



Reoperation Following Surgery for Cervical Adjacent Segment Disease

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Introduction

Spinal decompression and fusion is a commonly performed operation for treatment of symptoms secondary to spinal instability and deformity. While fusion is often effective in improving patient symptoms, adjacent segment disease (ASD) can arise in the cervical spine (Bydon *et al*). ASD is characterized by symptomatic degenerative changes at a segment adjacent to a previous spinal fusion. Surgical treatment of ASD involves decompression with or without extending the index fusion. While outcomes are generally favorable for treating ASD, a 14% reoperation rate has been reported in the lumbar spine (Schlegel *et al*), and corresponding outcomes for the cervical spine have not been well characterized. We sought to determine the reoperation rate following revision surgery for cervical ASD.

Methods

A retrospective analysis of a consecutive series of 84 procedures for degenerative adjacent segment disease in the cervical or thoracocervical region (first revision procedure) was performed. Patients whose adjacent segment pathology was due to trauma or malignancy were excluded.

Methods (CONTINUED)

Data was acquired from the electronic medical record on patient demographics, comorbidities, and perioperative parameters. Patient records were also reviewed for additional spinal surgeries following the first operation for ASD. Additional surgery (second revision procedure) was included in the reoperation rate if it occurred at the same segments(s) or adjacent to the ones in the first revision operation.

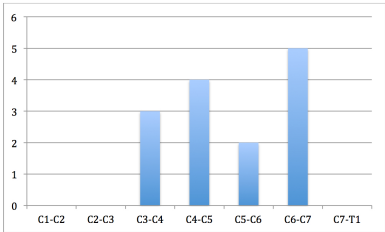
Results

A cohort of 84 patients (42 men, 42 women, mean age 56.6 years, mean follow-up time 61.3 months) who underwent surgery for ASD was identified. The most common level operated on for ASD was C6-C7, as seen in figure 1. 21 patients (25%) had multiple levels of adjacent segment pathology that were operated on. 69 (82.1%) patients underwent decompression with extension of fusion. Of these 69 patients, 44 (64%) patients underwent anterior cervical discectomy and fusion, and 25 (36%) patients underwent posterior cervical fusion.

Results (CONTINUED)

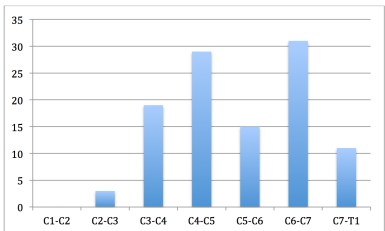
When extension of fusion was performed, it was extended an average of 1.6 levels (range = 1-5). 15 (17.9%) patients in the cohort underwent decompression alone. Of these 15 patients, 8 (53%) underwent hemilaminotomy, 4 underwent discectomy, 2 underwent foraminotomy, and 1 underwent laminectomy. 9 patients (10.7%) required additional surgery at a mean of 20.5 months after the first revision procedure (range = 2.5-68.6). 5 of these patients developed new ASD adjacent to an extended fusion, 2 patients required fusion of a previously decompressed segment, and 2 required revision of a prior decompression. Prior to the second revision surgery, 5 patients reported radiculopathy as their primary symptom, 2 patients reported axial pain, and 2 patients reported mechanical instability. As seen in figure 2, the most common level involved in the second revision procedure was C6-C7. 3 patients had multiple levels involved in the second revision procedure.

Figure 2



Distribution of segments involved in the second revision operation across 9 patients. 3 patients had multiple levels involved.

Figure 1



Distribution of segments with ASD across 84 patients. 21 patients had multiple levels involved.

References

1. Bydon M, *et al*. Adjacent segment disease after anterior cervical discectomy and fusion in a large series. *Neurosurgery* 74:139-146, 2013.
2. Schlegel, *et al*. Lumbar motion segment pathology adjacent to thoracolumbar, lumbar, and lumbosacral fusions. *Spine* 15:970-981, 1996.

Discussion

In our cohort, revision surgery for cervical ASD was associated with a long-term reoperation rate of 10.7%. This is similar to the corresponding rate that has been reported in the lumbar spine of 14% (Schlegel *et al*). While additional studies in larger cohorts with longer follow-up are needed, these preliminary results suggest that need for additional surgery should be considered when counseling patients about the surgical treatment of cervical ASD. 55% of second revision operations were for new ASD adjacent to an extended fusion, indicating that extension of fusion as an initial revision procedure for ASD may be a risk factor for additional surgery. Future studies include identifying risk factors for reoperation after revision surgery for cervical ASD and characterizing the long-term functional outcomes of surgery for cervical ASD.