

## Benign Natural History of Spondylolysis in Adolescence With Midterm Follow-Up

Ted Sousa, MD<sup>a</sup>, David L. Skaggs, MD, MMM<sup>a,\*</sup>, Priscella Chan, MS<sup>a</sup>,  
Kent T. Yamaguchi, Jr, MD<sup>b</sup>, Jerald Borgella, BS<sup>c</sup>, Christopher Lee, MD<sup>b</sup>, Jeffrey Sawyer, MD<sup>c</sup>,  
Alice Moisan, RN<sup>d</sup>, John M. Flynn, MD<sup>e</sup>, Melissa Gunderson, BA<sup>e</sup>, M. Timothy Hresko, MD<sup>f</sup>,  
Pierre D’Hemecourt, MD<sup>f</sup>, Lindsay M. Andras, MD<sup>a</sup>

<sup>a</sup>Children’s Orthopaedic Center, Children’s Hospital Los Angeles, 4650 Sunset Blvd., Mailstop #69, Los Angeles, CA 90027, USA

<sup>b</sup>Department of Orthopaedic Surgery, University of California Los Angeles, Los Angeles, CA 90095, USA

<sup>c</sup>Department of Orthopaedic Surgery, University of Tennessee-Campbell Clinic, Memphis, TN 38104, USA

<sup>d</sup>LeBonheur Children’s Hospital, 51 N Dunlap St #100, Memphis, TN 38105, USA

<sup>e</sup>Division of Orthopaedic Surgery, Children’s Hospital of Philadelphia, 3401 Civic Center Blvd, Philadelphia, PA 19104, USA

<sup>f</sup>Division of Sports Medicine, Boston Children’s Hospital, 300 Longwood Ave, Boston, MA 02115, USA

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### Abstract

**Study Design:** Retrospective chart review.

**Objectives:** To use the Micheli Functional Scale to assess adolescent patients with spondylolysis treated conservatively at midterm follow-up.

**Summary of Background:** Spondylolysis is a common source of back pain for adolescents and is generally managed with bracing and physical therapy. There is little data regarding the results of conservative management of spondylolysis over time.

**Methods:** Four major academic pediatric institutions performed a retrospective chart review of patients from 5 to 21 years of age with the initial diagnosis of spondylolysis. Inclusion criteria were patients who initially underwent conservative management and had a minimum of 2 years’ follow-up. The patients were contacted and asked to complete the Micheli Functional Scale Survey.

**Results:** A total of 295 patients with the diagnosis of spondylolysis were identified and contacted. Sixty-one subjects with spondylolysis completed the follow-up survey. Sixty of 61 respondents (98%) answered questions regarding their current pain level. Thirty-five of 60 (58.3%) reported no pain (0/10) and 47/60 (78%) rated their pain at 3 or less, whereas 22% (13/60) rated their pain as 4 or higher. There was no correlation with pain ratings on the follow-up survey and radiographic healing at initial management.

Of the 61 patients, 50 returned to sports (82%), 8 did not return (13%), and 5 returned to most but not all of their sports (8%). No correlation was observed between radiographic healing and return to sports ( $p = .4885$ ).

**Conclusion:** Using a validated functional scale, this study demonstrated that with conservative management of spondylolysis a majority of patients at an average of 8 years out self-report a return to sports (90%), though many reported continued pain (42%) and interference with

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This study has been carried out with approval from the Committee on Clinical Investigations at Children’s Hospital Los Angeles.

\*Corresponding author. Children’s Orthopaedic Center, Children’s Hospital Los Angeles, 4650 Sunset Blvd., Mailstop #69, Los Angeles, CA 90027, USA. Tel.: (323) 361-4658; fax: (323) 361-1310.

E-mail address: [dskaggs@chla.usc.edu](mailto:dskaggs@chla.usc.edu) (D.L. Skaggs).

activities (67%). There was no correlation observed between radiographic evidence of healing and pain or return to sports with a mean follow-up of 8 years.

**Level of Evidence:** Multicenter retrospective case series.

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**Keywords:** Spondylolysis; Nonoperative; Conservative; Adolescent; Radiology

## Introduction

Spondylolysis is a defect of the pars interarticularis most commonly found at the lower lumbar area of the spine [1]. The incidence of spondylolysis is estimated to be between 6% and 8% in the pediatric and adolescent population [2,3]. However, in the child athlete with low back pain, it may be as high as 47% of patients [4]. Initial care is conservative, with treatment usually consisting of cessation of all sports activities for approximately 3 months, full-time brace treatment for 6 weeks to 3 months, and physical therapy focused on core strengthening, hamstring stretching, and pelvic tilt exercises [1,5-8].

Prior studies have reported that 80% of patients return to their sports and have good to excellent outcome with conservative care though questions remain regarding long-term function and pain after conservative management. In 2012, d’Hemecourt et al. reported a validation study on a functional scale for the adolescent population to evaluate the athlete’s ability to return to sports and the presence of chronic pain [9]. This survey, using the Micheli Functional Scale, has been found to strongly correlate with the Oswestry Disability Index for evaluation in adults, but is more relevant to back pain in the adolescent population. As d’Hemecourt et al. emphasized, evaluating young athletic patients for symptoms and disability is preferably done with a survey that considers the context of their sport and baseline activity level. The Micheli Functional Scale has questions that address ability to return to sports, need for surgical intervention, and level of pain. The questions focus on things that are more relevant to the athletic adolescent or young adult and exclude items that are more exclusively relevant to the adult working population [9].

Our objective was to use the Micheli Functional Scale to assess adolescent patients with symptomatic spondylolysis at midterm follow-up and to investigate whether there were factors at the initial treatment that were predictive of being symptom free with midterm follow-up.

## Materials and Methods

Four major academic pediatric institutions performed a retrospective chart review of patients from 5 to 21 years of age with the initial diagnosis of spondylolysis (ICD-9) from June 1, 1998, to June 1, 2008. All centers had IRB approval. Patients who initially underwent conservative management (ie, bracing, physical therapy, core strengthening, chiropractic care) were included in this study. Patients diagnosed with spondylolisthesis and patients who

were initially treated surgically were excluded. All patients had a minimum of 2 years of follow-up. The patients who met inclusion criteria were contacted and asked to complete the Micheli Functional Scale Survey (Appendix 1). Multiple follow-up attempts were made to try to contact the patient. We also evaluated radiographic healing after conservative treatment as defined by bony continuity of the pars interarticularis on final imaging on oblique radiograph, computed tomographic (CT) scan, or magnetic resonance imaging as assessed by orthopedic spine attendings. Fisher exact test was used to compare groups, with a significance level of  $p < .05$ .

## Results

A total of 295 patients with the diagnosis of spondylolysis were identified from the four different academic centers and contacted. Most patients were excluded because they did not return the survey. Sixty-one subjects with spondylolysis completed the follow-up survey. The average age at time of diagnosis of the patients who responded to the survey was 14 (range 8–18). The mean time interval between diagnosis and completion of the survey was 8 years (range 5–14 years).

### Initial presentation and management

Of the 61 patients, 21% (13/61) of subjects had unilateral pars fractures and 79% (48/61) had bilateral pars fractures (78%). See Table 1 for location of spondylolysis. All 61 subjects participated in athletics before the diagnosis of spondylolysis. The study population was heterogeneous in regard to the sports they played, including gymnastics, basketball, baseball, weight lifting, ice hockey, wrestling, martial arts, track and field, soccer, and cheerleading. Overall, 75% (46/61) of patients played more than one sport.

Fifty-six (91%) patients responded to questions regarding their initial treatment. Fifty of the 56 (89%) used a brace and 47 among them (84%) received some sort of

Table 1  
Location of spondylolysis by respondents.

Location of spondylolysis	Number of patients (n = 61)
T12	1
L3	5
L4	9
L5	46

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