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Case Presentation

Ewing Sarcoma Causing Back and Leg Pain in 2 Patients

Stephan M. Esser, MD, Jennifer Baima, MD

INTRODUCTION

Ewing sarcoma is a malignant "round blue cell" tumor, with a peak incidence between the ages of 10 and 25 years. It is aggressive, with a 5-year mortality related to age [1]. We describe 2 cases of back and leg pain caused by Ewing sarcoma in adult patients who presented to an outpatient musculoskeletal clinic.

CASE PRESENTATIONS

Patient 1

A 69-year-old woman was referred by neurosurgery for evaluation of intractable left leg pain. The pain began 8 months earlier in the left low back, with radiation down the posterior thigh and lateral calf, and into the top of the left foot. The pain had a burning, aching quality and was more prominent at night. Treatments to date included restricting ankle motion in a walking boot for 4 weeks for presumed Achilles tendinopathy, physical therapy, spinal epidural injections, and oral agents including NSAIDs, gabapentin, and opioid analgesics. None of these treatments provided lasting benefit. Of note, the patient had a medical history of T-cell lymphoma 12 years previously. She had experienced 1 recurrence but had been in remission for 5 years. On review of systems, she mentioned marked ongoing fatigue, night pain, impaired sleep and appetite, weight loss, depression, and anxiety.

Physical examination revealed a woman appearing of stated age in no apparent distress. Inspection demonstrated that her lower limbs were symmetric and without atrophy. Neurologic examination of the lower extremities was significant for decreased sensation over the left lateral calf, dorsum of the foot, and left medial malleolus. Tinel test at the left fibular head did not reproduce sensory symptoms. Strength of the lower limbs was normal and symmetric throughout, with the exception of left great toe extension, which was 4/5, and left knee flexion, which was 5–/5. Patellar and Achilles reflexes were 1+ but symmetric. Palpation of the inguinal region did not demonstrate inguinal lymphadenopathy. Vascular examination showed symmetric distal lower limb pulses that were 2+, with good capillary refill. During the musculoskeletal examination, left hip external rotation reproduced familiar buttock pain. There was marked tenderness over the left distal Achilles tendon and the dorsum of the left foot. There was minimal lumbosacral tenderness. Lumbar spine range of motion, including flexion, side bending, and rotation, was unrestricted and painless; lumbar extension, however, reproduced her familiar left gluteal pain. A prior outside lumbar magnetic resonance image (MRI) demonstrated multilevel mild-moderate lumbar spondylosis most prominent at L3-L4 but no neural compression from disk herniation or central or foraminal stenosis was present at any level.

The differential diagnosis included left L4-L5 radiculitis, left L4-L5 lumbosacral plexopathy, left sciatic neuropathy, and a neuropathic tumor. We would expect sensory changes in the thigh with radiculopathy, which were not present. The distal distribution most closely approximated the L5 nerve root, but L4 must be included for the abnormal medial malleolar sensation. An isolated left peroneal or saphenous neuropathy would not explain the proximal symptoms. Focal gluteal tenderness in conjunction with sensory changes prompted us to order an MRI. The sacrum (arrow), without bony involvement as seen on a T1 coronal oblique image, is demonstrated in Figure 1A. A coronal T1 image (Figure 1B)

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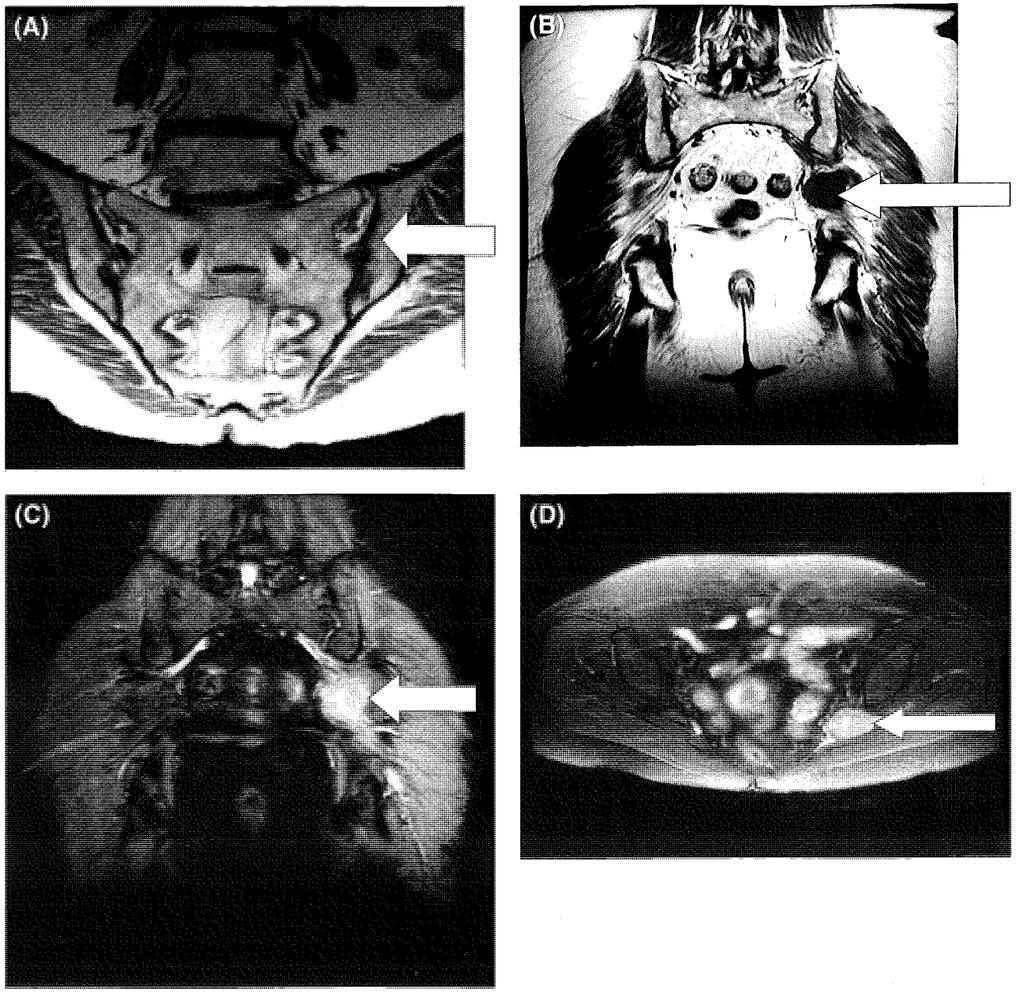

Figure 1. T1 coronal oblique and axial images. See text for discussion of Figure 1A-D.

demonstrated mass lesion of or around the sciatic nerve, which is hypointense. Coronal (Figure 1C) and axial (Figure 1D) short T1 inversion recovery (STIR) images showed an enlarged sciatic nerve (arrows) with increased fluid signal. It was unclear whether the mass has encapsulated the nerve or whether there was isolated sciatic nerve enlargement. Based on imaging, the lesion was most consistent with a nerve sheath or soft tissue tumor. The absence of bony involvement adjacent to the lesion is atypical of sarcoma. Pelvic MRI was chosen instead of a hip image for its wide field of view and the patient's known history of pelvic radiation. The patient underwent a computed tomography–guided biopsy of the tumor, which demonstrated Ewing sarcoma.

Patient 2

A 22-year-old woman was seen in the clinic for low back and left lateral hip pain of 5 months' duration. The onset was insidious, and the pain was accompanied by intermittent numbness, tingling, and stiffness in the left lateral lower limb. At presentation, she had pain both day and night. The pain worsened with prolonged lying or sitting and, paradoxically,

was also worse with increased activity. She previously enjoyed running, but her constant pain now made even prolonged walking difficult. Treatment to date included 3 months of physical therapy and daily aspirin, with minimal benefit. On review of systems, she reported occasional night sweats concomitant with worsening of her pain. She denied fever, cough, dysuria, changes in appetite or menstrual function, abnormal eating behaviors, or dietary restrictions. Physical examination revealed a well-developed, well-nourished woman with normal vital signs. Neurologic examination showed that sensation was intact to pinprick throughout the lower limbs, except for a 6-cm area over the left lateral calf where it was diminished; patellar and Achilles reflexes were 2+ and symmetric. Strength of the lower limbs was normal and symmetric throughout. Examination of the lumbar spine demonstrated unrestricted flexion, extension, side bending, and rotation without pain. Straight-leg raise and femoral stretch were both painless bilaterally. On musculoskeletal examination, there was tenderness to palpation of the left greater trochanteric bursa and gluteal muscles. There was no tenderness over the right greater trochanteric bursa. The Faber test reproduced lateral hip pain on the left. There was no increase in pain with resisted left hip abduction. There was full and painless left knee and ankle range of motion. Left hip internal rotation was 20° and provoked mild pain in the lateral hip but no inguinal pain. External rotation of the left hip was 40°, which reproduced familiar lateral hip pain. Palpation of the inguinal area revealed no masses or lymphadenopathy. Functionally, the patient

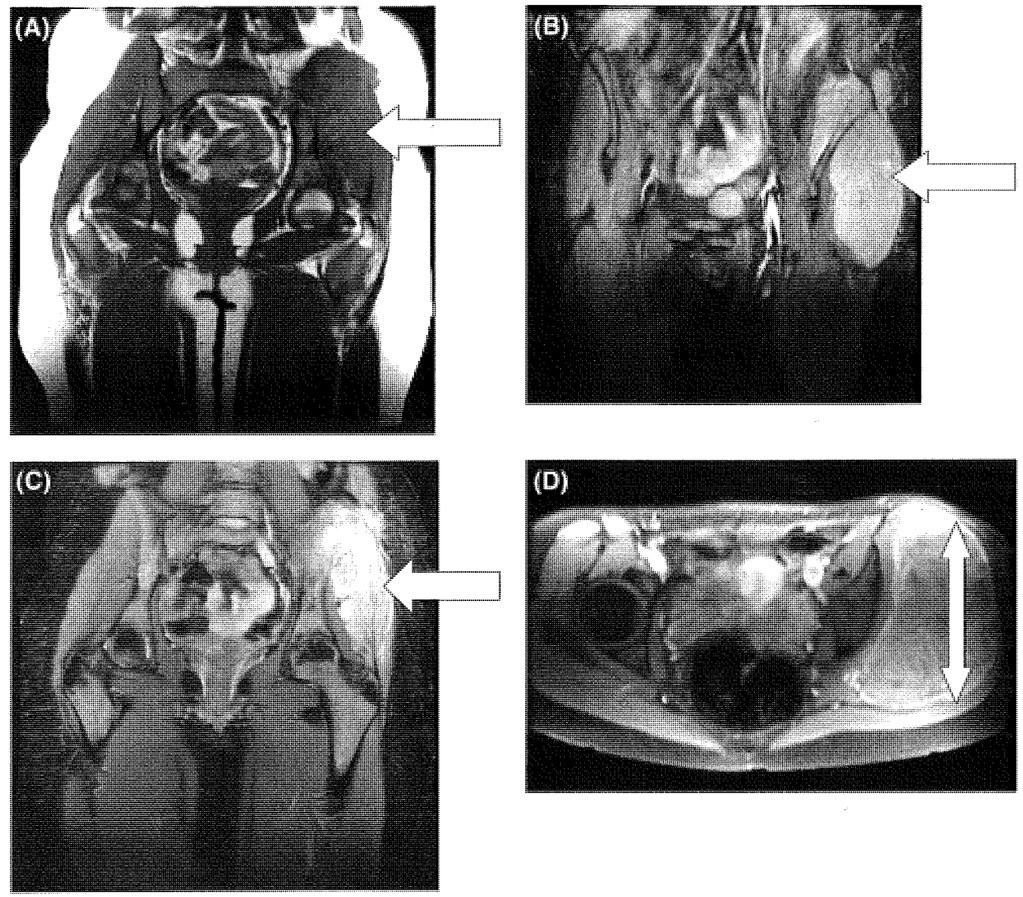

Figure 2. Coronal T1, coronal short TI inversion recovery, and fat-saturated images. See text for discussion of Figure 2A-D.

was able to ambulate on her heels and toes without difficulty and was able to perform a double-leg squat.

The differential diagnosis included left L5 radiculopathy, sciatic neuropathy, left greater trochanteric pain syndrome, hip pathology, and pelvic insufficiency fracture. Typically, musculoskeletal disorders of the hip would not cause lateral calf sensory loss. However, a recent case report demonstrated electrodiagnostic evidence of radiculopathy in a patient with pelvic insufficiency fracture [2]. Sensory loss prompted initial evaluation with a lumbar MRI, which was normal. In view of her gluteal and lateral hip symptoms and focal tenderness on physical examination, a subsequent hip MRI was ordered. Slight pelvic obliquity and decreased clarity of the left iliac crest on a coronal T1 image is shown in Figure 2A. A mass (arrow) that is similar in intensity to muscle on T1 images is difficult to visualize. Fat-saturated images (Figure 2B, coronal) are preferred for soft tissue mass evaluation in patients with suspected Ewing sarcoma [3]. The improved contrast-to-noise ratio allows better visualization and differentiation of tissue. In Figure 2C, the mass (arrow) can be seen extending through the iliac crest and into the iliacus muscle on a coronal spin-echo short inversion time inversion-recovery (STIR) image. The pattern of bony destruction is suspicious for sarcoma. STIR sequences are designed to suppress signal from fat and also to enhance signal from tissue with long T1 and T2 relaxation times, such as neoplastic and inflammatory tissue. Because both tumor and surrounding edema and/or inflammation have increased signal, STIR sequences may overestimate tumor extent. An axial fat-saturated image (Figure 2D) shows the 13.7-cm anterior-posterior dimension of the mass. In view of our findings on the MRI, the patient was referred for CT-guided biopsy, which demonstrated Ewing sarcoma.

DISCUSSION

Sciatic neuropathy is uncommon and can mimic lumbosacral radiculopathy. Reported causes of sciatic nerve entrapment include intramuscular gluteal injections, heterotopic ossification around the hip, posttraumatic or anticoagulant-induced

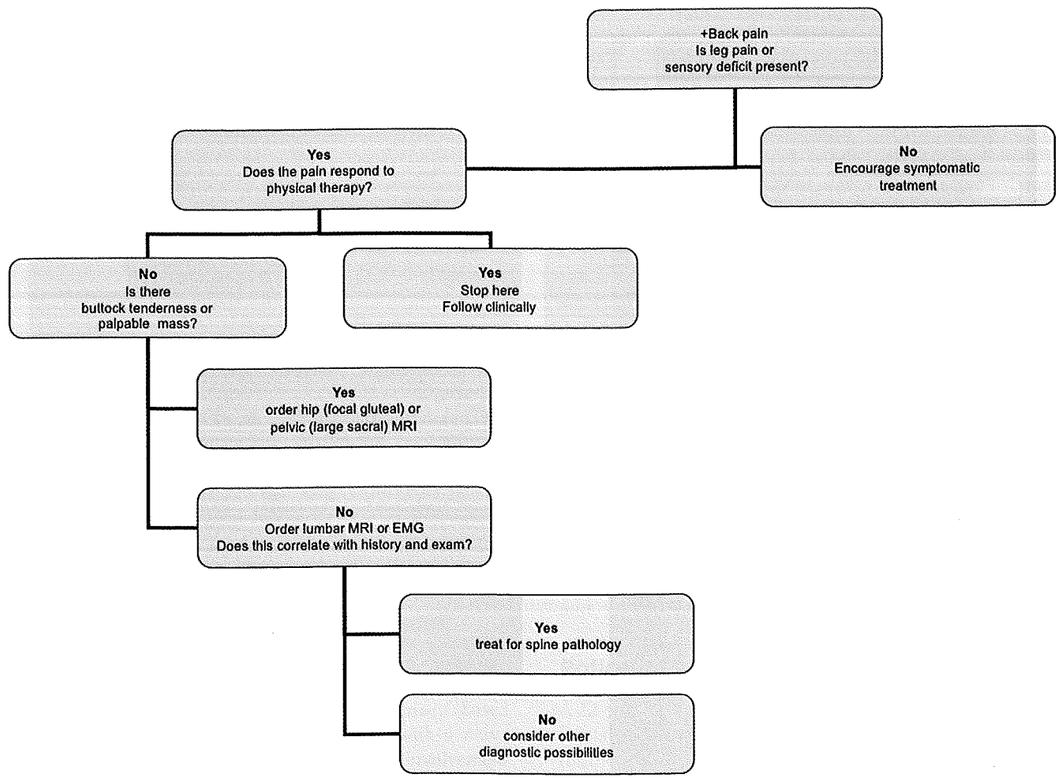

Figure 3. Flowchart.

extraneural hematomas, bone and soft tissue tumors along the nerve course, myofascial bands in the distal thigh, compartment syndrome of the posterior thigh, myositis ossificans of the biceps femoris muscle, and perisurgical injury [4]. The poor prognosis associated with bone and soft tissue tumors makes early identification essential. Although bone is classically involved in Ewing sarcoma, isolated soft tissue tumors can be seen.

Our cases underscore the importance of considering the hip and pelvis, even when the suspected diagnosis is radiculopathy (Figure 3). In both cases, physical examination and imaging of the hip or pelvis were necessary to achieve a prompt diagnosis of an aggressive cancer. MRI is the most commonly ordered test for radicular pain. However, MRI of the lumbar spine is very sensitive, and incidental findings abound [5]. Even asymptomatic patients in their 20s demonstrate lumbar disk abnormalities on MRI [6]. For this reason, it is imperative that the clinician correlate the lumbar MRI with the patient's reported symptoms and physical examination findings.

When a history suggests nonmechanical sources of pain, and/or "red flags," such as history of cancer, unrelenting or night pain, and weight loss, the clinician must have a high index of suspicion for neoplastic causes. In our cases, objective sensory loss on physical examination did not correlate with lumbar MRI findings. However, focal gluteal tenderness was present in both patients. Unexplained sensory loss and focal gluteal tenderness, especially in a patient with constitutional symptoms, merits further workup. Electrodiagnostics would have been helpful in both of these cases to identify the peripheral nerve lesion but would not have confirmed the diagnosis of sarcoma in isolation; imaging of the hip or pelvis was necessary. Hip MRI is more helpful to view the gluteal musculature. Pelvic MRI is necessary in bilateral gluteal pain or if there is suspicion for a sacral mass. Although imaging was suspicious for sarcoma, biopsy yielded the final diagnosis in both cases. In patient 1, imaging was most consistent with nerve sheath tumor. We could not distinguish aberrant nerve tissue from sarcoma by the images alone. The large size of the lesion in patient 2 was concerning for aggressive tumor, but tissue biopsy was necessary to confirm. Osteosarcoma was suspected because of her age and the location of the mass rather than its MRI appearance alone.

CONCLUSION

Ewing sarcoma is a rare tumor of mesenchymal origin, with an average incidence of 2.93 cases per 1,000,000 reported annually between 1973 and 2004 [7]. Two-thirds of the cases occur before the age of 35 years, with a median age of 20 years. Increased age, metastatic spread, tumor size greater than 8 cm, and lack of surgical intervention all appear to predict poor outcome [8,9]. Early diagnosis and rapid aggressive treatment are essential components of management.

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