Journal of Surgical Sciences (2016) Vol. 20(1)

JOURNAL OF SURGICAL SCIENCES

Original Article

CHANGES OF SERUM CEA LEVEL AFTER RESECTION OF COLORECTAL CARCINOMA

Md Jahangir Kabir[1], AKM Minhaj Uddin Bhuiyan[1], Md Mizanur Rahman[2]

Abstract

Introduction : Carcinoembryonic antigen is the most commonly used tumour associated antigen in the management of patients with colorectal carcinoma. The test appears useful to determine prognosis and to monitor patients with colorectal carcinoma for early recurrence, persistent elevation of CEA for a month after operation suggests the presence of occult metastatic disease.

Objective : The study was done to compare pre and postoperative CEA level in colorectal carcinoma patient and to analyze the relationship of CEA and different Dukes stage in pre operative period of colorectal carcinoma patients.

Methods : This cross-sectional and cohort study was performed to look at the change in CEA level among 97 colorectal carcinoma patients in pre and post operative state in the department of surgical oncology, NICRH from January 2010 to June 2012.

Results : Statistically significant changes was found in pre and postoperative CEA level in colorectal carcinoma patient ($p < .001$). Preoperative CEA level was raised in Dukes B(40%) and Dukes C(54%).

Conclusion : Postoperative CEA level was significantly reduced after resection of colorectal carcinoma.

Introduction

Carcinoembryonic antigen (CEA) is an oncofetal antigen first described by Gold and Freedom in 19651. Carcinoembryonic antigen is the most commonly used tumour associated antigen in the management of patients with colorectal carcinoma[1]. The sensitivity of CEA as a monitoring test varies from 43% to 89% with a specificity of 70% to 90%. Elevation of CEA in primary tumour correlates with Dukes stage (45% of C tumour and 25% B tumour). However , the test appears useful when used to determine prognosis and to monitor patients with resectable colorectal carcinoma for early recurrence[2]. Persistent elevation of CEA for a month after operation suggests the presence of occult metastatic disease.

In colon cancer, elevation of serum CEA has been found to be related to the mass of tumour present[3]. The tests appears useful when used to determine prognosis and to monitor patients with resectable colorectal carcinoma for early recurrence[4].

There is significant relationship of serum CEA level and different stage of colorectal carcinoma[5]. CEA is a classical tumour marker for colorectal cancer detected in 1965 by Gold and Freedman[6]. CEA utility regarding colorectal carcinoma has been documented not only for monitoring the recurrence but also during follow up of chemotherapy and as a prognostic factor compared with colonoscopy[6], CEA measurement were found to be the most cost effective test in detecting potentially curable recurrent disease.

1. Assistant professor, department of Surgical Oncology, NICRH, Dhaka
2. Professor & Head, department of Surgical Oncology, NICRH, Dhaka

Correspondence to: Dr Md Jahangir Kabir, Assistant professor, department of Surgical Oncology, NICRH, Dhaka

Materials and Methods

The study involved both cross-sectional and cohort study conducted at the department of Surgical Oncology, National Institute of Cancer Research and Hospital (NICR&H), Dhaka, Bangladesh during the period of January 2010 to June 2012. The study was undertaken among patients with colorectal carcinoma who underwent surgical treatment during the study period. Inclusion criteria were histologically or cytologically diagnosed case of colorectal carcinoma. Exclusion criteria were patients refused to take part in the study and patient already received chemotherapy or radiotherapy. The variable of interest in this study were level of serum CEA in pre and postoperative colorectal cancer patient, Duke stage. Total sample size was 97.

Patients of colorectal carcinoma who have proven cytological or histological evidence of malignancy were evaluated clinically. Pre operative serum CEA level was measured then operative management carried out. Post operative CEA was measured before giving chemotherapy within 15th post operative day to 45st post operative day. CEA level was measured from patients' venous blood by ELISA method. Duke staging was confirmed from gross and nodal status from histological report. All the collected information (from the examination findings, available relevant investigations and operation notes) was recorded in a preformed questionnaire. Data from the study were compiled and analyzed using SPSS version 13. Pre and post operative mean CEA levels were compared and paired t-test was used to detect any significant difference. Proportion of elevated levels of CEA was also compared between different tumor stage of the disease, and Chi-squared tests was performed to find any significant difference. Informed written consent from the patients and ethical clearance from authorized persons of our institute was taken before starting of any study procedures.

Observation and Results

Table-1.
Age distribution of the patients

Age group	Number of patients(N)	Percentage (%)
20-29	06	6.2
30-39	08	8.2
40-49	35	36.1
50-59	25	25.8
60-69	18	18.6
70 & above	05	5.2

Table 2.
Sex distribution of patients.

Sex	Frequency	Percenta ge(%)
Male	56	57.7
Female	41	42.3
Total	97	100

Table 3.
Distribution of blood group (ABO) of the patients with colorectal carcinoma.

Blood group	Frequency (n)	Percentage (%)
A	14	14.5
B	46	47.4
AB	06	6.2
O	31	32
Total	97	100

Table 4.
Site of the lesion of the patients.

Site of the lesion	Frequency	Percentage (%)
Right Colon	15	15.5
Left Colon	13	13.4
Transverse Colon	4	4.1
Rectum	65	67
Total	97	100

Table 5
PTable 5. Serum CEA level according to stage of the patients.

	CEA Level		
Stage	Normal	Raised	To tal
Duke A	3	0	3
Duke B	30	9	39
Duke C	17	35	52
Duke D	0	3	3
Total	50	47	97

Table 6
Paired Samples Statistics of pre & postoperative CEA level

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Preoperative CEA level	14.9320	97	20.59426	2.09103
	Postoperative CEA level	1.9754	97	.52123	.05292

Table 5 shows that frequency of raised CEA level is 47 (49%) and other 50 (51%) patients CEA level remained normal.

Table 7

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2 - tailed)
Pair 1	Preoperative CEA Level postoperative CEA level	12.95660	20.56858	2.08842	8.81111	17.10208	6.204	96	.000

Discussion

In USA colorectal carcinoma is the second most common cause of cancer death[7]. There were an estimated 130,200 new cases of colorectal cancer of which 36400 involved the rectum & 18,500 the recto sigmoid junction[8]. Incidence rate for colorectal carcinoma as a whole declined significantly during 1992--1996 (-2.1% per year). Research suggests that these declines many be because of increased screening & polyp removed, preventing progression of polyps to invasive cancers[9]. The death rates also declined slightly.

Approximately 18,000 patients in the UK are dying per annum from colorectal carcinoma[10]. The rectum is the most frequent site involved.

Western study reveals that overall male to female ratio is 1.7:1 & median age of presentation is 67 years[11]. But the frequency of colorectal carcinoma in our study are as follows - 36.1% in age group 40-49 yrs. Followed by 25.8% in age group 50-59 yrs. 18.6% in age group 60-69 yrs. 8.2% in age group 30-39 yrs. 6.2% in age group 20-29 yrs. 5.2% in age group 70 & above. The majority of patients have enrolled in primary education (38%). The mean age of the patient was 40.90 and standard deviation was 16.06.

In one study in 1966 reported at Southern Surgical association, Florida, USA, that out of 975 cases, the median age was 60 years. The incidence was highest in the 6th decade & comparison low in 7th decade12. But in my study doesn't equal to that. Here the incidence is relatively higher in the younger age group in comparison to western countries. The probable cause of this shifting towards younger side many be due to limited number of cases, geographical & racial factors.

It is evidenced that in our study of 97 cases, 56 patients are male (57.7%) & 41 patients were female (42.3%). So, the overall male, female ratio was 1.4 : 1 which is similar to western study.

In this study incidence of Colorectal carcinoma was highest in blood group 'B' patient (47.4%), followed by 'O' group (32%), 'A' (14.5%), 'AB' (6.2%). It is difficult to draw a definitive relation between the blood group & colorectal carcinoma from such a small number of cases. It was perhaps due to overall majority of our peoples having blood group B,O,A, AB respectively.

Among the 97 cases of this study irrespectable of all stages S. CEA was raised in 48% of cases. This study shows that S.CEA level raised with the advanced stage of the disease, Such as it was highest in stage D (100%), followed by stage C (67%) & stage B (23%). Statistically it also shows highly significant in Chi-square test where the P value is <. 001.In my study it was shown that mean post operative CEA level is significantly reduced than that of preoperative level.

Conclusion

The serum CEA level in relation to stage has been proved highly significant in Chi-square test. So it can be concluded that S. CEA level is significantly higher in advanced stages of carcinoma with or without metastasis and lower in early stages. Conclusively it can be said that S. CEA level could play an important role to determine the diagnosis of advanced stages of colorectal carcinoma and prognosis. Serum CEA level was significantly reduced after surgery in all cases of stage B and stage C. So it indicates that surgery is main option of treatment for colorectal carcinoma.

As steady increase in S. CEA level indicate the evidence of tumor recurrence16, where as decreasing the level after operation indicate removal of tumor successfully but stable CEA level after treatment indicate failure of treatment. Regular postoperative follow up of S. CEA level is important to detect recurrence of the disease. So that further appropriate measure can be taken.

Recommendation

Serum CEA is an important prognostic marker for colorectal carcinoma which is significantly reduced after surgery so surgery is the mainstay of treatment for colorectal carcinoma.

References

1. Emile Tan, Nicos Gouvas, R.John Nicholls et al.Diagnostic precision of carcinoembryonic antigen in the detection of recurrence of colorectal cancer: Surgical oncology(2009) 18,15-24
2. Jeong Yeon Kim,MD,Nam Kyn Kam,MD,Seung Kook Sohn,MD, et al.Prognostic Value of Postoperative CEA Clearance in Rectal Cancer Patients with High Preoperative CEA Levels:Ann Surg Oncol (2009)16:2771-2778.
3. Miguel A.Herrera,t.ming Chu,e.douglas Holyoke et al. CEA Monitoring of Palliative Treatment for Colorectal Carcinoma: Roswell Park Memorial Institute, Buffalo, New York.
4. Curado MP, Edwards SB, Shin HR, et al: Cancer incidence in five continents, vol IX. Lyon, International Agency for Research on Cancer, 2007.
5. Winawer SJ, Stewart ET, Zauber AG, et al: A comparison of colonoscopy and double-contrast barium enema for surveillance after polypectomy. National Polyp Study Work Group. N Engl J Med 2000; 342:1766-1772.
6. Carcinoembryonic antigen test [online]. 2006 [cited 2006 Aug 08]. Available from: URL:http//www.healthhatoz.com
7. Chang GJ, Rodriguez-Bigas MA, Skibber JM, Moyer VA: Lymph node evaluation and survival after curative resection of colon cancer: a systematic review. J Natl Cancer Inst 2007; 99:433-441.
8. Song K, Fendrick AM, Ladabaum U: Fecal DNA testing compared with conventional colorectal cancer screening methods: a decision analysis. Gastroenterology 2004; 126:1270-1279.
9. Allegra C, Sargent DJ: Adjuvant therapy for colon cancer—the pace quickens. N Engl J Med 2005; 352:2746-2748.
10. Glinghammar B, Rafter J: Colonic luminal contents induce cyclooxygenase 2 transcription in human colon carcinoma cells. Gastroenterology 2001; 120:401-410.
11. Park Y, Hunter DJ, Bergkvist L, et al: Dietary fiber intake and risk of colorectal cancer. A pooled analysis of prospective cohort studies. JAMA 2005; 294:2849-2857.
12. Brosens LAA, Van Hattem A, Hylind LM, et al: Risk of colorectal cancer in juvenile polyposis. Gut 2007; 56:965-967.