

Cross-Links Do Not Improve Clinical or Radiographic Outcomes of Posterior Spinal Fusion With Pedicle Screws in Adolescent Idiopathic Scoliosis: A Multicenter Cohort Study

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Abstract

Study Design: Retrospective, comparative analysis.

Objectives: Comparative analysis was performed to determine the differences, if any, between adolescent idiopathic scoliosis (AIS) patients who underwent posterior spinal fusion (PSF) with and without cross-links.

Summary of Background Data: Cross-links are frequently used during PSF for AIS. It is unclear whether they provide any advantage for patients with all–pedicle screw constructs.

Methods: A prospectively collected multicenter database of patients with AIS undergoing spinal fusion was retrospectively queried. Study inclusion criteria were primary PSF with all–pedicle screw fixation (greater than 90% fixation points) and minimum 2 years' follow-up. Collected data included demographics, radiographic measures, complications, Scoliosis Research Society–22r and Spinal Appearance Questionnaire (SAQ) scores.

Results: A total of 500 patients were included (377 cross-link and 123 non–cross-link). Age, body mass index, gender, and preoperative major Cobb angle were not different between groups. Except for a slightly decreased lumbar Cobb angle (2.7°) in the cross-link group, no other radiographic measures were different at follow-up. Complications were not significantly different between groups: 21 of 377 (6%) crosslink and 9 of 123 (7%) non–cross-link. Infection occurred in 1 patient in the cross-link group and none in the non–cross link group. Reoperation occurred in 4 patients, all with cross-links (3 for implant removal and 1 for distal adding-on). Scoliosis Research Society–22r scores, total and individual domains, improved by a similar amount in both groups. At follow-up, parent and patient SAQ appearance scores were not significantly different. The SAQ expectations domain scores were similar for all visits and improved for both patients and parents.

Conclusions: There do not appear to be significant clinical or radiographic outcome differences in patients with AIS undergoing PSF based on the use of cross-links at 2-year follow-up. Surgeons should consider eliminating cross-links in patients with AIS who have PSF with all–pedicle screw constructs. This may have substantial cost savings without affecting patient outcome.

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Keywords: Adolescent idiopathic scoliosis; Posterior spinal fusion; Cross-link; Pedicle screw

Introduction

Cross-links (transverse connectors) provide rigid fixation between spinal rods. Many surgeons use them routinely in the surgical treatment of adolescent idiopathic

scoliosis (AIS). Biomechanical studies have demonstrated increase torsional stiffness of spinal constructs with the use of cross-links [1–5]. The clinical implication of increased torsional stiffness, however, is not clear. Only a few clinical studies have assessed the effectiveness of cross-links in spinal surgery [6,7], none of which have shown clinical benefit with the use of cross-links. The cost of a cross-link at the authors' institution is approximately \$1,000 USD. With modern instrumentation techniques using predominantly pedicle screw fixation, this brings into question whether the additional stiffness imparted by cross-links is clinically indicated.

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The purpose of this study was to evaluate whether cross-links improve the outcomes in patients surgically treated for AIS enrolled in a multicenter, prospective surgical registry. The hypothesis was that cross-links do not improve clinical or radiographic outcomes in patients with AIS when treated with pedicle screw fixation.

Materials and Methods

After the researchers obtained institutional review board approval, they retrospectively queried a prospectively collected multicenter database for all patients with AIS who underwent a spinal fusion procedure. Patients were enrolled

into the database from 2004 to 2011. During that time, all study sites were consecutively enrolling patients. Figure 1 shows the methodology for establishment of the study cohort. Patients were included in the study cohort if they had undergone a posterior spinal fusion (PSF) with all–pedicle screw fixation (greater than 90% of the implants used were pedicle screws). Patients were excluded if they had undergone previous spinal surgery, a combined anterior and posterior procedure, or sacropelvic fixation. The final cohort consisted of 500 patients: 377 with and 123 without cross-links. Demographic information collected included age, gender, height, weight, Lenke classification Risser score, and triradiate cartilage assessment.

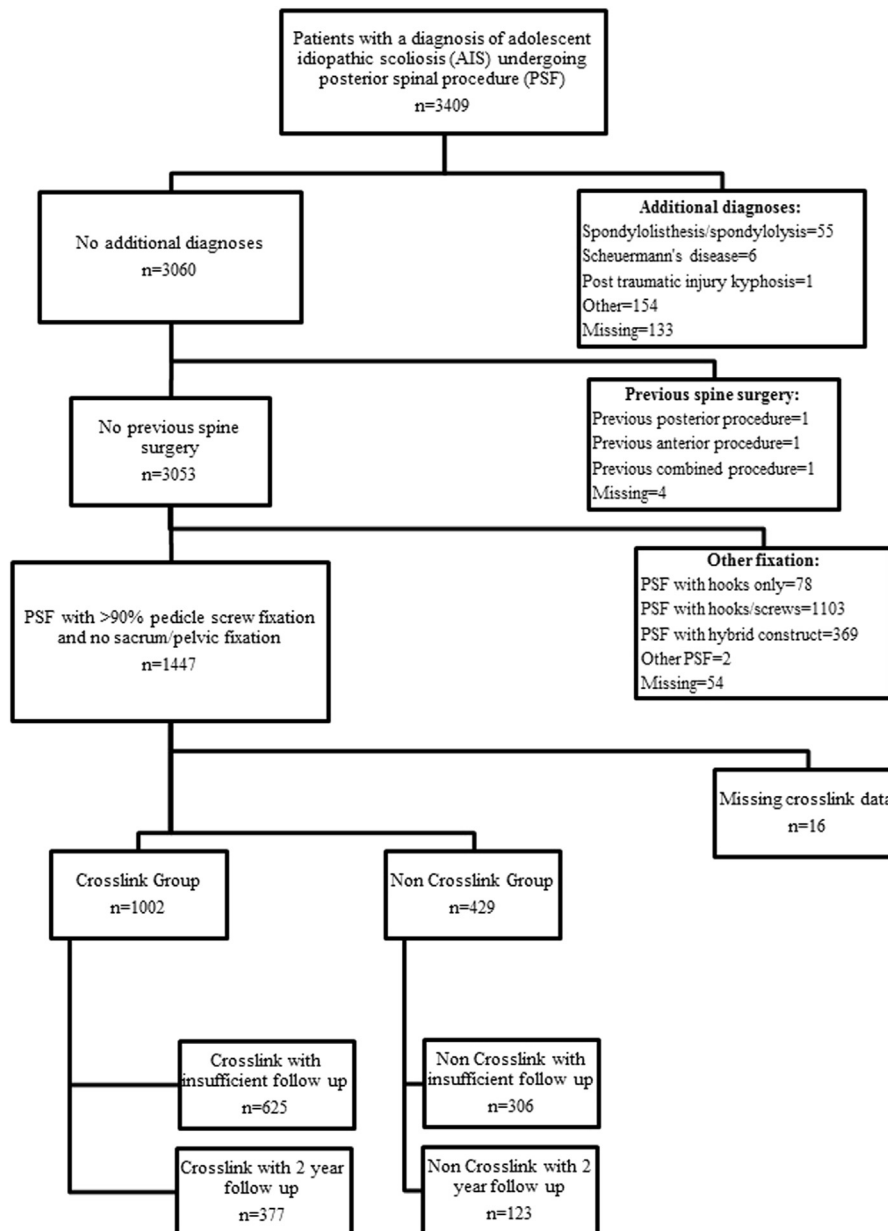


Fig. 1. Study cohort.

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