

Effect of Cervical Deformity Correction on Spinal Cord Volume and Stenosis

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Introduction

There persists a debate on whether simple isolation of points of stenosis is sufficient or whether certain deformities must also be mitigated to restore neurologic concerns in patients with spinal deformity.

Despite indications that cervical kyphosis has a significant effect on spinal cord volume, there remains no studies examining pre- and post-operative effect of deformity corrections on spinal cord volume and number of stenotic levels.

Purpose: To measure changes in spinal **canal volume** and number of **stenotic levels** after **cervical deformity** correction by MRI analysis.



Methods

Cervical deformity patients with pre-operative and 1-year MRI's available were assessed for spinal canal volume at each interspace and at each body from C2-C7/T1.

Stenotic vertebral levels were measured using Pavlov's method from C2-T1.

Statistical Analysis:

Changes in spinal cord volume and number of stenotic levels from baseline to 1-year according to decompression technique used (laminectomy, foraminotomy, discectomy, or corpectomy) and type of pre-operative cervical deformity were measured using t-tests

Improvement in radiographic alignment and myelopathy scores using bivariate correlation tests.

Results

14 Cervical Deformity Patients (60 years old, 57% female, BMI 32.1):

- 6 underwent posterior-only approach surgery and 8 had anterior-then-posterior approach
- 11 received an osteotomy
- 8 had a decompression procedure

Results Continued

Baseline Canal Volume and Stenosis:

- Average Canal Volume = 272.4 mm²
- Average Stenotic Levels = 4.6 levels

1-Year Post-Op Canal Volume and Stenosis:

- Average Canal Volume = 343.8 mm² (29% increase)
- Average Stenotic Levels = 2.9 levels

Deformity Apex:

- Deformity apices in the cervical spine had less baseline canal volume (cervical apex: 231.6 mm² vs. lower apex: 303.6 mm², p=0.022)
- Cervical apex deformities had more stenotic levels: 6.0 vs. 3.4 for lower deformity apex, p=0.049

There was no significant relationship between decompressive techniques and canal volume (with decompression: +75mm², without: +64mm², p=0.591).

Baseline to 1-year changes in spinal cord volume were not correlated with changes in myelopathy score (p=0.381)

Conclusions

This analysis shows a **29% increase in canal volume** and **correction of stenosis** in cervical deformity patients.

Realignment resulted in an increase in canal volume irrespective of decompression procedure.

This preliminary analysis highlights a need for further investigation of spinal cord changes in deformity cases.

References

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