Midweek Versus End-of-Week Posterior Spinal Fusion: Comparing Postoperative Outcomes in Adolescent Idiopathic Scoliosis Patients

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INTRODUCTION: The "weekend effect" refers to an observed difference in mortality and complication rate between patients admitted for care during weekends compared to those admitted on weekdays. This phenomenon has been attributed to hospitals' relatively lower weekend resource allocation. Recent studies contain mixed findings regarding the applicability of the "weekend effect" in spinal surgery (which commonly involves postoperative inpatient stay): some reveal no significant differences in hospital charges and length of stay (anterior cervical discectomy with fusion[1] and lumbar decompression[2]), while others indicate increased perioperative adverse events, length of stay, and mortality rates (non-elective spine surgery[3]). The role of the "weekend effect" on postoperative outcomes for patients with adolescent idiopathic scoliosis (AIS) undergoing posterior spinal fusion (PSF) remains to be clarified. This study compares how two specific times of the week (Tuesday/Wednesday vs. Friday) influence post-PSF outcomes in AIS patients at a single institution, such as complication rates and days to out of bed.

METHODS: AIS patients undergoing PSF between 2018-2023 at Cohen Children's Medical Center were included in this comparative clinical analysis study, which was approved by the Northwell institutional review board. Clinical charts and operative reports were reviewed. Cases were stratified by day of surgery (Tuesday/Wednesday or Friday) and by whether it was the patient's first or second surgery. Outcomes measured include days to out of bed (OOB) after surgery, narcotic refills, and 30-day and 90-day complications. Continuous variables were analyzed with Wilcoxon rank-sum tests, while categorical variables were analyzed using Chi-Square tests and Fisher exact tests.

RESULTS: In total, 288 patients were identified. The first surgery group included 223 patients (Table 1) (median ages for Tuesday/Wednesday: 15.4 [14.0-17.0] and Friday: 15.4 [13.7-17.4]). The percentage of female patients in the first surgery Tuesday/Wednesday group and Friday group were 82% and 76%, respectively. Median preoperative Cobb angles for both groups were not significantly different (p=0.47). There was no significant difference found between the first surgery Tuesday/Wednesday and Friday groups with regards to days OOB (p=0.33), narcotic refill rate (p=0.51), 30-day complication rate (p=1.0), and 90-day complication rate. The second surgery group included 65 patients (Table 2) (median ages for Tuesday/Wednesday: 15.0 [14.1-18.2] and Friday: 15.3 [14.3-16.0]). The percentage of female patients in the second surgery Tuesday/Wednesday group and Friday group were 27%, and 22%, respectively. Median preoperative Cobb angles for both groups were not significantly different (p=0.85). The results in this group mirrored those in the first surgery group; there was no significant difference found between the second surgery Tuesday/Wednesday and Friday groups with regards to days OOB (p=0.69), narcotic refill rate (p=1.0), 30-day complication rate (p=0.46), and 90-day complication rate.

DISCUSSION: No significant differences were found in days to out-of-bed, narcotic refill rate, and 30- and 90-day complication rates between the populations of AIS patients who underwent first or second PSF surgery on Tuesdays/Wednesdays versus their Friday counterparts. These findings suggest that regardless of whether the surgery is a patient's first or subsequent PSF, the quality of care for AIS patients receiving PSF surgery later in the week remains consistent and does not alter their recovery trajectory. It should be noted that the percentage of female patients was much higher in the first surgery group than in the second surgery group. It is also important to recognize that variations in institutional practices could affect weekend standards of care.

SIGNIFICANCE/CLINICAL RELEVANCE: The results of this study highlight a consistency between postoperative outcomes for AIS patients undergoing both first or second PSF surgeries, irrespective of the day of week. These findings challenge the traditional concerns associated with the "weekend effect" and are consistent with literature regarding other elective spine surgeries[1,2], encouraging further discussion and exploration into the exact effects of time of week on the quality and safety of PSF and other spinal procedures as well as the role of institutional variations on the degree of "weekend effect".

SOURCES:

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3. Charest-Morin, R., Flexman, A.M., Bond, M. et al. 'After-hours' non-elective spine surgery is associated with increased perioperative adverse events in a quaternary center. *Eur Spine J* 28, 817–828 (2019). doi:10.1007/s00586-018-5848-x

Table 1: Comparison of variables between Tuesday/Wednesday and Friday surgery, limited to first surgery.

	Tuesday or Wednesday surgery N = 116	Friday surgery N = 107	p-value
Age, years	15.4 (14.0-17.0)	15.4 (13.7-17.4)	0.754
Sex, n (%)			
Female	82 (70.7)	76 (71.0)	0.956
Male	34 (29.3)	31 (29.0)	
Pre-operative Cobb angle, degrees	53.9 (44.8-64.1)	52.0 (44.0-62.0)	0.473
OOB, n (%)			
0	50 (45.5)	43 (41.8)	0.334
1	36 (32.7)	42 (40.8)	
2	19 (17.3)	10 (9.7)	
3	3 (2.7)	6 (5.8)	
4	2 (1.8)	2 (1.9)	
Narcotic refill, n (%)			
No	52 (85.2)	46 (80.7)	0.511
Yes	9 (14.8)	11 (19.3)	
30-day complication, n (%)			
No	114 (98.3)	106 (99.1)	1.0
Yes	2 (1.7)	1 (0.9)	
90-day complication, n (%)			
No	115 (100)	105 (100)	n/a
Yes	0	0	

Data is presented as medians and percentages; age & pre-op Cobb angle with interquartile ranges
Categorical p value: Chi-square & Fisher exact tests, continuous p value: Wilcoxon rank-sum test

Table 2: Comparison of variables between Tuesday/Wednesday and Friday surgery, limited to second surgery.

	Tuesday or Wednesday surgery N = 35	Friday surgery N = 30	p-value
Age, years	15.0 (14.1-18.2)	15.3 (14.3-16.0)	0.754
Sex, n (%)			
Female	27 (77.1)	22 (73.3)	0.722
Male	8 (22.9)	8 (26.7)	
Pre-operative Cobb angle, degrees	49.2 (42.0-57.0)	49.5 (42.3-62.9)	0.854
OOB, n (%)			
0	18 (54.5)	17 (56.7)	0.685
1	9 (27.3)	10 (33.3)	
2	6 (18.2)	3 (10.0)	
3	0	0	
4	0	0	
Narcotic refill, n (%)			
No	22 (84.6)	13 (86.7)	1.0
Yes	4 (15.4)	2 (13.3)	
30-day complication, n (%)			
No	35 (100)	29 (96.7)	0.462
Yes	0	1 (3.3)	
90-day complication, n (%)			
No	34 (100)	30 (100)	n/a
Yes	0	0	

Data is presented as medians and percentages; age & pre-op Cobb angle with interquartile ranges
Categorical p value: Chi-square & Fisher exact tests, continuous p value: Wilcoxon rank-sum test