

Metastatic Rectal Adenocarcinoma of the Hip and Knee Joints: A Case Series

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Abstract

Two cases are presented of patients with a history of metastatic rectal adenocarcinoma presenting with a painful joint effusion. Both cases are potential examples of metastasis to periarticular bone with local infiltration to the synovium, which is one proposed mechanism of intrasynovial metastasis. While skeletal metastases are a relatively common occurrence in metastatic adenocarcinoma, intraarticular metastasis is extremely rare. These cases highlight the need to consider metastasis in the differential of joint swelling in the setting of a history of adenocarcinoma.

Keywords

Adenocarcinoma, Knee Joint, Hip Joint, Arthritis, Metastases, Synovial

1. Introduction

Metastatic disease is the most common neoplasm found in bones. The skeletal system is the third most common site (after the liver and lungs) for metastases from an adenocarcinoma primary. Only 32 cases of intrasynovial metastasis of adenocarcinoma have been reported [1]. Of these, ten cases involving colorectal carcinoma have been reported to date [1]-[10]. A proposed explanation for its rarity is that colorectal carcinoma does not commonly metastasize through the hematogenous route, which is the usual route of metastasis to bone [4]. Here we describe two cases of metastatic rectal adenocarcinoma to hip and knee joints that presented to our institution within the same calendar year in an attempt to expand the existing body of literature and highlight the need for considering metastatic disease in the differential of painful joint effusions.

2. Case #1

2.1. Background

A 51-year-old gentleman presented to orthopedic clinic in August 2012 with a multiple-month history of a

painful, swollen right knee with decreased range of motion. The patient was unable to bear weight and ambulate. A previous joint aspiration at another facility yielded serous fluid. On physical exam, the right knee was very swollen and slightly erythematous without induration. The patella was elevated on a palpable intraarticular mass. Flexion was limited to approximately 60 degrees but the patient was able to fully extend his knee. There was no joint instability and he was neurologically and vascularly intact. There was moderate edema distal to his knee.

His past medical history was significant for a proximal rectal adenocarcinoma (KRAS codon 13 mutation) with metastatic disease to the liver approximately one year prior. He was initially treated with 8 cycles of FOLFOX and Avastin. A restaging CT scan showed progression of disease and development of lung metastases. He was subsequently switched to FOLFIRI and Avastin and received 4 cycles. The patient developed deep vein thromboses of his right lower extremity in April 2012 and was started on anticoagulation. In addition, an IVC filter was placed. Three months ago, the patient developed a bowel obstruction and underwent a colon resection with diverting colostomy. His postoperative course was unremarkable and he recovered well.

2.2. Imaging

An MRI demonstrated an extensive lobulated soft tissue mass contiguous with the patella with poor definition of patellar margins and anterior extension. Axial T1-weighted image demonstrated normal synovium replaced with heterogenous, high signal intensity mass (**Figure 1**). Sagittal T2-weighted image demonstrated heterogenous high signal intensity mass (**Figure 2**). Fine needle aspiration of the knee was consistent with metastatic adenocarcinoma from a colorectal primary. A PET-CT scan demonstrated innumerable bilateral pulmonary nodules, hepatic lesions, and an enlarging rectal lesion. In addition, there was increased FDG uptake corresponding to the right knee mass with patellar involvement (**Figures 3(a)** and **Figure 3(b)**).

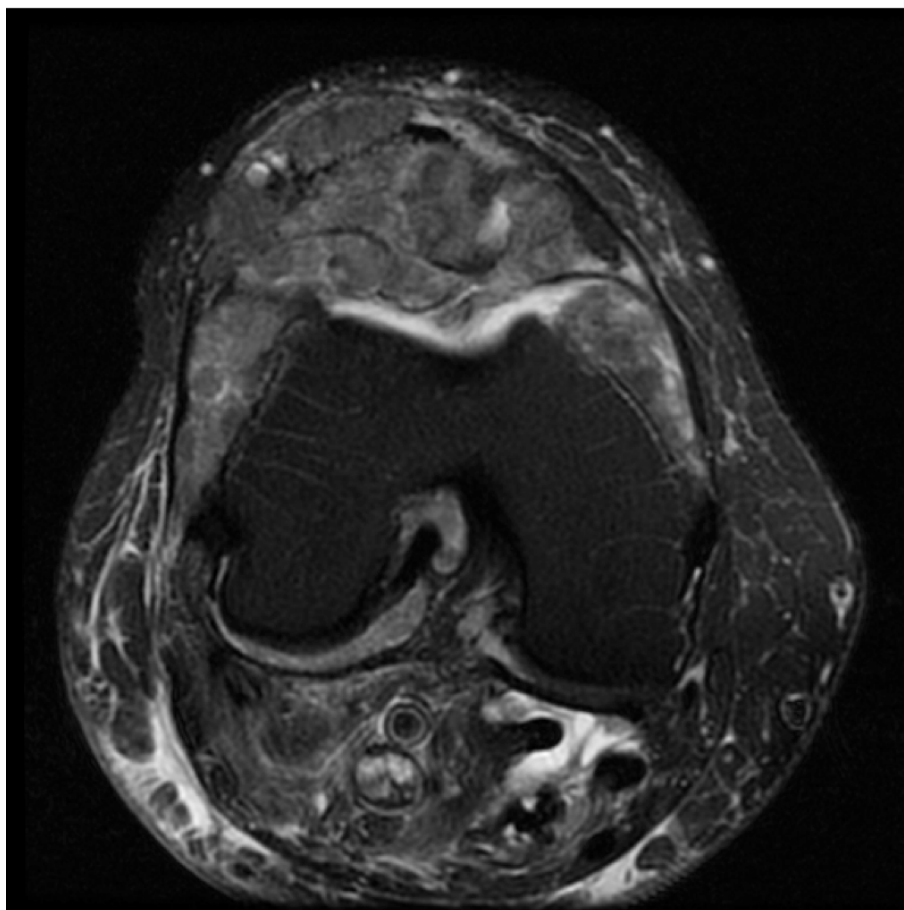


Figure 1. MRI of right knee: Axial T2-weighted image of right knee demonstrated normal synovium replaced with heterogeneous, high signal intensity mass.



Figure 2. MRI of right knee: Sagittal T2-weighted image demonstrated heterogeneous high signal intensity mass.

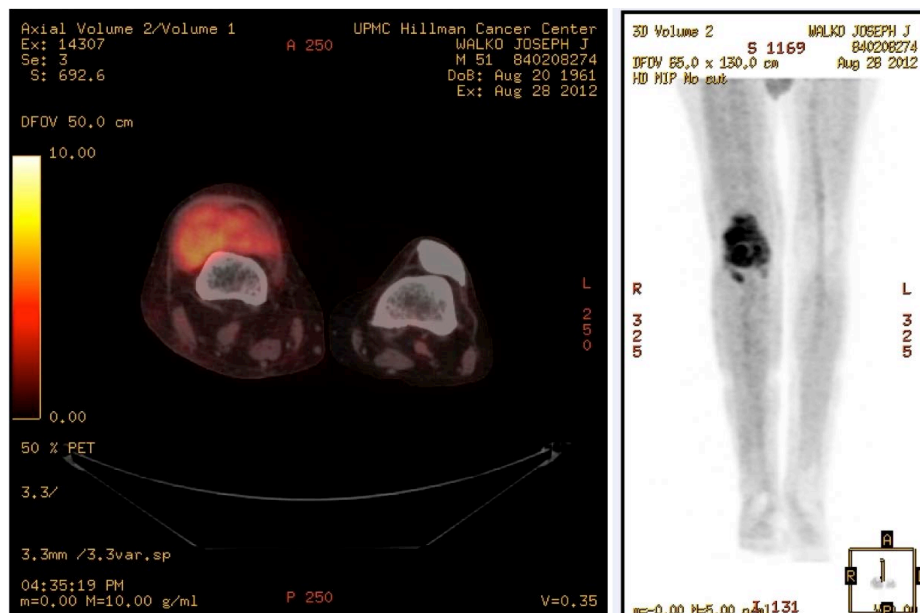


Figure 3. PET-CT scan of right knee: PET-CT scan demonstrated right knee mass with increased FDG uptake.

2.3. Operative Findings

The patient was taken to the operating room for en bloc resection of the right knee followed by reconstruction with distal femur prosthesis. A longitudinal incision was made from the distal thigh to the tibial tubercle, and dissection was conducted extrasynovially around the circumference of the knee. Portions of the retinaculum and tendons were dissected from the capsule and preserved wherever possible. It was necessary to sacrifice the medial collateral ligament. Approximately 10 cm of distal femur was resected together with the proximal tibia to just below the flare of the articular surface. Following implantation of an OSS distal femur prosthesis, the quadriceps tendons were re-approximated where possible (Orthopaedic Salvage System; Biomet, Inc.). Postoperative x-rays demonstrated anatomic alignment of the modular prosthesis (**Figure 4**).

2.4. Pathology

Gross pathology demonstrated tumor infiltration of the bony patella and adjacent fibrous tissue. A multi-lobulated tan mass involved approximately 50% of the patella and measured 12.0 cm by 6.0 cm by 2.5 cm. The tumor extended into the synovial fibrous and collagenous tissue (**Figure 5(a)** and **Figure 5(b)**). Histology demonstrated cells forming intestinal-like glands with a focal cribriform growth pattern and areas of necrosis (**Figure 6(a)** and **Figure 6(b)**). Immunohistochemical stains demonstrated positivity for CDX2 and CK20. These cells



Figure 4. X-ray right lower extremity: Postoperative X-ray demonstrating anatomic alignment of OSS modular prosthesis.

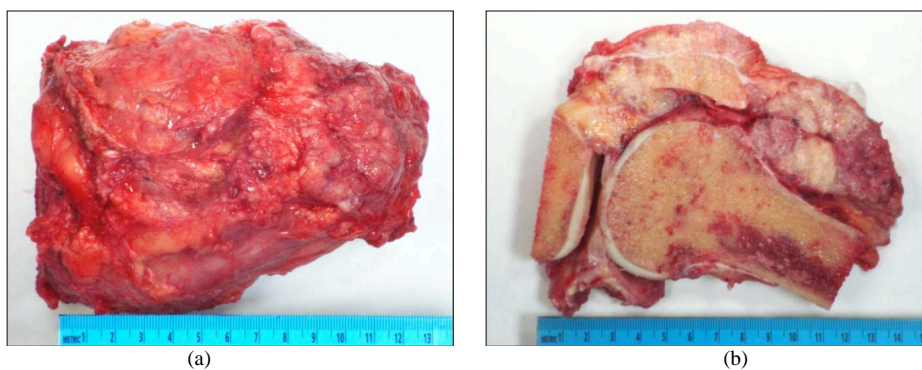


Figure 5. (a) En bloc resection of right knee joint; (b) Cross section of right knee joint: cross-section of knee joint demonstrating extensive tumor infiltration of patella and synovium.

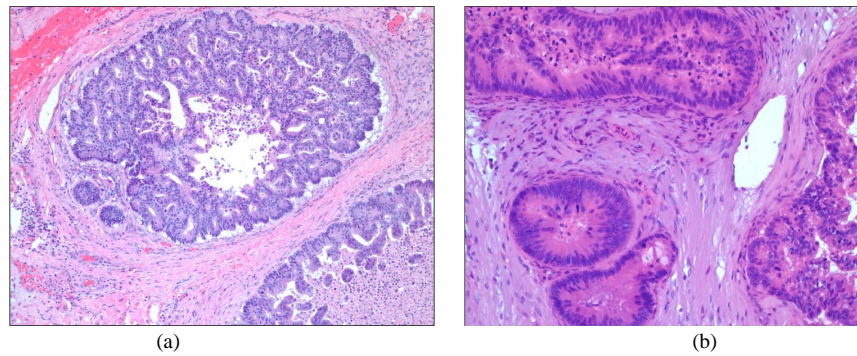


Figure 6. Histology (a) histological section demonstrating cells forming intestinal-like glands with a focal cribriform growth pattern and areas of necrosis (b). Immunohistochemical stains demonstrated positivity for CDX2 and CK20.

also exhibited a high Ki67 proliferation index. The morphology and immunohistochemical findings were consistent with adenocarcinoma of colonic origin.

3. Case #2

3.1. Background

A 62-year-old gentleman presented to orthopedic clinic in September of 2012 with intractable left hip and knee pain. His past medical history was significant for a proximal rectal adenocarcinoma (KRAS codon 12/13 mutation) with metastatic disease to the left upper lobe of the lung in November of 2010. Initial chemotherapy regimen consisted of 5-FU with Leucovorin and CPT-11. After first line chemotherapy failure with progression, the regimen was changed to oxaliplatin with CPT-11 in December of 2011. The patient underwent palliative sigmoid colectomy with end colostomy in February of 2012. He was subsequently treated with Erbitux and Avastin postoperatively.

The patient was found to have a pathologic left femoral neck fracture. Physical examination was remarkable for an irritable left hip with log roll and a moderate effusion of the left knee. There was no associated erythema, warmth or other skin changes. Range of motion about the knee was 10 to 60 degrees of flexion. There was no joint instability and he was neurologically and vascularly intact. Aspiration of the knee produced blood-tinged thin fluid and analysis of the synovial fluid demonstrated elevated leukocytes but no malignant cells. Serum studies showed a leukocytosis with left shift as well as elevated inflammatory markers including ESR and CRP.

3.2. Imaging

Computed tomography of the left lower extremity was performed and demonstrated a sclerotic focus in the left greater trochanter. A bone scan of the intertrochanteric area failed to demonstrate FDG uptake. MRI demonstrated a subcapital femoral neck pathologic fracture with surrounding marrow replacement of the left femoral neck as well as femoral diaphysis, sacrum, ilium, ischium and acetabulum (**Figure 7(a)** and **Figure 7(b)**). During the current admission, abdominal computed tomography was performed and demonstrated further disease progression and displayed intrahepatic metastatic extension. Leukocyte localization study showed a focus of moderately increased radiotracer uptake in the left knee (**Figure 8**). Left knee plain films were remarkable only for effusion.

3.3. Operative Findings

The patient was taken to the operating room for left bipolar hemiarthroplasty through an anterolateral approach. The femoral head and neck were removed and sent to pathology. The acetabulum was debrided of tumor and soft tissue. The patient returned to the operating room three days later for empiric incision and debridement of the left knee. An arthrotomy was performed through the central tendon using an anteromedial approach to the knee. Upon entering the joint, a large, bloody effusion was encountered. Extensive synovectomy and irrigation were performed. The wound was closed primarily with a single large caliber intraarticular drain.

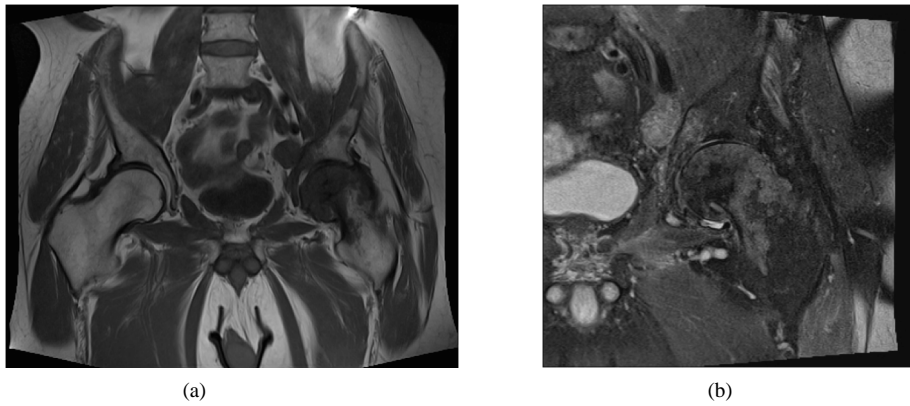


Figure 7. MRI (a) sagittal T1-weighted image of pelvis; (b) sagittal T2-weighted image of the left hip demonstrated a subcapital femoral neck pathologic fracture with surrounding marrow replacement of the femoral neck as well as femoral diaphysis, sacrum, ilium, ischium and acetabulum.

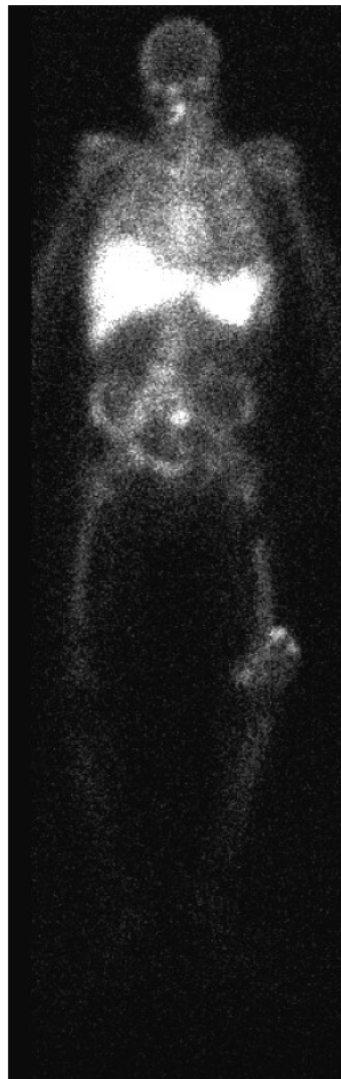


Figure 8. Leukocyte localization study showed a focus of moderately increased radiotracer uptake in the left knee.

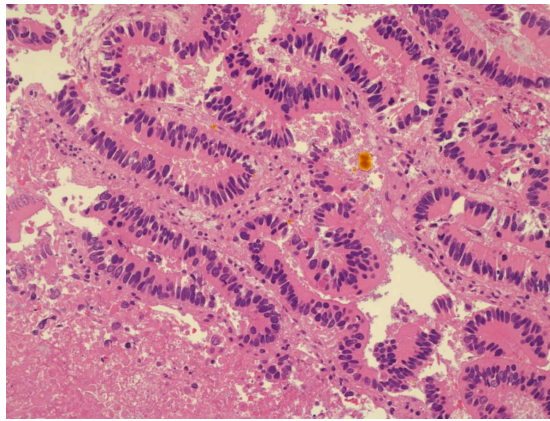


Figure 9. Histology: Tumor cells demonstrating intestinal-like growth pattern consistent with metastatic adenocarcinoma.

3.4. Pathology

Operative pathology from the left hip including the soft tissue, synovial tissue and the femoral head were positive for metastatic adenocarcinoma. Fluid analysis taken from the left knee was also positive for metastatic adenocarcinoma. Immunohistochemistry of both hip and knee samples matched the pattern of both the primary and pulmonary metastasis with positive staining for CDX2 and CK20 and negative staining for CK7 and TTF-1 (Figure 9).

4. Discussion

These cases illustrate the relationship between intrasynovial metastasis and metastasis to the periarticular bone. Direct hematogenous spread to the synovium is one proposed mechanism of intrasynovial metastases. An alternative route is via metastasis to periarticular bone with local infiltration to the synovium. In the first case, the tumor appears to be centered within the patella, which suggests that the tumor may have originated in the periarticular bone and subsequently spread locally to the synovium. In the second case, there is extensive intramedullary necrosis and tumor involvement in the femoral head and neck. This also suggests that the tumor may have originated in the bone and locally invaded the synovium.

Synovial metastasis should be considered in the differential diagnosis of painful joint effusions, particularly in the setting of known adenocarcinoma. Aspiration may not always be reliable or diagnostic. MRI may be informative, and should be pursued in cases with a high index of suspicion. Ultimately, the prognosis of intrasynovial metastasis is poor, with an average survival of less than 5 months [2]. The primary benefit of making the diagnosis is the institution of appropriate palliative interventions. In instances of large intrasynovial metastases such as in these cases, resection of the joint followed by reconstruction can be an effective means of palliating symptoms and restoring function.

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