

## Outcomes after Cervical Laminoplasty in Patients with High vs Low Pre-Operative Radiculopathy/Myelopathy: A Retrospective Cohort Study.

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**Introduction:** Cervical laminoplasty is increasingly used to manage myelopathy, but its effect on concomitant radicular complaints is unclear. In patients undergoing laminoplasty with radicular arm complaints we evaluated (1) demographic predictors of preoperative pain and (2) the influence of baseline pain on patient-reported outcome measures (PROMs) at 3- and 12-months.

**Methods:** A single institution, retrospective cohort study was conducted on cervical laminoplasty patients (2012-2024). Patients missing preoperative NRS arm or neck pain scores were excluded. Low (NRS $\leq$ 4) and high (NRS $>$ 4) preoperative arm pain groups were compared. Outcomes were postoperative arm and neck pain scores and change from baseline. Regression analysis controlled for demographics and baseline characteristics.

**Results:** Among 88 laminoplasty patients, mean age of 59 $\pm$ 10 years and 44 (50%) being male, 40 (45%) had low ( $\leq$ 4) and 48 (55%) had high ( $>$ 4) arm pain. Race ( $p<0.008$ ), education ( $p<0.017$ ), and PHQ-9 scores ( $p=0.002$ ) were associated with high arm pain. Operated levels ( $p=0.197$ ) and levels of laminoplasty ( $p=0.316$ ) were similar. High arm pain patients had worse baseline neck pain and NDI ( $p<0.001$ ). They also had higher neck and arm pain at 3-months (neck: 4.1 $\pm$ 2.7 vs. 2.3 $\pm$ 2.3,  $p=0.005$ ; arm: 2.9 $\pm$ 3.1 vs. 0.9 $\pm$ 1.3,  $p=0.004$ ) and at 12-months (neck: 5.0 $\pm$ 2.9 vs. 1.8 $\pm$ 2.0,  $p<0.001$ ; arm: 4.6 $\pm$ 3.2 vs. 0.9 $\pm$ 1.6,  $p<0.001$ ). However, the high pain group achieved greater absolute decrease in neck and arm pain from baseline to 3-months (neck: -3.1 $\pm$ 2.7 vs. -1.5 $\pm$ 3.0,  $p<0.009$ ; arm: -4.2 $\pm$ 3.1 vs. -0.4 $\pm$ 1.9,  $p<0.001$ ) and to 12-months for arm pain only (-2.4 $\pm$ 3.3 vs -0.6 $\pm$ 2.2,  $p=0.026$ ). More high arm and neck pain patients achieved a minimal clinically important difference (MCID) at 3- and 12-months but it was only significant for 3-month arm pain ( $p<0.001$ ). These were confirmed on demographic and baseline-adjusted linear regressions. Further, a greater proportion of patients among the low pain group indicated that surgery met their expectation at 12 months compared to the high pain group (64% vs. 32%,  $p=0.029$ ).

**Discussion:** This analysis shows a strong correlation between high preoperative arm pain and several psychosocial factors including race, education, and PHQ-9 scores. These patients had worse baseline neck pain and disability and maintained higher neck and arm pain through 12-month follow up. However, this cohort demonstrated greater absolute arm pain reduction and early MCID, suggesting meaningful clinical improvement despite persistently higher pain levels. Ultimately, fewer high pain patients felt surgery met their expectations at 12-month follow up. These findings suggest that high preoperative arm pain reflects greater symptom burden and worse patient reported outcomes. This study is limited by its single institution design and modest sample size, as well as reliance on patient reported outcomes which may introduce response bias. Future multicenter studies are needed to validate these findings and possibly explore the role of preoperative pain control in surgical outcomes of high arm pain patients.

**Significance/Clinical Relevance:** Severity of preoperative symptoms may impact postoperative outcomes. High arm pain patients should be counseled that their symptoms may persist and are less likely to improve to the same level as those with lower baseline pain.