

Don't Forget the Pulses! Aortoiliac Peripheral Artery Disease Masquerading as Lumbar Radiculopathy—A Report of 3 Cases

James D. Lin, MD, MS, Nicholas J. Morrissey, MD, and William N. Levine, MD

When I was a general surgery intern at Beth Israel Hospital in Boston in 1990, legendary general surgeon Dr. William Silen used to say to us, “Did anyone order a history and physical examination?” This was in response to the intense focus on magnetic resonance imaging, positron emission tomography scans, computed tomography scans, and other technological wizardry.



William N. Levine, MD

It is with that backdrop that we set out to write this case series of 3 patients who we believe represent the tip of the iceberg of undiagnosed arteriovascular disease. The patient who brought this to my attention was my 78-year-old mother—a relatively healthy woman who was diagnosed with “sciatica and lumbar stenosis” by a physiatrist, orthopedic surgeon, and neurosurgeon. She had over a year of progressively debilitating symptoms and was treated with rest, physical therapy, epidural injections, and nonsteroidal anti-inflammatory drugs, and was advised to consider spinal decompression surgery. Something didn't add up, however, and vascular examination suggested abnormal pulses in her groin. Duplex ultrasound confirmed the suspicion of severe occlusion, and stenting cured her instantaneously. Listening to the patient's complaints and performing a thorough physical examination remain the hallmark of being a good physician, and when we take shortcuts and go straight to advanced imaging studies, all too often we will be led astray. It is our hope that this case series of 3 patients

reminds us all that the vascular examination should always be a critical component of the orthopedic examination. Furthermore, when something does not make sense take a step back and reassess—you might be missing something that is right in front of your nose!

—William N. Levine, MD

Abstract

Orthopedic surgeons commonly encounter patients with lumbar radiculopathy. These patients typically seek treatment for lower back or buttock pain radiating down the leg. It can be challenging to differentiate between orthopedic, neurologic, and vascular causes of leg pain, such as peripheral artery disease (PAD), especially aortoiliac PAD, which can present with hip, buttock, and thigh pain. To our knowledge, this is the first report on a series of patients with thigh pain initially diagnosed as radiculopathy who underwent unproductive diagnostic tests and procedures, and ultimately were given delayed diagnoses of aortoiliac PAD.

Lumbar radiculopathy is a common problem encountered by orthopedic surgeons, and typically presents with lower back or buttock pain radiating down the leg.¹ While the most common causes of lumbar radiculopathy are lumbar disc herniation and spinal stenosis, the differential diagnosis for lower extremity pain is broad and can be musculoskeletal, vascular, neurologic, or inflammatory in nature.^{1,2} Differentiating between orthopedic, neurologic, and vascular causes of leg pain, such as peripheral artery disease (PAD), can sometimes be challenging. This is especially true in aortoiliac PAD, which can present with hip, buttock, and thigh pain. Dorsalis pedis pulses can be palpable due to collateral circulation. A careful history and physical examination is crucial to the correct diagnosis. The history should clearly document the nature of the pain, details of walking impairment, and the alleviating effects of standing

Authors' Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

still or positional changes. A complete neurovascular examination should include observations regarding the skin, hair, and nails, examination of dorsal pedis, popliteal, and femoral pulses in comparison to the contralateral side, and documentation of dural tension signs. Misdiagnoses can send the patient down a path of unnecessary tests, unindicated procedures, and ultimately, a delay in definitive diagnosis and treatment.¹

To our knowledge, this is the first report on a series of patients with thigh pain initially diagnosed as radiculopathy who underwent unproductive diagnostic tests and procedures, and ultimately were given delayed diagnoses of aortoiliac PAD. The patients provided written informed consent for print and electronic publication of these case reports.

Case 1

An 81-year-old woman with a medical history notable for hypertension, hyperlipidemia, and stroke initially presented to an outside orthopedic institution with complaints of several months of lower back and right hip, thigh, and leg pain when walking. She did not report any history of night pain, weakness, or numbness. Examination at the time was notable for painful back extension, 4/5 hip flexion strength on the right compared to 5/5 on the left, but symmetric reflexes and negative dural tension signs. X-rays showed multilevel degenerative disc disease of the lumbar spine, and magnetic resonance imaging (MRI) showed a small L3/4 disc protrusion causing impingement of the L4 nerve root.

A transforaminal epidural steroid injection at the L4 level was performed with minimal resolution of symptoms. Several months later, right-sided intra-articular facet injections were performed at the L4/5 and L5/S1 levels, again with minimal relief of symptoms. At this point, the patient was sent for further physical therapy.

Over a year after symptom onset, the patient presented to our institution and was evaluated by a vascular surgeon. Physical examination was notable for 1+ femoral artery and dorsal pedis pulses on the right side, compared to 2+ on the left. An aortoiliac duplex ultrasound showed severe significant stenosis of the right common iliac artery (>75%).

The patient underwent a right common iliac artery angioplasty and stenting (Figures 1A, 1B), which resolved her symptoms.

Case 2

A 65-year-old man, who is a former smoker with a medical history notable for hyperlipidemia and coronary artery disease status post myocardial infarction, presented with a long history of right leg pain. He underwent a L5/S1 anterior posterior fusion at an outside institution and did well for about 5 years after the procedure (Figures 2A, 2B). The pain returned and he underwent several years of physical therapy, epidural steroid injections, and implantation of a spinal cord stimulator with no im-

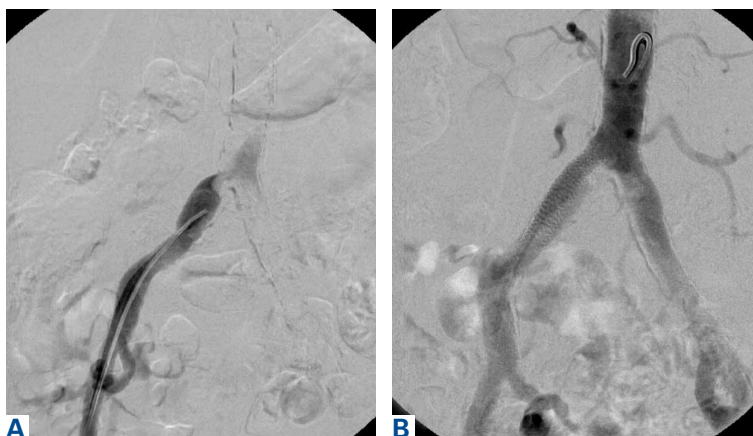


Figure 1. (A) Angiography demonstrates significant right common iliac stenosis. (B) Successful revascularization status post angioplasty and stenting.



Figure 2. (A) Anteroposterior and (B) lateral radiographs of the lumbar spine status post anterior posterior fusion of L5/S1.

provement. He reported right leg pain with minimal back pain, primarily in the thigh and not radiating to the feet and toes. The pain limited him from walking more than 1 block. On examination, strength was 5/5 bilaterally. Pulse examination was notable for lack of dorsalis pedis/posterior tibial pulses bilaterally. He had no bowel or bladder dysfunction.

Computed tomography myelogram showed a moderate amount of stenosis at L3/4 and L4/5. He was sent for evaluation by a vascular surgeon. Arterial duplex ultrasound showed significant stenosis of the right common iliac artery.

Angioplasty was attempted but vascular surgery was unable to cross the lesion (**Figures 3A, 3B**),

and the patient ultimately had a femoral-femoral bypass, which resolved his leg pain.

Case 3

A 78-year-old woman, nonsmoker, presented with a 1-year history of left buttock and thigh pain exacerbated by ambulation. Ambulation was limited to 2 blocks. The patient was being worked up for spinal and hip etiologies of pain at an outside hospital. MRI revealed a mild posterior disc herniation at L3/4 and L4/5 and moderate narrowing of the spinal canal. She underwent 2 epidural steroid injections with no improvement. The patient's relative, a physician, suggested that the patient receive a vascular surgery consultation, and the patient ultimately presented to our institution for evaluation by vascular surgery.

The physical examination was significant for a 1+ dorsal pedis pulse on the left compared to 2+ on the right. Moreover, the patient only demonstrated trace L femoral pulse compared to the right. Strength was 5/5 bilaterally.

The patient was taken to the operating room for angioplasty and stenting of the left common iliac artery (**Figures 4A, 4B**). This provided immediate symptom relief, and she has remained asymptomatic.

Discussion

Lumbar radiculopathy is a common diagnosis encountered by orthopedic surgeons. Although the diagnosis can appear to be straightforward in a patient presenting with lower back and leg pain, the etiology of lower back and leg pain can be extremely varied, and can be musculoskeletal, neurologic, vascular, rheumatologic, or oncologic in origin.¹ In particular, differentiating between radiculopathy and vascular claudication can sometimes be challenging.

The 2 most common causes of lumbar radiculopathy are lumbar disc herniation and spinal stenosis.¹ Lumbar disc herniation results from tear in the annulus of the intervertebral disc, resulting in herniation of disc material into the spinal canal causing compression and irritation of spinal nerve roots.¹ Spinal stenosis is narrowing of the spinal canal that produces compression of neural elements before they exit the neural foramen.³ Adult degenerative spinal stenosis is most often caused by osteophytes from the facet joints or hypertrophy of the ligamentum flavum, and can be broadly categorized into central spinal stenosis or lateral spinal stenosis.

PAD is defined as progressive stenosis or

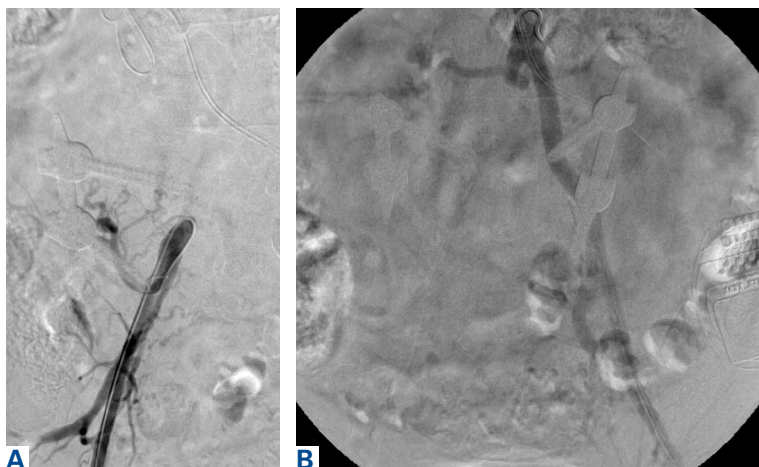


Figure 3. (A) Angiography demonstrates significant stenosis of right common iliac artery. (B) Angioplasty attempted but unable to cross lesion with guidewire.

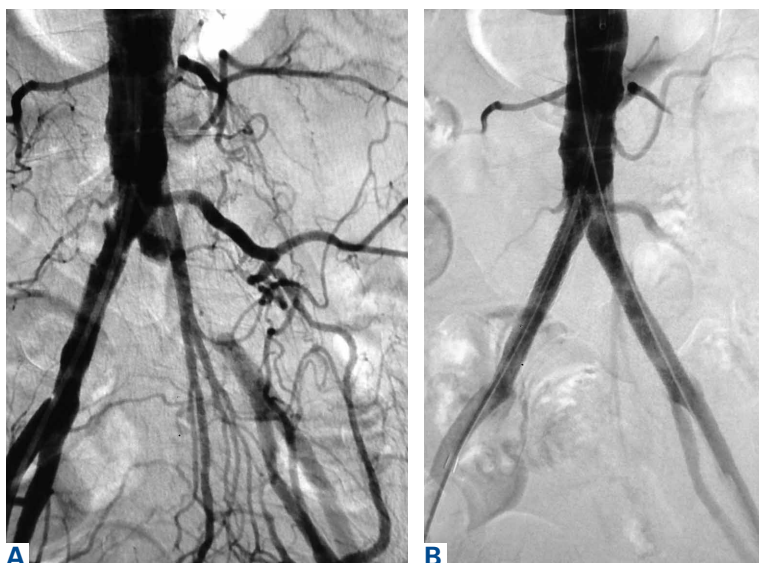


Figure 4. (A) Angiography demonstrating left common iliac stenosis with significant collateral circulation. (B) Successful revascularization status post angioplasty and stenting.

occlusion, or aneurysmal dilation of noncoronary arteries.² When PAD affects the vessels of the lower extremities, the symptoms typically manifest as intermittent claudication, which is exercise-induced ischemic pain in the lower extremity that is relieved by rest.² As the disease progresses, symptoms can progress to rest pain, ulceration, and, eventually, gangrene. The most common cause of PAD is atherosclerosis, and the risk factors include smoking, hypertension, diabetes, and hyperlipidemia. The prevalence of PAD rises sharply with age, starting from <3% in ages less than 60 years to >20% in ages 75 years and older.⁴

A detailed and pertinent history from the patient provides important information for differentiating radiculopathy and neurogenic claudication from vascular claudication. Patients with lumbar radiculopathy typically report pain in the lower back radiating down the leg past the knee in a dermatomal distribution. The pain often begins soon if not immediately after activity, but often takes time for relief onset after rest. Positional changes in the back such as flexion can provide relief.² Patients with neurogenic claudication from central spinal stenosis can present with bilateral thigh pain from prolonged standing and activity that is alleviated with flexion or stooping.³ Patients may admit to a positive “shopping cart sign,” with increased walking comfort stooped forward with hands on a shopping cart.

In contrast, patients with vascular claudication often report pain in the calf, thigh, or hip, but rarely in the foot. The location of pain varies with area of stenosis; generally, patients with superficial femoral artery occlusion present with calf claudication, while patients with aortoiliac disease present with buttock and thigh pain. The pain typically occurs after a very reproducible length of walking, and is relieved by cessation of walking, often even if the patient remains standing. Back positioning should have no effect on the pain.²⁻⁵

Physical examination should begin with observation of the patient’s gait and posture, which may be hunched over in the setting of spinal stenosis. Examination of the patient’s skin may show loss of hair, shiny skin, or atrophic changes suggestive of vascular disease (**Figure 5**).¹ Prior to proceeding to a spine examination, palpating the trochanteric bursa and testing for hip range of motion is important to rule out intra-articular hip pathology and trochanteric bursitis as common causes of pain in the area. Patients with radiculopathy may show sensory disturbances in a dermatomal distribution, muscular weakness at the corresponding spinal



Figure 5. Classic skin changes secondary to peripheral artery disease include loss of hair, discoloration, and shiny skin.

level, and decreased deep tendon reflexes. The straight leg raise test can elicit signs of nerve root tension. A careful examination of bilateral lower extremity pulses at the dorsal pedis, popliteal, and femoral levels can help identify any asymmetric or decreased pulses that would indicate peripheral vascular disease. With chronic aortoiliac disease, it is important to check for femoral pulses, given the dorsal pedis pulse can be present due to collateral circulation. And finally, the ankle brachial index (ABI), measured as the ratio of the systolic pressure at the ankle divided by the systolic pressure at the arm, is a good screening test for PAD.⁶ A normal ABI is >1.

A thorough history and physical examination can elicit important information that is helpful in evaluating orthopedic patients, especially to differentiate between spinal and vascular causes of leg pain. This can help avoid misdiagnoses, which result in unnecessary tests, procedures, and wasted time. Don’t forget the pulses!

Dr. Lin is a Resident, Department of Orthopedic Surgery, Columbia University Medical Center, New York, New York. Dr. Levine is a Professor, Department of Orthope-

dic Surgery, New York Presbyterian Hospital/Columbia University Medical Center, New York, New York. Dr. Morrissey is Associate Professor, Division of Vascular Surgery and Endovascular Interventions, New York Presbyterian Hospital-Columbia University Medical Center, New York, New York.

Address correspondence to: William N. Levine, MD, Department of Orthopedic Surgery, Columbia University, 622 W 168th Street, PH-1117, New York, NY 10032 (tel, 212-305-0998; email, wnl1@columbia.edu).

Am J Orthop. 2016;45(5):314-318. Copyright Frontline Medical Communications Inc. 2016. All rights reserved.

References

1. Grimm BD, Blessinger BJ, Darden BV, Brigham CD, Kneisl JS, Laxer EB. Mimickers of lumbar radiculopathy. *J Am Acad Orthop Surg*. 2015;23(1):7-17.
2. Hirsch AT, Haskal ZJ, Hertzner NR, et al. ACC/AHA Guidelines for the Management of Patients with Peripheral Arterial Disease (lower extremity, renal, mesenteric, and abdominal aortic): a collaborative report from the American Associations for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (writing committee to develop guidelines for the management of patients with peripheral arterial disease)—summary of recommendations. *J Vasc Interv Radiol*. 2006;17(9):1383-1397.
3. Spivak JM. Degenerative lumbar spinal stenosis. *J Bone Joint Surg Am*. 1998;80(7):1053-1066.
4. Criqui MH, Fronek A, Barrett-Connor E, Klauber MR, Gabriel S, Goodman D. The prevalence of peripheral arterial disease in a defined population. *Circulation*. 1985;71(3):510-515.
5. Ouriel K. Peripheral arterial disease. *Lancet*. 2001;358(9289):1257-1264.
6. Jeon CH, Han SH, Chung NS, Hyun HS. The validity of ankle-brachial index for the differential diagnosis of peripheral arterial disease and lumbar spinal stenosis in patients with atypical claudication. *Eur Spine J*. 2012;21(6):1165-1170.

This paper will be judged for the Resident Writer's Award.