



Do Racial Differences Affect Surgical Outcomes in Patients with Degenerative Cervical Myelopathy?

Results from the Prospective, Multicenter AOSpine International Study on 479 Patients

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Introduction

Degenerative cervical myelopathy (DCM) is a common spine disorder that involves progressive compression of the cervical spinal cord. Surgical decompression is the gold standard for the management of symptomatic DCM. However, it is unclear whether decompressive surgery for DCM is comparably safe and effective in patients of different racial backgrounds.

The objective of this study is to compare functional and QOL outcomes between Caucasian and East Asian DCM patients following cervical decompressive surgery, and to determine whether race is an independent predictor of surgical outcomes.

Methods

Between October 2008 and January 2011, 479 patients with DCM were prospectively enrolled in the AOSpine CSM-International study at 16 global sites. Subjects were approached to participate in this study if they satisfied the following inclusion criteria:

- 1) aged 18 years or older,
- 2) presenting with symptomatic CSM with at least one clinical sign of myelopathy,
- 3) evidence of cervical cord compression on MRI or CT,
- 4) no previous cervical spine surgery

Of the 479 patients, 324 were claffified as Caucasians, and 106 East Asians.

Results

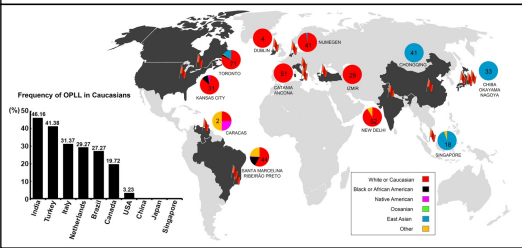
1. Demographics of Caucasian and East Asian patients

| | Caucasian (N=324) | East Asian (N=106) | p-value |
|-------------------------------|-------------------|--------------------|---------|
| Demographics | | | |
| Age (years) | 55.94±11.91 | 57.07±12.18 | 0.545 |
| Gender (%) | 62.65 M, 37.35 F | 68.87 M, 31.13 F | 0.247 |
| Duration of Symptoms (months) | 27.33±34.47 | 23.11±35.68 | 0.0002 |
| Smoker (%) | 26.85 Y, 73.15 N | 29.25 Y, 70.75 N | 0.632 |
| Number of Co-morbidities | 1.28±1.36 | 0.92±1.10 | 0.0288 |
| Diabetes (%) | 15.84 Y, 84.16 N | 16.04 Y, 83.96 N | 0.961 |
| Cardiovascular (%) | 46.44 Y, 53.56 N | 31.13 Y, 68.87 N | 0.0057 |
| Respiratory (%) | 10.25 Y, 89.75 N | 4.72 Y, 95.28 N | 0.0824 |
| Gastrointestinal (%) | 15.53 Y, 84.47 N | 17.92 Y, 82.08 N | 0.561 |
| Renal (%) | 1.55 Y, 98.45 N | 3.77 Y, 96.23 N | 0.234 |
| Psychiatric (%) | 10.87 Y, 89.13 N | 1.89 Y, 98.11 N | 0.0043 |
| Rheumatologic (%) | 3.73 Y, 96.27 N | 1.89 Y, 98.11 N | 0.533 |
| Neurological (%) | 3.73 Y, 96.27 N | 3.77 Y, 96.23 N | 1.00 |

Caucasians had a longer duration of symptoms and higher number of co-morbidities.

2. Cause of DCM and prevalence of OPLL at 16 global site

| | Caucasian | East Asian | p-value |
|-----------------|-----------|------------|---------|
| Spondylosis (%) | 82.72 | 57.55 | <0.0001 |
| Disk (%) | 73.46 | 70.75 | 0.587 |
| OPLL (%) | 28.40 | 30.19 | 0.724 |
| HLF (%) | 25.00 | 21.70 | 0.491 |
| Subluxation (%) | 6.79 | 4.72 | 0.445 |



A greater percentage of Caucasians exhibited spondylotic changes than East Asians; however, there were no differences in the other diseases between the two races. Interestingly, the frequency of OPLL in Caucasians was higher in India and Turkey than in other countries.

3. Baseline severity scores of Caucasian and East Asian Patients

| | Caucasian | East Asian | p-value |
|---------------------------------|-------------|-------------|---------|
| Baseline Functional Status | | | |
| mJOA | 12.50±2.82 | 12.84±2.96 | 0.244 |
| Nurick | 3.28±1.23 | 3.11±1.18 | 0.262 |
| Baseline Quality of Life (QOL) | | | |
| Neck Disability Index | 38.32±20.13 | 36.97±22.06 | 0.678 |
| SF36v2 Physical Component Score | 33.85±9.04 | 37.47±8.67 | 0.0002 |
| SF36v2 Mental Component Score | 38.33±12.53 | 40.25±13.73 | 0.139 |

East Asian patients had a higher preoperative score on the SF-36 PCS. After adjustment of co-morbidity score and duration of symptoms, East Asians still had significantly higher SF-36 PCS scores, likely reflecting cultural perception of illness.

4. Functional Status and Quality of Life at 24-months following Surgery

| | Outcome | Caucasian | East Asian | p-value |
|---------------------|-----------|----------------------|----------------------|---------|
| Unadjusted* | mJOA | 14.97 (14.68, 15.26) | 15.70 (15.22, 16.7) | 0.0117 |
| | Nurick | 1.83 (1.65, 2.01) | 1.53 (1.23, 1.82) | 0.0870 |
| | NDI | 23.61 (21.58, 25.63) | 27.71 (22.08, 33.34) | 0.178 |
| | SF-36 PCS | 40.81 (39.58, 42.04) | 43.69 (41.64, 45.74) | 0.0187 |
| | SF-36 MCS | 45.33 (43.88, 46.79) | 48.99 (46.58, 51.41) | 0.0111 |
| Adjustment Model 1† | mJOA | 15.39 (14.91, 15.86) | 15.74 (15.11, 16.37) | 0.225 |
| | Nurick | 1.63 (1.33, 1.92) | 1.54 (1.15, 1.94) | 0.652 |
| | NDI | 24.62 (21.10, 28.13) | 27.90 (21.26, 34.54) | 0.290 |
| | SF-36 MCS | 42.58 (40.14, 45.02) | 44.38 (41.21, 47.56) | 0.222 |
| | SF-36 PCS | 41.92 (39.87, 43.99) | 43.76 (41.04, 46.47) | 0.150 |

*adjusted for preoperative severity
†adjusted for differences in patient characteristics between Caucasian and East Asian: preoperative severity, co-morbidity score, duration of symptoms, cardiovascular co-morbidities, psychiatric disorders (depression and/or bipolar) and spondylosis.

Three-hundred and forty-seven patients (80.70%) attended their 24-months follow-up appointment. East Asians had significantly higher scores on the mJOA, SF-36 PCS, and SF-36 MCS than Caucasians. After adjusting for relevant baseline characteristics, these differences decreased and became statistically insignificant.

5. Perioperative complications

| | Caucasian | East Asian | p-value |
|---|-----------|------------|---------|
| Perioperative complications (%) | 17.90 | 13.21 | 0.261 |
| Pseudoarthrosis (%) | 0.62 | - | 1.00 |
| Hardware Failure (%) | 0.31 | - | 1.00 |
| Screw malposition (%) | 0.93 | - | 1.00 |
| Graft dislodgement (%) | 0.31 | - | 1.00 |
| Graft pain (%) | 0.31 | - | 1.00 |
| C5 palsy (%) | 1.23 | - | 0.576 |
| New neck pain (%) | 0.62 | - | 1.00 |
| Dural tear (%) | 2.47 | 4.72 | 0.323 |
| Superficial infection (%) | 2.47 | 0.94 | 0.463 |
| Deep infection (%) | 0.62 | - | 1.00 |
| Dysphagia (%) | 5.56 | 0.94 | 0.0542 |
| Dysphonia (%) | 0.93 | - | 1.00 |
| Perioperative worsening of myelopathy (%) | 0.93 | - | 1.00 |
| Progression of myelopathy (%) | 0.31 | - | 1.00 |
| New radiculopathy (%) | 0.31 | 0.94 | 0.433 |
| Cardiopulmonary (%) | 0.31 | 0.9 | 0.433 |
| DVT (%) | - | - | - |
| Other (%) | 2.57 | 5.66 | 0.120 |

There were no significant differences in rates of perioperative complications between the two races.

Conclusions

-This is the first prospective large-scale international study to evaluate the impact of race on surgical outcomes in patients with DCM. This study demonstrated that race is not an independent predictor of functional status, and that the efficacy of decompressive surgery for DCM is equivalent for both races.

-Interestingly, a greater percentage of Caucasians residing in India and Turkey exhibited evidence of OPLL than Caucasians enrolled at centers in other countries. Although OPLL is considered a disease common in East Asian populations, our findings indicate that individuals from India and Turkey may also be at a high risk of OPLL development.