



Resource Utilization in Adolescent Idiopathic Scoliosis Surgery: Is There Opportunity for Standardization?

Baron S. Lonner, MD^{a,*}, Courtney S. Toombs, BA^b, Justin C. Paul, MD, PhD^c,
Suken A. Shah, MD^d, Harry L. Shufflebarger, MD^e, John M. Flynn, MD^f,
Peter O. Newton, MD^g

^aDepartment of Orthopaedic Surgery, Mount Sinai–Beth Israel Medical Center, Scoliosis and Spine Associates,
820 Second Avenue, New York, NY 10017, USA

^bNew York University School of Medicine, Scoliosis and Spine Associates, 820 Second Avenue, New York, NY 10017, USA

^cDepartment of Orthopaedic Surgery, New York University Hospital for Joint Diseases, Scoliosis and Spine Associates,
820 Second Avenue, New York, NY 10017, USA

^dDepartment of Orthopaedic Surgery, Al Du Pont Hospital, Nemours Children's Clinic – Wilmington of the Nemours Foundation,
1600 Rockland Road, Wilmington, DE 19803, USA

^eDepartment of Orthopaedic Surgery, Miami Children's Hospital, Nicklaus Children's Orthopedic Spine Center,
3100 SW 62 Avenue NE Wing #108, Miami, FL 33155, USA

^fDepartment of Orthopaedic Surgery, The Children's Hospital of Philadelphia, Division of Orthopedic Surgery, 2nd Floor Wood Building,
34th St. & Civic Center Blvd., Philadelphia, PA 19104, USA

^gDepartment of Orthopaedic Surgery, Rady Children's Hospital, Pediatric Orthopedic & Scoliosis Ctr,
3030 Children's Way #410, San Diego, CA 92123, USA

Received 16 July 2016; revised 23 November 2016; accepted 3 January 2017

Abstract

Introduction: Recent healthcare reforms have raised the importance of cost and value in the management of disease. Value is a function of benefit and cost. Understanding variability in resources utilized by individual surgeons to achieve similar outcomes may provide an opportunity for cutting costs through greater standardization. The purpose of this study is to evaluate differences in use of implants and hospital resources among surgeons performing adolescent idiopathic scoliosis (AIS) surgery.

Methods: A multicenter prospective AIS operative database was queried. Patients were matched for Lenke curve type and curve magnitude, resulting in 5 surgeons and 35 matched groups (N = 175). Mean patient age was 14.9 years and curve magnitude 50°. Parameters of interest were compared between surgeons via ANOVA and Bonferroni pairwise comparison.

Results: There was no significant difference in percentage curve correction or levels fused between surgeons. Significant differences between surgeons were found for percentage posterior approach, operative time, length of stay (LOS), estimated blood loss (EBL), cell saver transfused, rod material, screw density, number of screws, use of antifibrinolytics, and cessation of intravenous analgesics. Despite differences in EBL and cell saver transfused, there were no differences in allogenic blood (blood bank) use.

Author disclosures: BSL (grants from Setting Scoliosis Straight Foundation, during the conduct of the study; grants from Setting Scoliosis Straight Foundation; personal fees from DePuy Synthes Spine, K2M, Paradigm Spine, Spine Search, and Ethicon; nonfinancial support from Spine Deformity Journal; grants from AO Spine, John and Marcella Fox Fund Grant, and OREF, outside the submitted work); CST (none); JCP (none); SAS (reports grants from Setting Scoliosis Straight Foundation, during the conduct of the study; grants from Setting Scoliosis Straight Foundation; personal fees from DePuy Synthes Spine, outside the submitted work); HLS (none); JMF (reports other from Biomet, other from LWW, outside the submitted work); PON (reports grants from Setting Scoliosis Straight Foundation, during the conduct of the study; grants and other from Setting Scoliosis Straight Foundation, other from Rady Children's Specialists, grants and personal fees from DePuy Synthes Spine, personal fees from Law firm of Carroll, Kelly, Trotter, Franzen & McKenna, and the Law firm of Smith, Haughey, Rice & Roegge; grants from NIH and OREF,

grants and other from SRS; grants from EOS imaging; personal fees from Thieme Publishing; other from NuVasive; personal fees from Ethicon Endosurgery; other from Electrocure; personal fees from Cubist; other from International Orthopedic Think Tank; other from Orthopediatrics Institutional Support, and personal fees from K2M, outside the submitted work; in addition, PON has a patent "Anchoring systems and methods for correcting spinal deformities" (8540754) with royalties paid to DePuy Synthes Spine, a patent "Low profile spinal tethering systems" (8123749) issued to DePuy Spine, Inc.; a patent "Screw placement guide" (7981117) issued to DePuy Spine, Inc.; and a patent "Compressor for use in minimally invasive surgery" (7189244) issued to DePuy Spine, Inc.).

*Corresponding author. Mount Sinai Beth Israel Medical Center, Department of Orthopaedic Surgery, New York, NY 10017, USA. Tel.: 212 986 0140; fax: 212 986 0160.

E-mail address: blonner@scoliosisassociates.com (B.S. Lonner).

Conclusion: Significant variability in resource utilization was noted between surgeons performing AIS operations, although radiographic results were uniform. Standardization of resource utilization and cost containment opportunities include implant usage, rod material, LOS, and transition to oral analgesics, as these factors are the largest contributors to cost in AIS surgery.

© 2017 Scoliosis Research Society. All rights reserved.

Keywords: Resource utilization; Cost; Scoliosis; Blood loss; Operative time

Introduction

Rising healthcare costs in US hospitals have led to increasing consideration of the quality of medical care with respect to its cost and value. Analysis of the economics of operative care has benefited surgical fields including orthopedics. There is significant opportunity to improve disparities in costs in the area of spine care [1–5]. Efforts to reduce variability in resource utilization in elective spine surgery require thorough investigation to determine significant drivers of increased cost. Variability in perioperative evaluation and operative care can lead to increased cost without demonstrated increase in value.

Arthrodesis of the spine for adolescent idiopathic scoliosis (AIS) involves many operative and perioperative decisions by the surgeon, which have not been standardized. Sanders et al. surveyed spinal deformity surgeons on operative choices for four typical scoliosis curves. They noted wide variability of surgeon preference for implant, approach, number of levels, and resultant high range of estimated costs [6]. Kamerlink et al. reviewed 125 cases of operative AIS and found that the largest contributors to cost were implants, intensive care unit, and inpatient room costs (hospital length of stay [LOS]), operating room and post-anesthesia care unit time, and bone graft [7]. We queried a prospective AIS database for a broad range of perioperative parameters and evaluated radiologic outcomes with the hypothesis that surgeon resource utilization is variable but does not change outcomes. We also hypothesized that more contemporary surgical techniques would require fewer resources and result in better outcomes.

Methods

A retrospective query of a prospective, multicenter, longitudinal database of surgical outcomes in AIS involving 10 institutions was conducted. The study registry was queried for all surgical AIS patients from 2005 to 2010 with minimum first postoperative visit data. Patients were then classified by operating surgeon and matched between surgeons by Lenke curve type, followed by curve magnitude within 5 degrees, resulting in 5 surgeons represented with 35 matched groups ($n = 175$). The analysis of only five surgeons from the databases resulted in fewer groups than expected, given that there are >10 surgeons in the database, but each group was larger when only these five surgeons were used. A smaller number of larger-sized groups provides more power and more likelihood of

heterogeneity in the variance between groups. Between the five surgeon groups, the following variables were compared in order to analyze variation in resource utilization: pedicle screw density, number of pedicle screws, construct type used (categories include “all screws” that are cases using 80% or more screws, all hook, or hybrid which is screws plus hooks and/or wires with screws less than 80%), levels fused, posterior column osteotomy levels, operative time, blood loss (EBL), percentage estimated blood volume (%EBV), cell saver and allogenic blood transfusions (blood bank), approach, rod material, LOS, cessation of intravenous (IV) analgesics, antifibrinolytics used, complications. ANOVA and Bonferroni pairwise comparison was performed for each parameter.

Results

Resource utilization by surgeon comparison, matched cohort

In the matched group, the overall mean age was 14.9 years (range 14.5–15.4). Mean preoperative thoracic major curve magnitude was 52.5° (range 38°–81°); major lumbar curve magnitude was 52.2° (41°–66°). Percentage curve correction for main thoracic curvature was 65% (range 12.2% to 98.4%) and for major lumbar curve was 77.9% (range 35.4% to 97.9%).

There was no difference among surgeons with respect to age, gender, Lenke curve type distribution, preoperative major thoracic curve magnitude and preoperative major thoracic and lumbar percentage curve correction (Table 1).

In the matched cohort, 120 cases were classified as Lenke I curve types, 30 were Lenke II curves, and 25 were Lenke V curves (Table 2). The percentage curve corrections were 64.2%, 68%, and 77.9% for the three respective Lenke types (Table 2).

Significant differences were found between the 5 surgeon groups for percentage posterior approach, levels fused, operative time, LOS, EBL, %EBV, cell saver transfused, rod material, construct type, screw density, number of screws, use of antifibrinolytics, and cessation of IV analgesics ($p \leq .001$; Table 3). Despite differences in EBL and cell saver used, there were no differences in allogenic blood transfusion. No difference was found in the number of levels of posterior column osteotomies performed.

All surgeons performed posterior approaches for approximately 75% of cases in this series. Surgeon 4 in the series had the greatest reported values for operative time

Download English Version:

<https://daneshyari.com/en/article/5712684>

Download Persian Version:

<https://daneshyari.com/article/5712684>

[Daneshyari.com](https://daneshyari.com)