DIAGNOSTIC EVALUATION OF BARIUM ENEMA IN COLORECTAL CANCER AND ITS CORRELATION WITH HISTOPATHOLOGY

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Abstract

Background: Colorectal cancer is common in western countries and less common in Asian countries. The aim of the study to determine the diagnostic value of barium enema in colorectal cancer.

Materials and methods: A prospective study was carried out on 50 cases presented with clinical features of colorectal cancer in Bangabandhu Sheikh Mujib Medical University, Dhaka Medical College Hospital and National Institute of Cancer Research & Hospital (NICRH) during the session July 2000 to June 2001. The male was 30 and female 20. Mean age of the male was 46 ± 10.8 years that of female was 44.5 ± 11.2 years.

Results: No statistically significant difference was found between age and sex of the patients. People suffer at an earlier age in our country than western people and highest number of cases occurred at 4th and 5th decade. Males predominate over females and the rectum is more involved than the colon. 96% of patients took meat and fat and one patient had a family history of colon cancer. Colorectal cancer was more (44%) in better socio-economic condition than low (4%). Constipation (70%) and per rectal bleeding (64%) were predominant symptoms and 68% cases had abnormality in per rectal examination. Out of 40 cases colonoscopy detected lesion in 33 cases, one was false positive and 7 cases were negative, of them 3 cases were false negative, 4 true negative. In 50 cases barium enema detected lesion in 42 cases, 2 were false positive. 8 cases were negative in barium enema of them 5 were false negative and 3 true negative. Histologically 45 (90%) cases proved to be adenocarcinoma, among them 4 (8%) cases were mucinous adenocarcinoma. Histologically 5 cases were negative. The sensitivity and accuracy of barium enema was 88.9% and 86% and that of colonoscopy was 91.4% and 90% respectively.

Conclusion: Though colonoscopy had greater sensitivity and accuracy, it is less acceptable to the patients, high cost, not easily available, requires sedation and expertise and entire colon is not seen in 2-40% of the patient. Barium enema maybe accepted asinitial investigation in the diagnosis of clinically suspected colorectal cancer.

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Introduction

Colorectal cancer is primarily a disease of elderly population. The incidence increases with age from 3.9 per 1000 persons per year at age 50 to 4.5 per 1000 persons per year at age 80.[1] Exact incidence of colorectal cancer in our country is not known due to lack of population based study and absence of cancer registry. One study done at Radiotherapy Department, Dhaka Medical College Hospital for a period of three years (1990-92) showing out of 10,095 new cases of cancer came for treatment, total number of colon and rectum cancer was 194 of them male constituted 148 and females were 46.[2] Though it may not represent the exact situation in Bangladesh but it is not likely to be quite unrepresentative also. Incidence of disease is related to the environmental factors as well as genetic factors. Some important environmental risk factors are animal fat, meat, processed meat and refined carbohydrate.In Bangladesh rapid urbanization is occurring due to migration of people from rural to urban areas. Occupation adopted in urban areas are predominantly service, business and industrial job. So easily available simpler food item consumption is increasing which contain less fiber due to more use of refined carbohydrate. Meat especially fried or direct fire contact preparation produce carcinogen is another alarming situation is urban areas. All these factors are a potential threat to increase the risk of colorectal cancer in our country.

Two commonly used strategies for initial evaluation are Double Contrast Barium Enema (DCBE) and diagnostic lower GI endoscopy. Other modalities are CT US & MRI (Computed Tomography, Ultrasound & Magnetic Resonance Imaging). Double centrast barium enema is recommended radiographic study for routine examination of colon which allows optimal evaluation of mucosal details. It is the best imaging techniquefor detecting polyps or tumors and for demonstrating early inflammatory disese of colon such as fine ulcerations and mucosal granularity.

Colonic lesions such as polyps or carcinomas greater than 1cm are detected by DCBE (Double Contrast Darium Enema) with an accuracy of 90-95% which is equivalent to the accuracy of colonoscopy.[3] Besides, Barium enema is easy to perform, requires no sedation, cheap and readily available in our country. The objectives are :

i) To evaluate the role of barium enema as an initial investigation in the diagnosis of colorectal cancer in our country. ii) To determine accuracy, sensitivity and specificity of barium enema in colorectal cancer. iii) To diagnose colorectal cancer with barium enema and evaluate its correlation with histopathology. A study is required in our setup to determine the diagnostic value of barium enema in colorectal cancer and to evaluate wheather we can reach up to the level.

Materials and methods

The present study was prospective for evaluations of barium enema in the diagnosis of colorectal cancer and its correlation with histopathology. Total number of 50 cases included in the study on the basis of clinical, radiological, colonospic and histopathological examination, Among 50 cases colonoscopy was done in 40 cases.

This study was carried out in Bangabandhu Sheikh Mujib Medical University (BSMMU). Dhaka Medical College Hospital (DMCH). National Institute of Cancer Research and Hospital (NICRH).

The study was performed from 1st July 2000 to 30th June 2001, a period of one year.

Patients of both indoor & out patients department were included in the study.

Inclusion criteria

i) Patient having clinical features as per rectal bleeding alteration of bowel habits, constipation, diarrhea, pain and lump in the abdomen
ii) Patient with colorectal cancer detected by Barium enema examination
iii) Patient who completed barium enema and agreed to undergo colonoscopy or surgery
iv) Patient was selected irrespective of age and sex.

Exclusion criteria

i) Patient who refuses Barium enema examination

ii) Patient who denies to undergo colonoscopic examination or surgery

iii) Patient who was operated on the basis of Barium enema report but histopathology was not done

iv) Patient with inflammatory bowel diseases.

All 50 cases underwent barium enema examination under fluoroscopic control after proper bowel preparation. The mAs and kv were applied depending upon the thickness of the part of the patient x-rayed. Among 50 cases single contrast was done in 11 cases and double contrast in 39 cases. Reports were reviewd by experienced radiologists.

Diagnostic criteria of barium enema: Following features were considered for the diagnosis of the lesion:-

- Constant irregular filling defect with narrowing, Mucosal destruction.
- Annular constricting lesion, Apple core appearance of the lesion.
- Complete obstructing lesion, Ulcerated mass
- Polypoid lesion, Cauliflower like lesion.

Colonoscopic examination: After proper bowel preparation colonoscopy was done on left lateral position in 40 cases and biopsy were taken. Sedation was given with injection midazolam (2.5-5mg) or diazepam (5-10mg) either alone or with Injection pethidine (25-75mg) intravenously. The procedure was done by colonoscopists 2-3 days after barium enema. It was uneventful.

Histopathological examination: The findings of barium enema examination were confirmed by histologic examination of the specimens obtained by colonoscopy and that of 10 cases were after operation. The biopsy specimens were collected in containers containing 10% formalin and sent for histopathology. On microscopic examination any alteration in gland architecture epithelial growth pattern and smooth muscle cytology were considered abnormal and recorded. Reports were prepared by pathologists. Relevant data were collected by questionnaire, interview, case history and clinical examinations. Objectives of the study were explained to the patients and assured that the procedure would be helpful for the physician concerned to manage the disease

Results

A total of 50 patients were clinically, radiologically, colonoscopically and histologically evaluated with a view to find out the diagnostic correlation

among them. The mean age of the patient was 45.7 ± 10.9 years. It was found that 30.0% of the patients had in the range of 30-39 years, same percentage of patients were also in 40-49 years age group, 22% in 50-59 years & 18% in 60-69yrs

Thirty patients (60.0%) were male and remaining twenty were female (40.0%).

It was evident from the study that 40.0% of the patients were housewives followed by 22.0% businessmen, 20.0% farmer, 12.0% service holder.

More than two fifth (44.0%) were average socio-economic followed by 28.0% below average and 24.0% had good socio-economic conditions.

It was found that cent percent of the subjects were rice eater followed by 96.0% meat and fat and 38.0% took vegetables. Here fibres containing food (Vegetables and cereals) are protective agents and meat and fat etiologic factors.

It was found that 70.0% of the patients had complaint of constipation followed by 64.0% per rectal bleeding, 56.0% diarrhoea, 48.0% alteration of bowel habit, 42.0% sense of incomplete evacuations and 34.0% had complaint of passes of mucus.

It was observed that 68.0% of the patients had tenderness on abdominal examination followed by 54.0% had anemia, 40.0% weight loss, 38.0% abdominal mass.

It was evident that 68.0% of the patients had abnormality on per rectal digital examination and remaining (32.0%) did not.

It was found that 39 patients had conducted double contrast and 11 patients had single contrast examination.

It was found that highest percentage (40.0%) of lesion in rectum followed by 10.0% in caecum and ascending colon 8.0% in recto-sigmoid junction, 8.0% in ascending colon & 4.0% in caecum. It also showed that 6.0% in sigmoid colon & 2.0% transverse colon.

More than half (54.0%) of the patients had irregular filling defects followed by 10.0% in each polypoid defects and annular constriction, 6.0% complete obstruction 2.0% ulcerated mass 2.0% cauliflower lesion and 16.0% had no abnormality.

These results were shown in Table I.

Table I : Radiological findings of the study patients (n=50).

Radiological findings	Number of patients	Percent (%)
Irregular filling defect & narrowing	27	54.0
Polypoid defect	5	10.0
Annular constriction	5	10.0
Complete obstruction	3	6.0
Ulcerated mass	1	2.0
Cauliflower lesion	1	2.0
Normal	8	16
Total	50	100.0

Out of 50 study subjects only 40 patients had under gone colonoscopy. Out of 40 patients, 32.5% had lesion in rectum followed by 15.0% lesion in recto-sigmoid colon, 12.5% caecum and ascending colon and 7.5% in each sigmoid colon and descending colon. It was found that 17.5% had no lesion. These results were shown in Table II.

Table II : Site of lesion detected by colonoscopy (n=40).

Site	Number of patients	Percent (%)
Rectum	13	32.5
Recto-sigmoid colon	6	15.0
Caecum and ascending colon	5	12.5
Sigmoid colon	3	7.5
Descending colon	3	7.5
Ascending colon	2	5.0
Caecum	1	2.5
Normal	7	17.5
Total	40	100.0

It was found that one fourth of the patient had ulcerative mass followed by 20.0% obstruction stenosed mass, 15.0% annular mass and 10.0% polypoid mass. 17.5% were normal. These results were shown in Table III.

Table III : Distribution of patients by Colonoscopic findings (n=40).

Colonoscopic findings	Number of patients	Percent (%)
Ulcerative mass	10	25.0
Obstructing stenosed mass	8	20.0
Annular mass	6	15.0
Polypoid	4	10.0
Cauliflower	3	7.5
Flat lesion	2	5.0
Normal	7	17.5
Total	40	100.0

It was found that 82.0% (41 patients)were adenocarcinoma, 8.0% (04 patients)Mucinous adenocarcinoma and 10.0% (05 patients) of them were normal. These results were shown in Table 1V.

Table IV : Histological findings of carcinoma (n=50).

Histological findings	Number of patients	Percent
Adenocarcinoma	41	82.0
Mucinous adenocarcinoma	4	8.0
None	5	10.0
Total	50	100.0

It was shown that out of 50 cases, 20.0% were well differentiated, 18.0% moderately differentiated, 44.0% poorly differentiated.

The sensitivity for barium enema was 88.0%, specificity 60.0%, accuracy 86.0%, positive predictive value 95.2%, negative predictive value 37.5%.

These results were shown in Table-V below : Sensitivity, specificity, accuracy, positive predictive value, negative predictive value of barium enema and comparison with histopathology report (n=50).

Table V : Sensitivity and specificity analysis of barium enema and comparison with histopathology report :

Barium enema	Histopathology (n=50)		Total
	Positive	Negative	
Positive	40	2	
	(True positive)	(False positive)	42
Negative	5	3	8
	(False Negative)	(True Negative)	
Total	45	5	50
Sensitivity		88.0%	
Specificity		60.0%	
Accuracy		86.0%	
Predictive positive value		95.2%	
Predictive negative value		37.5%	

The sensitivity for colonoscopy was 91.4%, specificity 80.0%, accuracy 90.0%, positive predictive value 97.0%, negative predictive value 57.1%.

These results were shown in Table V1 below : Sensitivity, specificity, accuracy, positive predictive value, negative predictive value of colonoscopy and comparison with histopathology report (n=40).

Table VI : Sensitivity and specificity analysis of colonoscopy and comparison with histopathology report:

Colonoscopy	Histopathology (n=40)		Total
	Positive	Negative	
Positive	32	1	33
	(True positive)	(False positive)	
Negative	3	4	7
	(False Negative)	(True Negative)	
Total	35	5	40
Sensitivity		91.4%	
Specificity		80.0%	
Accuracy		90.0%	
Predictive positive value		97.0%	
Predictive negative value		57.1%	

Discussion

This prospective study was carried out to determine the value of barium enema and its correlation with histopathology for the diagnosis of colorectal carcinoma. A total of 50 patients were included in this study on the basis of clinical features of colorectal carcinoma and evaluated radiologically, colonoscopically (40 patients) and hitopathologically. Male patient was 30 (60%) and female 20(40%).Colorectal carcinoma is the disease of elderly. In the western countries colorectal cancer occur at late adult life 6th, 7th decade.[4] However in this study it was found the highest at the 4th and 5th decade followed by 6th decade. Causes for this earlier age group can't be explained from the present study. Multiple biopsies and chromosomal analysis is the reasonable answer. No exact report of correlation of colorectal carcinoma to any occupation till now has been reported. In this series 20(40%) cases were house wives and 11 (22%) businessmen. Colon cancer is more common in the industrialized countries with Japan being a notable exception.[5] The world wide frequency of this disease seems to be related to a highdegree of socio-economic standard. It is generally accepted that diet, particularly high intake of diatary fat and beef, is a major etiological factor in colon cancer. People in low risk areas eat diets low in fat content but rich in vegetable protein or fish protein.[6] In this series 100% were rice eater because it is the staple food of this country, 96% took meat and fat and 38% vegetables. Fibres from vegetables and cereals got some protective role. Cancer association was found between patients who reported constipation and high fat intake and above 40 years old patients with recent onset of rectal bleeding, a colorectal cancer is found in about

10%.[7] 54% of patients were found anaemic (Hb < 50%) and 40% had weight loss which generally viewed as a manifestation of serious disease. Other laboratory findings (Urine R/E, Urea, Creatinine, Blood Sugar) and Chest X-Ray were not significant. Fecal occult blood test was not done Digital rectal examination is by far the most important step of the examination. Up to 75% of all rectal tumors and 35% of all large bowel tumors can be palpated by finger.[8] Site of lesion detected by barium enema was predominant in rectum 40% and other parts of the colon as a whole it was 60%. Adenocarcinoma is the most common type of colorectal cancer, amounting 85% of cases and mucinous adenocarcinoma less than 15% of the colorectal carcinoma.[7] In this series histologically 82% cases were adenocarcinoma and 8% mucinous adenocarcinoma which were almost same as previous study. Brewster also opined that colonoscopy is regarded as the gold standard in colonic examination, but is impractical as the first line of investigation as this would place a huge demand on endoscopy services and because the entire colon is not seen in 2 to 40% of patients.[9] Barium enema is more acceptable, easy to perform, cheap easily available requires no sedation, able to detect synchronous lesion beyond stenosingtumour, take short timeand it has close correlation with histopathology, so barium enema may be the initial investigation of choice in the diagnosis of the colorectal cancer.

Limitation

Barium enema is usually not appropriate for some one who is in extreme abdominal pain or who has had a colonic biopsy. X-ray imaging is not usually indicated for pregnant women.

Conclusion

It can be concluded that barium enema is useful in the detection of colorectal lesion and may be accepted as initial investigation in the diagnosis of clinically suspected colorectal cancer. During this study it was found that barium enema was cost-effective, quicker, easily available acceptable method and had close correlation with histopathology. It is less invasive, sensitive and accurate method. But it demands meticulous bowel preparation, training and experience of operator for getting optimum results.

Recommendation

It is unicentre study and sample size is small. It requires maximum sample size and multicentre study.

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Disclosure

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