

Regional Differences in Outcomes of Surgical Treatment for Cervical Spondylotic Myelopathy (CSM).

Outcomes of the AOSpine Multicenter Prospective CSM-I Study.

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Introduction

Cervical spondylotic myelopathy (CSM) is a common degenerative condition that affects patients over the age of 50 worldwide. At present there is a paucity of literature data on regional variations in surgical outcome in the management of CSM.

Primary Investigators and Regions

Materials and Methods

Patients from 16 sites with clinically confirmed CSM and imaging evidence of cord compression (MRI or CT-myelogram) were enrolled in the prospective cohort study. Patients underwent anterior surgery (discectomy/corpectomy and instrumented fusion) or posterior surgery (laminectomy and fusion or laminoplasty) based on the judgment of the operating surgeon. Patients were followed up at 6, 12 and 24 months. Outcomes were evaluated using: modified Japanese Orthopaedic Assessment scale (mJOA), Nurick Score, Neck Disability Index (NDI) and SF36v2. Treatment associated complications were also assessed.

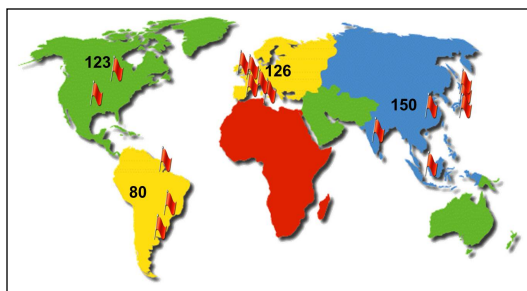


Fig 1: Number of patients recruited from the participating regions

Subject Accounting

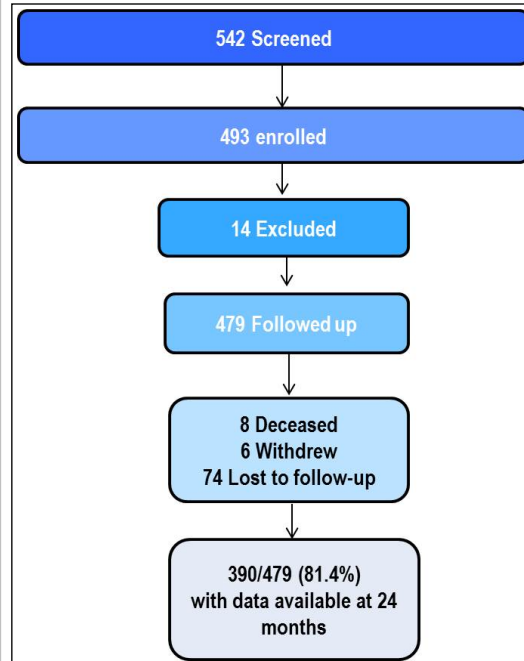
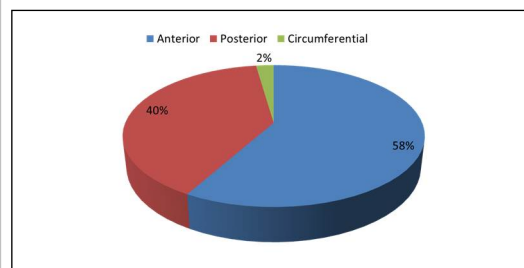


Fig 3. The overall percentage of type of surgical approach in all regions



Surgical Techniques:

Surgeons decided on the surgical approach according to standard clinical grounds.

Fig 2. The number of patients screened and recruited for the study and the percentage of follow up.

Fig 4. Surgical approaches employed to treat patients with CSM in each region

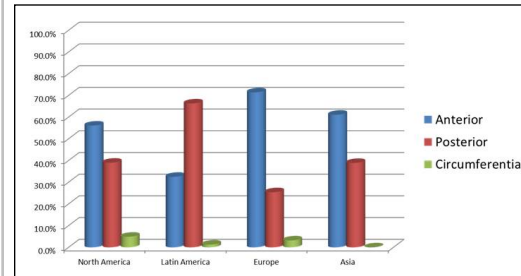


Table 1. Regional Differences in Demographics, Disease Presentation and Surgical Preferences

	North America (n=123)	Europe (n=126)	Asia Pacific (n=150)	Latin America (n=80)
Sites per region	2	5	6	3
Gender (male)	70 (56.91%)	75 (59.52%)	111 (74.00%)	54 (67.50%)
Age (years)	59.60±11.63	57.44±11.85	53.95±12.20	54.22±10.65
Duration of symptoms (months)	28.29±36.60	24.89±32.48	22.04±35.68	37.96±30.92
Baseline mJOA score	12.26±2.39	12.93±2.94	12.29±2.96	12.59±3.15
Diagnosis				
Spondylosis	84 (68.29%)	116 (92.06%)	100 (66.67%)	64 (80.00%)
Disc Herniation	78 (63.41%)	92 (73.02%)	127 (84.67%)	51 (63.75%)
HLF	11 (8.94%)	34 (26.98%)	28 (18.67%)	49 (61.25%)
OPLL	23 (18.70%)	40 (31.75%)	53 (35.33%)	19 (23.75%)
Subluxation	16 (13.01%)	6 (4.76%)	6 (4.00%)	2 (2.50%)
Surgical Approach				
Anterior	69 (56.10%)	90 (71.43%)	91 (61.07%)	26 (32.50%)
Posterior	48 (39.02%)	32 (25.40%)	58 (38.93%)	53 (66.25%)
Combined	6 (4.88%)	4 (3.17%)	0 (0.00%)	1 (1.25%)

Values in parentheses are standard deviations. Last value carry-forward imputation on 12 and 24 month scores

Table 2. Baseline and follow-up Outcomes Among Patients Receiving Decompressive Surgery for CSM

	Baseline	12 month	24 month	P-value
mJOA	12.5 (2.8)	14.9 (2.7)	15.0 (2.8)	<0.0001
Nurick Score	3.3 (1.2)	2.0 (1.6)	2.0 (1.7)	<0.0001
NDI	37.3 (19.9)	25.3 (19.2)	24.9 (19.3)	<0.0001
SF-36v2 PCS	34.2 (8.9)	41.2 (10.6)	40.7 (10.8)	<0.0001
SF-36v2 MCS	39.5 (13.0)	46.2 (13.3)	46.0 (13.4)	<0.0001

Table 3. Regional Differences in Outcomes

Variable	North America (N=119)	Latin America (N=79)	Europe (N=118)	Asia Pacific (N=138)	P value
mJOA	3.1 (2.8)	2.0 (2.6)	1.4 (2.7)	3.1 (2.9)	<.0001
NDI	10.9 (18.7)	15.1 (18.7)	9.2 (21.6)	17.8 (19.4)	.0181
Nurick	1.5 (1.5)	1.0 (1.4)	1.1 (1.5)	1.5 (1.5)	.0021
SF36v2	6.2 (10.8)	7.3 (10.6)	3.9 (9.9)	8.4 (10.6)	.0001
PCS					
SF36v2	4.9 (13.4)	9.6 (16.1)	3.8 (13.6)	7.9 (14.7)	.0001
MCS					

Values in table show changes in outcome between baseline and 24 months adjusted for baseline predictors. Values in parentheses are standard deviations. Last value carry forward imputation on scores.

Table 4. Peri and postoperative complications

Complication Category	Frequency	Percent of patients	Complication Category	Frequency	Percent of patients
Neurological			Pain related		
Cerebral injury	4	2.5%	New intractable neck pain	2	0.4%
Posterior dissection	5	3.0%	Acid pain	1	0.2%
Respiratory failure	4	0.8%	Other	2	0.4%
Blood test (L, B, C)	3	0.6%	Medical (drug)		
Surgical damage of larynx/nerve	2	0.4%	Pseudoaneurysm (vertebral artery)	1	0.2%
Soft-tissue damage	1	0.2%			
Soft-tissue injury	4	0.8%			
Other	4	0.8%			
Respiratory and Speech			Medical		
Aspiration	3	0.3%	Cardiopulmonary event	3	0.6%
Disphagia	5	1.0%	Transient postoperative Confusion	3	0.6%
Neurological injury			Acute renal failure	1	0.2%
Worsening of symptoms	6	1.2%	Deep venous thrombosis	1	0.2%
CS Radiation injury	5	1.0%	Other	3	0.6%
New radiculopathy	4	0.8%	Life complication		
Soft-tissue injury	2	0.4%	Fluoridation	4	0.8%
CS Disks	1	0.2%	Residence	1	0.2%
Endocrine care (diabetes)	1	0.2%	Progression of kyphosis	1	0.2%
Infection					
Superficial	13	2.7%			
Deep	3	0.6%			

Acknowledgments:

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Conclusions

The baseline functional status was similar in all regions but there were significant regional variation in CSM etiology. Anterior cervical approach for CSM was the most common surgical approach worldwide. Surgical decompression achieved statistically significant improvements in mJOA, NDI, Nurick score and SF36v2 regardless of centre of treatment. However, there were minor variations in the degree of functional improvements gained across the regions. Complication rate in the cohort fell within the reported rates.