was the leading clinical; presentation both in benign and malignant cases and rectal involvement is common in both. In the pattern of attenuation, degree of thickness and length there was significant difference with HPE. In the diagnosis of benign and malignant lesions by CT, statistically there was significant difference.

Discussion

CRC ranks as the third most prevalent malignancy globally and the second leading cause of cancer-related deaths. In India, there's an escalating incidence, recorded at 8.5% according to cancer registry data. [5] Recent advancements, spanning genetic studies to imaging techniques, mark new trends in diagnosis. [6]

CRC predominantly impacts individuals aged 50 years and above, being less prevalent in those under 40. Elzouki et al. [7] reported a mean patient age of 57.4±12.92 years for CRC cases. In the current research, the mean age was 55.37 ± 15.82 years. Moreover, CRC risk is influenced by factors such as the gut microbiome, age, gender, race, and socioeconomic status. [8, 9] The male female ratio was 1.14. Similar to this study male dominance was reported in CRC in the literature. [10]

Loose stools were the predominant symptom in patients with benign colon lesions, whereas abdominal pain and rectal bleeding were most common in those with malignant tumors of the colon and rectum. Malignant lesions commonly invaded the cecum, ascending colon, transverse colon, descending colon, and rectum, with a higher prevalence observed in the rectum, consistent with findings by Rajesh et al. [11] where rectal involvement was noted in 53.71% of cases. Among benign cases, seven showed homogeneous attenuation, while one had heterogenous mixed attenuation. Conversely, 23 out of 24 malignant cases exhibited heterogenous mixed attenuation, with only one displaying homogeneous attenuation. According to research by Michael Macari et al. [12] and Balthazar EJ et al.[13] homogeneous attenuation is typical in benign diseases, while heterogenous attenuation indicates adenocarcinoma.

In Charan I et al. [14] study, 50% of benign cases showed mild bowel wall thickening, while 88% of malignant cases exhibited marked thickening on CT. In this study, HPE confirmed cancer presence in 23 out of 25 lesions detected on CT. Thus, CT demonstrated 100% sensitivity, 71.4% specificity, 92.0% positive predictive value, and 100%

negative predictive value for identifying malignant lesions. For benign lesions, CT exhibited 71.4% sensitivity, 100% specificity, 100% positive predictive value, and 92.0% negative predictive value. Horton et al. [15] found that CT's sensitivity in detecting primary colon cancer varies, with 75% diagnosable for the main tumor. In Zhou Q et al. [16] study, HPE confirmed malignancy in 18 of 19 tumors detected as cancerous on CT. One CT-identified cancer case was inflammatory, yielding 100% sensitivity and 50% specificity.

CRC poses a significant global health burden, with an increasing incidence in India. Recent advancements in diagnosis include genetic studies and imaging techniques. CRC predominantly affects individuals aged 50 and above, with symptoms varying between benign and malignant lesions. CT demonstrates high sensitivity and specificity in detecting CRC, aiding in accurate diagnosis and treatment planning.

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