



Musculoskeletal Case No. 11, September 2002

Presenting Symptom: Neck and shoulder girdle asymmetry, trapezius and sternocleidomastoid muscle atrophy, lateral protraction of scapula.

This case is no longer available for CME credit.

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Appropriate Audience: Residents and practicing physicians

Learning Objectives: After completing this educational activity, participants will be able to:

1. Identify neck and shoulder girdle asymmetry and define its typical causes (traumatic injury, surgical procedures, head and neck manipulations).
2. Explain the mechanism of spinal accessory nerve injury and neck muscle atrophy using the pertinent knowledge about neck and shoulder functional anatomy.
3. Perform a physical examination in patients with neck and shoulder girdle muscle atrophy, using the specific physical tests; select the imaging and electrodiagnostic studies to confirm the diagnosis.
4. Analyze patients' functional potentials and limitations, prescribe the rehabilitation program, select assistive devices/splints in order to achieve functional independence.

History

The patient is a 52-year-old right-handed runner who presents with atraumatic left lateral hip pain off 1-week duration.

His current symptoms began insidiously 1 week prior to presentation and have gradually worsened. He places the palm of his left hand over his left greater trochanter to indicate the region of maximal discomfort. The pain is occasionally also experienced in the lateral aspect of the thigh and on a few occasions in the lateral leg and calf. He usually experiences the pain only when running and it tends to worsen during the course of a run. The pain has occasionally occurred with walking. He experiences no pain with cycling or rest. He states that the pain differs from previous lateral hip symptoms (which he was told was iliotibial band syndrome) in that his current symptoms "feel more like a bone pain."

- *Prior to continuing, please develop a differential diagnosis in order of likelihood.*

Differential Diagnosis

1. The patient's past history of intermittent iliotibial band problems and location of his current symptoms would certainly be compatible with recurrent iliotibial band dysfunction with associated trochanteric bursopathy.
2. Because the patient describes his current symptoms as a "bone pain" that differs from his previous hip pain, and because it increases during the course of a run, suspicion for pelvic or femoral stress reaction or stress fracture is raised.
3. Lateral hip pain may also be due to gluteus medius overload.



4. The referral of pain down the limb to the calf raises the possibility of nerve irritation, due to either lumbar (radicular) or piriformis pathology.
5. Any local hip pain raises the possibility of trochanteric bursitis.
- *Is there any additional information regarding the clinical history that might be useful in clarifying your differential list or changing its order of priority?*

HPI:

He has a past musculoskeletal history of intermittent left iliotibial band dysfunction causing left lateral hip pain. Prior to the current episode of hip pain, this region was symptom-free for greater than one year. In the past, the hip pain had resolved when he decreased his running and increased his stretching. He had a recent change in his usual training regimen. For the past six weeks prior to presentation he reduced his mileage from 45 miles per week to 35-40 miles per week while increasing his pace from 7 ½ minutes per mile to 6 ½ minutes per mile.

ROS:

He denies systemic symptoms. He denies sensory, bowel or bladder changes. He denies a sense of weakness. He denies other current musculoskeletal complaints, including past or present low back pain. He eats a well balanced diet including dairy and meat.

PMHx:

He gives no past medical or surgical history. He has no allergies and takes no medications. He owns a construction company. He does not drink or smoke.

Exercise History:

The patient exercises regularly and vigorously. His primary form of exercise is running. He runs 6-7 days per week. He runs on a treadmill or outside on level streets or firm trail. He does not run on hills or tracks. He changes his running shoes about every 300 miles. His training routine also includes cycling and lifting. His strength training focuses on the upper body. He does resistance training only for quadriceps and hamstrings in the lower limbs. He stretches once a day after running. His flexibility regimen includes hamstrings, calves, and hip adductors. He holds his stretches 10-20 seconds. In the past he did a lot of deep sea diving and sailing.

Past Musculoskeletal History:

1. Intermittent left iliotibial band dysfunction.
2. Bilateral patellofemoral arthralgia - resolved.
3. Chronic right proximal hamstring overload –2 years ago with proximal hamstring pain for 1 year- currently asymptomatic.
4. Right tibial stress fracture 8-10 years ago - resolved.
- *If necessary, revise your differential diagnosis based on the additional clinical history.*

Commentary I

With the history of a change in speed of running the differential starts to favor a stress reaction or fracture. Recurrent ITB is also very possible with patients intermittent problems



with this entity. Also with no history of low back pain or radiculopathy, the likelihood of a back related etiology is less.

- *On which details of the physical examination should you focus at this point?*

Commentary II

1. To assess for iliotibial band problems, the flexibility and strength of tensor fascia lata and gluteus maximus should be tested.
2. There are no reliable physical examination maneuvers to assess for pelvic or femoral stress fractures. One test with low sensitivity and specificity is to simply have the patient jump on the affected leg.
3. The flexibility and length of the gluteus medius muscle should be tested to assess for gluteus medius overload.
4. Because some of the symptoms are suggestive of nerve irritation, a complete neurologic evaluation, including tests for adverse neural tension, should be performed. Flexibility and strength of the hip external rotators should be assessed.
5. Intrinsic hip joint pathology, such as osteoarthritis, osteochondral defect, labral injury or osteonecrosis, rarely presents as lateral hip pain. Physical examination maneuvers that test for intrinsic joint pathology include passive hip range of motion, femoral-acetabular grinding maneuvers, and single leg hopping.

Physical Examination

The patient presents as a well-developed, well-nourished, athletically-built male who appears younger than his stated age. He is very pleasant and fully cooperative with the history and physical examination. There are no pain amplification behaviors.

Inspection reveals no significant spine- or lower-limb abnormalities. Alignment is normal throughout the spine and lower limbs.

Muscle stretch reflexes are 2/4 at knees, medial hamstrings and left Achilles. The right Achilles reflex is trace. There are no sensory deficits in the lower limbs. There is no adverse neural tension on either side by the straight leg raise test or the slump test. Posterior tibial and dorsal pedis pulses are 2+ symmetrically. There are no skin or vasomotor changes. Muscle tone and bulk are normal and symmetric.

Manual muscle testing reveals (grading is bilateral unless otherwise indicated): hip flexors 5/5; knee extensors 5/5; ankle dorsiflexors 5/5; great toe extension 5/5; ankle plantar flexors 5/5; right hip abduction 5/5; left hip abduction 4+/5; hip extension 4+/5; knee flexion 4+/5; hip adduction 4+/5; hip external rotation 5/5

Flexibility testing is significant for marked left iliotibial band tightness. Range of motion elsewhere in the lumbar spine and lower limbs is within normal limits. There is no discomfort with passive flexion, extension, rotation or ab/adduction of the left hip. There is no discomfort with piriformis length testing above or below 90 degrees of hip flexion.

Palpation examination is significant for tenderness over the left greater trochanter, and distal portion of the lateral thigh. There is no tenderness elsewhere throughout the lumbar spine, hip girdle or lower limbs.



The patient does not experience any discomfort when hopping on his left lower limb. There is no discomfort with femoral-acetabular grind maneuvers. Sacroiliac motion tests are normal.

Running shoe and running gait evaluation were not performed because the patient did not have his shoes with him at the time of the initial visit.

- *At this point review your differential and revise as appropriate.*

Commentary III

The normal lumbar and piriformis examination, lack of adverse neural tension, and normal left lower limb neurologic examination makes radiculopathy or piriformis syndrome unlikely. The diminished right ankle reflex is not relevant to the patient's left-sided symptoms.

Diagnostic Testing

- *What diagnostic testing would you order at this time?*

Commentary IV

Plain radiographs of the left hip, femur and pelvis are appropriate at the time of the initial evaluation.

Radiologic Examination

The articular surfaces of the left hip are smooth and regular and the joint space is normal. Osteitis pubis is identified. Periosteal new bone formation is noted along the superior pubic ramus of both pubic bones. There are enthesopathic changes at both ischial tuberosities. There is no fracture or dislocation. There are no osteolytic lesions.

Based on the normal x-ray results the patient wanted to know if he could continue running and training despite the pain.

Commentary V

Of the four conditions listed in the original differential diagnosis list (Commentary I), three were soft tissue conditions: ITB dysfunction, gluteus medius overload and adverse neural tension. Adverse neural tension has been ruled out by physical examination. The plain radiographs do not provide additional information with regard to these soft tissue conditions. The remaining diagnosis on the list was stress reaction or stress fracture. Although the plain radiographs have numerous abnormalities, none are directly related to the patient's current symptoms. Plain radiographs will not reveal stress reactions and have low sensitivity for stress fracture, especially in the acute setting. Thus, the plain radiographs do not alter the differential diagnosis.

- *What additional test would you order?*

Commentary VI

If the patient's symptoms are due to soft tissue pathology such as ITB and/or gluteus medius dysfunction, then he should respond to activity modification and physical therapy to address the biomechanical deficits. If, on the other hand, he has a stress fracture, then it is imperative that he stop all impact activities including running. Because the index of suspicion for stress fracture is reasonably high, it is important to establish the presence or



absence of a stress fracture. The diagnostic options include radionuclide bone scan, computed tomography (CT) and magnetic resonance imaging (MRI). Because the location of the a possible stress fracture cannot be precisely known based on the given history and physical examination, bone scan is the test of choice because no extra time or expense is required to look at the entire region of interest, which includes the left hemipelvis, femoral neck and femoral shaft.

Bone Scan Results:

There is markedly increased uptake in the symphysis pubis, bilateral sacroiliac joints, and left femoral shaft at approximately the junction of the proximal and middle thirds. There is moderately increased uptake in the right ischial tuberosity and left iliac crest. There is faintly increased uptake in the right tibia at the junction of the middle and distal thirds.

The area of increased uptake in the right femur appears to be intramedullary in location. The radiologist comments that this intramedullary-appearing lesion, in conjunction with the widespread radionuclide imaging abnormalities, might be consistent with metastatic bone disease, such as metastatic prostate cancer.

- *If necessary, revise your differential diagnosis based on the test results.*

Commentary VII

Bone scans are highly sensitive for bone pathology but they lack specificity. The nuclear medicine report provides an interesting dilemma. It has added metastatic bone disease to the differential diagnosis in this 52-year-old male with no medical problems and no systemic symptoms.

Taken individually, each of the abnormalities on the bone scan can be explained by musculoskeletal conditions. The faint uptake in the right tibia is probably residual from his old tibial stress fracture. Granted, it is unusual to see continued bone remodeling so long after a stress fracture. In this case, however, the patient's heavy exercise regimen has likely precluded full healing and resulted in ongoing remodeling in that area. The increased uptake in the right ischial tuberosity is consistent with his history of chronic right hamstring insertion tendinopathy and corresponds to the radiographic findings of enthesopathy at this location. The increased uptake in the left iliac crest is consistent with gluteus medius overload and the weakness the patient demonstrated on resistance testing of left hip abduction. The uptake seen in the pubic symphysis merely confirms the diagnosis of osteitis pubis that was made radiographically. Osteitis pubis is common in runners and need not be treated unless symptomatic. The uptake in the sacroiliac joints is in a sense complimentary to the uptake in the pubic symphysis because all three joints are part of the pelvic ring. Excessive forces in one part of the ring is nearly always transmitted to the other parts of the ring. Once again, this may be considered to be an incidental finding because the patient has no symptoms referred to the sacroiliac joints. When viewed from a musculoskeletal point of view, none of these findings is particularly worrisome. In fact, the abnormal uptake in the right tibia, right ischial tuberosity, pubic symphysis and sacroiliac joints are not even particularly relevant because the patient is not having any symptoms in these areas.

The increased uptake in the left femur is concerning, however. First, it may represent a stress fracture. Its intramedullary appearance, however, in conjunction with the multiple other abnormalities, suggests to the nuclear medicine attending that it may represent something more ominous. It therefore behooves the clinician to rule out metastatic disease.



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Further diagnostic options include magnetic resonance imaging of the pelvis and proximal left femur, and laboratory work such as CBC, LFT's, PSA, electrolytes, ESR, SPEP, etc. (and/or referral to an internist).



MRI Results:

An MRI of the pelvis and left proximal femur was obtained. This was read by a radiologist at another institution as entirely normal.

When the results were reviewed over the telephone with the patient, he again inquired if that meant he could return to his regular routine. The patient was informed that all the imaging studies would be reviewed the next night at the multidisciplinary sports medicine conference.

The patient's history, physical examination and all imaging results were reviewed at sports medicine conference attended by musculoskeletal radiologists, musculoskeletal physiatrists and sports orthopedists at the University Hospital. The consensus was that the patient had a stress fracture in the left femoral shaft and that there was no evidence for metastatic bone disease.

- *Make the final revisions of your diagnostic impression(s).*

Diagnostic Impression

1. Left femoral shaft stress fracture.
2. Left Iliotibial band dysfunction.
3. Left gluteus medius overload.

Commentary VII

Biomechanical deficits include tight left iliotibial band, weak left hip abductors, weak bilateral hip extensors and mildly weak bilateral knee flexors.

The increase in running pace led to fatigue in the femur.

Treatment

1. No impact activities for 4 months, including running.
2. Cross training with non-impact activities to maintain cardiovascular fitness. Aquatherapy is ideal.
3. Address biomechanical deficits - principally the tight left ITB, weak left hip abductors, weak bilateral hip extensors and knee flexors.
4. When the patient begins to run again, perform a running gait evaluation to assess for gait abnormalities that might predispose to overload. Running shoes should also be evaluated. Return to running at four months should be done only in a gradual manner and only if the biomechanical deficits have been addressed.
5. The patient was given a referral to a sports psychologist to assist with psychological adjustment to a new training routine that does not include running. He accepted this referral gratefully.
6. Should the patient develop another stress fracture in the future, consideration should be made for a metabolic bone work-up.
7. Supplementation with calcium citrate 1500 mg/d and vitamin D 800 IU/d was recommended.



Follow Up

The patient complied with all aspects of the rehabilitation program. He had some irritability related to not running. This was addressed by the sports psychologist. He successfully corrected the biomechanical deficits with the help of a physical therapist. He successfully returned to running without incident. Running evaluation revealed no major deviations. He changed his training routine in that his speed work was limited to a maximum distance of one mile. His overall mileage was limited to 35-40 miles per week.

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