



NYU Langone Medical Center
Division of Spinal Surgery
Departments of Neurological and Orthopaedic Surgery
New York Spine Institute

E-Presentation 37

Distinctions Between Two Year Recovery Patterns and Outcomes in Circumferential Lumbar Reconstructions Based on Surgical Positioning: Comparative Analysis of Single Positon vs Staged vs Same-Day Approaches

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Staging vs. Same-Day Flipped

- MIS traditionally required double position approach (AKA “flipping”)
- Staging may be completed same day or over several days
 - Often requires staging over separate days due to patient comorbidities or frailty

Same-Day: Flipped vs. Single Position

- More recently introduced: single-position prone-lateral or lateral decubitus approach
- Permits advantages of minimally invasive spine surgery while eliminating need for intraoperative repositioning
 - Maximizes neural decompression
 - Optimizes pain relief
 - Still allows proper segmental alignment

Objective

- Versatility in patient positioning (single position vs. same-day “flipped” vs. staged) still relatively new
- Long-term outcomes not yet studied in these different groups
- What are the perioperative and postoperative outcomes in single position, same day, and staged ASD patients, and what are the differences between groups?

Methods: Patient Selection

- Operative spinal deformity patients with baseline and up to 2-year radiographic and health-related quality of life (HRQL) data
- Stratified by surgical approach
 - Same-day “flipped” (SD) vs. Staged (ST)
 - Double position → same-day vs. multi-day
 - Single position (SP) vs. Same-day “flipped” (SD)
 - Same-day → single position vs. double position
 - Then, SP vs. SD vs. ST

Methods: Analysis

- Descriptive analyses and means comparisons tests to assess baseline characteristics
- ANCOVA used to assess differences in demographic, radiographic, clinical, and surgical factors
- Multivariate logistic regression used to determine influence of single-position approach on perioperative complications, radiographic outcomes, and patient-reported outcome measures (PROMs)
 - Controlled for age, levels fused, and Charlson Comorbidity Index (CCI)

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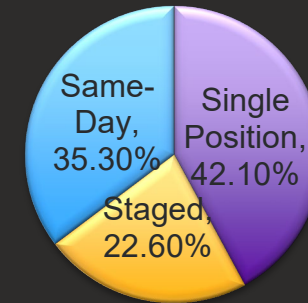
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Overall Cohort Distribution

- 133 patients met inclusion criteria
 - 42.1% single position
 - 22.6% staged
 - 35.3% same-day (flipped)

Surgical Positioning Distribution



■ Single Position ■ Staged ■ Same-Day



SD vs. ST: Overall Cohort

- 105 patients met inclusion criteria
 - 61.0% staged
 - 39.0% same-day
 - On avg. 57 years old, 49% female, BMI of 32, CCI of 1.2

Baseline Demographics	
Age (years)	57.3±10.2
Gender	49% female
BMI (kg/m ²)	32.0±6.5
CCI	1.2±1.3
Baseline Deformity	
PI	56.7±11.6°
LL	50.8±12.9°
PI-LL	5.8±10.7°
PT	18.5±7.4°
SS	38.3±8.8°
Surgical Characteristics	
OR time (mins)	522±199
EBL (mL)	850±958
Levels fused	4.7±3.1

SP vs. SD: Overall Cohort

- 208 patients met inclusion criteria
 - 27.4% flipped (same-day)
 - 72.6% single position
 - On avg. 62 years old, 48% female, BMI of 30, CCI of 3.1

Baseline Demographics	
Age (years)	61.8±11.4
Gender	48% female
BMI (kg/m ²)	30.0±6.0
CCI	3.1±3.1
Baseline Deformity	
PI	55.2±11.7°
LL	50.4±12.9°
PI-LL	4.9±12.9°
PT	20.1±7.8°
SS	36.4±8.5°
Surgical Characteristics	
OR time (mins)	290±199
EBL (mL)	402±595
Levels fused	2.8±1.9
Length of stay (days)	3.7±3.1

SD vs. ST: Surgical Data

- Same day (flipped) group had **shorter operative time**
 - Shorter length of stay
 - Less levels fused (all $p < .05$)
 - Also less blood loss (but $p > .05$)

Surgical Characteristics			
	Same Day	Staged	p-value
OR time (mins)	466.8±163.9	614.1±219.2	.001
EBL (mL)	762.1±853.5	998.7±1108	.230
Levels fused	3.8±2.1	6.2±3.9	<.001
LOS (days)	5.39±5.7	8.95±4.4	<.001

SP vs. SD: Surgical Data

- Single-position surgeries were **faster**
 - Lower EBL
 - Fewer levels fused
 - Shorter length of stay
 - All $p < .05$

Surgical Characteristics			
	SP	Flipped	p-value
OR time (mins)	205±144	502±157	<.001
EBL (mL)	220±278	861±876	<.001
Levels fused	2.3±1.6	4.0±2.1	<.001
LOS (days)	3.1±2.7	5.0±3.6	<.001

SD vs. ST: Radiographic Outcomes

- Similar postoperative in Same Day vs. Staged LL, PI-LL, and SS
 - SD group had lower LL, PI-LL, and SS ($p>.05$)
- Higher postoperative PT in same-day/flipped cohort

Postoperative Radiographics			
	Same Day	Staged	p-value
LL	50.7±11°	52.9±8.6°	.570
PI-LL	8.23±8.6°	9.11±6.4°	.769
PT	22.8±9.1°	16.0±7.6°	.043
SS	36.1±6.8°	36.8±8.2°	.786

SP vs. SD: Radiographic Data

- SP cohort had lower postoperative PI-LL ($p=.005$)
- SP achieved lower postoperative PT ($p=.041$)
- LL and SS were similar between groups ($p>.05$)
 - SP trended towards higher LL
 - SS was nearly the same at 36°

Postoperative Radiographics			
	SP	Flipped	p-value
LL	53.1±12.0	50.7±10.7	.330
PI-LL	1.8±11.1	8.2±8.6	.005
PT	19.1±7.9	22.8±9.1	.041
SS	36.0±9.0	36.1±6.8	.940

SP vs. SD. vs. ST: Surgical Data

- SP cohort had lowest operative time ($p=.059$), least EBL ($p<.05$), and shortest LOS ($p<.05$)
- ST had least levels fused
- All had comparable post-op radiographic measurements and correction ($p>.05$)

Surgical Characteristics				
	SP	SD	ST	p-value
OR time (mins)	386	498	652	.059
EBL (mL)	296	418	498	<.001
Levels fused	2.1	2.7	2.6	.037
LOS (days)	4.5	5.7	8.2	.022

SD vs. ST: HRQL Outcomes

- Postoperative HRQL outcomes were similar between groups
 - SD group had slightly worse (higher) NRS-Back and NRS-Leg (both $p > .05$)

Postoperative HRQLs			
	Same Day	Staged	p-value
NRS-Back	6.04±2.5	5.15±2.7	.220
NRS-Leg	5.61±3.3	4.20±3.7	.149

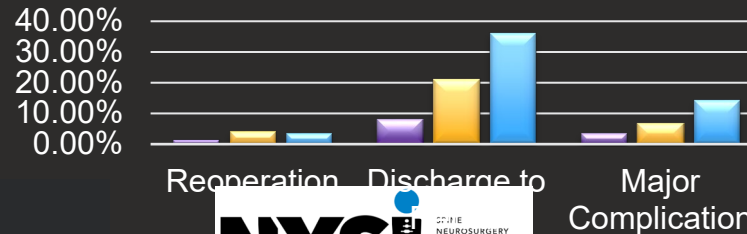
SP vs. SD: HRQL Outcomes

- SP had better postoperative NRS-Back score ($p < .05$)
- Similar NRS-Leg scores
 - SP trended towards better (lower) NRS-Leg scores ($p > .05$)

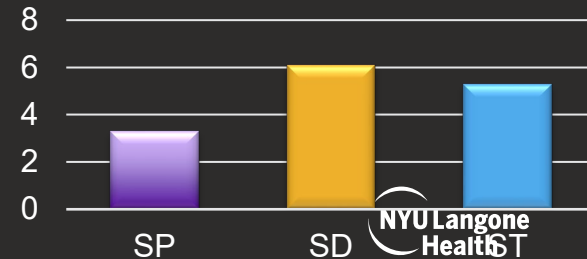
Postoperative HRQLs			
	SP	Flipped	p-value
NRS-Back	3.2	6.0	.011
NRS-Leg	2.6	4.7	.118

Differences in SP vs SD vs ST

Perioperative Outcomes



Postoperative NRS



Discussion

- Previously established that MIS provides numerous benefits over open for the right patients
- Staging introduced as a way of achieving circumferential fusion without open approach, may be beneficial for more frail patients but same-day shows numerous benefits over staged
- Same-day requires “flipping” → intraoperative change in pt position associated with its own set of challenges
- Single position surgery has been shown to have good outcomes for thoracolumbar surgery

Conclusions

- SP patients experienced fewest major complications, least reoperations, lowest rates of discharge to rehab, and lowest postoperative NRS-Back
- This study shows comparable correction with improved perioperative outcomes and pain scores for single position surgery compared to both same-day (flipped) and staged