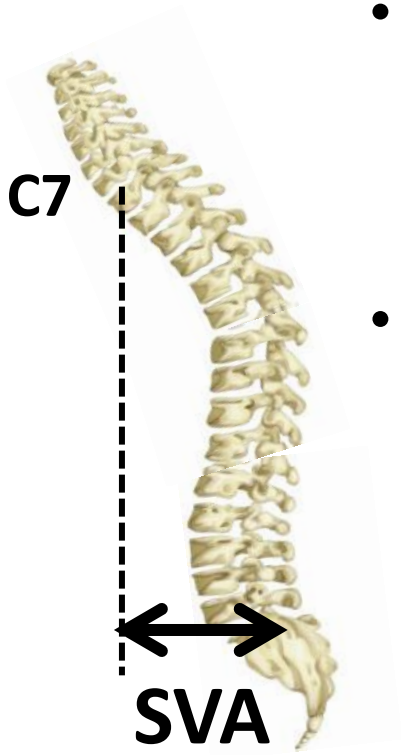
Spinopelvic sagittal alignment after minimally invasive decompression surgery without fusion in patients with lumbar degenerative spondylolisthesis

Department of Orthopaedic Surgery, Osaka City University Graduate School of Medicine

Sho Dohzono, Hiromitsu Toyoda, Yusuke Hori, Akinobu Suzuki, Hidetomi Terai, Hiroaki Nakamura.

SVA

sagittal vertical axis



- Spinopelvic sagittal balance is important in the management of lumbar diseases and low back pain
- The SVA has been associated with health-related quality of life

Little is known about the relation between SVA and clinical outcoms after decompression surgery for degenerative spondylolisthesis (DS)

Objective

1. To evaluate the change in spinal sagittal alignment after microendoscopic laminotomy (MEL)

2. To identify the preoperative spinopelvic parameters related to the improvement of global sagittal alignment

in pts with low-grade DS in comparison with LSS patients without DS

Patients

- A retrospective study
- **87 patients** (2008-2012) underwent MEL
  - 35 patients with DS (DS group)
  - 52 patients without DS (non-DS group)
- Minimum f/u ; 12months.

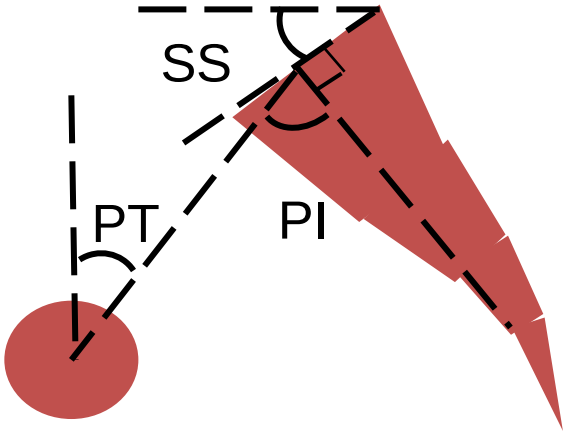
Exclusion criteria for use of MEL in pts with DS
1. % slip > 25%
2. segmental kyphosis in flexion > 5˚

Clinical evaluations

1. JOA score
2. VAS (LBP, leg pain and leg numbness)

Radiological evaluations

1. Sagittal vertical axis (SVA)
2. Lumbar lordosis (LL)
3. Sacral slope (SS)
4. Pelvic tilt (PT)
5. Pelvic incidence (PI)



Demographic data

	DS group (N=35)	non-DS group (N=52)	p
Age (years)	72.0 ± 9.1	67.3 ± 9.1	0.021
Male/Female	17/18	31/21	0.381
Preoperative anterior slip			
neutral position (mm)	3.7 ± 2.8	0.0 ± 0.6	< 0.01
flexion position (mm)	6.7 ± 2.4	0.3 ± 0.9	< 0.01
Body mass index	24.1 ± 4.3	23.5 ± 2.6	0.381
Duration of symptom (month)	38.0 ± 45.5	44.4 ± 43.8	0.513
Operation time per level (min)	160.9 ± 38.8	173.2 ± 51.1	0.230
Blood loss per level (gram)	80.6 ± 92.9	53.9 ± 60.3	0.108
No. of level			
1	26	49	
2	5	3	0.198
3	1	0	
Mean follow-up period (month)	25.1 ± 13.1	27.6 ± 14.9	0.423

Clinical outcomes before surgery and at the latest follow-up in DS and non-DS group

	DS group		non-DS group		
	Before Surgery	Latest f/u	Before Surgery	Latest f/u	p *
JOA score (points)	14.6 ± 4.6	25.3 ± 3.8†	13.3 ± 4.0	25.6 ± 3.0†	0.645
VAS (LBP)	45.6 ± 31.7	13.1 ± 20.9†	45.9 ± 31.9	16.4 ± 21.6†	0.492
VAS (leg pain)	59.4 ± 31.6	13.3 ± 23.5†	59.8 ± 28.0	14.5 ± 23.0†	0.818
VAS (leg numbness)	57.5 ± 30.6	19.2 ± 22.0†	47.3 ± 29.5	26.5 ± 29.4†	0.223

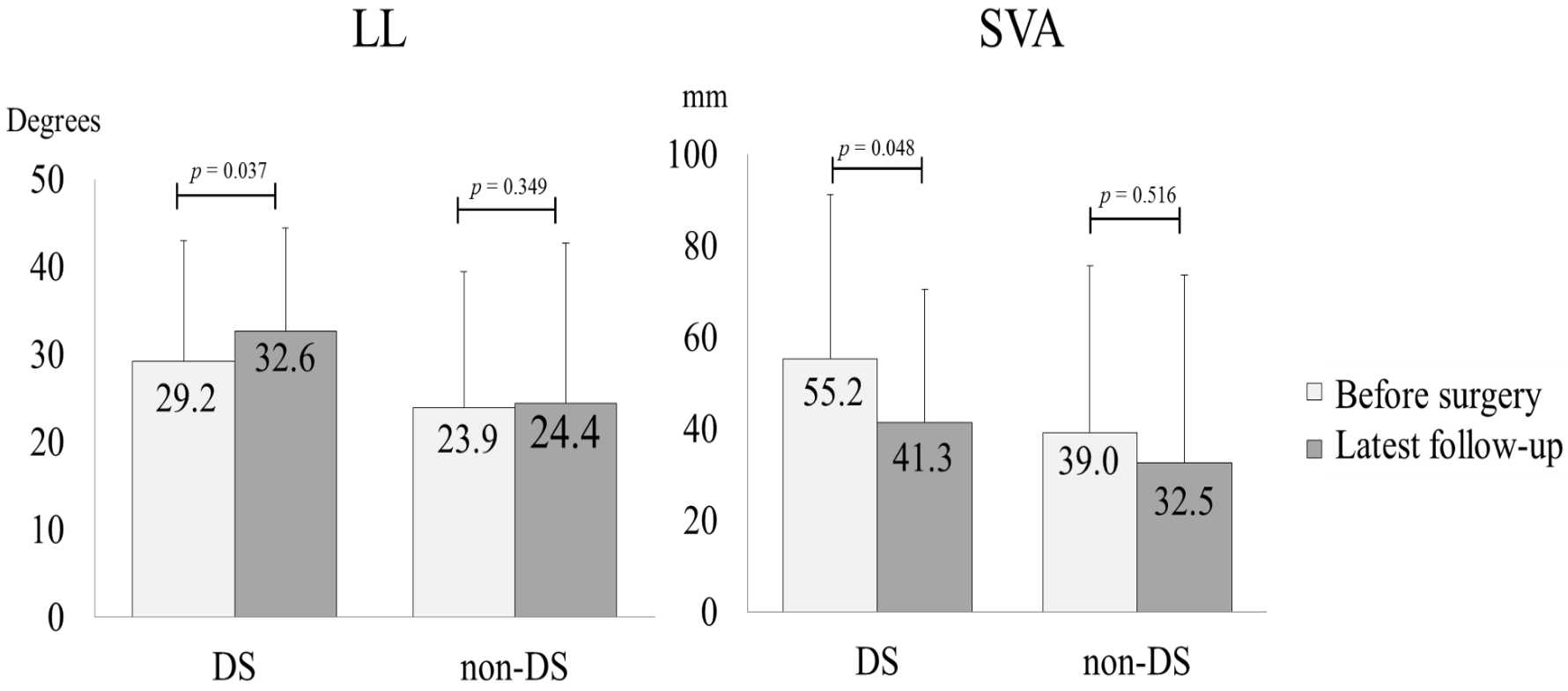
Values are presented as the mean ± standard deviation
*Intergroup significance at latest follow-up
†Intragroup significance compared with value before surgery ($p < 0.01$)

Radiographic data before surgery and at the latest follow-up in DS and Non-DS group

	Before Surgery			Latest follow-up		
	DS	non-DS	p	DS	non-DS	p
SVA (mm)	55.2 ± 35.9	39.0 ± 36.5	0.037	41.3 ± 29.2*	32.5 ± 41.1	0.386
LL (°)	29.2 ± 13.8	23.9 ± 15.6	0.066	32.6 ± 11.8*	24.4 ± 18.3	0.034
SS (°)	32.0 ± 7.4	29.4 ± 8.2	0.138	31.4 ± 9.0	28.6 ± 10.9	0.307
PT (°)	22.1 ± 8.8	18.1 ± 8.7	0.171	21.7 ± 7.3	17.8 ± 11.4	0.518
PI (°)	54.4 ± 10.0	47.0 ± 7.9	< 0.01	53.1 ± 11.5	45.9 ± 7.7	< 0.01
PI - LL (°)	25.2 ± 15.5	23.2 ± 14.5	0.551	20.5 ± 13.0	21.8 ± 17.2	0.767

Values are presented as the mean ± standard deviation

* significantly different between before surgery and at latest follow-up



SVA significantly decreased (p=0.048)
LL significantly increased (p=0.037) in DS group, whereas those parameters in non-DS group were not significantly different between before and after surgery.

Correlation coefficients between SVA improvement and preoperative radiographic parameters

	DS group		non-DS group	
	N=35	p	N=52	p
Age	0.260	0.219	-0.228	0.181
BMI	-0.107	0.619	0.097	0.572
Pre-op SVA*	0.702	< 0.001	0.397	0.017
Pre-op LL	-0.603	0.002	0.017	0.920
Pre-op SS	-0.066	0.759	0.344	0.040
Pre-op PT	0.183	0.391	-0.232	0.174
Pre-op PI	0.076	0.723	0.188	0.271
Pre-op PI minus LL	0.603	0.002	0.076	0.661
LL improvement††	0.660	< 0.001	0.554	< 0.001
PT improvement†	-0.007	0.975	0.101	0.559

*significantly different between the groups ($p < 0.05$)
† (Value before surgery) - (Value at final follow-up)
†† (Value at final follow-up) - (Value before surgery)

In conclusion

SVA and LL significantly improved after MEL in pts with low-grade DS and neurologic symptoms.

SVA improvement in the DS group was correlated with preoperative spinopelvic sagittal imbalance.

COI

- No external sources of funding were received.
- The authors report no conflict of interest concerning the materials or methods used in this paper.