

Clinical Study

Matched-pair cohort study of 1-year patient-reported outcomes following pelvic fixation

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Abstract

BACKGROUND CONTEXT: Pelvic fixation improves fusion and stability for thoracolumbar constructs that extend across the L5–S1 junction. No patient-reported outcomes have been published to evaluate patients' functional outcomes following these procedures compared with pelvis-sparing procedures.

PURPOSE: The goal of this study is to identify the effect of pelvic fixation on both objective and patient-reported outcomes.

STUDY DESIGN/SETTING: This was a retrospective, matched cohort study.

PATIENT SAMPLE: The sample comprised adult patients undergoing spine surgery at our institution who had complete 1-year postoperative follow-up.

OUTCOME MEASURES: Patient-reported outcome instruments (Oswestry Disability Index [ODI], Short-Form 12-item survey, and EuroQol-5D) and objective measures (length of hospital stay, discharge disposition, postoperative complications, and readmission rates) were considered.

METHODS: We identified patients in our outcomes registry undergoing instrumented spinal fusion involving the pelvis between October 2010 and May 2014 who had 1-year follow-up data. Nearest-neighbor 1:1 matched controls were identified using propensity scoring from the cohort of patients undergoing any spinal procedure which extended caudally to the lumbar spine or sacrum. Objective and patient-reported outcomes were compared between cases and controls.

RESULTS: There were 44 patients who underwent spinal procedures involving the pelvis and had 1-year follow-up data. An equal number of controls were identified and had similar baseline demographic and clinical characteristics. No significant differences were found among operative variables or objective complication rates. Patients undergoing pelvic fixation had moderately greater improvement at 3 months as measured by ODI, but this difference was not present at 1 year. Other patient-reported outcome measures were equivocal between groups.

CONCLUSIONS: This matched cohort study demonstrates that inclusion of the pelvis in spinal hardware constructs is not associated with increased complications and may slightly improve patient disability at 1 year. Given that pelvic fixation may reduce L5–S1 breakdown and improve biomechanics, surgeons should more readily include the pelvis in instrumented fusion procedures. © 2016 Elsevier Inc. All rights reserved.

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Iliosacral; Ilium; Instrumentation; Pelvis; Sacro-alar-iliac; Spinopelvic fixation

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The other authors have no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

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Introduction

Long thoracolumbar constructs that stop at L5 have a propensity for advanced degeneration of the L5–S1 disc space at a rate of 61% [1]. Inclusion of the L5–S1 junction has gained in popularity to prevent this breakdown. However, successful fusion to the sacrum can be challenging, and fixation at L5–S1 often fails before a successful fusion [2,3]. Additional fixation into the ilium dramatically improves the biomechanics, providing an environment for successful fusion [4]. Iliac fixation has its own associated complications, yet little is known about its effect on patient's perceived outcomes.

Inclusion of the pelvis in instrumented fusion procedures has evolved from the original Harrington threaded sacral rod method to the more modern iliac screw fixation, and the indications for fixation have grown concomitantly [5,6]. Indications for the extension of instrumented fusion to the pelvis include high-grade spondylolisthesis, correction of pelvic obliquity, osteotomies for flat-back syndrome, complex sacral fractures, sacrectomy, or large, instrumented fusion constructs which require additional caudal stability (eg, scoliotic deformity correction) [7,8]. In the latter case, the definition of a “large construct” is not strictly defined, and considerable controversy exists as to when pelvic fixation is truly necessary [7,9,10].

Although certain conditions necessitate pelvic fixation, others are more relative indications. In these situations, the decision of whether or not to include the pelvis in a fusion procedure must be based on a mixture of patient preference and clinical intuition. Unfortunately, there is limited evidence to assist the patient or provider in navigating this decision.

Most outcomes studies of pelvic fixation have addressed the rates of particular complications. Examples range from general adverse outcomes such as infection (4%) and hardware failure (11%) to more procedure-specific complications like iliac screw halos and hardware prominence (up to 20%) [6]. Hardware prominence can require revision surgery in up to 34% of patients [3]. Additionally, neurologic injury rate of 10% has been reported for iliosacral screws, and pseudarthrosis rates may exceed 30% in long fusions spanning to the sacrum or pelvis [11,12].

Although these risks certainly enter the calculus in the decision to perform pelvic fixation, they can be difficult for patients to understand. Patient-reported outcomes, on the other hand, may be better suited for assisting patients in the decision-making process. No prospective, patient-reported outcomes have been published to evaluate patients' functional outcomes following pelvic fixation.

The goal of this study is to characterize the effect of pelvic fixation on both objective- and patient-reported long-term outcomes. Improved understanding of the consequences of pelvic fixation will allow both patients and surgeons to make more informed treatment decisions.

EVIDENCE & METHODS

Context

In the era of health care reform and patient-centered outcomes research, increased emphasis has been placed on determining of the impact of intensive surgical interventions, such as thoracolumbar fusion with extension to the pelvis, on functional outcomes and quality of life. In this context, the authors evaluated the impact of pelvic fixation on outcomes in a matched cohort study considering the experiences of 88 patients.

Contribution

No significant differences in complication rates or functional outcomes were appreciated between the two groups at the one-year time point. The authors maintain that surgeons should feel safe in giving strong consideration to adding pelvic fixation to long thoracolumbar constructs.

Implications

While providing some potentially useful information, it must be appreciated that the design of this study limits the possibility of broad generalization in several respects. The results are likely confounded by the fact that this study was limited to patients treated at a single center and the sample, overall, was quite small with relatively limited length of follow-up. Furthermore, in the era of risk-based reimbursement, surgeons must consider the additional costs of pelvic instrumentation which, at least based on the results presented here, do not yield demonstrable functional gains in the short term. When considering cost-effectiveness, this would seem to render the use of pelvic instrumentation unfavorable, except in select clinical situations.

—The Editors

Materials and methods

Design

This study used a matched cohort design to evaluate objective- and patient-reported outcomes after pelvic fixation. This study was approved by the Institutional Review Board.

Data collection

This study relied on data from our prospective spine surgery outcomes registry. Baseline demographic and clinical characteristics, surgical variables, objective outcome measures, and patient-reported outcome scales were obtained from the electronic medical record and included in the registry. Objective outcomes included length of hospital stay in days, postoperative complications, discharge disposition, and 30-day readmission rates; these were also abstracted from the electronic medical record. EuroQoL-5D (EQ-5D), Short-Form12-item survey (SF-12), and Oswestry Disability Index

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