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ROLE OF COMPUTED TOMOGRAPHY IN COLORECTAL CANCER

Radiodiagnosis

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ABSTRACT

Colorectal cancer is a common malignancy that results in significant morbidity and mortality. Abdominal computed tomography (CT) is valuable in planning surgery for colon cancer because it can demonstrate regional extension of tumor as well as adenopathy and distant metastases. At CT, colorectal cancer typically appears as a discrete soft-tissue mass that narrows the colonic lumen. Colorectal cancer can also manifest as focal colonic wall thickening and luminal narrowing. Complications of primary colonic malignancies such as obstruction, perforation, and fistula can be readily visualized with CT. At CT, local extension of tumor appears as an extra colic mass or simply as thickening and infiltration of pericolic fat. Extra colic spread is also suggested by loss of fat planes between the colon and adjacent organs. The liver is the predominant organ to be involved with metastases from colorectal cancer. At CT, hepatic metastases usually appear as hypo attenuating masses, which are best visualized during the portal venous phase of liver enhancement. Other common sites of metastases from colon cancer include the lungs, adrenal glands, and bones. Use of CT is critical for identifying recurrences, evaluating anatomic relationships, documenting "normal" postoperative anatomy, and confirming the absence of new lesions during and after therapy.

KEYWORDS

INTRODUCTION

Colorectal cancer is the second most common cause of cancer death in developed countries.The initial diagnosis is usually made with colonoscopy or air-barium enema examination; however, with the increased use of computed tomography(CT) as the initial imaging modality in patients with a variety of gastrointestinal symptoms, the radiologist may be the first to suggest the diagnosis of colon cancer on the basis of CT findings. Nevertheless, at this time, CT is not routinely performed for detection of colon cancer, although continued advancements in scanner and computer technology may allow CT to play a future role in detection of polyps and early-stage colon cancer.

The current role of CT in patients with known colon cancer is controversial. Accuracy rates for preoperative staging of colon cancer with CT have been disappointing, ranging between 48% and77% . Limitations of CT staging include an inability to definitively identify nodes that contain tumor or to determine the exact depth of tumor invasion through the wall. Despite these limitations, CT is valuable in the management of colon cancer. Preoperative CT is useful for planning surgery or radiation therapy, particularly when local extension of tumor into adjacent organs or distant metastases are detected. In addition, preoperative CT provides baseline findings for comparison during the postoperative period and is the modality of choice for detection of local recurrence after surgical resection. The role of CT in preoperative staging, treatment planning, and postoperative follow-up, the radiologist should be familiar with the CT appearance of colon cancer.

AIMS & OBJECTIVES

To compare the sensitivity and specificity of CT scan in bowel lesion identification and characterization.

To correlate CT scan finding with histopathological findings.
To evaluate role of CT scan in diagnosis of bowel masses.
To analyse the advantages and limitations of each imaging modality in diagnosis of bowel masses.

MATERIALS AND METHODS

METHODOLOGY

Sample size= 72
Study design= Prospective study
Type of study= Single center
Duration of study= 1yr
Place of study=PDU Medical college & govt. hospital, Rajkot
Consent for participation in study= Yes

PATIENT SELECTION

Inclusion Criteria

- All cases of colorectal carcinomas diagnosed by CT scan during study period

Exclusion Criteria

- Pregnant females
- Infectious and inflammatory pathologies
- Patients in which no bowel mass was diagnosed on imaging and/or surgery

Machine Used

- GE 16 slice CT scanner

Consent for participation in the study will be taken from the patient. The indication and details of the CT scan procedure explained to patient.

A written consent will be obtained either from patient or his/her relatives for CT scan. Findings of CT scan will be correlated with surgical and histopathological findings whenever available. Observations will be recorded in patient proformas and analysed statistically.

STATISTICS

Table 1-Age distribution of Colorectal cancer

AGE GROUP					
	TOTAL	ADENOCARCINOMA	GIST	LYMPHOMA	MISC
0-10	2	-	-	1	1
11-20	1	1	-	-	-
21-30	2	2	-	-	-
31-40	12	12	-	-	-

41-50	14	13	-	1	-
51-60	16	14	1	1	-
61-70	14	13	-	-	1
71-80	10	9	-	-	1
81+	1	1	-	-	-
TOTAL	72	65	1	3	3

Table 2-Distribution of Colorectal cancer

LOCATION	NUMBER OF PATIENTS	PERCENTAGE(%)
Ileocecal and ascending colon	16	22.2
Hepatic flexure	9	12.5
Transverse colon	3	4.2
Descending colon	2	2.8
Rectosigmoid	37	51.4
Multifocal	5	6.9
TOTAL	72	100

RESULTS

In our study, most large bowel neoplasms occur after age of 31 years with peak incidence in age group of 51-60 years. Adenocarcinoma was by far the most common large bowel neoplasm accounting for 90.3% of all large bowel neoplasms in the study.

In our study, 51.4%(31/72) cases of colorectal neoplasm involved the rectosigmoid colon. 22.2%(16/72) cases involved the ileocecal region and ascending colon and 12.5%(9/72) involved the hepatic flexure. Transverse colon and descending colon neoplasms accounted for 7%(6/72) cases and 6.9%(5/72) cases were multifocal.

FIGURES

68-year-old man with cecal cancer. Axial CT scan of abdomen shows mass in cecum (black arrow) and adjacent lymphadenopathy (white arrow).

Image 2 (Computed Tomography): Thickened rectal wall with invasion of the mesorectal fascia on the right side (arrow). The mesorectal fascia on the left appears normal.

DISCUSSION

Colorectal cancer is the second most common cause of cancer deaths in western world, with high lifetime incidence of 6%. The initial diagnosis is usually made with ultrasound examination and sometimes with barium enema; however, with the increased use of computed tomography in patient with inconclusive results on ultrasound and other conventional studies, CT may be the first to suggest diagnosis of Colorectal cancer.

Accuracy rates of preoperative staging of Colorectal cancer with CT ranges between 90-100%.In our study, CECT had sensitivity of 100% in detecting Colorectal cancer greater than 1cm size.

Colorectal carcinoma is common, accounting for 15% of all newly diagnosed cancers, and tends to be a disease of the elderly, with the median age of diagnosis between 60 and 80 years of age 2, slightly younger for rectal carcinoma. There is also a slight male predilection for rectal cancers, not found in tumors elsewhere in the colon.

CT is the modality most used for staging colorectal carcinoma, with an accuracy of only between 45-77% 4, able to assess nodes and metastases.

It is often able to diagnose tumors although it is insensitive to small masses. CT colonography is increasing in popularity as an alternative to colonoscopy.

Most colorectal carcinomas are of soft tissue density that narrow the bowel lumen 4. Ulceration in larger mass is also seen. Occasionally low-density masses with low-density lymph nodes are seen in mucinous adenocarcinoma, due to the majority of the tumors composed of extracellular mucin. Psammomatous calcifications in mucinous adenocarcinoma can also be present. Complications may also be evident, e.g. fistulae, obstruction, intussusception, perforation [4].

TNM Classification for Staging of Colorectal Cancer

Primary tumor (T)
TX = primary tumor cannot be assessed
T0 = no evidence of primary tumor
Tis = carcinoma in situ
T1 = tumor invades the submucosa
T2 = tumor invades the muscularis propria
T3 = tumor invades through the muscularis propria into the subserosa or into nonperitonealized pericolic orperirectal tissues
T4 = tumor directly invades other organs or structures or perforates the visceral peritoneum
Regional lymph nodes (N)
NX = regional lymph nodes cannot be assessed
N0 = no regional lymph node metastasis
N1 = metastasis in 1–3 pericolic or perirectal lymph nodes
N2 = metastasis in ³4 pericolic or perirectal lymph nodes
Distant metastasis (M)
MX = distant metastasis cannot be assessed
M0 = no distant metastasis
M1 = distant metastasis

Stage	Definition
0	Tis N0 M0
I	T1 N0 M0
	T2 N0 M0
II	T3 N0 M0
	T4 N0 M0
III	Any T N1 M0
	Any T N2 M0
IV	Any T any N M1

Prognosis and 5 yr survival rates for Colon Cancer

- Stage I (T1-2N0) - 93%
- Stage IIA (T3N0) - 85%
- Stage IIB (T4N0) - 72%
- Stage IIIA (T1-2 N1) - 83%
- Stage IIIB (T3-4 N1) - 64%
- Stage IIIC (N2) - 44%
- Stage IV - 8%

Dukes Staging System

Stage	Definition
A	Limited to bowel wall
B	Extension into serosa or mesenteric fat
C	Lymph node metastases
D	Distant metastases

Overall 5 year survival rate is 40-50%, with stage at operation the single most important factor affecting prognosis.

- Duke A: 80-90%

- Duke B: 70%
- Duke C: 33%
- Duke D: 5%

SUMMARY AND CONCLUSION

We evaluated 72 patients with colorectal carcinoma using CECT with histopathological correlation.

Our study suggests that CECT can be used as a front line imaging modality for detection of colorectal carcinomas with its ability to show intraluminal, mural and extra intestinal lesions with their characteristic density and features to successfully differentiate between the different neoplasms and stage them. However, Biopsy is still confirmatory diagnostic method.

With Easy availability, low cost, widespread use of ultrasound as imaging modality, many cases of colorectal carcinomas were first time diagnosed on ultrasound examinations which later confirmed by CT scan and Histopathological Reports.

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