

Clinical Outcomes Following 3- and 4-level Anterior Cervical Discectomy and Fusion

Nima Alan MD; Alexandra Sansosti; Alp Ozpinar MD; Enyinna Levi Nwachuku MD; Zachary Tempel MD; Daniel A. Wecht MD University of Pittsburgh Medical Center, Department of Neurological Surgery; Pittsburgh, PA

Introduction

- Anterior cervical discectomy and fusion (ACDF) is the most commonly performed cervical spine surgery.
- ACDF is most commonly performed at one or two levels, the outcomes of whih are well described.
- 3- and 4-level ACDF however is not as commonly performed.
- We report the clinical outcomes of patients undergoing 3- and 4level ACDF.

Methods

- We retrospectively reviewed adult neurosurgical patients who underwent elective ACDF at a single institution by a single surgeon between 2004 and 2016.
- None of the patients underwent corpectomy.
- We investigated the following clinical outcomes: perioperative complications, need for revision, presence of symptoms on last follow up.

Results

- 54 patients underwent 3-level and 51 patients underwent 4-level ACDF with mean follow up of 2.7 ± 1.9 years.
- Patients did not differ based on their baseline demographic variables and medical comorbidities which included diabetes, hypertension, obesity, smoking status.
- The two groups had similar presenting symptoms the most common of which were neck pain followed by sensory deficits.

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	Table 1						
Table 1. Demographic data of all patients who underwent multilevel ACDF.							
Parameter	3 Treated Levels	4 Treated Levels	Р				
N	54	51					
Age (Mean (SD))	56.2 (11.3)	58.7 (10.15)	0.23				
Sex = Male (%)	31 (57.4)	30 (58.8)	1.00				
Comorbidities							
Diabetes Mellitus (%)	9 (18.8)	6 (12.2)	0.55				
Obesity (%)	19 (42.2)	24 (48.0)	0.72				
Hypertension (%)	24 (48.0)	23 (46.9)	1.00				
Smoking History (%)			0.45				
Non-smoker	27 (57.4)	25 (50.0)					
Smoker	17 (36.2)	18 (36.0)					
Former Smoker	3 (6.4)	7 (14.0)					
Presenting Symptoms							
Neck Pain (%)	52 (96.3)	47 (94.0)	0.93				
Radiculopathy (%)	15 (28.8)	7 (14.0)	0.11				
Myelopathy (%)	19 (37.3)	17 (34.0)	0.89				
Weakness (%)	26 (49.1)	32 (64.0)	0.18				
Sensory Deficit (%)	43 (79.6)	42 (84.0)	0.75				
Bladder Dysfunction (%)	0(0.0)	0 (0.0)	NA				

 Patients with 4-level fusion were more likely than 3-level fusion to have estimated blood loss >100ml (p=0.04).

	3	4	p	
N	54	51		
Specific Levels (%)			< 0.00]	
C3-C6	8 (14.8)	0(0.0)		
C3-C7	0 (0.0)	49 (96.1)		
C4-C7	41 (75.9)	0(0.0)		
C4-T1	0 (0.0)	2(3.9)		
C5-T1	5 (9.3)	0(0.0)		
IliacCrestAutoGr = 1 (%)	0 (0.0)	0 (0.0)	NA	
Allograft = 1 (%)	54 (100.0)	49 (100.0)	NA	
Estimated Blood Loss ≥100mL (%)	13 (24.1)	22 (44.9)	0.043	

Table 3 Table 3. Outcome data of all patients who underwent multilevel ACDF | No. | 3 Treated Levels | 4 Treated Levels | 7 | | No. | 54 | 51 | | Other (%) | 4 (7.5) | 5. (10.2) | 0.90 | | Vertebral Artery Injury (%) | 0 (0.0) | 0 (0.0) | 0 | | Transient (5 Palsy (%) | 0 (0.0) | 0 (0.0) | 0 | | Wound Infection (%) | 0 (0.0) | 0 (0.0) | 0 | | Laryngeal Nerve Palsy (%) | 0 (0.0) | 1 (2.0) | 0.0 | | Laryngeal Nerve Palsy (%) | 0 (0.0) | 1 (2.0) | 0.0 | | Laryngeal Nerve Palsy (%) | 0 (0.0) | 1 (2.0) | 0.0 | | Laryngeal Nerve Palsy (%) | 0 (0.0) | 0 (0.0) | 0 | | Laryngeal Nerve Palsy (%) | 0 (0.0) | 0 (0.0) | 0.0 | | Laryngeal Nerve Palsy (%) | 0 (0.0) | 0 (0.0) | 0.0 | | Emphasized Perferation (%) | 0 (0.0) | 0 (0.0) | 0 | | Exophasized Perferation (%) | 0 (0.0) | 0 (0.0) | 0 | | Symptoms at Last Follow-up | 22 (419.0) | 16 (35.6) | 0.27 | | Radiculopathy (%) | 3 (6.4) | 0 (0.0) | 0.26 | | Myelopathy (%) | 7 (1.19) | 4 (8.9) | 0.37 | | Sensory Deficit (%) | 21 (41.7) | 14 (31.1) | 0.26 | | Bladder Dysfunction (%) | 1 (2.1) | 0 (0.0) | 1.00 | | Days of Follow-up | 4 (8.3) | 3 (8.3) | 3 (8.3) | 3 (8.3) | 3 (8.3) | | Mean | 673.1 | 3 40.2 | 0.33 |

- Perioperatively, none of the patients, in neither group, experienced wound infection, vertebral artery injury, laryngeal nerve palsy, durotomy or esophageal perforation.
- One patient in each group experienced postoperative hematoma, which did not require surgical intervention.
- Dysphagia was the most perioperative complication at 18% in the 3-level and 14% in the 4level fusion (p=0.61).
- Two patients in each group underwent revision surgery (3.7% vs 3.9%, p>0.05).
- At the last follow up, the most common symptom was neck pain followed by sensory deficits. The two groups did not differ with regard to symptoms at the time of last follow up.

Conclusions

- In this study, there were no significant difference between patients who underwent 3- and 4-level ACDF in terms of perioperative complications, the need for revision surgery, or persistent symptoms on last follow up. Patients with 4 level fusion had more blood loss which is expected.
- Importantly, the rate of complications in our series is similar to those reported for 1and 2-level ACDF's.
- Thus, 3- and 4-level ACDF's are not inherently associated with more complications and can be performed safely with similar risk profile as shorter fusion constructs.

References

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