Adjacent Segment Disease After ACDF: Clinical Outcomes After First Repeat Surgery Versus Second Repeat Surgery

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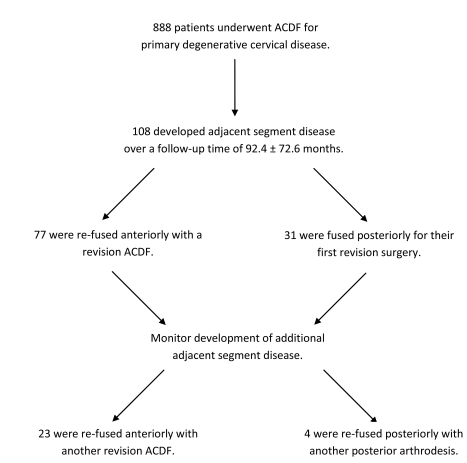
Introduction: The purpose of this study is to evaluate the long-term effects of repeat cervical fusion after development of adjacent segment disease (ASD).

Methods: We collected 888 patients who underwent ACDF for cervical degenerative disease over a 20-year period at a single institution. Patients were followed for an average of 94.0 ± 78.1 months after the first ACDF.

Results: Of 888 patients who underwent ACDF, 108 (12.2%) patients developed ASD, necessitating a second cervical fusion. Among these 108 patients, 27 (25%) patients later developed recurrent ASD, requiring a third cervical fusion. A 12.2% incidence of ASD after the first ACDF significantly increased to 25% after the second ACDF (p=0.0002). ASD developed significantly faster after the second ACDF (30.3 ± 24.9 months) versus the first ACDF (47.0 ± 44.9 months) [Student's t-test (p=0.01); Kaplan-Meier analysis (p<0.0001)]. Out of 77 patients who underwent a second cervical fusion via an anterior approach, 23 developed recurrent ASD requiring a third cervical fusion. In contrast, of 31 patients who had a posteriorly approached second cervical fusion, only 4 developed recurrent ASD requiring a third cervical fusion (p>0.05). Overall, patients who underwent a second anterior cervical fusion benefited neurologically via a decrease in Nurick score.

Figure 1

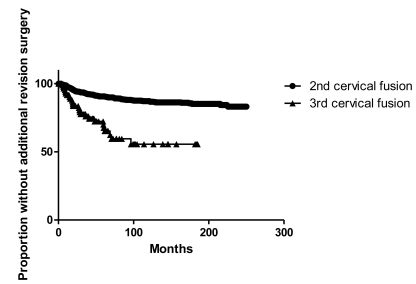
Figure 1. Schematic of patients treated with ACDF for cervical degenerative spinal disease.



Schematic of patients treated with ACDF for cervical degenerative spinal disease.

Figure 2

Figure 2. Patients receiving a second revision surgery for recurrent adjacent segment disease were likely to require surgery after a shorter interval compared to those needing primary revision surgery after the index ACDF (p<0.0001).



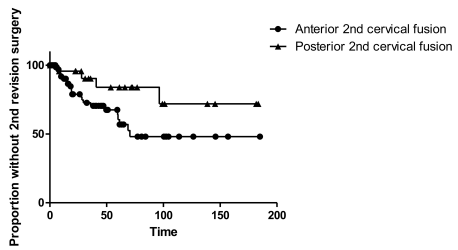
Patients receiving a third cervical fusion for recurrent adjacent segment disease were likely to require surgery after a shorter interval compared to those needing a second cervical fusion after the index ACDF (p<0.0001).

Conclusions: The pathophysiology of adjacent segment disease after ACDF has yet to be fully established. The incidence of ASD development is lowest after the first ACDF. Patients who undergo a second cervical fusion develop ASD at both higher and faster rates. Moreover, ASD is more likely to occur after a second cervical fusion with an anterior approach versus posterior approach.

While patients with ASD improved neurologically after their second cervical fusion, a third cervical fusion resulted in worse neurologic function for patients approached anteriorly.

Figure 3

Figure 3. Patients receiving anterior revision surgery after initial ACDF due to adjacent segment disease were more likely to require a second revision surgery due to recurrent adjacent segment disease over time. This bordered on statistical significance (p=0.053).



Patients receiving a second cervical fusion via an anterior approach after initial ACDF due to adjacent segment disease were more likely to require a third cervical fusion due to recurrent adjacent segment disease over time. This bordered on statistical significance (p=0.053).

Learning Objectives: By the conclusion of this session, participants should be able to: 1) Discuss the impact of repeat cervical fusion on the development of adjacent segment disease, 2) Identify the rate of adjacent segment disease for second and third repeat cervical fusions.

References

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