



Comparision of CT Colonoscopy and Conventional Colonoscopy in Evaluation of Colorectal Malignancies

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

CT colonoscopy is one of the recent advances in the field of Computed tomography with various post processing techniques. The aim of work is to evaluate and compare the role of CT colonoscopy and conventional colonoscopy in diagnosing and characterizing the colorectal malignancies.

Subject and Methods: Our study included 50 patients with lower GI symptoms; 6 of them had colorectal malignancies. They ranged in age from 28 to 60 years. All patients were subjected to CT colonoscopy examination and results were compared to conventional colonoscopy and documented by histopathology in all cases.

Results: The results in our study showed that CT colonoscopy has equal sensitivity and specificity in diagnosing colorectal malignancies when compared to conventional colonoscopy and further helps in delineating the locoregional extent of the lesion.

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1. INTRODUCTION

Colorectal malignancies are one of the most common debilitating illnesses in the society. Conventional colonoscopy is still being considered the gold standard of evaluating colonic malignancies but conventional colonoscopy is an invasive procedure with patient discomfort being one of the key disadvantages.

In the last decade, computed tomographic (CT) colonoscopy, a new cross-sectional technique for imaging of the colon, emerged [1]. CT colonoscopy has potential advantages over colonoscopy and double-contrast barium enema examination [2]: multiplanar capabilities, detection of enhancing lesions that make the distinction between fecal residue and true lesion possible, ante- and retrograde virtual colonoscopy.

CT colonoscopy generates a large number of source images [3], which have to be read carefully for filling defects and wall thickness and, if intravenous contrast material is used, enhancing lesions [4]. An important post-processing technique is multiplanar reformatting, which allows the viewer to see potential lesions in an orientation other than that of the source images. Virtual colonoscopy, a volume rendering technique that generates images from within the colon lumen, is used for problem solving. Currently, a number of studies suggest that patients have a preference for CT colonoscopy over colonoscopy [5].

2. MATERIALS AND METHODS

Sample size: 50 cases.

Inclusion criteria: All patients with lower GI symptoms were included (Age group > 20 years).

Exclusion Criteria: Asymptomatic individuals; Children and pregnant women.

Methods: All patients will be subjected to CT colonoscopy and followed up by conventional colonoscopy.

Imaging Protocols and Procedure: Patients of the inclusion criteria were referred from the

department of gastroenterology and after overnight fasting on empty stomach CT colonoscopy is done using HITACHI ECLOS 8 SLICE SCANNER. Patient was placed in supine position and manual insufflations of colon was done

Scanning parameters: All patients were examined in cranio-caudal direction starting from the level of the diaphragmatic cupola down to the anus.

Slice thickness: 2.5 mm.

Pitch factor: 2:1 Milli ampere 200 mAs.

Kilo volt: 120 to 150 kv, matrix 512 · 512.

Range for scanning time: 20 to 30 s.

Field of view Full Reconstruction interval: 1.25 mm.

The colon was insufflated by gentle squeezing of the BP cuff using room air, until the patients stated they were full or ~15 to 20 manual compressions. The adequacy of air insufflations was evaluated with a CT scout view, with more air insufflated if required. Bowel distension with air till cecum was considered adequate. Now the patient is made to lie down prone and scout view taken to look for if additional air insufflations were necessary. When air insufflations are satisfactory then image acquisition in prone position is done [6].

Data analysis: All the data acquired from the examination including the scanograms supine and prone acquisitions were transferred to work station unit.

After analyzing the data, the patient is sent for conventional colonoscopy to evaluate the colon on the same day.

3. RESULTS AND INTERPRETATION

Table 1 shows the distribution of various age groups in the cases taken for the study. Majority of the patients come under age group of 51-60 years (36%) followed by the 41-50 years age group (28%).

Table 1. Age distribution

Age group	No. of cases	%
21-30	03	6%
31-40	15	30%
41-50	14	28%
51-60	18	36%
Total	50	100%

Table 2 shows the ratio of Male and female in the cases taken under study. Majority of the patients are male (78%).

Table 2. Sex ratio

Male	39	78%
Female	11	22%
Total	50	100%

Table 3 shows that the majority of the male patients were under the age group of 51-60 (38.46%), whereas female patients were more in age group 41-50 years (45.45%).

Table 3. Age vs. sex

Age group	Male	Female	Total
21-30	02	01	03
31-40	13	02	15
41-50	09	05	14
51-60	15	03	18
Total	39	11	50

The comparison of CT and conventional colonoscopy in regard with each other showed that the CT findings were exact for Inflammatory Bowel disease and Carcinomas as they were in Conventional colonoscopy. But, for Hemorrhoids and polyp, CT findings showed 8 and 7

respectively, whereas both the proven and conventional colonoscopy figures were 10 and 9 respectively.

Age wise distribution of malignancies shows 66.6% of the cases were less than 40 years of age.

There were various extra-colonic findings observed in which Ascites, hepatic metastasis, renal calculi & cortical cyst, hernia etc. were observed.

4. DISCUSSION

Among the 50 patients in our study, 37 patients had pathologies on CT colonoscopy with the most common being inflammatory bowel disease found in 32% of the patients included in the study.

In our study lesions were more prevalent in the sigmoid colon accounting for 40.5% of the lesions, while 27.1% of the lesions were seen in the rectum and colon, 16.2% lesions in descending colon, 10.8% in transverse colon, 2.7% each in ascending colon and cecum. This is similar to the study by Ayman et al. [7].

Virtual colonoscopy identified 19 cancers-with a sensitivity and specificity of 100% and 99.2% respectively in a study conducted by White TJI et al. [8]. In our comparative study of CT vs Conventional colonoscopy, CT colonoscopy identified 6 cancers with a 100% sensitivity and specificity which showed improved specificity and sensitivity compared to the study conducted by White TJI et al.

Table 4. Correlation of no. of findings of CT colonoscopy and Conventional colonoscopy for various incidences

Incidence	CT colonoscopy	Conventional colonoscopy	Biopsy/surgically proven cases
Inflammatory Bowel Disease	16	16	16
Hemorrhoids	08	10	10
Polyp	07	09	09
Carcinoma (malignancy)	06	06	06

Table 5. Comparative study for the sensitivity of incidence of malignancy between CT colonoscopy and conventional colonoscopy

Incidence	CT colonoscopy Sensitivity (%)	Conventional Colonoscopy sensitivity (%)
Carcinoma (malignancy)	100	100%

Table 6. Age wise distribution of malignancy on CT colonoscopy

Age group	Carcinoma (n=6)
21-30	2 (33.33%)
31-40	2 (33.33%)
41-50	1 (16.66%)
51-60	1 (16.66%)
Total	6 (100%)

Table 7. Distribution of extra-colonic findings

Findings	No. of cases
Ascites	02
Hepatic metastasis	01
Renal calculi	05
Renal cortical cyst	02
Inguinal Hernia	03
Lumbar spondylosis	02
GB wall thickening	01
Cholelithiasis	01
Cirrhosis and Portal hypertension	01
Hiatal Hernia	01

In one case, there was an ulceroproliferative lesion in the rectum which was obstructing the lumen of the rectum and the probe in conventional colonoscopy could not be passed beyond the rectum and further evaluation could be done by CT colonoscopy which showed pericolic fat stranding and multiple perirectal nodes.

Perry J. Pickhardt et al, in his study of 30 patients with colorectal cancer where the systematic review and meta analysis of detection of colorectal cancer by CT colonography and colonoscopy was done concluded computed tomography colonography was highly sensitive

for colorectal cancer which is in concordance with our study [9].

All the cases of malignancies were further evaluated for the presence of pericolic/perirectal fat stranding and peri rectal lymphnodes, in which all the 6 cases showed the involvement of the perirectal fat stranding and peri rectal lymph nodes. Further staging by evaluation of the fat plane between the rectum and the bladder, between the rectum and the prostate were also done.

Jarmillo et al. has described that the incidence of colorectal cancer rises sharply after the age of 40, and 90% of cases occur over the age of 50. This has been correlated by Halligan et al. [10]. But in our study 66.66% of the cases with colorectal cancer were detected in age group less than 40 years of age which is indicating a shift in the incidence of colorectal malignancies.

Michel et al. in his study of prospective comparison of thin low dose multi detector row CT colonography and conventional colonoscopy among 296 patients 13.2% had extracolonic findings (13.2%), varying in nature including aneurysmal dilatation of the aorta, vertebral changes, hemangiomas in the liver and pancreatic pseudocysts, leiomyomas of the uterus, mature teratomas in female patients and, in one case, a urothelial cell carcinoma was detected. In our study the 19 out of 50 patients had extracolonic findings (38%), which were hepatic metastases in 1 patient, ascites in 2 cases, renal calculi in 5 cases, renal cortical cysts in 2 cases, inguinal hernia and lumbar spondylosis each in 2 cases; Gall bladder wall thickening and cholelithiasis in 1 case each; hiatal hernia in 1 case and 1 case of cirrhosis with portal hypertension.



(a)



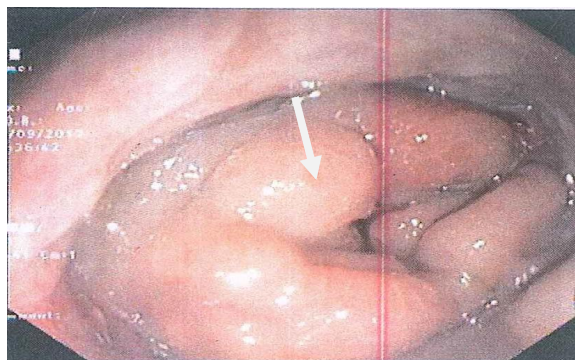
(b)

Fig. 1a & b. Axial CT shows diffuse circumferential wall thickening involving the entire rectum, recto sigmoid junction (black arrows in a, b) and the distal part of the sigmoid colon



(c)

Fig. 1c. CT axial section shows extensive fat stranding involving the peri and meso rectal fascia (arrows)



(d)

Fig. 1d. Conventional colonoscopy shows circumferential proliferative growth with luminal narrowing noted 3CM from anal verge in the rectum. Probe could not be passed beyond the lesion. This lesion was proved to be moderately differentiated adenocarcinoma

Fig. 1. Illustrative case: A case of 28 year old male with complaints of bleeding per rectum

The main drawbacks of CT colonoscopy from our study were its low sensitivity in detecting polyps and the radiation exposure to the patients. Conventional colonoscopy is ultimately necessary for diagnostic and therapeutic excision of lesions and obtaining histopathological diagnosis which cannot be done using CT colonoscopy. Conventional colonoscopy is ultimately necessary for diagnostic and therapeutic excision of lesions and obtaining histopathological diagnosis which cannot be done using CT colonoscopy.

5. CONCLUSION

CT Colonoscopy is minimally invasive effective method of investigation of colorectal malignancies with equal sensitivity in detecting malignancy as compared to the gold standard conventional colonoscopy. In addition to the detection of the malignancy CT colonoscopy can evaluate the locoregional extent of the lesion and gives us the information about any extracolonic incidental findings which may help the clinicians to provide further management to the patients. CT colonoscopy will be of immense use in evaluation of colorectal pathologies in bed ridden and chronically ill patients. However conventional colonoscopy will still be a necessary tool for evaluation of colonic pathologies due to its concurrent excision of lesion which will be helpful for the histopathological correlation.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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