

Pars Interarticularis Defect

Patrick Graham

Introduction

Pars interarticularis defect, also known as a pars defect or spondylolysis, is a common cause of axial low back pain in which there is cortical defect of the posterior vertebral arch between the superior and inferior articular processes. The most widely accepted theory is repetitive loading forces that lead to stress response and eventual fracture of the pars interarticularis. Although rare, this can occur acutely with forceful axial loading and rotational forces (Beutler et al., 2003; Chung & Shimer, 2021; Mansfield & Wroten, 2021; McTimoney & Micheli, 2003; Tawfik et al., 2020).

With overall incidence of 4%–6% in the general population, pars defect is more frequently encountered in youth or adolescent athletes, affecting males at rates 2–3 times more than females. Repetitive high-impact activities, such as gymnastics or diving, carry the largest risk. Pars defects are also routinely found incidentally during radiographic evaluation of the adult population, most often associated with degenerative disease and facet arthropathy. Accounting for 85%–95% of cases, L5 is by far the most frequently affected level. This may occur unilaterally or bilaterally. When bilateral pars defects are present, there is potential for movement or “slip” known as spondylolisthesis of the associated vertebral levels. Significant spondylolisthesis has potential to cause neurological compromise (Beutler et al., 2003; Chung & Shimer, 2021; Mansfield & Wroten, 2021; McTimoney & Micheli, 2003; Tawfik et al., 2020).

Case Presentation

A 47-year-old woman, referred by bariatric surgery, presented for evaluation of chronic, overall worsening, low back pain. She reported back symptoms for greater than 20 years. She had been involved in two car accidents in that time but reported back symptoms that were separate from these incidents as well. She described symptoms as “aching” and “sore,” with mild to moderate pain on most days. This was always centered about the low back, with pain banding across the posterior waistline, sometimes into the buttocks, with activities.

In the past year, she had started working with bariatric specialists on weight loss program. This program dramatically increased her level of physical activities. As she progressed, her back symptoms had concurrently worsened to a point where she could not tolerate day-to-day activities such as grocery shopping or household chores. She felt as if someone was “stabbing a knife”

into her low back with any weight-bearing activities. She denied any radiating leg pain, numbness, tingling, burning, incoordination, or weakness. She denied bowel or bladder issues. She was initially prescribed Tylenol (acetaminophen) and cyclobenzaprine with minimal, insufficient relief noted. She was then prescribed hydrocodone, but that caused nausea and, at doses providing significant enough relief, made her too drowsy for use during the day. Given the continued back pain, she was referred to the orthopaedic spine clinic for further evaluation.

On presentation was a super obese woman, alert, oriented, affect-appropriate, and in no apparent distress. She ambulated with a coordinate, although coxalgic, gait while holding her husband's arm for support. Inspection revealed redundant adipose but no gross deformity, abrasions, or discoloration. There was notable tenderness about the lower lumbar paraspinals and midline overlying L5. Her range of motion was limited by body habitus, with pain noted in all planes, especially forward flexion. She compensated with hands on thighs for a return to neutral from flexion. Lower extremity strength was 5/5 bilaterally, and she was found to be distally neurovascularly intact. She displayed a negative straight leg raise and slump with a positive thrust and Gaenslen's test.

Management

For initial assessment of the patient's continued low back pain, radiographs of the lumbosacral spine were obtained in the office (see Figure 1). These images were revealing for pars defects at L3 and L5, with Grade 2 anterolisthesis associated with L5–S1. There were notable multilevel degenerative changes with a subtle degenerative curve. There was no instability on flexion and extension views. Given lack of neurological findings, the patient was referred for computed tomography (CT) of the lumbar spine to further evaluate the extent of pathology and plan for potential surgical intervention. For the interim, the patient was referred to physical therapy to continue working on core strengthening and pelvic

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The author has disclosed no conflicts of interest.

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DOI: 10.1097/NOR.0000000000000799

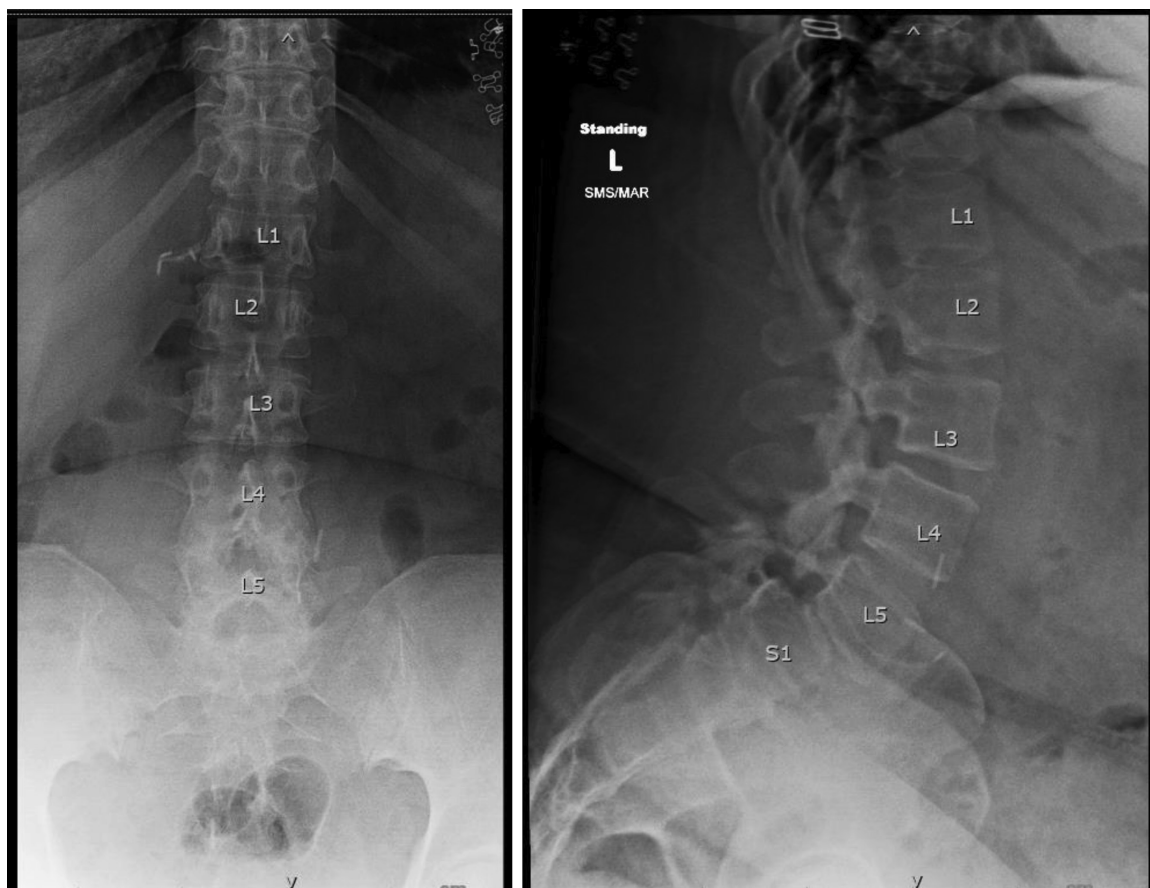


FIGURE 1. Anteroposterior and lateral radiographs of the lumbosacral spine—Note pars defect at L3 and L5. There is Grade 2 anterolisthesis of L5–S1 with loss of intervertebral height.

stabilization as well as a modified weight loss program that incorporated aquatic exercise. We discussed the utility of a lumbar supportive brace, and she was instructed to continue with medications as needed (Beutler et al., 2003; Chung & Shimer, 2021; Jarvik & Deyo, 2002; Mansfield & Wroten, 2021; Maus, 2010; McTimoney & Micheli, 2003; Tawfik et al., 2020).

The patient presented for follow-up 5 weeks later to review CT findings and discuss plan of care. She noted an improvement of her previously severe low back pain to her baseline level of mild to moderate aching. She was no longer requiring hydrocodone for symptom management and reported using the cyclobenzaprine once or twice a day as needed. Aquatic therapy was going well, with a 12-lb weight loss during this time. The bariatric surgeon was pleased with progress and was planning to sign her up for surgical intervention in the next month. CT findings were reviewed in detail (see Figure 2), and options for surgical intervention were discussed. Given the improved symptoms, and continued lack of neurological findings on examination, the patient elected to continue with conservative management and aquatic exercise for her weight loss program. She was instructed to follow up if she experienced any progressive symptoms.

Discussion

Pars interarticularis defect is a common finding in those presenting with axial low back pain. Radiographs are

typically sufficient for diagnosis but, when in doubt, advanced imaging with CT or magnetic resonance imaging (MRI) is appropriate for confirmation. With adolescent athletes, one should have a low threshold for obtaining MRI to evaluate for early stress reaction. Proper identification and implementation of appropriate interventions early on may well prevent the progression of stress response to true fracture, significantly impacting treatment course and the overall time to return to sport. Those who are refractory to conservative management may be candidate for surgical intervention and should be referred to an orthopaedic spine specialist accordingly (Beutler et al., 2003; Chung & Shimer, 2021; Gillis et al., 2015; Jarvik & Devo, 2002; Mansfield & Wroten, 2021; Maus, 2010; McTimoney & Micheli, 2003; Tawfik et al., 2020).

In treating the adult population, the advanced practice provider can reassure those patients presenting without acute injury of the likely chronic nature of this condition and routinely successful outcomes with conservative management. Thorough history and physical examination, with focused evaluation for any neurological compromise, is of primary importance in those with associated spondylolisthesis. Flexion and extension radiographs are helpful in determining the presence of dynamic instability, which, given the degree, may necessitate surgical intervention in symptomatic patients. In the presence of instability or neurological deficit, the most appropriate course of action is urgent referral to an orthopaedic spine specialist for further

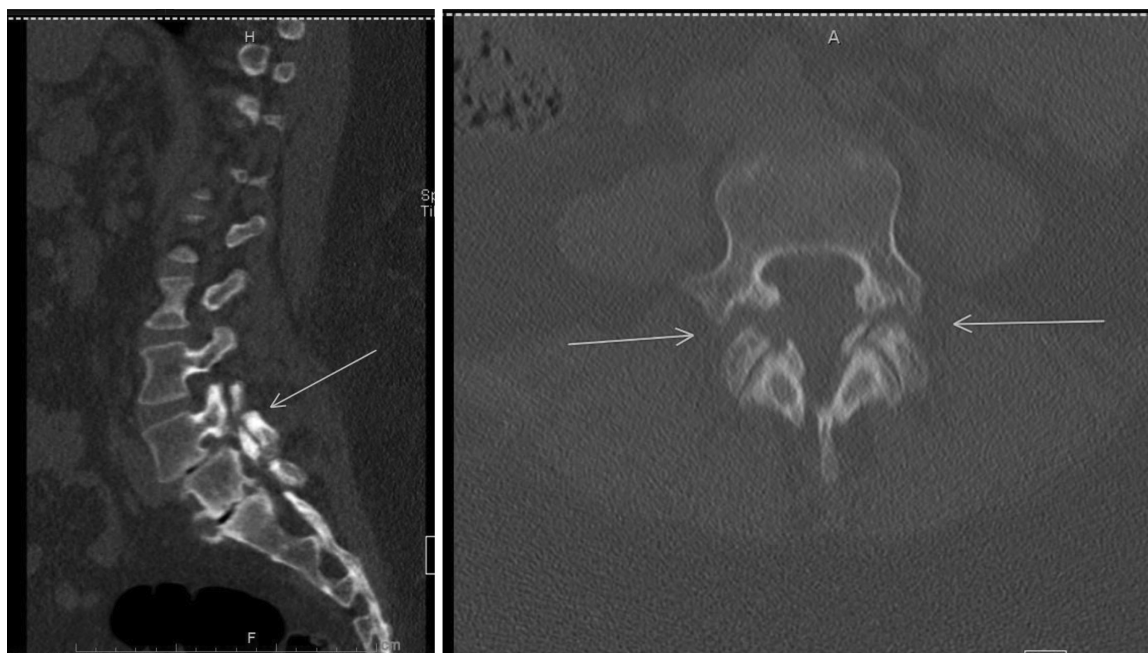


FIGURE 2. Sagittal and axial computed tomographic scans of the lumbar spine—Arrows denote bilateral pars defects of L5.

evaluation and management (Beutler et al., 2003; Chung & Shimer, 2021; Jarvik & Deyo, 2002; Mansfield & Wroten, 2021; Maus, 2010; McTimoney & Micheli, 2003; Tawfik et al., 2020).

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