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Diagnosis of Spondylolysis and Spondylolisthesis Is Delayed Six Months After Seeing Nonorthopedic Providers*

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Abstract

Study Design: Retrospective single center.

Objective: Our purpose was to quantify the time to diagnosis of spondylolysis/spondylolisthesis in symptomatic patients after first seeking medical care.

Summary of Background Data: Several studies have found a high prevalence of pars defects in adolescent athletes with back pain, up to 47%. A review by the Scoliosis Research Society Evidence-Based Medicine Committee reports that both nonsurgical and surgical treatment of symptomatic spondylolysis effectively relieves pain and allows most patients to return to activities. Nonoperative treatment outcomes improve with early diagnosis.

Methods: A retrospective chart review was conducted of patients presenting at our institution between 2005 and 2015 with symptomatic spondylolysis or spondylolisthesis with radiographic confirmation. Medical records were reviewed for demographics, date of symptom onset, date of initial presentation to a health care provider, type of provider, and date of diagnosis.

Results: Forty-six patients met the inclusion criteria. Average patient age was 14 years (range: 6–19 years). Forty-one percent (19/46) of patients had spondylolysis, and 59% (27/46) of patients had spondylolisthesis. Of those with spondylolisthesis, 20 had grade I, 4 had grade II, 2 had grade III, and 1 had grade IV slips. The average time between onset of symptoms and initial presentation was 24 weeks (orthopedic: 21 weeks, nonorthopedic: 29 weeks, unknown: 18 weeks; $p = .26$). The average delay between initial presentation to a health care provider and diagnosis was 15 weeks. Time from initial presentation to diagnosis was 1 week for orthopedic surgeons, 25 weeks for nonorthopedic providers, and 10 weeks for unknown providers; this difference was significant ($p = .02$).

Conclusion: Diagnosis of spondylolysis/spondylolisthesis was significantly longer after seeing a nonorthopedic versus an orthopedic provider. Education of primary care providers on this topic is warranted. Children suffering from back pain from spondylolysis/spondylolisthesis may benefit from early referral to an orthopedic surgeon.

Level of Evidence: Level II.

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Keywords: spondylolysis; spondylolisthesis; delay in diagnosis; pediatric spine deformity

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Introduction

Spondylolysis and spondylolisthesis can be a source of back pain in the pediatric population. Several studies have found a high prevalence of pars defects in adolescent athletes with back pain, up to 47%, especially in those performing activities with flexion and extension of the lumbar spine, such as gymnasts, dancers, and volleyball players [1-5]. Clinically, both spondylolysis and spondylolisthesis present with low back pain, hamstring tightness, and/or neurologic sequelae related to compression of spinal nerve roots, though these symptoms do not have particularly high sensitivity or specificity [6,7]. Back pain on hyperextension and pain that worsens with activity are classic. With spondylolisthesis, a lumbar step-off may also be appreciated [8].

Treatment options include physical therapy, bracing, nonsteroidal anti-inflammatory drugs, and in some cases surgical intervention. Nonoperative treatment outcomes improve with early diagnosis [9]. Bony healing is more likely to occur when spondylolysis is diagnosed within one month of the onset of symptoms, with unilateral fractures having higher healing rates than bilateral and pseudobilateral fractures [10,11].

To our knowledge, no study has reported on the length of time to diagnosis of spondylolysis and spondylolisthesis in the pediatric population. Our study aims to quantify the time to diagnosis of spondylolysis and spondylolisthesis and investigate factors that impact the delay in diagnosis.

Materials and Methods

An institutional review board–approved retrospective review of all patients with a recorded diagnosis of spondylolysis or spondylolisthesis treated at our tertiary pediatric medical center from 2005 to 2015. Patients were identified using ICD-9 codes for spondylolysis and spondylolisthesis.

Patients 0 to 21 years of age who had a recorded diagnosis of spondylolysis and/or spondylolisthesis within the study date range were eligible for the study (n = 140). Patients were excluded for a lack of low back pain worsened by extension (n = 43), no recorded date of initial presentation for their symptoms (n = 45), and absence of imaging studies confirming the diagnosis (n = 6). Patients without low back pain worsened by extension were excluded to narrow down the cohort to patients most likely to be symptomatic from spondylolysis.

Patient charts and radiographs were reviewed. Date of diagnosis was defined as the date that the first imaging study confirmed the presence of spondylolysis or spondylolisthesis. Imaging studies used for diagnosis included radiography, computed tomography, and magnetic resonance imaging; studies performed at outside medical centers were included in the study.

The primary outcome variable was time from initial presentation at a medical provider to diagnosis; time from onset of symptoms to initial presentation was also zzevaluated. Providers were classified as orthopedic or nonorthopedic. If a patient presented to an outside provider before being definitively diagnosed at our institution, but the type of provider was not recorded in their chart, they were assigned to an unknown category (n = 10).

Differences in time to diagnosis for continuous variables were calculated using Spearman rho, differences in dichotomous variables were calculated using Mann-Whitney U analysis, and differences for more than three categorical covariates were calculated using the Kruskal-Wallis H test. Descriptive data were summarized using mean, standard deviation, and range.

Results

For the 46 patients who met inclusion criteria, the mean delay between onset of symptoms and initial presentation was 24 weeks (range: 0-256, standard deviation [SD]: 52). The mean delay between initial presentation and diagnosis was 15 weeks (range: 0-208; SD: 34).

These patients were 63% female (n = 29/46) and 37% male (n = 17/46). Mean age at presentation was 14 years (range: 6-19; SD: 3). Mean patient body mass index was 21 (range: 11-33; SD: 4). Sixty-seven percent (n = 31/46) of patients had private insurance, 31% (n = 14/46) had public insurance, and 2% (n = 1/46) were self-pay. Overall, 41% (n = 19/46) of patients had spondylolysis and 59% (n = 27/46) had both spondylolysis and spondylolisthesis. Of those patients with spondylolisthesis, 74% (n = 20/27) had Grade I, 15% (n = 4/27) had Grade II, 7% (n = 2/27) had Grade III, and 4% (n = 1/27) had Grade IV (Tables 1 and 2).

Twenty-eight percent (n = 13/46) of patients initially presented to an orthopedist, 50% (n = 23/46) presented to a nonorthopedic facility (primary care: n = 15; urgent care: n = 1; ER: n = 4; other: n = 3), and 22% (n = 10/46) presented to an unknown type of provider before being definitively diagnosed at our institution (see Table 2).

Fifty-two percent of all patients (n = 24/46) initially presented to a nonorthopedic or unknown provider before being definitively diagnosed by an orthopedic provider. In

Table 1
Patient diagnoses.

	n (%)
Diagnosis (n = 46)	
Spondylolysis	19 (41)
Spondylolisthesis	27 (59)
Degree of spondylolisthesis (n = 27)	
I	20 (74)
II	4 (15)
III	2 (7)
IV	1 (4)

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