Comparing ACDF Outcomes by Cervical Spine Level: A Single Center Retrospective Study

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Background

- Anterior cervical discectomy and fusion (ACDF) is commonly utilized for treatment of cervical radiculopathy and myelopathy.
- However, data on ACDF outcomes based on C3-C4 fusion involvement are minimally available in literature.
- Given the complex anatomy at this level of the cervical spine, the authors hypothesize that ACDF cases involving C3-C4 fusion lead to higher rates of postoperative dysphagia and greater hospital length of stay.

Objectives

1) To compare outcomes of ACDF involving C3-C4 fusion to outcomes of ACDF without C3-C4 involvement.

Methods

- A retrospective chart review was conducted on patients who underwent ACDF (without involvement of C1,C2, or T1) between January 2012 to September 2022 at a single academic center. .
- Eligible patients have been diagnosed with cervical myelopathy or radiculopathy before surgery due to degenerative disc disease.
- Excluded patients included trauma patients, patients undergoing revision procedures, and patients with a previous ACDF surgery.
- Two patient groups were identified. One group underwent ACDF without C3-C4 fusion, and the second group underwent ACDF with C3-C4 fusion.
- Recorded variables include those bolded in Table 1 and Table 2.
- *Campbell et* al[1] .was used to define major and minor complications.
- SAS version 9.4, chi-square test, and Student's t-test were used for data analysis.

Table 1: Demographics and clinical characteristics of both patient groups (N=860)

Characteristics	ACDF without C3-C4 (n = 569)	ACDF with C3-C4 (n = 291)	p-value
Age, years (mean, SD)	53.6 (10.7)	58.4 (9.5)	<0.0001
BMI, kg/m^2 (mean, SD)	30.3 (7.3)	29.3 (6.9)	0.047
Sex, % (n)			<0.0001
Female	53.1 (302)	29.9 (87)	
Male	46.9 (267)	70.1 (204)	
Race, % (n)			<0.0001
Black or African American	36.0 (205)	56.7 (165)	
White or Caucasian	60.3 (343)	39.9 (116)	
Other	3.2 (18)	2.4 (7)	
Not available	0.5 (3)	1.0 (3)	
Insurance, % (n)			0.007
Medicaid	27.4 (156)	18.9 (55)	
Medicare	32.4 (184)	43.6 (127)	
Self-pay	20.9 (119)	17.2 (50)	
Private	12.1 (69)	12.4 (36)	
Other	7.2 (41)	7.9 (23)	

ACDF = Anterior cervical discectomy and fusion; BMI = body mass index; SD= standard deviation.

Table 2: Outcomes of both patient groups (N=860)

Characteristics	ACDF without C3-C4 (n = 569)	ACDF with C3-C4 (n = 291)	p-value
LOS, mean (95%CI)	1.5 (1.3 – 1.8)	3.0 (2.6 – 3.6)	<0.0001
Discharge location, % (n)			<0.0001
Home	92.8 (528)	83.5 (243)	
In-patient/out-patient rehabilitation	7.2 (41)	16.5 (48)	
Additional posterior approach needed, % (n)	0.7 (4)	1.7 (10)	0.175
NS post-surgery not available, % (n)	25.9 (147)	23.7 (69)	0.479
NS post-surgery (n=642), % (n)			0.0001
Resolved/Got Better	75.5 (317)	60.8 (135)	
No change/Worsen	24.5 (103)	39.2 (87)	
Complications			
At least 1 major complication, % (n)	12.8 (73)	15.1 (44)	0.354
New neurologic deficit, % (n)	5.1 (29)	5.2 (15)	0.971
Revision surgery, % (n)	3.2 (18)	4.5 (13)	0.332
At least 1 minor complication, % (n)	18.8 (107)	29.6 (86)	0.0004
Dysphagia, % (n)	15.0 (85)	22.0 (64)	0.01

ACDF = Anterior cervical discectomy and fusion; CI= Confidence interval; NS=Neurological symptoms; LOS= length of hospital stay.

Results

- 860 patients were included in the study.
- Patients with C3-C4 involvement were more likely to be older, African American, and male (Table 1).
- Both groups had a high percentage of Medicaid and Medicare patients (Table 1).
- ACDF with C3-C4 involvement was associated with longer LOS, a higher prevalence of at least one minor complications, no change or a worsening of neurological symptoms following surgery, and an increased need for rehabilitation (Table 2).
- There was no significant difference in major complications, new neurological deficits, or rates of revision between the two groups (Table 2).

Conclusion

1) Patients undergoing ACDF involving a C3-C4 fusion were more likely to have longer lengths of stays, higher rates of complications, less improvement in neurologic symptoms, and an increased need for rehabilitation services.

References

1. Campbell, P. G.; Yadla, S.; Malone, J.; Maltenfort, M. G.; Harrop, J. S.; Sharan, A. D.; Ratliff, J. K., Complications related to instrumentation in spine surgery: a prospective analysis. Neurosurg Focus 2011, 31 (4), E10.

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