Long Term Outcome Of A Modified Open-Door Laminoplasty Technique With Suture Anchor Fixation For Cervical Myelopathy Evaluated By MRI Volumetric Analysis.

INTRODUCTION: Open-door cervical laminoplasty is a technique that was originally described by Hirabayashi for the treatment of multilevel cervical stenosis. A main complication of this procedure is postoperative closure of the hinge with subsequent restenosis. In an effort to maintain canal expansion, a modification of the Hirabayashi technique was introduced which uses 2.0mm suture anchors throughout the area of expansion from C3-C7. The purpose of this study is to present a modification of the suture anchor laminoplasty technique, by minimizing structural change at the end levels and to quantify the sustained canal expansion by MRI volumetric analysis.

METHODS: Thirteen patients (average age 64.5 years) with multilevel cervical stenosis who were treated with a modified cervical open-door laminoplasty with suture anchor fixation were reviewed retrospectively. The modification involves a partial laminectomy at the end levels of the stenotic region and use of 2.0mm suture anchors at the intermediate laminoplasty levels. Nine patients had a partial laminectomy at C3 and C7 levels, and a laminoplasty from C4 to C6. One patient had a partial laminectomy at C3 and C6 levels, and a laminoplasty from C4 to C5. One patient had a partial laminectomy at C6, and a laminoplasty from C3 to C5. Two patients had a partial laminectomy at C7 and a laminoplasty from C3 to C6. Through the use of computer analysis software, measurements of canal and cord volume were done on preoperative and postoperative MRIs to quantify the expansion in the space available for the spinal cord (SAC) from C2-3 to C7-T1 levels and at the end levels alone where the partial laminectomies were done. Additionally, radiographic outcomes, preoperative and postoperative neck and arm Visual Analog Scale (VAS) scores and postoperative modified Japanese-Orthopaedic-Association scores (JOA) scores were evaluated.

RESULTS: The mean follow-up period was 27 months. All patients showed no evidence of instability, suture anchor loosening on flexion/extension radiographs, or kyphosis at final follow-up. Twelve patients had CT scans done at final follow-up, and all showed evidence of hinge fusion. There was one superficial wound infection which was treated with oral antibiotics. The mean preoperative SAC (in cubic mm) from C2-3 to C7-T1 levels improved from 7,542 to 13,279 mm³ (p< 0.00001) and the mean SAC (in cubic mm) at the undercut end levels improved from 2,135 to 3,467 mm³ (p< 0.02). The mean preop VAS score for neck pain improved from 5.2 to 1.9 (p< 0.02), and the mean preop VAS score for arm pain improved from 6.2 to 1.5 (p< 0.0006). At
final follow-up, the average modified JOA score was 12 (range, 10 to 15).

**CONCLUSIONS:** Significant and sustained expansion in the space available for the spinal cord can be accomplished with this modified technique by performing a partial laminectomy at the end levels and an open-door laminoplasty at the intermediate levels with suture anchor fixation. This is associated with improved clinical outcomes in neck pain, arm pain, and myelopathy. This method is less invasive, and allows for maintained canal expansion while preserving spinal stability.