The Effect of Two Attending Surgeons on Patients with Large Curve Adolescent Idiopathic Scoliosis Undergoing Posterior Spinal Fusion

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Abstract

Background and Significance: Surgical correction of AIS carries a substantial risk of complication. The literature supports improved perioperative outcomes through the two surgeon strategy in other complex orthopedic procedures.

Research Question: Does the presence of 2 versus 1 attending affect the perioperative morbidity of posterior spinal fusion (PSF) in patients with adolescent idiopathic scoliosis (AIS) curves greater than 70°.

Methods: We reviewed the database from a large regional children's hospital of all patients with AIS curves greater than 70° who underwent PSF from 2009-2014 and divided the cohort into single versus 2-surgeon groups (28 vs. 19 cases, respectively). We analyzed cases for length of surgery, estimated blood loss, and length of stay.

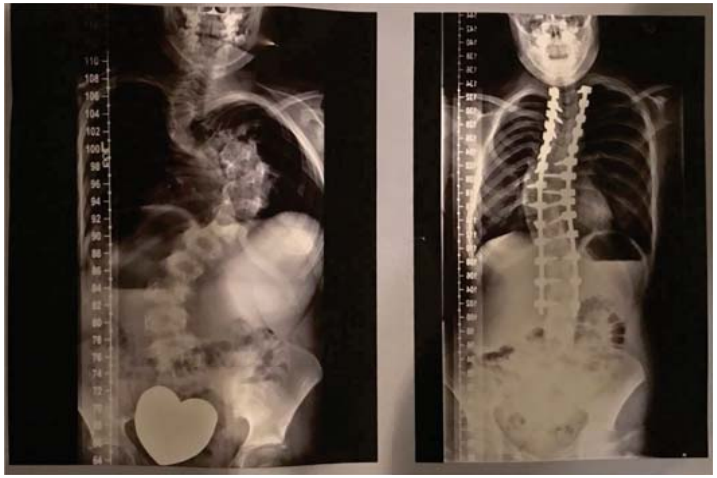
Results: The groups were identical when comparing age, gender, spinal levels fused, and average ASA score. However, the average Cobb angle in the single surgeon group was significantly less than in the 2 surgeon group at 78.4 vs 84.0 degrees, respectively (p=0.049). Mean operative time for single versus 2 surgeons was 238 vs 212 minutes (p=0.078). Mean percent estimated blood loss was 26% for single surgeon vs 31% for 2 surgeons (p=0.236), and mean estimated blood loss for single surgeon vs 2 surgeons was 830ml vs 1045ml (p=0.052). Mean length of stay was significantly decreased in the 2 surgeon group at 5.16 days versus the single surgeon group at 6.82 days (p=0.002).

Conclusions: The use of 2 surgeons in AIS deformity correction at an experienced regional children's hospital had a variable effect on clinical outcomes; the mean length of stay was reduced in the two-surgeon group but there was no difference in operative time or blood loss. This study does not rule out the potential for positive impact with a two-surgeon strategy, and given previous supportive data in the literature, this approach should further evaluated to determine its effect on improving perioperative outcomes.

Introduction

Adolescent Idiopathic Scoliosis (AIS) is the most common cause of spinal deformity. Surgical correction of larger deformities is associated with higher perioperative morbidity. For this reason, it is important to mitigate risk factors to the greatest extent possible.

Previous studies have shown that intraoperative risk factors can be reduced by having two surgeons operate simultaneously. The purpose of this study is to investigate the impact of using two surgeons for posterior spinal fusion (PSF) in patients with AIS with large magnitude curves (greater than 70°).



Above: The same patient before and after posterior spinal fusion for adolescent idiopathic scoliosis. This patient had a preoperative Cobb angle of over 100°.

Methods

A chart review was conducted on all eligible patients from 2009 to 2014. 47 patients were identified, 19 of whom had two attending surgeons while 28 underwent PSF performed by a single attending surgeon assisted by a resident or PA. All patients underwent similar operative procedures with pedicle-screw only constructs. Patients in the two groups underwent identical surgical and anesthetic protocols, including use of tranexemic acid. Percent EBL was calculated as EBL divided by total estimated blood volume, which was estimated as weight in kilograms multiplied by either 75ml/kg for males or 65ml/kg for females. All patients were followed out to a minimum of one year. The Student's T-test was used to compared the three major variables of blood loss, anesthesia time, and hospital length of stay. A Chi-Square test was used to compare categorical variables between the groups.

Results

Patients in the single-surgeon group and the 2-surgeon group had no significant difference in age, gender, spinal levels fused, or ASA score. However, the average preoperative Cobb angle was slightly higher in the two surgeon group (84.02 vs. 78.42).

There was no statistical difference between the total operative time, anesthesia time, EBL, %EBL, blood transfusions or complications. Average hospital length of stay was decreased in the two-surgeon group (5.16 vs. 6.82 days, p=0.002). The two-surgeon group had three complications (acute blood loss anemia, hardware failure with pseudoarthrosis, and late infection at 6 months). The single-surgeon group had 7 complications (extension of deformity, infected spinal wound, acute respiratory failure, CSF leak, compensated shock, urinary incontinence, and loss of lower extremity motor function).

TABLE 1	Single Surgeon	Two Surgeon	P Value
Patients (n)	28	19	n/a
Total Operative Time (minutes)	238 (SD 48)	212 (SD 46)	0.078
Total Anesthesia Time (minutes)	326 (SD 54)	302 (SD 45)	0.135
Estimated Blood Loss (ml)	830 (SD 361)	1045 (SD 346)	0.052
Estimated Blood Loss (%)	26.1 (SD 14.1)	31.4 (SD 14.9)	0.236
Length of Stay (days)	6.82 (SD 3.2)	5.16 (SD 1.7)	0.002
Complications	7	3	0.718

Conclusion

The aim of this project was to determine if two attending surgeons could lower the surgical time and blood loss in the treatment of large magnitude (>70°) scoliotic curves in patients, and thus lead to potentially a lower complication rate.

While hospital length of stay was decreased by 1.7 days, there was no difference in total operative time, anesthesia time, EBL, %EBL, or blood transfusion units. The difference in the hospital stay time is difficult to explain, since these groups were treated during contemporary time periods. The retrospective nature of the study certainly could have confounding variables that are significantly impacting this finding.

Demographically, the single-surgeon and two-surgeon groups were comparable. However, the preoperative Cobb angle was significantly greater in the two-surgeon group. This suggests that selection bias may have led to difficult cases being given higher priority for receiving two operative surgeons.

The use of two surgeons for PSF for AIS has previously been shown to decrease operative time and blood loss. However, in this study, the technique of having two experienced orthopaedic spine surgeons work simultaneously to perform pedicle screw only posterior spinal fusion on large magnitude AIS curves greater than 70° did not improve blood loss or operative time. Further study needs to continue to identify ways to minimize complications for patients that undergo spinal fusion.

Acknowledgements

I wish to thank my mentor Dr. Wade Shrader and PCH research coordinator Carla Boan.