Can baseline radiographic findings guide surgical technique selection for degenerative spondylolisthesis (DS)?

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**Purpose**

1. Determine if baseline radiographic findings predict different outcomes among various surgical techniques for DS.
2. Evaluate published classification systems designed to guide surgical technique selection by comparing outcomes between patients treated appropriately and inappropriately according to the classification schemes.

**Hypothesis**

We hypothesize that outcomes for DS patients with certain baseline radiographic findings vary depending on the surgical technique employed.

**Method of Research**

An ongoing study of surgical appropriateness criteria in DS has prospectively enrolled approximately 500 surgery patients. All patients had dynamic radiographs and lumbar MRI as part of their pre-operative work-up, but these imaging data were not included in the research database. The current proposal aims to extract the baseline digital images from the electronic health record into a research database for analysis. We will include the preoperative radiographs and MRI scan. Radiographs will be analyzed to determine magnitude of listhesis, disk height, translation and rotation. Disk height, magnitude of listhesis, and facet joint angle will be measured on the MRI. The presence or absence of facet joint effusion and Pfirrmann grade will be determined on the MRI as well. Radiographs will be classified according to the “Clinical and Radiographic Degenerative Spondylolisthesis (CARDS)” classification based on disk space collapse, magnitude of translation, and kyphosis. Patients will also be classified according to the “Degenerative Spondylolisthesis Instability Classification (DSIC)” based on predominant pain location, disk height, presence of kyphosis, magnitude of translation, and presence of facet joint effusion.

Patients will be stratified according to the above baseline radiographic parameters, classification systems, and type of surgery received (i.e. decompression alone, decompression with uninstrumented fusion, decompression and instrumented fusion, or decompression and instrumented fusion plus interbody fusion). The primary outcome will be the Core Outcome Measure Index (COMI) change score (compared to baseline) at 12 months. Univariate analysis will be performed to determine if there are differences in 12 month COMI change scores among the different surgical techniques within each of the radiographic parameter and classification system groups. Multivariate models will be created to control for baseline patient differences among the surgical
technique groups and to evaluate the interaction between baseline radiographic parameters/classification system groups and surgical technique. Complication and reoperation rates will also be compared for the different surgical techniques.

**Expected Results**
This study should help to determine if DS subgroups defined by radiographic characteristics have different outcomes with different surgical techniques. This should provide novel data to surgeons to assist them with surgical technique selection. It may also provide data that serves as the impetus to fund a prospective randomized controlled trial comparing outcomes among different surgical techniques for DS.