A Rare Case of Ossifying Intramuscular Metastasis from Colon Adenocarcinoma

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Abstract

Colorectal cancer is one of the most common cancers. It is well known to metastasize through lymphatic and hematogenous spread with regional lymph nodes, liver, and lung being the usual sites of metastasis. We report a rare case of solitary metachronous ossifying intramuscular metastasis in a patient with known rectosigmoid adenocarcinoma and review its imaging features.

KEYWORDS: Colorectal neoplasm, Neoplasm metastasis, Tomography, Emission-Computed, Bone neoplasms
INTRODUCTION
Colorectal cancer is the most common cancer in Hong Kong.\textsuperscript{1} It has a tendency of lymphatic and hematogenous spread. Regional lymph nodes, liver, and lung are the usual site of metastasis. However, intramuscular metastasis is uncommon. We will report a rare case on ossifying intramuscular metastasis in a patient with known rectosigmoid adenocarcinoma. We will also review the imaging features of the ossifying intramuscular metastasis.

CASE REPORT
A 72-year-old gentleman was diagnosed with rectosigmoid colon carcinoma when he presented acutely with intestinal obstruction early 2011. Computerized tomography of thorax, abdomen and pelvis at the time of presentation demonstrated a large bowel obstruction with transition zone at rectosigmoid junction. No radiographic evidence of distant metastasis was noted. The preoperative carcinoembryonic antigen (CEA) was 18.0ng/mL. Emergent laparoscopic Hartmann’s operation was performed due to significant colonic obstruction. Pathological diagnosis was stage B3 (modified Astler-Coller) invasive adenocarcinoma without evidence of ossifying metaplasia. TNM staging was T4N1M0. Post-operative CEA performed in the surgical unit was within normal limit. Because of significant medical comorbidities, the patient refused subsequent colostomy closure. Post-operative colonoscopy in one year showed no evidence of luminal recurrence.

In early 2013, patient experienced right hip pain for one month and was subsequently admitted to the hospital. He denied history of trauma to the right hip. Right hip radiography revealed a pathologic fracture of the neck of femur with erosions of the femoral head and acetabulum. Irregular, ossified soft-tissue was noted adjacent to the right ileum. The working diagnosis was bone metastasis. Bone scan was arranged to confirm the diagnosis.

Technetium HDP SPECT bone scan with plain CT in bone algorithm showed an ossifying intra-muscular mass at right piriformis, right gluteus minimus, and right superior gemullus muscles which also extended into his right hip joint. The mass showed intense increased bone scan uptake. Several lytic lesions were also present in the right iliac bone and consistent with bone metastasis. The overall imaging features suggested metastatic disease and thus the diagnosis of ossifying intramuscular metastasis was made.

Biochemical markers including alkaline phosphatase, CEA, and prostate specific antigen (PSA) were shown to be within normal limits. No other metastatic focus or primary lesion
was identified on contrast CT of the thorax, abdomen, and pelvis.

The patient was referred to the Medical Oncology and Orthopedic Surgery services for further management including biopsy, radiation therapy and orthopedic fixation. However, the patient opted for palliative care, refusing further investigations and treatment secondary to significant comorbid conditions.

DISCUSSION
Although no biopsy of the intramuscular lesion was performed, the imaging and clinical findings were consistent with ossifying intramuscular metastasis from colorectal carcinoma. CT of the thorax, abdomen and pelvis ruled out the possibility of lung or other intra-abdominal primary carcinoma. Normal PSA level and unremarkable per rectal examination made prostate cancer very unlikely.

Skeletal muscle is an uncommon site of colorectal carcinoma metastasis. However, the more prevalent musculoskeletal metastases are usually from breast and lung carcinoma with thigh muscles potentially being involved. Various protective factors against musculoskeletal metastasis have been proposed. These include muscle contraction, pH alterations, and accumulation of metabolites. Ossifying intramuscular metastasis from colon cancer is rare with only 8 published case reports to date. All of the reported metastases occurred metachronously with the primary tumor.

Ossification represents formation of heterotopic bone tissue. Although ossification is frequently seen in tumors that produce large amount of mucin, its pathogenesis is currently unknown. It has been postulated that mucinous tumors may secrete a substance that stimulates bone formation in necrotic tissue.

The main differential diagnosis of ossifying skeletal muscle lesion is primary soft-tissue sarcoma especially in patients without a known history of other primary malignancy. Biopsy is recommended for definitive diagnosis in view of overlapping imaging features between primary sarcoma and intramuscular metastasis. With advancement in imaging technology, intramuscular metastasis may present as an incidental finding. It is the role of the radiologists to detect the lesion and help with guidance of further evaluation. It is believed that intramuscular metastasis tends to be found in patients with advanced stages of disease.
Two published studies\textsuperscript{5,6} provided clues for CT and MRI diagnosis of skeletal muscle metastasis. The most common CT appearance is rim enhancing intramuscular mass with an area of central hypoattenuation due to tumor necrosis. On MRI, it presents as extensive tumoral enhancement with central necrosis. Peritumoral edema is also a common feature of skeletal muscle metastasis. PET/CT is another sensitive investigation tool in assessing the extent of the disease.

Treatment depends on the clinical settings and condition of the patients. Options include radiotherapy, chemotherapy, and surgical excision. With only 8 patients in the literature, a preferred method of management cannot be recommended.

**CONCLUSION**

Ossifying intramuscular metastasis is a rare manifestation in colorectal carcinoma. Even in patients with known malignancy, primary soft tissue sarcoma is an important differential diagnosis. Several imaging features that may be helpful in identifying intramuscular metastasis include extensive tumoral enhancement and peritumoral edema.

**REFERENCES**


Image 1. Plain radiograph of the pelvis showing clusters of heterotopic ossification adjacent to the femoral head destruction.

Image 2. Bone scan showing intense uptake over the right hip.
**Image 3.** CT in bone window showing ossification in the right piriformis muscle (arrow).

![Image 3](image3.png)

**Image 4.** Fused CT/ SPECT Bone scan showing intense uptake at ossification in the right piriformis muscle.

![Image 4](image4.png)