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Carcinoembryonic antigen as a screening tool in the diagnosis of colorectal cancer: Is it a viable option?

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Abstract

Introduction: To determine the number of cases of colorectal carcinoma with a significantly elevated CEA level in plasma and its viability as a screening tool.

Materials and methods: The study included 30 patients diagnosed with colorectal carcinoma over the last one year and 30 controls. A written informed consent was taken from all the patients included in the study. Other cause of raised CEA levels was ruled out. The CEA levels were measured using immunoassay. The cut off value chosen was 3.5ng/ml. The tumour marker relationship with the grade of tumor differentiation and site of tumor was studied.

Statistical analysis used: The data was analysed using frequency, percentage and chi square statistics.

Results: There was 30 cases of colorectal cancer and 30 control cases studied for elevated CEA levels. Of the 30 cases of proven colorectal malignancy, 22 cases have elevated CEA levels and among the control group one case has elevated CEA levels. Majority of the patients was males (65%) and belonged to the age group between 60 to 80 years (38.3%). The sensitivity in this study amounted to 83.3% and specificity 96.7%.

Conclusion: The rising incidence of colorectal cancer demands for a feasible and economical screening tool especially in large population like India. Through this study it is difficult to make a definitive conclusion due to the limited time span and number of patients. However it can be told that CEA serves as a satisfactory diagnostic tool.

Keywords: CEA, colorectal cancer, Screening tool, diagnostic tool

Introduction

Colorectal cancer, a frequently detected human malignant neoplasm [1]in the developed and industrialised countries with annual incidence of 1,00,000 cases. However its incidence in India is noteworthy.[2]

Like most malignancies colorectal cancer too is seen above 50 years and the survival rate depends upon on the stage of the disease.[3] An early means of detection would help improve the cure rate.[4]

There are many modalities available to diagnose the malignancy. Colonoscopy being the gold standard diagnostic test but limited by the invasiveness of the procedure and cost factor.[5] There have been other alternatives tried like fecal occult blood and

fecal immunohistochemical tests but failed to prove effective due to poor patient compliance in giving the stool sample[6]. Tumour markers serve as a cost effective[7] and non invasive method to screen the population at large. Though many are known to be associated to colorectal malignancy but carcinoembryonic antigen is the most sensitive and specific marker.[8,9]

Carcinoembryonic antigen is an oncofetal glycoprotein. It is elevated in benign conditions like in smokers, hypothyroidism, peptic ulcer, cirrhosis, pancreatitis, biliary obstruction and inflammatory bowel disease.[10] It is also elevated in adenocarcinoma, specially colorectal adenocarcinoma. It is noted to be elevated more with the advancing stage of the tumour , lymph node involvement and distant metastasis.[11] It is a proven prognostic marker and preoperative elevated levels indicate shorter disease free period postoperatively.[12,] The cut off usually considered is 3.5ng/ml and values of 10ng/ml or more is definitely not seen in benign conditions.[13]

The purpose of this study was to correlate how many of the patients with a colorectal malignancy on colonoscopy had elevated CEA levels to suggest it as an initial diagnostic tool to detect colorectal malignancy. For the population as a whole it would be an effective screening tumour marker.

Materials and methods

The data was collected prospectively over one year amounting to a total of 30 cases of newly diagnosed colorectal cancer and 30 controls. The study was approved by the local ethical committee. A written informed consent was taken from all the patients included in the study.

The cases included all the newly diagnosed carcinoma colon and rectum, aged above 18years, in Father Muller Medical College and Hospital, detected over 1 year either through colonoscopy or CECT abdomen. It excluded all the cases aged less than 18years or who detected to have other conditions that may cause an elevated CEA levels. Those conditions included hypothyroidism, peptic ulcer, cirrhosis, pancreatitis, biliary obstruction and inflammatory bowel disease.

The general protocol was to do a clinical examination, blood investigations (CBC, LFT, TFT and CEA levels), colonoscopy, CECT abdomen and chest X-ray. Three cases had an incomplete colonoscopy, one due to an obstructing growth and the other two due to stricture. CECT abdomen performed in these cases helped to rule out other synchronous lesions in the rest of the colon.

The CEA levels were measured using immunoassay. The cut off value chosen was 3.5ng/ml. The tumour marker relationship with the grade of tumor differentiation and site of tumor was studied.

The data obtained was analysed using frequency, percentage and chi square statistics.

Results

There were 30 cases of colorectal cancer and 30 control cases studied for elevated CEA levels. Of the 30 cases of proven colorectal malignancy, 22 cases have elevated CEA levels and among the control group one case has elevated CEA levels.

Majority of the patients were males (65%) and belonged to the age group between 60 to 80 years (38.3%).

The important symptoms for which the 60 patients were analysed were altered bowel habits, bleeding per rectum, constipation, mass abdomen and pain abdomen. Of these symptoms the frequent complaint for which the patients underwent colonoscopy was bleeding per rectum (46.7%) and least complaints was of mass abdomen (1.7%).

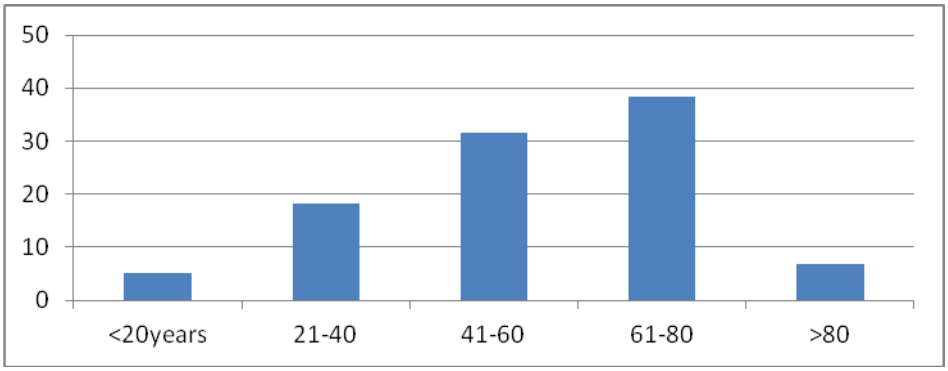

Fig 1: Age group and elevated CEA levels

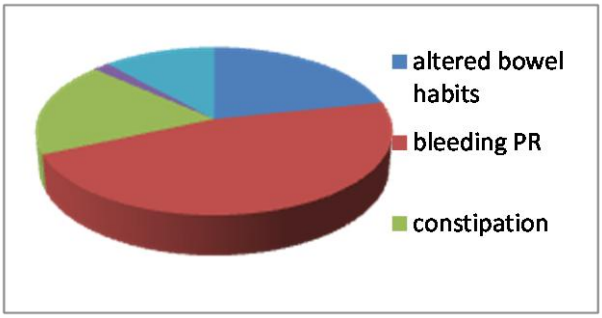

Fig 2: Symptomatology of patients undergoing colonoscopy

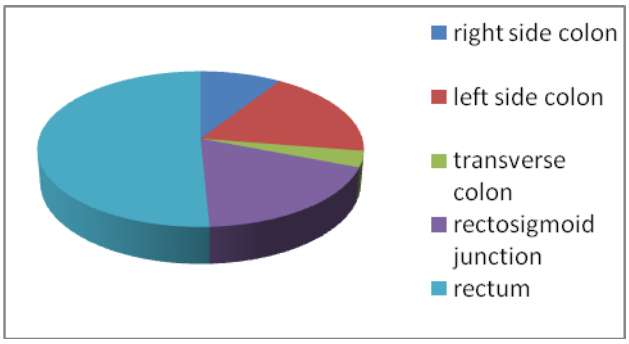

Fig 3: Site of tumor and elevated CEA levels

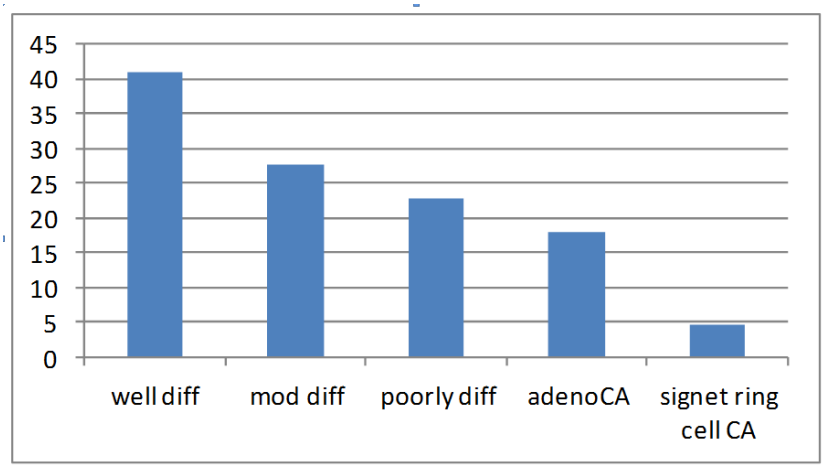

Fig 4: Histopathological types and elevated CEA levels

The cases with colorectal cancer had the following distribution of the tumor along the colon and rectum with 3 right sided colonic growth, 5 left sided growths, 1 in transverse colon, 4 in rectosigmoid junction, 17 in rectum.

On comparing with the grade of the tumor, it was seen that, 9 of the 10 well differentiated tumors, 6 of the 8 moderately differentiated and 5 of the 7 poorly differentiated have elevated CEA levels.

The sensitivity in this study amounted to 83.3% and specificity 96.7%.

Discussion

There have been many studies done in the past to evaluate the use of tumour markers in the diagnosis, staging and prognosis of colorectal cancer. In our study a significant number of colorectal patients had elevated CEA levels. 22 of the 30 cases studied had elevated CEA levels more than 3.5ng/ml.

The correlation with grade of tumour differentiation did not yield positive results. It has been noted in earlier studies that the CEA levels were elevated more in patients with high grade tumors[14] but in our study the poorly differentiated carcinoma five out of seven cases had elevated levels above 3.5ng/ml but less than 10ng/ml.

The right colon tumours were three , of which two had elevated CEA levels and the left sided growths were five , of which four had elevated levels , one reaching 96.2. It is generally seen that left sided growths had elevated CEA levels.

The number of cases considered in this study is small owing to the short duration of one year study period. Therefore a definitive conclusion cannot be made but however owing to the significant number of cases with elevated CEA levels we can conclude that CEA levels is a useful marker to screen the population at large and subject the patients with elevated levels to colonoscopy or CECT abdomen which can yield a confirmative result of colorectal cancer.

Considering colonoscopy, as a screening investigation based on symptomatology of patients is not only cumbersome but also expensive. It would certainly be difficult in a population like India which is expanding and having a reasonably large crowd on the poorer scale. The aim of using CEA levels in our country would not be to pick up all but at least most cases of colorectal cancer. The ones symptomatic, yet with low levels should certainly not be assured of no cancer and should be explained regarding colonoscopy or kept under surveillance. The benefit of this cheap method of screening would be that it can reach out to many, especially in the rural set up where colonoscopy is not available.

Conclusion

There have been various studies conducted in the past with analysis of colonoscopy and tumour markers in the diagnosis of colorectal malignancy. The results of which concluded CEA to be a better prognostic marker [15] than a diagnostic tool.

India being an economically deprived and large population has the need of the hour to detect an economical and easy tool to screen the population at large. Determining serum CEA levels satisfies these criteria and serves as a satisfactory diagnostic tool. The p value in our study being less than 0.001 proves that detecting elevated plasma CEA levels for diagnosing colorectal cancer is a feasible tool.

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