

Serum Carcinoembryonic antigen (CEA) Levels in Oesophageal Carcinoma

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Serum CEA levels were determined on 45 patients with carcinoma of oesophagus. In normal healthy persons serum CEA levels ranged between 0.0–2.5 $\mu\text{g/ml}$. Serum CEA levels were significantly higher in oesophagus carcinoma and corresponded to the extent of disease and presence of jaundice.

INTRODUCTION

Carcinoembryonic antigen (CEA) was first defined by Gold and Freedman¹ as a tumour specific antigen found in endodermally derived neoplasms of the gastrointestinal tract. CEA is a B-migrating glycoprotein with a molecular weight of approximately 2,00,000.² This compound contains approximately 50% carbohydrate and 40% protein, although the carbohydrate protein ratio may be quite variable, depending particularly on the tumour of origin^{3,4}. Carcinoma of the colon, pancreas, stomach, lung, breast, kidney and the tumours of head and neck have been shown to be associated with elevated CEA levels⁵.

In present study the level of CEA has been studied in oesophageal carcinoma to evaluate it as biochemical marker.

EXPERIMENTAL

Present study included 45 patients of oesophageal carcinoma admitted to the Deptt. of Surgery, L. L. R. M. Medical College, Meerut. 20 healthy age matched individuals of either sex were also studied as control.

All patients were clinically evaluated and thoroughly investigated for extent of disease. Diagnosis was confirmed by histopathology. For study purpose, patients were divided in 4 groups according to the extent of disease as follows :

- Group A : Ca oesophagus with localized tumour
- Group B : Ca oesophagus with lymphatic metastases
- Group C : Ca oesophagus with visceral metastases
- Group D : Ca oesophagus with disseminated metastatic disease + jaundice.

Estimation of CEA was done by Elisa principle (enzyme linked immunosorbent assay)—sandwich assay. 5 Ml blood was taken and centrifuged. Supernatant serum was removed and stored at -20°C . 0.1 Ml standard solution (A, B, C, D & E) and control serum supplied with kit were mixed with 1 ml solution (1a) (prepared by mixing acetate buffer or incubating buffer and anti CEA-POD conjugate in the ratio of 100 : 1) in monoclonal antibody coated tubes. 0.1 Ml serum sample of the patients was also mixed with '1a' solution in the similar tubes and incubated for 1 hr at 20 to 25°C , during which CEA from the sample reacts both monoclonal antibody bound to be solid phase and also with the POD labelled monoclonal antibody to form a sandwich complex. After 1 hr incubation the tubes were thoroughly washed with tap water, so that unused reagents were removed leaving behind the sandwich complex in the tubes. Now 1 ml solution '4a' substrate chromogen bottle to solution of substrate buffer (phosphate/citrate buffer sodium perborate) was added in each tube and incubated for 1 hr at 20 to 25°C .

The absorbance of sandwich CEA complex was determined spectrophotometrically at 420 nm. The calibration curve was plotted between absorbance (as ordinate) and respective concentration of the standards (as abscissa) on the graph paper supplied with the kit to evaluate the serum CEA concentration ($\mu\text{g/ml}$) of the sample.

RESULTS AND DISCUSSION

Serum CEA levels were estimated in 45 patients of carcinoma oesophagus and 20 normal healthy persons (Table 1). In normal healthy persons, serum CEA levels ranged between 0.0–2.5 $\mu\text{g/ml}$ (mean $-1.6 \pm .46 \mu\text{g/ml}$). Other workers⁶⁻¹⁰ have also reported CEA level below 2.5 $\mu\text{g/ml}$ in normal healthy persons.

In 5 patients (11.11%) who had carcinoma confined to oesophagus, the serum CEA levels ranged between 2.0–6.5 $\mu\text{g/ml}$ (mean $-4.6 \pm 1.71 \mu\text{g/ml}$). In 12 patients (26.67%) wherein the metastasis was confined to regional lymphnodes the serum CEA levels ranged between 4.0–15.0 $\mu\text{g/ml}$ (mean $-9.4 \pm 2.76 \mu\text{g/ml}$). In 18 patients (40.0%) wherein visceral metastasis was present, the serum CEA levels ranged between 10.0–35.0 $\mu\text{g/ml}$ (mean $17.6 \pm 4.00 \mu\text{g/ml}$), and in 10 patients (22.22%) wherein apart from liver and regional lymphnodes the disease was extended in peritoneal cavity & serosal surface of gastrointestinal tract with ascites and jaundice, the serum CEA levels ranged between 22.0–60.0 or $> 60.0 \mu\text{g/ml}$ (mean $-40.8 \pm 7.29 \mu\text{g/ml}$). These levels were highly significant ($P < 0.001$).

This study indicates that carcinoma of oesophagus is associated with elevated serum CEA level during the course of disease. Other workers^{8,11,12}

TABLE 1

SERUM CEA LEVELS IN CONTROL AND OESOPHAGEAL CARCINOMA PATIENTS UNDER STUDY GROUPS

	Total No of Cases	Range ($\mu\text{g/ml}$)	Mean \pm S. D.
Control	20	0.0 – 2.5	1.6 \pm 0.46
Group A	5	2.0 – 6.5	4.6 \pm 1.71*
Group B	12	4.0 – 15.0	9.4 \pm 2.76*
Group C	18	10.0 – 35.0	17.6 \pm 4.00*
Group D	10	22.0 – 60	40.8 \pm 7.29*
		or	
		> 60	

P (significance) value, control vs Patients P < 0.001.

have reported raised level of CEA in oesophageal carcinoma. Alexander et al¹³ reported in his study that 70% of patients with carcinomas of the oesophagus had elevated CEA level, and suggested that adenocarcinomas were more prone to produce CEA, but that squamous tumours of the oesophagus also possess the ability to produce large amount of CEA.

Hence, value of CEA level may be considered as important biochemical parameter in oesophagus carcinoma. Levels rise with extent of disease and still higher levels in visceral metastases. This is also an important parameter during the follow-up of these patients. Elevated level may guide for the need of specific investigations to detect the metastases early and may serve as useful prognostic parameter also.

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