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CEA as a Marker for Medullary Thyroid Carcinoma in a Patient with Colorectal Cancer

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INTRODUCTION

Carcinoembryonic antigen (CEA) is a protein involved in cell adhesion.[1] First described by Gold and Freedman,[2] CEA measurement is used as a tumor marker to monitor colorectal carcinoma treatment, identify recurrences after surgical resection, and stage or localize cancer spread through measurement of biological fluids.[3] Rarely, CEA elevation can be associated with other malignancies and disorders. In this report, a middle-aged man with a history of colon cancer presented with persistently elevated CEA after presumptive remission.

CASE REPORT

A 56-year-old male with poorly controlled hypertension and glycemia presented with recurrent episodes of pressure sensation in his chest, profuse sweating, and flushing for the past few months. Past medical history was significant for left adrenal pheochromocytoma status post left adrenalectomy 10 years prior and colon cancer status post partial colectomy followed by chemotherapy with persistent CEA elevation of 400s ng/ml (normal range 0.0 - 4.7 ng/ml). Further testing, including whole body CT scan, PET scan, and gastrointestinal scopes, failed to localize colon cancer recurrence. Physical examination revealed a palpable hard, non-tender nodule in the left mid-antero-lateral compartment of the neck.

Laboratory testing showed elevated 24-hour urinary metanephrines with a markedly abnormal serum calcitonin level of 7735 pg/ml (normal range is 10 pg/ml or less). CT scan of the abdomen confirmed a right adrenal nodule with positive uptake on a metaiodobenzylguanidine (MIBG) scan. Thyroid sonography showed a calcified thyroid node in the left mid-antero-lateral compartment of the neck. Genetic testing confirmed a mutant RET oncogene, confirming the clinical suspicion of multiple endocrine neoplasia syndrome type 2A (MEN 2A).

Right adrenalectomy was performed, revealing an 8.5 cm tumor located in the adrenal medulla, consistent with pheochromocytoma. Total thyroidectomy followed consistent with multifocal medullary thyroid carcinoma (MTC) and 18/18 lymph nodes with metastatic medullary carcinoma. However, calcitonin was elevated persistently on routine follow-up after the surgery with 10250 pg/ml and CEA of 187 ng/ml. The follow-up measurements, a year later, were 9242 pg/ml and 160 ng/ml for the calcitonin and CEA, respectively. Of note, the patient's daughter also was diagnosed with MTC at the age of 16 after prophylactic thyroidectomy was performed.

DISCUSSION

Although of minimal use in detecting early colorectal cancer, high preoperative concentrations of CEA correlate with adverse prognosis.[4] Serial CEA measurements can detect recurrent colorectal cancer with a sensitivity of 80% and a specificity of 70%.[5] CEA is the most frequent indicator of recurrence in asymptomatic patients.[6,7] CEA levels also may be raised in medullary thyroid carcinoma[8] as well as some non-neoplastic conditions like cirrhosis[9] and hypothyroidism,[10] as well as in smokers.[11]

History of bilateral pheochromocytoma, a thyroid mass, markedly elevated serum calcitonin level, and a persistently elevated CEA with a normal yearly colonoscopy, suggests that the elevated CEA, in this case, was due to MTC. CEA level also was found to be correlated with progression and prognosis of the MTC. A CEA level of less than 30 ng/mL is consistent with local MTC and surgery might be curative in this situation. Levels more than 30.0 ng/mL indicate central and lateral (ipsilateral) lymph node metastases, whereas CEA levels more than 100.0 ng/mL suggest lateral (contralateral) lymph node metastases and distant metastasis.[12] CEA has additional importance in this specific disease as preoperative CEA levels may be helpful for determining the invasiveness of the surgery, the extent of lymph node dissection, thus the prognosis in patient with MTC.[12]

CONCLUSION

Patients with colorectal carcinoma often have higher levels of CEA (above approximately 2.5 ng/mL) than healthy individuals.[13] CEA commonly is used to identify recurrences after surgical resection.[3] Bilateral pheochromocytoma, a thyroid mass, markedly elevated serum calcitonin level, and a persistently elevated CEA favored the diagnosis of MEN 2A syndrome over recurrence of colon cancer. In cases with persistently elevated CEA with non-significant colonoscopies, suspicion should be high for other causes, especially if patient presentation was consistent with signs and symptoms of MEN 2 syndrome. Also, CEA signals the extent and the site of metastases and subsequently the surgical invasiveness.

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