



Adult Spinal Deformity: National Trends in the Presentation, Treatment, and Perioperative Outcomes From 2003 to 2010

Peter G. Passias, MD^{a,*}, Cyrus M. Jalai, BA^a, Nancy Worley, MS^a, Shaleen Vira, MD^a, Bryan Marascalchi, MD^a, Shearwood McClelland, III, MD^a, Virginie Lafage, PhD^b, Thomas J. Errico, MD^a

^aDepartment of Orthopaedic Surgery, NYU Hospital for Joint Diseases, 301 E 17th St, New York, NY 10003, USA

^bDepartment of Orthopaedic Surgery, Hospital for Special Surgery, 535 E 70th St, New York, NY 10021, USA

Received 1 October 2015; revised 10 February 2017; accepted 11 February 2017

Abstract

Study Design: Retrospective review of a prospective database.

Objectives: To investigate adult spinal deformity (ASD) surgery outcome trends on a nationwide scale using the Nationwide Inpatient Sample (NIS) from 2003 to 2010.

Methods: ASD patients ≥ 25 years from 2003 to 2010 in the NIS undergoing anterior, posterior, or combined surgical approaches were included. Fractures, 9+ levels fused, or any cancer were excluded. Patient demographics, hospital data, and procedure-related complications were evaluated. Yearly trends were analyzed using univariate analysis and linear regression modeling.

Results: Of 10,966 discharges, 1,952 were anterior, 6,524 were posterior, and 1,106 were combined. The total surgical ASD volume increased by 112.5% ($p = .029$), and both the average patient age ($p < .001$) and number of patients > 65 years old significantly increased from 2003 to 2010 ($p = .009$). Anterior approach case volume decreased by 13.7% ($p = .019$), whereas that of combined increased by 22.7% ($p = .047$). Posterior case volume increased by 38.9% from 2003 to 2010, though insignificantly ($p = .084$). Total hospital charges for all approaches increased over the interval ($p < .001$). Total length of stay for all approaches decreased over the time interval ($p < .005$). Although the overall morbidity for all approaches increased by 22.7% ($p < .001$), mortality did not change ($p = .817$). The most common morbidities in 2003 were hemorrhagic anemia, accidental cut, puncture, perforation, or laceration during a procedure, and device-related complications, which persisted in 2010 with the exception of increased acute respiratory distress syndrome and pulmonary-related complications.

Conclusions: For ASD surgery from 2003 to 2010, the volume of anterior approaches decreased, whereas posterior procedures did not change, and combined approaches increased. Total hospital charges increased for all considered procedures, length of hospital stay decreased, whereas operative patients were increasingly elderly, and more procedures were observed for patients > 65 years old. For all approaches, morbidity increased whereas mortality did not change. Future study is required to develop methods to reduce morbidity and costs, thereby optimizing patient outcomes.

© 2017 Scoliosis Research Society. All rights reserved.

Keywords: Adult spinal deformity; National trends; Morbidity; Mortality; Hospital characteristics

Author disclosures: PGP (none); CMJ (none); NW (none); SV (none); BM (none); SM (none); VL (grants from SRS, NIH, and DePuy Spine Synthesis; personal fees from Medicea, MSD, DePuy Spine Synthesis, and Nemaris INC; other from Nemaris Inc, outside the submitted work); TJE (personal fees from K2M, Fastenetix, K2M, and K2M; institutional research support from Pfizer; grants from Fridolin, Paradigm Spine, and ISSGF; fellowship support from OMEGA and AO Spine, outside the submitted work).

*Corresponding author. New York Spine Institute, 361 Merrick Avenue, Westbury, New York, NY 11590, USA. Tel.: (516) 357-8777; fax: (516) 357-0087.

E-mail address: Peter.Passias@nyumc.org (P.G. Passias).

Introduction

Adult degenerative spinal disorders are increasing in frequency nationwide, and thus have been the subject of recent rigorous analyses [1]. Adult spinal deformity (ASD) encompasses a spectrum of spinal conditions present in aging populations, including degenerative scoliosis, iatrogenic deformity, imbalance in coronal/sagittal planes, among others. Multiple studies evaluating the prevalence of scoliosis over the past two decades in the United States have estimated a broad range, ranging from 1.4% to 68% [2-4].

Although surgical intervention is required only for a small percentage of these patients [5,6], literature from the 1990s demonstrated a steady increase in spinal surgery rates, consistent across age in adults, gender, and spinal diagnoses [7–9]. With an aging population expected to triple in number over the next 40 years [10], the volume of hospitalizations and prevalence of certain spinal deformities is persistently increasing [4,11,12]. As a recent illustration of this, McCarthy et al. observed a 4-fold increase in the number of ASD surgeries for Medicare patients from 2000 to 2010, with a concomitant 16-fold increase in costs [8].

Effective ASD treatment consists predominantly of corrective surgery, traditionally performed in only the most severe cases. In the past decade though, surgical intervention has become a more common occurrence in individuals who have failed at conservative management. Literature surrounding methods of addressing patient-specific factors have thus proliferated, offering a number of surgical approaches and procedures to achieve surgical goals. These include posterior-only, anterior-only, and combined anterior-posterior approaches, each with varying levels of success [13,14]. Although surgical approach selection is often guided by deformity severity and surgeon preference, the common surgical objectives remain consistent [15]. Technical refinements, advancements in surgical instrumentations, and efforts toward optimizing surgical plans have made the undertaking of these severe deformity cases more feasible [16–18]. Nonetheless, the benefits and drawbacks of each potential procedure, along with changes in costs based on the ever-changing health care policy, contribute to the current uncertainty in ASD treatment.

Understanding recent developments in ASD surgery can reveal trends in morbidity and mortality, which in turn can be used to optimize preoperative patient counseling. Nationwide databases facilitate the pooling of data from multiple institutions to provide the sample sizes needed to elucidate these clinical treatment differences with respect to surgical and hospital characteristics. This study uses a nationwide sample of patients from all payer types and age ranges from 2003 to 2010 to analyze surgical and hospital-related trends in the surgical treatment and outcomes of ASD.

Materials and Methods

Data source

The Nationwide Inpatient Sample (NIS) is the largest all-payer database available in the United States, developed as part of the Healthcare Cost and Utilization Project (HCUP) sponsored by the Agency for Healthcare Research and Quality (AHRQ). Each annual file of the NIS contains data from approximately 8 million hospital stays from 45 states nationwide, and approximates a 20% stratified sample of all discharges from about 1,000 US community hospitals [19]. The database contains 100 clinical and nonclinical data elements for patients and hospital characteristics, along with diagnoses and procedures in *International Classification of*

Disease—9th Revision—Clinical Modification (ICD-9-CM) format. National estimates are produced using discharge weight files. An in-depth description of the NIS design is available at http://www.hcup-us.ahrq.gov/db/nation/nis/NIS_Introduction_2010.jsp [20].

Patient selection

Discharges of patients from 2003 to 2010 over the age of 25 years who underwent anterior and/or posterior lumbar fusions, presenting with at least one of the following diagnoses in ICD-9-CM format were retained for analysis: idiopathic scoliosis and kyphoscoliosis (737.30), progressive infantile idiopathic scoliosis (737.32), scoliosis not elsewhere classified (737.39), kyphosis not elsewhere classified (737.19), acquired postural kyphosis (737.10), acquired postural lordosis (737.20), kyphoscoliosis from secondary cause (737.43), kyphosis from secondary cause (737.41), lordosis from secondary cause (737.42), and thoracogenic scoliosis (737.34). The study cohort included fusions/refusions of 4–8/9+ vertebrae. Patients were excluded if they presented with any metastatic or nonmetastatic cancer, lymphoma, or leukemia (140.x–172.x, 174.x–195.8, 200.x–208.x, and 196.x–199.1), any vertebral fracture (805.00–806.09), pathologic fractures of vertebrae (733.13), chronic osteomyelitis (730.18), unspecified osteomyelitis (730.28), or any cervical fusion or refusion (81.00–81.03 and 81.30–81.33). Three surgical approaches were considered for analysis based on ICD-9-CM coding: anterior-only (anterior dorsal, dorsolumbar, lumbar, and/or lumbosacral fusions with instrumentation without posterior fusion), posterior-only (posterior dorsal, dorsolumbar, lumbar, and/or lumbosacral fusions with instrumentation without anterior fusion), or combined.

Data collection

For each discharge, collected measures included mortality, total charges, duration of hospital stay, and ICD-9-CM diagnosis and procedural codes. Complex cases were defined as those with 9+ levels fused. Procedure-related complications specific to individual issues resulting from surgical and medical care were determined using ICD-9-CM codes. Total complication rate was determined by identifying the occurrence of any of the following procedure-related complications: device-related, central nervous system, cardiac, peripheral vascular, respiratory, gastrointestinal, genitourinary, postoperative shock, hematoma seroma, puncture laceration, wound dehiscence, postoperative infection, hemorrhagic anemia, acute respiratory distress syndrome, and venous thromboembolism.

Statistical analysis

Statistical analysis was performed using R Foundation for Statistical Computing (Vienna, Austria) and Statistical Package for the Social Sciences (SPSS version 20.0, IBM

Download English Version:

<https://daneshyari.com/en/article/8804308>

Download Persian Version:

<https://daneshyari.com/article/8804308>

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