

## INTERVENTIONS IN CHRONIC PAIN MANAGEMENT

## Interventions in Chronic Pain Management. 3. Evaluation and Management of Lumbar Pain Syndromes

Michael F. Saulino, MD, Ira D. Kornbluth, MD, E. Anthony Overton, DO, Michele Y. Holding, MD, Mitchell K. Freedman, DO

**ABSTRACT.** Saulino MF, Kornbluth ID, Overton EA, Holding MY, Freedman MK. Interventions in chronic pain management. 3. Evaluation and management of lumbar pain syndromes. *Arch Phys Med Rehabil* 2008;89(3 Suppl 1): S47-50.

This self-directed learning module highlights approaches to the investigation of selected lumbar spine conditions. It is part of the chapter on chronic pain management in the Self-Directed Physiatrix Education Program for practitioners in physical medicine and rehabilitation. The first objective explores the diagnostic evaluation for groin and buttock pain in a 66-year-old man with pain during ambulation. The second objective describes the unique challenges of managing the adolescent with low back pain.

**Overall Article Objective:** To review evaluation and management strategies for selected lumbar pain syndromes.

**Key Words:** Adolescent; Groin; Low back pain; Rehabilitation.

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### 3.1 Clinical Activity: To diagnose the etiology of groin and buttock pain in a 66-year-old man who has pain during ambulation.

**T**HE DIAGNOSIS OF BUTTOCK pain can be quite challenging because the differential diagnosis is broad and the pain generator(s) may be difficult to tease out from the history, physical, and routine diagnostic studies. The differential diagnosis for groin and buttock pain in this 66-year-old man includes pathology related to the lumbar disks, lumbar zygapophyseal joints, lumbosacral nerve roots, sacroiliac joints (SIJs), hip joints, bony structures in the pelvis, muscles such as the piriformis, visceral structures in the lower abdomen and pelvis, and local bursa. Neoplasm and fractures should always be considered in formulation of the differential diagnosis because missing these diagnoses could have a devastating consequence to the patient. Reasons for pain are often multifactorial and, when related to degenerative changes, often involve multiple structures in the spine concurrently.

A history of trauma such as a fall may point toward a fracture, muscular injury, bursitis, or SIJ dysfunction. The patient may note symptom onset shortly after lifting a heavy object, with a disk bulge or herniation causing radiculopathy. A

relatively innocuous event such as a cough or sneeze can incite disk pathology resulting in buttock pain. Symptom onset tends to be more gradual and insidious in cases of degenerative processes such as hip arthritis, zygapophyseal joint pain,<sup>1</sup> and spinal stenosis.<sup>2</sup> Visceral causes such as an aneurysm should be considered in the differential diagnosis. Pelvic and lower gastrointestinal pathology can be experienced in the groin or buttock. Infection should be considered in patients with fever, localized tenderness and warmth, recent systemic infection, or invasive procedure such as an injection. Traumatic soft-tissue injuries including muscular or tendinous injuries, ligamentous inflammation, sprains, and strains should be considered in active patients.

The location of pain points to certain diagnoses, but it is important to consider that pain can be referred to the buttock and groin from a variety of structures. For instance, trigger points within the lumbar musculature can refer pain into the buttocks.<sup>3</sup> The lumbar disks and zygapophyseal joints are common causes of referred pain into the buttocks or groin. It is important to have patients clarify complaints of "hip" pain because they are often referring to a general location and not an etiology; patients with "hip" pain may have pain in the groin, buttocks, or lateral thigh. Pain from the hip joint tends to be experienced in the groin and is often referred to the buttocks. Hip joint pain may worsen with standing and walking.<sup>4</sup>

An acute onset of pain, especially pain that inhibits normal gait, should prompt urgent imaging and protection from weight bearing until there is a clear explanation for symptoms. Sacral insufficiency fractures are often the result of low-impact trauma, and there may even be no history of trauma at all. Signs of insufficiency fractures are generally nonspecific, and symptoms may be severe and interfere with weight bearing. Osteoporosis is a major risk factor for sacral insufficiency fractures.<sup>5</sup> Pelvic fractures occur as the result of more high-energy traumas such as falls or motor vehicle collisions. Hip pathology such as avascular necrosis, fractures, and labral tears can trigger acute onset of pain. Corticosteroids and heavy alcohol use are 2 risk factors for avascular necrosis. Herniated disks may also cause severe buttock or groin pain of acute onset.

Trochanteric bursitis causes proximal lateral thigh pain that may radiate into the leg, often down the lateral thigh. Trochanteric bursitis often worsens at night when patients lie on the affected side. Pain at the greater trochanter may have an underlying cause such as a leg-length discrepancy or hip pathology causing altered gait biomechanics; an underlying basis should be sought to help in diagnosis and treatment. Tenderness over the ischium suggests ischial bursitis that could be the result of local trauma or a local hamstring inflammation.

Pain from the piriformis muscle is generally described as a dull, achy, deep pain in the buttocks. There may be associated pain traveling down the leg in a sciatic nerve distribution because the sciatic nerve has a close anatomic relationship with the piriformis muscle. Pain attributable to the piriformis muscle can be an elusive diagnosis, and many consider it a diagnosis of exclusion. Often, patients with piriformis muscle pain have

From Moss Rehabilitation, Elkins Park, PA (Saulino); Spine Medicine and Rehabilitation Therapies, Westminster, MD (Kornbluth); Rothman Institute, Philadelphia, PA (Overton, Freedman); and The Back Pain Center, Phoenixville, PA (Holding).

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Correspondence to Michael F. Saulino, MD, Moss Rehabilitation, 60 E Township Line, Elkins Park, PA 19027, e-mail: [docsaulino@msn.com](mailto:docsaulino@msn.com). Reprints are not available from the author.

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a history of trauma that precedes the pain. A leg-length discrepancy or an anatomic variation in the relationship between the piriformis muscle and the sciatic nerve could lead to a painful piriformis muscle.<sup>6</sup>

The SIJ is a common cause of pain in the buttock and groin. The pain may be referred distally into the lower extremity. Of all the features on history, physical examination, and imaging, it has been shown that the best prognostic indicator of SIJ pain is the patient pointing to the sacroiliac joint as the location of pain.<sup>7</sup> There are many predisposing factors for sacroiliac dysfunction such as trauma, spondyloarthropathy, tumor, infection, degenerative changes, and joint laxity.<sup>8</sup>

Axial back pain that travels into the groin or buttocks and worsens with standing and walking suggests a diagnosis of stenosis with neurogenic claudication. The etiology of lumbar stenosis can be multifactorial, often involving degenerative processes such as disk desiccation, facet arthropathy, ligament hypertrophy, and spondylolisthesis. It is important to distinguish symptoms of neurogenic claudication from vascular claudication. There is no statistically significant feature on examination or in the history for diagnosis of zygapophyseal joint pain and radiographic correlation is nonspecific. Diskogenic pain tends to worsen with prolonged sitting.

A comprehensive, thorough examination helps in honing in on a diagnosis. An altered gait pattern should be closely analyzed because it may be the cause or result of pathology. For example, a Trendelenburg gait could lead the physician to look closely for hip pathology or weakness of the lumbosacral musculature. Weakness or asymmetrical reflexes must be explained and can help establish a diagnosis. An abnormal patella reflex suggests involvement of the L2, L3, or L4 nerve root, whereas an abnormal ankle jerk reflex suggests S1 nerve root involvement. A medial hamstring reflex can be used to assess the L5 nerve root. Manual muscle testing should be used to evaluate for weakness and can provide evidence of radiculopathy. Hip flexors are innervated by the L1 and L2 nerve roots, hip adductors and knee extensors by the L2 through 4 nerve roots, ankle dorsiflexors by the L4 and L5 nerve roots, ankle everters by the L5 nerve root, and ankle and great toe plantarflexors by the S1 nerve roots. There may be anatomic variability.

Limited and painful hip range of motion points to hip pathology. A painful "click" in the inguinal area with radiation to the buttocks is often present with labral tears. Moving the hip from a flexed, externally rotated, and abducted position to an extended, internally rotated, adducted position is a provocative test for anterior labral tears. Moving the hip from a flexed, internally rotated, and adducted position to an extended, externally rotated, and abducted position is a provocative maneuver for posterior labral tears. A painful straight-leg raise insinuates nerve root impingement. Lumbar range of motion should be assessed. Tenderness to palpation of the SIJ, the lower lumbar musculature, piriformis muscle, and trochanteric bursa suggest that the tender structure may be a pain generator. Pulses should be felt and any abnormalities investigated. The groin should be examined for femoral or inguinal hernias.

Gaenselen's sign and Patrick's test are 2 (of many) tests used to help with the diagnosis of SIJ dysfunction. The Pace test and the Freiberg test can help with the diagnosis of piriformis syndrome because these tests are thought to place stress on the piriformis muscle. Ipsilateral buttock pain that is reproduced with resistance to active hip abduction and external rotation represents a positive Pace test, whereas ipsilateral buttock pain with passive hip abduction and internal rotation represents a positive Freiberg sign.

Magnetic resonance imaging (MRI) is a particularly useful imaging study to evaluate for spinal pathology. However, it has a very high incidence of incidental findings such as disk bulges and herniations in asymptomatic people.<sup>9,10</sup> Spinal stenosis can be shown well on MRI, computed tomography (CT) scan, and CT myelography. Radiographic testing is of limited value in investigation for piriformis syndrome and sacroiliitis. However, imaging using radiography, CT scan, or MRI can be quite helpful in some causes of buttock and groin pain such as hip pathology or to evaluate for local fractures or neoplasm. Ultrasound and CT scan can be valuable ways to evaluate for less common causes of buttock or groin pain, such as visceral etiologies from pelvic and abdominal organs. A bone scan can be useful for the evaluation of fractures and tumors. Arthroscopy and magnetic resonance arthrography can be considered for the diagnosis of groin pain to look for labral tears in the hip joint.

There should be a low threshold for ordering imaging in patients with "red flags" for neoplasm. These warning signals include profound, unintentional weight loss, back, or buttock pain in elderly or adolescent patients, worsening pain at night, and new or worsening pain in persons with a history of neoplasm. A history of significant trauma should prompt the physician to order imaging. Worrisome signs or symptoms for cauda equina syndrome, including major lower-extremity weakness, saddle anesthesia, loss of bowel or bladder function, and laxity of anal sphincter, warrant emergent imaging.<sup>11</sup>

Electrodiagnostic testing can certainly help in diagnosing the cause of buttock and groin pain. Lower lumbar and sacral radiculopathies, in particular, are fairly common causes of buttock pain. Upper lumbar radiculopathies, which are less common, may cause pain into the groin region. The presence and size of polyphasic motor units and fibrillations give insight into the acuity of abnormalities. A normal electromyography does not completely rule out radiculopathy because there are multiple reasons for false-negative electromyographic studies in radiculopathy such as the study was done prematurely, the injury is purely demyelinating, the sensory nerve root is primarily affected, or the wrong muscles or not enough muscles were tested. An electromyography, like MRI and results of other diagnostic tests, should be used as an important piece of clinical data but usually not as a sole means of making a diagnosis.<sup>12</sup>

Electrodiagnostic testing in spinal stenosis produces variable findings including multiple, bilateral lumbosacral radiculopathies, normal findings, or limited symmetrical or asymmetrical findings such as absent H-reflexes or monoradiculopathy. Electromyography can detect myopathic and neuropathic changes in evaluation for piriformis syndrome. A delay of the H-reflex with the affected leg in flexion, adduction, and internal rotation of greater than 3 standard deviations as compared with the H-reflex in the normal anatomic positioning is highly suggestive of piriformis syndrome.<sup>13</sup>

Injections can be a useful tool in the diagnosis of buttock pain because substantial pain relief from targeted diagnostic procedures supports the notion that the injected structure is a pain generator. Fluoroscopic or CT imaging is essential to the proper performance of spinal injections. The interventionalist should keep in mind the likelihood of false-positive and false-negative results with each procedure. Some patients may have psychosocial reasons for not getting benefit with interventions, making diagnosis more difficult. On the other hand, there is a fairly high placebo response with interventional procedures.

Diskography is a test in which a contrast medium is typically used to visualize internal disk morphology while pressurizing the disk to determine whether that pressure produces a concor-

dant pain response. Pain from internal disk disruption can be experienced in a variety of sites, including the back, buttock, leg, and groin.<sup>14</sup> The positive predictive value for diskography is at best 57% but likely less than that because of a high percentage of false-positive responses.<sup>15</sup> The criterion standard for diagnosis of zygapophyseal joint pain is relief from low-volume local anesthetic injection. From an interventional standpoint, zygapophyseal joints can be evaluated by either intraarticular injection or by blocking the medial branch of the dorsal rami that innervates the joint. Pain relief from sacroiliac joint injection remains the criterion standard for the diagnosis of SIJ pain. Injections into the hip, bursa, and muscles can also be used to aid in diagnosis. A particular lumbosacral nerve root can be targeted "selectively" with an injection, keeping in mind that anesthetic may spread to nearby structures, diminishing the selectivity.<sup>16</sup>

### 3.2 Clinical Activity: To evaluate and manage an adolescent athlete who presents with a 6-month history of back pain.

The prevalence of low back pain (LBP) in adolescents varies from 15% to 35% with a higher percentage reported in athletes. A correlation exists between the intensity of the athletic participation and the incidence of LBP. A number of sports are associated with LBP, including rowing, football, tennis, diving, soccer, and dance. Gymnastics is reported as the most common activity linked with LBP. The average age when treatment is sought by an athletic population is 15 or 16 years.<sup>17,18</sup>

Spondylolysis is the most common LBP diagnosis in adolescent athletes, although nonspecific LBP without precise diagnosis occurs more frequently. Other diagnostic considerations include injuries to the vertebral body, intervertebral disk, ring apophysis, pelvis, articular processes, spinous processes, interspinous ligament, or other soft tissues of the lumbar spine. Compared with adults, adolescents are more likely to show structural pathology as a cause of their LBP.<sup>19</sup> Spondylolysis is a bony defect in the pars interarticularis, the concave lateral part of the lamina that connects the superior and inferior facets. It is caused by repetitive microtrauma. When the innate healing processes are unable to keep pace with the repetitive microtrauma, a stress fracture results. Of note, spondylolysis can be a frequent radiographic finding in asymptomatic adolescents, with a reported prevalence of 5%. Spondylolysis occurs most commonly at L5 (85%–95%) followed by L4 (5%–15%).

If spondylolysis is bilateral, the superior vertebra may translate anteriorly on the inferior segment. This slippage is referred to as spondylolisthesis. This abnormality is measured as a slip percentage; the amount of anterior translation is divided by the anterior-posterior width of the inferior vertebral endplate. The severity of the spondylolisthesis is graded from 1 to 5, according to the Meyerding grading system, with 5 being complete translation of the superior vertebra (spondyloptosis) and a grade of 1 indicating a translation increment of 25% or less. At diagnosis, spondylolysis has already progressed to spondylolisthesis in a quarter of cases. The adolescent growth spurt is thought to be the most vulnerable time for slippage.<sup>20</sup> The incidence of asymptomatic spondylolisthesis was reported to be 2.6% in a study of 6-year-old children.

Adolescents with spondylolysis typically report an insidious onset of back pain. Only half of symptomatic patients correlate the onset of symptoms to sports training. Pain can be referred to the buttocks or to the posterior aspect of the thigh. Pain is typically associated with athletic activity. As the disease progresses, pain starts to occur with less strenuous activities. Rest usually relieves the symptoms. Night pain is uncommon and warrants investi-

gation into an occult neoplasm. Morning stiffness may indicate a need for rheumatologic evaluation. True radicular pain, weakness, and bowel or bladder dysfunction are rare but have been reported with high-grade spondylolisthesis. Weight loss, fever, and pain at rest should be regarded as suspicious for tumor or infection and require an urgent evaluation.

As with adults, all adolescents with LBP should undergo a thorough musculoskeletal and neurologic examination. The motor, sensory, and reflex examination should be normal unless a radicular component is present. A palpable step off can be observed in high-grade spondylolisthesis. Lumbar flexion and extension range of motion is often reduced, with hyperextension frequently reproducing pain. The single-leg hyperextension maneuver has some utility for spondylolysis, although the specificity of this test is debatable. This test is performed by having the patient stand on 1 leg and hyperextend the back. If a pars injury exists on the weight-bearing side, this movement will reproduce the pain. When the affected side is unloaded and not bearing weight, the pain should be relieved. In the case of bilateral involvement, hyperextension on both sides would be painful. The straight-leg raise test assesses nerve root irritation. A shortened stride length with flexion at the hips and knees secondary to hamstring contracture may be seen in patients with advanced degrees of spondylolisthesis.

Given the higher likelihood of structural abnormalities in the adolescent with LBP, radiologic evaluation is mandated. The recommended initial study is standing posterior-anterior and lateral radiographs of the thoracolumbar spine with supine oblique views of the lumbosacral spine. The lateral view is useful for identifying spondylolytic defects and assessing the degree of spondylolisthesis. Flexion and extension views should be checked as well. Supine, oblique, and spot lateral radiographic views of the lumbosacral junction improve the likelihood of diagnosing spondylolytic defects. Single-photon emission computed tomography (SPECT) of the lumbosacral spine is the most effective method for detecting spondylolysis when plain radiographs are normal and the clinical presentation is suggestive of the diagnosis. Increased radionuclide uptake in an intact pars, lamina, or pedicle is consistent with a stress reaction. CT scanning is the best imaging study to assess bony anatomy, with 2-dimensional and 3-dimensional reconstruction being particularly helpful for surgical planning. MRI scanning is indicated in the presence of neurologic deficits because this modality has better utility in evaluating soft tissue.

The hallmarks of treatment for the adolescent athlete with symptomatic spondylolysis are pain control, activity restriction, and immobilization of the lumbar spine. Early treatment with brace immobilization is more effective than activity restriction alone. After an initial trial period of activity restriction fails, bracing is more effective. Full-time immobilization in a thoracic lumbar sacral orthosis is indicated for the patient with an observable stress reaction on SPECT scanning. The classic immobilization technique that was described by Steiner and Micheli<sup>21</sup> put forth that the brace should be set to minimize the degree of lumbar lordosis, but controversy exists about what the best position is for immobilization. Immobilization may be discontinued once pain-free lumbar extension and rotation are obtained and evidence of healing is observed on a CT scan. When these conditions are met, physical therapy and a graduated return to physical activity can commence. If symptoms resolve but persistent nonunion is shown on a CT scan, a fibrous union has occurred. This result does not necessarily represent instability. When pain, spinal mobility, and hamstring spasm are improved, the patient may return to full activities. Surgical treatment may be warranted for the patient with persistent pain resulting from any of the following con-

ditions: a nonhealing stress fracture of the pars, a spondylolytic defect or low-grade spondylolisthesis despite a minimum of 6 months of nonsurgical treatment, progressive dysplastic spondylolisthesis, a neurologic deficit, or symptomatic high-grade slippage.<sup>20,22</sup>

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