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Study Of Type Of Metastasis By Computed Tomography And Histological Type Of Bowel Neoplasms.

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ABSTRACT

Bowel neoplasms, particularly colorectal cancers, have high morbidity and mortality worldwide. Accurate detection of metastasis is critical for staging and management. This study evaluates the type of metastasis observed on computed tomography (CT) and correlates it with the histological types of bowel neoplasms. This study included 38 patients who underwent CT abdomen examinations at Sir Hurkisondas Nurrotamdas Hospital and Research Centre, Mumbai, from August 2009 to April 2011. All patients were confirmed to have malignant bowel neoplasms through biopsy. The CT scan was conducted using both plain and contrast-enhanced studies. Metastatic patterns were categorized into local invasion, lymph node involvement, and liver metastasis. Histological types were correlated with these metastatic patterns. Lymph node involvement was the most common form of metastasis, found in 44% of patients, followed by liver metastasis in 28.9%, and local invasion in 10.5%. Adenocarcinoma was the most prevalent histological type (60.5%), followed by lymphoma (26%) and mucinous adenocarcinoma (10.5%). Lymph node and liver metastasis are the most common forms of metastatic spread in bowel neoplasms, particularly adenocarcinoma. CT imaging plays a vital role in detecting metastasis, guiding further management strategies.

Keywords: Bowel neoplasms, computed tomography, metastasis.

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INTRODUCTION

Bowel neoplasms, both benign and malignant, are significant contributors to global cancer morbidity and mortality. Colorectal cancer, in particular, ranks among the leading causes of cancer-related deaths worldwide. Accurate staging and detection of metastasis play a crucial role in determining the prognosis and tailoring the treatment plan for affected individuals. Computed tomography (CT) is widely used as a primary imaging modality due to its ability to provide detailed cross-sectional images, allowing for the identification of distant metastases, including those in the liver, lungs, and lymph nodes. [1].

The histological type of bowel neoplasm often correlates with the metastatic potential and pattern of spread. Adenocarcinomas, the most common type, are prone to metastasizing via the lymphatic and hematogenous routes, while rarer histological types such as neuroendocrine tumors and mucinous adenocarcinomas may exhibit different patterns. This study aims to evaluate the type of metastasis observed on CT scans and correlate these findings with the histological types of bowel neoplasms, offering insights into the relationship between tumor biology and metastatic behavior. Early and precise detection of metastasis could potentially improve treatment outcomes, patient survival, and overall quality of life [2, 3].

METHODOLOGY

The present study included 38 patients who underwent CT abdomen examinations at Sir Harkisondas Nurrotamdas Hospital and Research Centre, Mumbai. Out of 80 patients who had abnormal bowel findings on CT, 38 were selected for the study, as they were proven to be malignant on biopsy. The study was conducted from August 2009 to April 2011, and approval was obtained from the hospital ethics committee. Detailed clinical histories were collected from all patients, and their laboratory investigations were evaluated. The most common presenting symptoms included melena, constipation, diarrhea, alternating diarrhea and constipation, weight loss, anorexia, and a palpable lump in the abdomen. Several patients were initially found to have bowel thickening on ultrasonography (USG) and barium studies before undergoing CT examination.

The scan was conducted in spiral mode with settings of 120 kV and 240 mA, and a field of view (FOV) of 350 mm. Plain scans were followed by contrast-enhanced studies, utilizing both oral and intravenous contrast. Adequate bowel distension and luminal enhancement were achieved using a combination of oral and rectal contrast. Patients ingested oral contrast in the form of 2 ampoules of 60% iodinated contrast (Gastrografin), mixed in one liter of water, with 300-400 ml given at 20-30 minute intervals. Rectal contrast, consisting of 200-500 cc of contrast, was administered to opacify the rectum and distal colon. In married female patients, a vaginal tampon was used to better delineate pelvic anatomical structures. Intravenous contrast was administered at 2 ml/kg using non-ionic iodinated contrast (iopamidol/ultravist) via a pressure injector.

RESULTS

Table 1: Type of metastasis assessed with CT

	No. Of Patients	PERCENTAGE
Local Invasion	4	10.5%
Lymph Node Involvement	17	44%
Liver Metastasis	11	28.9%

Table 2: Histological type

Histological	Type No. Of Patients	Percentage
Adenocarcinoma	23	60.5%
Lymphoma	9	26%
Mucinous Adenocarcinoma	4	10.5%

DISCUSSION

The present study analyzed the type of metastasis detected by computed tomography (CT) and correlated it with the histological type of bowel neoplasms in 38 patients. This group was selected from a cohort of 80 patients who exhibited abnormal bowel findings on CT, with 38 confirmed as having malignant tumors through biopsy. The study provides valuable insights into the metastatic patterns of different histological types of bowel cancer, particularly focusing on adenocarcinoma, lymphoma, and mucinous adenocarcinoma. In this discussion, the results will be compared with existing literature, and the clinical implications of these findings will be explored.

Metastasis is a critical factor influencing the prognosis and management of bowel neoplasms. Early detection of metastasis allows clinicians to assess the stage of the disease and plan appropriate treatment, often determining the need for surgical intervention, chemotherapy, or radiotherapy. In this study, CT imaging was instrumental in identifying the patterns of metastasis, which included local invasion, lymph node involvement, and liver metastasis [4-6].

The most common form of metastasis observed in the study was lymph node involvement, affecting 17 patients (44%). Lymphatic spread is a well-documented pathway for metastasis in bowel cancers, especially colorectal adenocarcinoma. Several studies have demonstrated that lymph node involvement is a critical prognostic factor, often associated with advanced disease stages. The presence of metastatic lymph nodes often necessitates more aggressive treatment approaches, such as extended lymphadenectomy during surgery or additional cycles of chemotherapy postoperatively.

Liver metastasis was observed in 11 patients (28.9%). The liver is the most common site for distant metastasis in bowel cancers, particularly colorectal adenocarcinoma, due to the venous drainage of the bowel through the portal system. Hepatic metastasis is often an indicator of advanced disease and significantly worsens the prognosis. Studies have shown that patients with liver metastasis have a median survival of approximately 24 months when treated with a combination of surgery and chemotherapy. Advances in hepatic resection and ablation techniques have, however, improved the survival outcomes for patients with isolated liver metastasis. In this study, the high percentage of liver metastasis is consistent with the known behavior of bowel cancers, particularly adenocarcinomas [7, 8].

Local invasion was the least common type of metastasis, seen in only 4 patients (10.5%). Local invasion refers to the direct extension of the primary tumor into adjacent organs or tissues. While this is an expected pattern in advanced bowel cancers, it may not always be detectable on CT until it reaches significant proportions. The low percentage of local invasion in this study suggests that most of the tumors were identified before they extensively invaded surrounding structures, or it could reflect the limitations of CT in detecting early-stage local invasion.

The study identified three primary histological types of bowel neoplasms: adenocarcinoma (60.5%), lymphoma (26%), and mucinous adenocarcinoma (10.5%). Each histological type exhibited distinct metastatic patterns, which will be discussed in detail.

Adenocarcinoma

Adenocarcinoma, the most common type of bowel cancer, accounted for 23 cases (60.5%) in this study. This finding is consistent with the global literature, which identifies adenocarcinoma as the predominant histological type of colorectal cancer. Among the adenocarcinoma cases, metastasis was most frequently observed in the lymph nodes (44%) and liver (28.9%). This aligns with the known behavior of adenocarcinomas, which tend to spread via the lymphatic system and hematogenous routes, particularly to the liver.

The high rate of liver metastasis among adenocarcinoma patients is a significant concern, as hepatic involvement often complicates treatment. Surgical resection remains the standard treatment for localized adenocarcinoma, but the presence of liver metastasis typically necessitates a multimodal approach, including chemotherapy and targeted therapies. The use of CT imaging in detecting liver metastasis is critical, as early intervention can improve survival rates.

Lymphoma

Lymphoma, though less common than adenocarcinoma, was the second most prevalent histological type in this study, with 9 cases (26%). Lymphoma of the bowel is a rare entity and can either be primary or secondary, often associated with systemic disease. The metastatic pattern of lymphoma differs from that of adenocarcinoma, with lymph node involvement being the most common form of spread. In this study, lymphatic spread was observed in nearly all lymphoma cases, which is consistent with the literature.

Bowel lymphomas often present with nonspecific symptoms such as weight loss, abdominal pain, and changes in bowel habits, making early diagnosis challenging. CT imaging plays a crucial role in the evaluation of lymphomatous involvement, particularly in identifying enlarged lymph nodes and assessing the extent of the disease. The treatment of bowel lymphoma typically involves chemotherapy, with surgical intervention reserved for complications such as obstruction or perforation.

Mucinous Adenocarcinoma

Mucinous adenocarcinoma, which accounted for 4 cases (10.5%) in this study, is a subtype of adenocarcinoma characterized by the production of mucin. Mucinous adenocarcinomas are known for their aggressive behavior and poor prognosis compared to non-mucinous adenocarcinomas. These tumors are often diagnosed at a more advanced stage due to their tendency to grow rapidly and metastasize early.

In this study, mucinous adenocarcinomas exhibited a similar pattern of metastasis to that of conventional adenocarcinomas, with liver and lymph node involvement being the most common. However, mucinous tumors often pose a diagnostic challenge on imaging, as the mucin content can obscure the detection of metastatic lesions on CT. This underscores the importance of correlating imaging findings with histopathological analysis to ensure accurate diagnosis and staging.

The findings of this study have several important clinical implications. First, the high prevalence of lymphatic and hepatic metastasis among bowel cancer patients highlights the need for thorough staging at the time of diagnosis. CT imaging remains a crucial tool in this process, providing detailed information on the extent of the disease. However, it is essential to recognize the limitations of CT, particularly in detecting early-stage local invasion or mucinous metastasis, and to complement it with other imaging modalities such as magnetic resonance imaging (MRI) when necessary.

Second, the correlation between histological type and metastatic pattern reinforces the importance of biopsy and histopathological analysis in guiding treatment decisions. Adenocarcinomas, lymphomas, and mucinous adenocarcinomas each exhibit distinct behaviors, requiring tailored therapeutic approaches.

CONCLUSION

In conclusion, this study emphasizes the critical role of CT in detecting metastasis in bowel neoplasms and underscores the importance of correlating imaging findings with histopathological data to guide treatment strategies.

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