

Adjacent Segment Disease After ACDF: Development of Adjacent Segment Disease is More Likely to Occur Above the Index ACDF Level

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Introduction

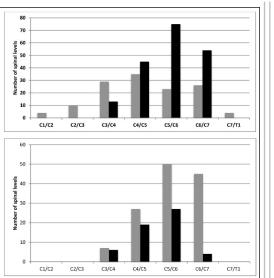
We examine the propensity of adjacent segment disease (ASD) to occur above the level of an index anterior cervical discectomy and fusion (ACDF).

Methods

We report 888 consecutive patients who underwent ACDF for cervical spondylosis over a twenty-year period at a single institution. Of these patients, 108 had re-do surgery due to symptomatic ASD. Pre-operative, intra-operative, perioperative, and post-operative data were collected via clinical notes and patient interviews. Patients were followed for an average of 92.4 \pm 72.6 months after the index ACDF.

Results

In agreement with previous literature, we found the highest rates of cervical spinal degenerative disease requiring surgery at C5/C6, followed by C6/C7. Interestingly, neither the location of index ACDF, nor the length of instrumented fusion affected the propensity to develop ASD in a statistically significant fashion (p>0.05). However, patients were statistically more likely to develop ASD above the index fusion construct (p<0.01). This was also true for patients undergoing a second revision surgery due to recurrent ASD. Importantly, these findings are consistent with existing in vitro biomechanical data in cadaveric spines.



(a) Distribution of index ACDF levels (black) and ASD levels (gray) in 108 patients who experienced adjacent segment disease. There was a statistically significant difference in distribution of where ASD vertebral levels were compared to index ACDF levels as assessed by Mann Whitney U (p<0.0001) and Kolmogorov-Smirnov test (p<0.0001). (b) Location of ASD expressed as a function of above (gray) or below (black) the original index ACDF surgery. The distributions of spinal levels involved above index ACDF levels are significantly different from those involved below index ACDF levels, as measured via Mann Whitney U (p<0.0001) and Kolmogorov-Smirnov tests (p=0.0065).

Conclusions

Although ACDF is a generally welltolerated surgical treatment for cervical spondylosis, adjacent segment disease remains a poorly understood but highly morbid complication. In this study, neither the inherent location of index ACDF. nor the length of instrumented arthrodesis affected the propensity to develop ASD. However, patients were statistically more likely to develop ASD at the level above-compared to below-the index fusion construct. This was true even for patients experiencing recurrence of ASD after a second cervical fusion surgery. Importantly, our data are consistent with existing in vitro biomechanical studies in cadaveric spines. Our findings support the theory that iatrogenically introduced stress and instability at adjacent spinal segments may contribute to the pathogenesis of adjacent segment disease.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Discuss the impact of number of levels of fusion construct on the development of adjacent segment disease; 2) Identify the likelihood of adjacent segment disease to occur after ACDF.

References

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