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Case Reports

Adrenal Metastasis from Carcinoma of the Colon and Rectum: A Report of Three Cases

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Abstract: We report herein three cases of patients with adrenal metastases from colorectal carcinoma. Recurrent disease was suspected following markedly elevated levels of serum carcinoembryonic antigen (CEA), and adrenal metastases were confirmed by computed tomography (CT) scanning in all three patients. The adrenal metastasis was solitary in one patient and this patient is still alive and free from disease 1 year after undergoing complete removal of the adrenal metastasis. On the other hand, metastatic disease was not limited to the adrenal gland in the other two patients and both died of recurrent disease, 33 months and 4 months after undergoing removal of the adrenal metastases, respectively. Thus, although the prognosis of adrenal metastasis from colorectal cancer is usually poor, we believe that patients with a solitary adrenal metastasis will benefit from complete removal of the metastasis.

Key Words: adrenal metastasis, colorectal carcinoma, CEA, CT

Introduction

Carcinoma of the colon and rectum tends to metastasize to distant organs, including the liver and lungs, although according to autopsy reports, metastatic involvement of the adrenal glands is infrequent.[1,2] Clinically, the symptoms seen in patients with disseminated carcinoma are quite similar to those caused by adrenal insufficiency secondary to extensive metastases to both glands, but such symptoms rarely appear as the initial sign of recurrence of carcinoma of the colon or rectum.[3] Moreover, we seldom, if ever, encounter patients with symptoms caused by a solitary adrenal metastasis arising from carcinoma of the colon or rectum.[3,4]

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During the last decade, new noninvasive methods for visualizing the adrenal glands have become available, including computed tomography, ultrasonography, and magnetic resonance imaging. In this report, we describe three cases of adrenal metastasis from colorectal carcinoma. In all three patients, metastasis was suspected from an elevated serum level of carcinoembryonic antigen (CEA), diagnosed by computed tomography (CT), and confirmed by surgery.

Case Reports

Case 1

A 66-year-old man underwent a right hemicolectomy for a moderately differentiated adenocarcinoma of the cecum, at which time a metastasis was found in one of the resected lymph nodes, but there was no evidence of distant metastases. According to Dukes' classification, the tumor was stage C. Adjuvant chemotherapy with 5-fluorouracil and mitomycin C was instituted and the postoperative course was uneventful. His preoperative serum CEA level was 5.5 ng/ml, the normal value being less than 2.5 ng/ml, and this dropped to 2.6 ng/ml postoperatively. Eighteen months later, the serum CEA level had gradually increased to 49.8 ng/ml. To determine the site of recurrence, colonoscopy and ultrasonography were performed, but there was no evidence of local recurrence or metastasis to the liver. A CT scan of the abdomen revealed a suprarenal mass measuring approximately 9 × 8 cm in diameter with a low density area, adjacent to left adrenal gland (Fig. 1). Selective inferior phrenic arteriography and renal arteriography subsequently showed fine neovascularization within the mass that apparently arose from the superior adrenal artery. As no other focus causing elevation of the serum CEA level was able to be found, the adrenal

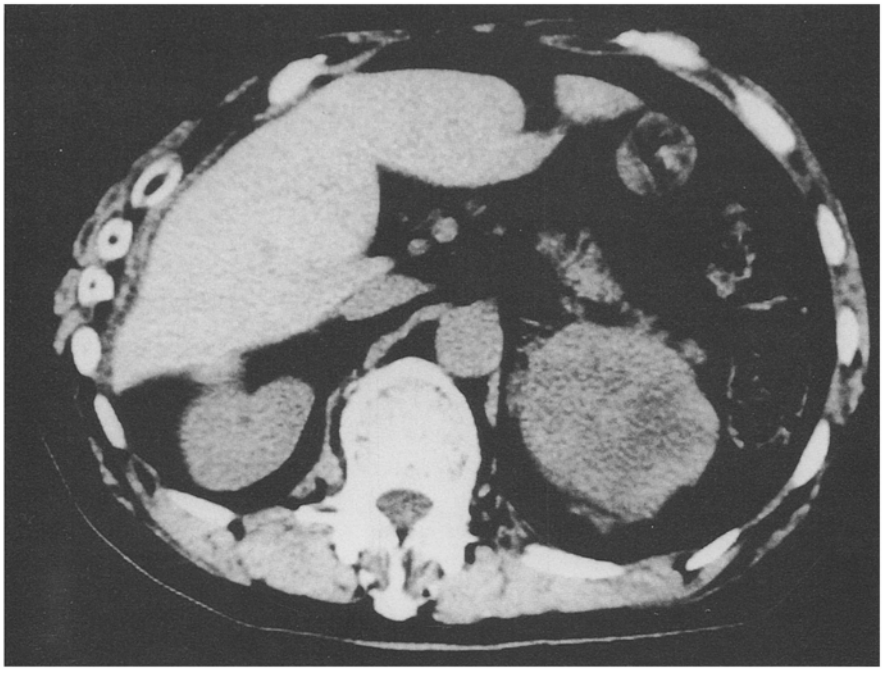

Fig. 1. CT scan of case 1 demonstrating an enlarged left adrenal gland with a low density area

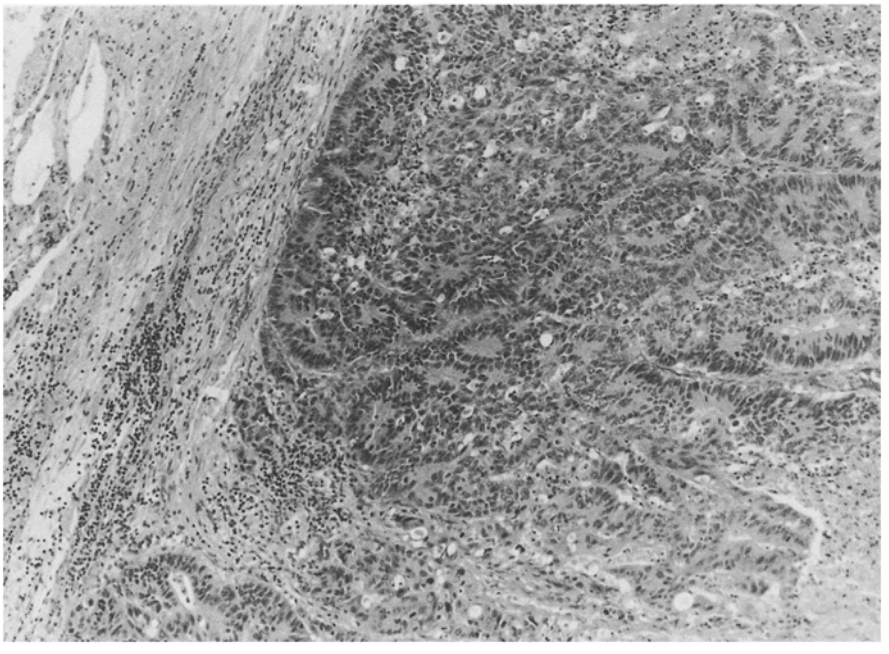

Fig. 2. Microscopic appearance of the adrenal tumor from case 1 showing a moderately differentiated adenocarcinoma, similar to that found in the primary cecum carcinoma. (H&E, ×28)

tumor was considered to be a metastasis from the cecal carcinoma.

Thus, left adrenalectomy and nephrectomy were performed, revealing a large solid mass that was firmly adherent to, and compressing the upper pole of the left kidney. Macroscopically, the adrenal gland was completely replaced by tumor tissue, leaving no normal adrenal tissue remaining. The left kidney was sharply demarcated from the adrenal tumor and there was no obvious renal involvement. Histologic examination confirmed the adrenal lesion to be moderately differentiated adenocarcinoma with a tubular growth pattern, and the histologic findings were similar to those of the cecal carcinoma resected 18 months previously (Fig. 2). The patient was discharged following an uneventful recovery and thereafter received chemotherapy with 5′-doxyfloxyuridine. As shown in Fig. 3, the serum CEA level declined postoperatively and has remained within the normal range for one year (Fig. 3).

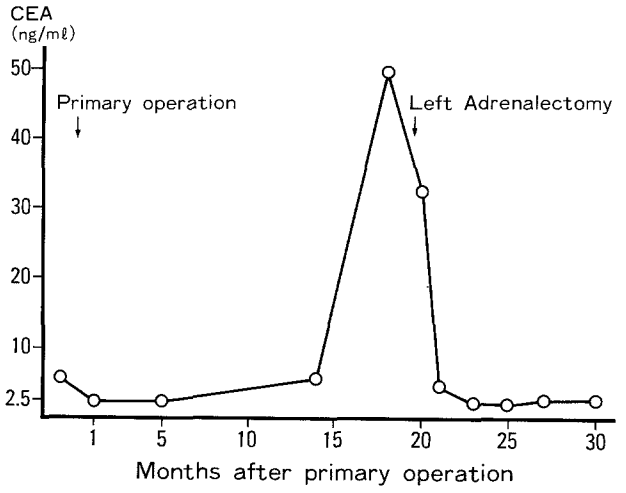

Fig. 3. Changes in serum carcinoembryonic antigen (CEA) levels after the first operation for primary cecum carcinoma in case 1

Case 2

A 52-year-old man presented with anal bleeding on defecation and a 10-kg weight loss over 3 months. On physical examination, no abdominal mass was palpable but a tumor occupying two-thirds of the wall of the rectum was detected by digital examination. The serum CEA level was extremely elevated, at 504 ng/ml. Romanoscopy revealed a rectal carcinoma of the ulcerating type located 1 cm above the dentate line and biopsy specimens confirmed it to be a well-differentiated adenocarcinoma. CT scan disclosed a 9-cm mass with a low density area in the region of the right adrenal gland, suspected of being a metastasis from the rectal carcinoma.

At laparatomy, neither peritoneal seeding nor metastasis to the liver was observed, and therefore right adrenalectomy and abdominoperineal excision of the rectal lesion were performed simultaneously. The postoperative stage was D according to Dukes' modified classification. Histologic examination revealed a well-differentiated adenocarcinoma of the rectum with a papillo-tubular growth pattern consistent with the preoperative biopsy findings. The adrenal gland had been completely replaced by a tumor 10.5 × 6 × 5 cm in size with a papillo-tubular growth pattern which confirmed its origin from the rectal carcinoma. Postoperatively, chemotherapy was instituted with adriamycin, mitomycin C, and 5-fluorouracil. The serum CEA level had decreased to 1.0 ng/ml by 2 months postoperatively, but thereafter it gradually rose above the normal range again. Chest X-ray demonstrated pulmonary metastases 6 months postoperatively, and the patient died 33 months after the initial operation, with extensive metastases to the lungs and liver. An autopsy was not performed.

Case 3

A 53-year-old man was admitted for evaluation of a coin lesion in his left lung and a high serum CEA level. Four years previously, he had undergone sigmoidectomy for a well-differentiated adenocarcinoma of the sigmoid colon at another hospital, followed by treatment with 5-fluorouracil. Colonoscopy and abdominal CT scanning showed no local recurrence; however, bronchoscopy detected an endobronchial lesion, which was revealed to be an adenocarcinoma from the biopsy materials. Left pneumonectomy and regional lymph node dissection was subsequently performed, after which the serum CEA level rapidly returned to normal. Although we could not rule out the possibility that the bronchial tumor was a primary lung carcinoma, we considered it more likely to be a metastasis from the sigmoid colon carcinoma. Nine months after discharge, the CEA level increased to 48.6 ng/ml, although the patient remained asymptomatic. A CT scan disclosed a left suprarenal mass, suggestive of a metastatic adrenal tumor, and thus, left adrenalectomy was performed, 5 years after the initial sigmoidectomy procedure. The tumor, 3.5 × 5.2 × 6.0 cm in size, was composed of moderately differentiated adenocarcinoma cells with an irreguler tubular growth pattern. The histologic appearance of the three resected tumors was compared, and as a result, both the pulmonary and adrenal tumors were considered to be metastases from the primary sigmoid colon carcinoma. The patient received combination chemotherapy with cyclophosphamide, mitomycin C, and 5-fluorouracil. Nevertheless, the serum CEA level remained elevated, suggesting that there might be another focus producing this marker. Although no obvious change was found in the right adrenal gland at the time of the third operation, CT scan performed 6 months later revealed a right adrenal mass measuring 5 × 3 cm in diameter. Right adrenalectomy was performed and microscopic examination showed adenocarcinoma characterized by an irregular tubular structure with areas of necrosis. No normal adrenal tissue was found. Both the left and right adrenal tumors were determined to be metastases from the sigmoid colon carcinoma which had been resected 5 years 6 months before the right adrenalectomy. The patient was given appropriate glucocorticoids and showed no symptoms of adrenal insufficiency. However, 4 months after the right adrenalectomy, he died of tumor recurrence with extensive metastases to multiple organs.

Discussion

Several studies have shown that metastases to the adrenal glands from malignant neoplasms of epithelial origin are frequently found at autopsy.[1,5] However, the primary tumors most often responsible for adrenal metastases are carcinoma of the lung and breast and, based on autopsy studies, the incidence of metastasis to the adrenal glands from colorectal carcinoma is relatively low. Cedermark et al. reviewed the autopsy records of 457 patients who had died from carcinoma of the colon and rectum and found the frequency of metastasis to the liver and lung to be 48% and 38%, respectively, while that to the adrenal gland was 14%.[2]

Generally, adrenal metastasis is considered to result from the hematogenous spread of the primary carcinoma. It is anatomically conceivable that carcinomas originating in the colon or rectum would metastasize to distant organs mainly via the portal and systemic circulation, respectively. However, according to several autopsy studies of large bowel carcinoma, the liver was the most common site of metastasis from carcinoma of both the colon and rectum.[1,6,7] Abrams et al. reported that the high incidence of liver metastasis, regardless of the site of the primary lesion, can probably be attributed to surgical intervention and lymph node dissection.[1] Our case 1, however, had a solitary adrenal metastasis without any distant metastases, which probably developed from the cecal carcinoma as a result of alterations to the local blood circulation following right hemicolectomy with lymphadenectomy.

It is generally agreed that determination of the serum CEA level has an adjunctive role in patients with colorectal carcinoma when performed in conjunction with established tumor diagnostic procedures. The postoperative prognosis of these patients can be predicted from the changes in the serum CEA level.[8] In case 1, tumor recurrence was suspected when the CEA level, which had returned to normal after the first operation, became elevated again. So far, this patient has shown no evidence of tumor recurrence, and the serum CEA level has remained within the normal range. However, in case 3, the serum CEA level failed to return to normal even after the third operation, the left adrenalectomy, was performed. Thus, serial postoperative determination of the CEA level has proven to be a useful and effective guide for understanding the status of patients with recurrent colorectal carcinoma.

There are various reports on the detection of adrenal metastases by computed tomography or ultrasonography. Recent progress in imaging techniques, especially CT, has allowed us to detect adrenal masses as small as 1 cm in diameter with a high degree of accuracy.[9] However, the false-positive diagnosis of adrenal metastasis can occur due to the presence of an adrenal incidentaloma, with an incidence of about 0.34%, as shown in a series of 153 000 autopy cases.[10] When patients with previously-treated carcinoma are found to have a solitary adrenal mass in the absence of another metastatic lesion, histologic confirmation is important for directing the treatment of the adrenal tumor. Although the tumors were not diagnosed in our patients by percutaneous fine needle aspiration biopsy, this procedure is considered useful for making a differential diagnosis between a metastatic adrenal tumor and incidentaloma.[11,12]

Cedermark et al. reported that if the patients with colorectal carcinoma show metastatic adrenal involvement, it is likely that more than two organs are involved.[2] Accordingly, the surgical intervention in case 3 for bilateral adrenal metastases might have been too aggressive. Conversely, case 1 had a solitary adrenal lesion without any evidence of distant metastasis or local recurrence and this allowed for a presumed curative resection, since there has been no recurrence of the carcinoma for more than $1\frac{1}{2}$ years. Based on our own observations and those of others, the following considerations should be taken into account when deciding upon whether to resect an adrenal metastasis from colorectal carcinoma: (1) the absence of local recurrence and (2) the absence of other distant metastases. Under such circumstances good quality of life can be achieved for patients with a single metastatic adrenal tumor.

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