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The Spine Journal 16 (2016) 728–736

THE SPINE JOURNAL

Clinical Study

Validity of the Japanese Orthopaedic Association scoring system based on patient-reported improvement after posterior lumbar interbody fusion

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Received 1 June 2015; revised 13 October 2015; accepted 15 January 2016

Abstract

BACKGROUND CONTEXT: The Japanese Orthopaedic Association (JOA) scoring system is a physician-based outcome that has been used to evaluate treatment effectiveness after lumbar surgery. However, patient-centered evaluation becomes increasingly important. There is no study that has examined the relationship between the JOA scoring system and patients' self-reported improvement.
PURPOSE: The purpose of the present study was to validate the JOA scoring system for assessment of patient-reported improvement after lumbar surgery.
STUDY DESIGN: This is a retrospective review of prospectively collected data.
PATIENT SAMPLE: The patient sample included 273 mail-in responders of the 466 consecutive patients who underwent posterior lumbar interbody fusion for spondylolisthesis between 1996 and 2008 in a single hospital.
OUTCOME MEASURES: The outcome measures were the JOA scoring system and patients' self-reported improvement.
METHODS: Two hundred seventy three patients were divided into five anchoring groups based on self-reported improvement from "Much better" to "Much worse." Outcomes (ie, recovery rate, amount of change from preoperative condition, and postoperative score) based on the JOA scoring system were compared among groups. Using the patient's self-reported improvement scale as an anchor, the association among each of the outcomes was examined. The cutoff point and the area under the curve (AUC) that differentiated "Improved" from "Neither improved nor worse" was calculated using receiver operating characteristic (ROC) curve analysis.
RESULTS: The recovery rate and postoperative score were significantly different in 9 of 10 pairs of anchoring groups. The amount of change was significantly different in six pairs. Spearman correlation coefficient for the 5-point scale anchors of patients' self-reported improvement was 0.20 (p=.001) for the baseline score, 0.31 (p<.001) for the amount of change, 0.55 (p<.001) for the recovery rate, and 0.56 (p<.001) for the postoperative score. According to ROC analysis, the best cutoff points and AUCs were 13 points and 0.69, respectively, for the amount of change, 67% and 0.73, respectively, for recovery rate, and 23 points and 0.72, respectively, for postoperative score.
CONCLUSIONS: The JOA scoring system is a valid method for assessment of patients' self-reported improvement. Patients' self-reported improvement is more likely to be associated with the final condition, such as postoperative score or recovery rate, rather than the change from the preoperative condition.

Keywords: JOA; Patient-reported improvement; PLIF; Recovery rate; ROC; Validation

FDA device/drug status: Not applicable.

Author disclosures: ***TF:*** Nothing to disclose. ***SO:*** Nothing to disclose. ***MI:*** Nothing to disclose. ***RY:*** Nothing to disclose. ***TaM:*** Nothing to disclose. ***TY:*** Nothing to disclose. ***ToM:*** Nothing to disclose. ***EW:*** Nothing to disclose. ***TO:*** Nothing to disclose.

The authors declare no conflict of interest associated with this manuscript.

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http://dx.doi.org/10.1016/j.spinee.2016.01.181
1529-9430/

Introduction

The Japanese Orthopaedic Association (JOA) scoring system [1] for assessment of treatment for low back pain is a surgeon-based assessment tool that has been widely published in the literature [2–7]. High interobserver reliability (r=0.92), reproducibility (r=0.91), and correlation with other health-related quality of life scores have been reported [8]. The recovery rate based on the JOA scoring system has been used as a primary clinical end point in numerous studies [2,4–7,9,10]. However, few studies have investigated the validity either of the recovery rate or the JOA scoring system [8].

There is a potential pitfall in the assessment of treatment efficacy of musculoskeletal diseases [11]. Even the smallest difference in an outcome measurement can become statistically significant by increasing the number of subjects in a study, even though the measured change is not clinically important or relevant [11–13]. The concept of minimum clinically important difference, therefore, has been proposed as a critical threshold by which to measure the effect of treatment [14–16]. A significant amount of recent spinal surgery literature concerns minimum clinically important difference [17–25].

The purpose of the present study was to examine the relationship between the JOA scoring system and patients' self-reported improvement after posterior lumbar interbody fusion (PLIF) surgery. The ability of the JOA scoring system to distinguish patients' self-reported improvement was also examined. An additional goal was to investigate the minimum clinically important improvement in the JOA scoring system for our cohort of patients.

Materials and methods

Patients

Our study protocol was approved by our institutional review board. A retrospective review of prospectively collected data from a single hospital was conducted. A total of 466 consecutive patients underwent PLIF for lumbar spondylolisthesis between 1996 and 2008. All patients who underwent surgery had severe, disabling leg pain with or without low back pain unresponsive to conservative treatment, such as medication, physical therapy, and root or epidural injection.

Of the 466 patients, 439 patients (94%) completed their 2-year follow-up and had JOA scores available. A set of questionnaires was mailed to the patients in 2011. Finally, 273 patients (121 men and 152 women) who responded to the questionnaires were included in the study (inclusion rate: 59%; 273/466). Of these 273 patients, 215 had degenerative spondylolisthesis and 58 patients had isthmic spondylolisthesis. All PLIF procedures were performed using the same technique [26].

JOA scoring system

The outcomes assessed by the JOA scoring system (Table 1) included the preoperative score, the amount of change from the preoperative score, the recovery rate, and the postoperative score. The recovery rate was calculated as follows: recovery rate (%)=(postoperative score−preoperative score)/(29−preoperative score)×100 [27]. The scores at final follow-up period were used for the analysis.

Questionnaire and anchor

In the present study, we adopted the common 5-point scale used in many studies [12,15,16,18,21,25,28–30].

In the questionnaire, patients were asked to respond to a question that concerned improvement due to the surgical procedure using a 5-point scale of responses that ranged from "Much better," "Better," "Neither better nor worse," "Worse," to "Much worse." A numerical value from 5 to 1 was attributed to each answer and patients were divided into five anchoring groups based on this response: 5="Much better" group, 4="Better" group, 3="Neither better nor worse" group, 2="Worse" group, and 1="Much worse" group. These five anchoring groups were used as an external criterion to examine an association with the JOA scoring system.

EVIDENCE & METHODS

Context

In the current health care climate, the importance of patient-centered outcomes research is increasingly recognized. In this context, the authors sought to contrast physician reported outcomes using the JOA tool with patient-reported measures following posterior lumbar interbody fusion.

Contribution

This study included 273 patients who completed outcomes surveys over the course of a 12-year period. The authors found reasonable correlation between JOA assessment and self-reported outcomes. They maintain that patient self-report is highly influenced by final outcome and rate of improvement as opposed to the change from preoperative baseline.

Implications

This study clearly provides useful information for those physicians looking to apply the JOA score to their posterior lumbar interbody fusion patients. As a result of the means through which this study was conducted, however, the validity of this tool for other types of spine surgical procedures cannot reasonably be addressed. Furthermore, readers must recognize the potential for response bias, especially if those patients doing extremely well or extremely poorly neglected to complete the survey. Although a response rate of 59% is quite favorable for a survey study, substantial potential for confounding still exists if there are meaningful differences between the responders and nonresponders in this cohort.

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