Original Article

CHANGES OF SERUM CEA LEVEL AFTER RESECTION OF COLORECTAL CARCINOMA

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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 carcinoma¹. 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.

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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 | Percentage (%) |
|--------|-----------|----------------|
| 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 | 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         | 4         | 4.1            |
| Colon              | 65        | 67             |
| Total              | 97        | 100            |

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

| Stage | Normal | Raised | Total |
|-------|--------|--------|-------|
| 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

| Pair 1                  | Mean       | N  | Std. Deviation | Std. Error  |
|------------------------|------------|----|----------------|-------------|
| Preoperative CEA level | 14.9320    | 97 | 20.59426       | 2.09103     |
| Postoperative CEA level| 1.9754     | 97 | 0.52123        | 0.05292     |

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

| Pair 1 CEA Level         | Std. Deviation | Std. Error  | Lower     | Upper     | t     | df | Sig. (2 - tail) |
|--------------------------|----------------|-------------|-----------|-----------|-------|----|----------------|
| Preoperative CEA level   | 20.56858       | 60          | 8.81111   | 17.10208  | 6.204 | 96 | .000           |
| Postoperative CEA level  |                |             |           |           |       |    |                |

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

Approximately 18,000 patients in the UK are dying per annum from colorectal carcinoma. 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. 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 decade. 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 may 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 irrespectible 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 recurrence, 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.

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