Metastatic rectal adenocarcinoma to forearm muscle: An unusual site of metastasis

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ABSTRACT

Hematogenous metastases to the skeletal muscles are extremely rare, while the liver and lung are primary targets for distant metastasis from colorectal carcinoma. An unusual case of metastasis to the skeletal muscle of the right forearm from an adenocarcinoma of the rectum is reported herein. In addition to the rarity of an uncommon metastasis, skeletal muscle metastasis from an adenocarcinoma of the rectum as the first presentation of the metastatic disease is, therefore, extremely rare. The previously published reports are reviewed and the possible mechanisms underlying are discussed in the light of the current literature. [Turk J Cancer 2005;35(4):181-185].

KEY WORDS:
Colorectal cancer, distant metastasis, skeletal muscle

INTRODUCTION

Colorectal cancers have a potential for lymphatic and hematogenous metastases. Following definitive surgical resection, the prognosis can be improved with the addition of chemotherapy, radiotherapy, or both. Nevertheless, the incidence of recurrence, both local and distant, remains significant. Distant metastases occur most often in the liver and lung; however, metastasis to bone, adrenals, lymph nodes, brain and skin have also been reported (1). Because of the resistance of skeletal muscle to primary and metastatic carcinoma, it is very unusual site for metastasis for any malignancy, although it makes up a large part of the body and receives an abundant blood supply (2). Only 16 cases of skeletal muscle metastasis, from colorectal carcinomas which of only five were rectal carcinomas, have been documented in the literature. We report a case of skeletal muscle metastasis from rectal cancer 63 months after the resection of the primary tumor as the first metastatic side. Besides the rarity of skeletal muscle metastasis from any malignancy, skeletal muscle metastasis from an adenocarcinoma of the rectum as the first manifestation of the metastatic disease is, therefore, extremely rare and worthful for reporting. According to the best of our knowledge, the current is the first case with both the longest disease free interval time after the initial pelvic surgery and the solitary skeletal muscle metastasis as the first metastatic site in the literature.
CASE REPORT

A 31-year-old man was admitted on April 1997 with a 10-day history of blood and mucus in the stool. Rectal examination and endoscopical evaluation showed a circumferential lesion that began 5 cm above the anal verge and caused an obstruction. A computerized tomography (CT) scan of the abdomen and double-contrast colon graphy demonstrated a mass of 4.5 cm in length with a filling-defect. Transanal incisional biopsy was performed. Histologic examination revealed an adenocarcinoma. The patient underwent a rectosigmoid resection. Histopathological examination revealed a mucinous adenocarcinoma of the rectum extending through the whole muscular layer. There was neither nodal involvement, nor invasion of the serosa or adjacent structures. Postoperatively, he received a course of radiotherapy (RT) consisting of 50 Gy in 25 fractions to the whole pelvis.

He remained symptom-free until September 2002. He readmitted with a mass in the right forearm and pain in the right elbow especially during flexion. Physical examination revealed a 9x6 cm mass. The mass was firm, slightly tender and had indistinct margins. Rectal and pelvic examinations failed to reveal recurrent disease. Chest roentgenogram and liver scan showed no distant metastases, but serum carcinoembriyonic antigen was elevated to 40.5 ng/ml. Magnetic resonance imaging (MRI) study of the right forearm showed 9x5x4 cm mass in the proximal half portion of the radius destructing the cortex and infiltrating the medulla of proximal metaphysis and diaphysis. It showed an iso- and high-intensity area in T1- and T2-intensified images; respectively. The tumor shadow was enhanced on gadolinium-diethylenetriamine pentaacetic acid (Gd-DTPA)-enhanced T2-intensified MRI (Figure 1A&B). An excisional biopsy revealed a histopathology of adenocarcinoma. A curative resection was not technically feasible and a continuous external beam RT was planned. The patient received 40 Gy in 16 fractions to the right forearm with megavoltage energy (6 MV) with opposed anterior-posterior: posterior-anterior (AP:PA) fields. The daily dose, specified at isocenter, was 2.5 Gy. A course of chemotherapy, consisting of 425 mg/ m² fluorouracil and 25 mg/ m² of calcium folinate on the first and last three days of radiotherapy. Post-irradiation examination five weeks later determined a residual tumor of only 3 cm in diameter. It was accepted as partial remission.

On the basis of these results, the patient underwent wide resection of the proximal half of the radius seven weeks after radiotherapy. The posterior interosseous nerve was not preserved however, surgical margins were clear. No immediate reconstructive measures were anticipated especially in terms of the postoperative radiotherapy protocol. The patient had an excellent postoperative course however, tendon transfers were planned within few months after radiotherapy. Microscopically, solid sheets of atypical epithelial cell groups and focal extracellular mucin pools among muscle fibers were demonstrated in the histopathological examination of the operation specimen (Figure 2). Epithelial cells showed diffuse, growth pattern as individual cells containing mucin in their cytoplasm that resulted in a typical signet ring appereance. Intracellular mucin presence was also confirmed by histochemical study (Figure 3). Strongly positive membranous staining for carcinoembriyonic antigen (CEA) was demonstrated well in the immuno-
histochemical staining of the tumor cells. No gross tumor was detected in MR Imaging done one month after surgery. The patient was begun a protocol of irinotecan at 300 mg/m² in day 1 for every 21 days. In March 2003, he experienced a pain in the left lower extremity. Metastasis to the head of left femur was found and palliative irradiation to that area was started. A 67Ga scintigraphy scan showed positive spots not only in the head of left femur, but also in the 8th costa of the right hemothorax. Computerized tomographic scan of the thorax revealed a subcutaneous nodule that invades the underlying costa. He received a course of palliative radiotherapy with electron beams. A complementary treatment including biphosphonates was planned and there has been no longer complaint fifteen months after the first diagnosis of skeletal muscle metastasis: ambulation has improved such that he is able to work actively as his usual daily life.

**DISCUSSION**

Typical sites of colorectal carcinoma metastases are liver, lung, bone, brain and skin. Hematogenous metastasis to skeletal muscles have been reported to be uncommon, even in patients with known malignancy, and skeletal muscle is thought to be highly resistant to both primary and metastatic cancer. It has long been recognized that the majority of cancer cells released into the blood-stream from tumors do not form metastases; they appear to be destroyed in the microvasculature of the first organ encountered. It means metastatic patterns are not random and appear to be dependent on properties unique to the tumor cell and certain organs. These have been postulated to result either from variations in vascular supply of the organs or from chemometabolic features favoring the arrest and growth of tumor cells. Previous reports have cited factors such as contractile activity, pH changes, the accumulation of metabolites, intramuscular blood pressure, and local temperature as reasons for muscle resistance to malignancy (3). Autopsy studies have quoted an incidence of skeletal muscle metastases ranging from 0.8% to 16% (4), but a few of them had a solitary metastasis and in most of them the primary tumor was the breast or lung cancer. In general, the skeletal muscle metastases reported can be divided as asymptomatic metastases found at autopsy, and symptomatic metastases discovered during life. Although, a limited number of cases have been reported on this topic it is possible that the true incidence is underestimated because of asymptomatic cases.

Another concept is the skeletal muscle injury that may alter the normal physiology and result in increased possibility for the development of metastatic disease at such sites, although most cancer cells die soon after spread in normally functioning muscles. In a retrospective review of twenty-eight biopsy proven skeletal muscle metastatic cases, approximately 25% of the patients had revealed significant trauma with resultant muscle injury be consistent with the mechanism of injury (5). No previous skeletal trauma was documented in the present case at the exact site of the metastasis.

Contrary to improved techniques for early diagnosis in rectal cancers, the five-year survival rate has remained in 40-50% with approximately one-third of patients presenting
initially with visceral metastases. Depth of tumor penetration through the bowel wall, presence of regional lymph-node metastases, high histologic grade and microscopic venous invasion have been associated with an increased risk of distant metastasis (6). In the present case, there was a moderately differentiated mucinous adenocarcinoma penetrating into the whole muscular layer without infiltrating the serosa. Neither any metastasis in the dissected pelvic lymph nodes nor venous invasion was demonstrated in the histopathological examination.

The anatomy and natural history of rectal adenocarcinoma require attention to issues of local and systemic tumor control. In the present case, any adjuvant systemic chemotherapy could not be administered as he had refused after the initial pelvic surgery, although he received pelvic RT in order to diminish the ratio of locoregional recurrences. The recent studies with large numbers of patients with Dukes’ stage B2-C colorectal cancers have permitted the conclusion that combined treatment with chemotherapy and RT is superior to both surgery alone and any other adjuvant modality alone. Optimal protocol for chemotherapy are not defined (6). However, a Consensus Development Conference sponsored by National Institutes of Health recommended that effective adjuvant therapy exists for stage II and III (Dukes’ stages B and C equivalent) rectal cancers. The overall and disease-free survival were found superior with the combined adjuvant chemoradiotherapy treatment (6).

Not only oncologists, but also orthopedic surgeons should be aware of the existence of intramuscular metastasis from colorectal cancer. When intramuscular mass is seen in a patient with a previous history of colorectal carcinoma, metastatic carcinoma should be included in the differential diagnosis. MRI is recommended in order to both diagnose the intramuscular metastasis and evaluate the extent of the lesion and its relationship with surrounding tissues. A surgical removal of the metastatic lesion was recommended to obtain an effective palliation. RT was administered in one case reported in the literature because of the narrow margin of resection (7). In the present case, RT was administered preoperatively in order to obtain palliation and a shrunked tumor mass that could be removed adequately.

We could not explain the peculiar tendency of metastases to occur solely in a striated muscle and not in other sites such as liver and lungs, which are the most common sites for metastases of colorectal cancers. Only sixteen previous instances of colorectal carcinoma metastatic to skeletal muscle have been reported (1,3, 7-17). In the previous reports, metastatic carcinoma in the striated muscle was generally reported as a feature of systemic spread in terminal stage patients. As a result, the prognosis associated with skeletal muscle metastasis have been thought to be poor. However, our case was not in a terminal stage as he has been alive fifteen months after the diagnosis of skeletal muscle metastasis. Characteristics of tumor cells, such as their adhesive capacities, cell motility, surface properties and enzyme secretion, may have a role in the metastatic process (18). Further investigations on the immunity of striated muscles to tumor cells and mechanism-related new treatment regimens would probably help to diminish the incidence of such unusual metastases.

References


