Effect Of Elective Cervical Spine Surgery On Mental Health of Patients with Degenerative Cervical Myelopathy: a Canadian Spine Outcomes and Research Network study.

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INTRODUCTION:

Degenerative cervical myelopathy (DCM) is a progressive degenerative condition, widely recognized as the most common cause of spinal cord dysfunction. Depending on the severity of the disease, symptoms can include neck pain, loss of hand dexterity, gait difficulties, and sphincter disturbance. Such symptoms can affect the health-related quality of life (HRQOL) in patients. In fact, mental health conditions such as depression may be exacerbated by, or incited by, the experience of disability and/or chronic pain such as that caused by DCM.

The objective of this investigation is to evaluate the effect of surgery on the mental health of patients suffering from DCM stratified by their disease severity. We hypothesized that mental health is improved after surgery in patients diagnosed with DCM regardless of the severity of the cervical disease.

METHODS:

The Canadian Spine Outcome Research Network registry was queried for all patients who received surgery for DCM with ≥12-month follow-up. Exclusion criteria were trauma, tumor, infection, and previous spine surgery. The primary outcome assessed was the change between the pre-operative and post-operative SF12 Mental Component Score (MCS) alongside the modified Japanese Orthopedic Association (mJOA) scores. Secondary outcomes include SF-12 Physical Component Score (PCS), EQ-D5, Neck Disability Index (NDI), Patient Health Questionaire-9 (PHQ9), and neck pain scale.

Patients were categorized into cohorts based on their SF-12 MCS (pre-operative presence or absence of depression) and mJOA (mild, moderate, or severe DCM). SF-12 Mental Component Scores (MCS) were compared between those with and without significant improvement (reaching Minimally Clinically Important Differences (MCID)) for mJOA and between disease severity groups. Multivariate analysis examined factors predictive of MCS improvement.

RESULTS:

22 hospitals contributed 500 eligible patients (figure 1). An overall significant improvement was seen in NDI scores from 47.4 (CI 95% [45.2, 49.5]) to 32.8 (CI 95% [30.4, 35.1]) (change= -14.5, $p<0.0001$) in pre-operatively depressed patients, and a change from 31.5 [95% CI 29.4-33.6] to 22.1 [95% CI 20.1-24.1] in pre-operatively non-depressed patients (change= -9.5, $p<0.0001$). Notably, such reduction in NDI scores was higher in depressed patients than in non-depressed patients, $p<0.0001$. A significant improvement was observed in MCS scores from 34.3 [95% CI 33.4-35.3] to 42.7 [95% CI 41.4 to 44.1] ($p<0.0001$) in depressed patients and a small change from 53.9 [95% CI 53.1-54.7] to 52.7 [95% CI 51.6-53.8] ($p=0.0338$) in non-depressed patients. Similar significant improvements were observed in PHQ9, PCS, and EQ-5D in both depressed and non-depressed cohorts.

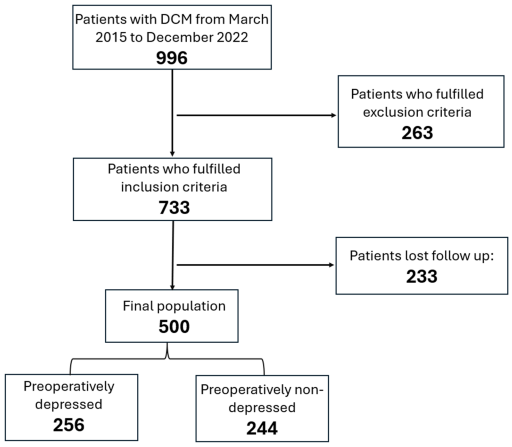
In addition, major depression prevalence decreased by 43% following the degenerative cervical myelopathy surgery. Patients exceeding MCID in mJOA had the greatest improvements in MCS regardless of disease severity. However, patients who did not reach MCID for mJOA post-operatively were found to have decreased MCS scores as seen in figure 2. Of all the factors studied, sole the presence of depression pre-operatively is predictive of improved MCS post-operatively with an odds ratio of 4.066.

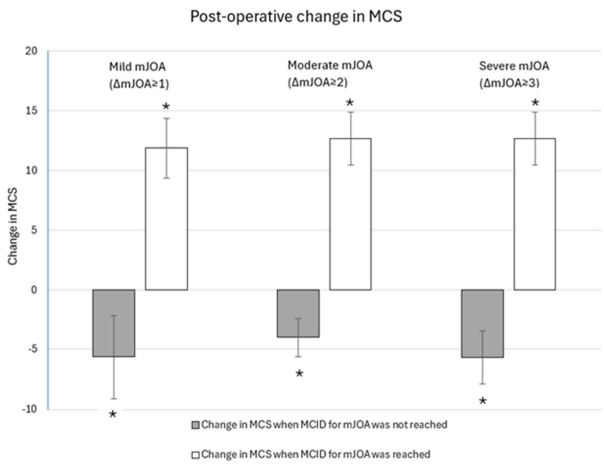
DISCUSSION AND CONCLUSION:

Our data suggests that successful surgery for DCM is associated with improvement of MCS and decrease in prevalence of major depression, and this decrease in prevalence was more pronounced in patients with pre-operative depression regardless the severity of DCM.

When MCID for mJOA was reached, significant improvements in MCS scores were observed, regardless of the severity of the mJOA. However, when the MCID for mJOA was not reached, a reduction in MCS scores was observed, regardless of the severity of the mJOA. This implies that the mental status of patients is worsened when there is no clinically observed difference in improvements of mJOA, and the mental status only improves when the patient reaches the MCID for improvement in mJOA.

Notably, our adjusted multivariable analysis showed that preoperatively depressed patients were found to have 4.066 odds of improvements in MCS scores compared to non-depressed patients, suggesting that depressed individuals may exhibit a greater propensity for improvement in mental well-being.


Patients with DCM from March 2015 to December 2022
996
Patients who fulfilled exclusion criteria
263
Patients who fulfilled inclusion criteria
733
Patients lost follow up:
233
Final population
500
Preoperatively depressed
256
Preoperatively non-depressed
244


Post-operative change in MCS
Mild mJOA (ΔmJOA≥1)
Moderate mJOA (ΔmJOA≥2)
Severe mJOA (ΔmJOA≥3)
Change in MCS
20
15
10
5
0
-5
-10
Change in MCS when MCID for mJOA was not reached
Change in MCS when MCID for mJOA was reached