

Cervical Disc Arthroplasty is Associated with Lower Postoperative Healthcare Utilization Compared to Anterior Cervical Discectomy and Fusion

Darren Z Nin¹, Andrew Powers, Ya-Wen Chen², Ruijia Niu³, David Hanwuk Kim, David C Chang⁴, Raymond W Hwang¹ Massachusetts General Hospital, ²MGH, ³New England Baptist Hospital, ⁴Massachusetts General Hospital, Harvard Medical Sch

INTRODUCTION:

Cervical disc arthroplasty (CDA) represents an increasingly common alternative to anterior cervical discectomy and fusion (ACDF) for the treatment of cervical spine conditions. Given the growing interest in value-based care, it is important to understand both the short- and long-term costs associated with these procedures. This study compares postoperative healthcare utilization and reoperation rates among patients who underwent one- or two-level ACDF vs. CDA.

METHODS: A cohort study of patients who underwent one- or two-level ACDF or CDA in 2017 was conducted using a national insurance databases, which contain deidentified clinical and financial data (Merative, 2021). Patients who switched insurance providers during the study period or underwent other concurrent procedures, including combination ACDF and CDA, were excluded. Postoperative costs of physical therapy, injections, medications, psychological treatment, and subsequent cervical spine surgeries were collected at 30 days, 90 days, and 2 years. Costs and reoperation rates were compared.

RESULTS:

A total of 2,304 patients were included in the study: 1,723 (74.8%) underwent ACDF and 581 (25.2%) underwent CDA. The majority underwent single-level surgery (82.0%) and were male (50.1%) (Table 1). Total postoperative costs were higher in the ACDF group compared to the CDA group with significant differences at 30 days (\$34,311 vs. \$31,024, $p = 0.005$), 90 days (\$37,517 vs. \$33,064, $p = 0.002$), and 2 years (\$68,113 vs. \$55,723, $p < 0.001$). Costs were not significantly different for any individual postoperative treatment subcategory (Table 2). A nonsignificant trend toward higher reoperation rates was noted in the ACDF group compared to the CDA group (15.0% vs. 11.9%, $p = 0.06$). The costs of subsequent spine surgeries among patients who required additional surgery were not different between the two groups (Table 3).

DISCUSSION AND CONCLUSION:

CDA is associated with lower total short- and long-term postoperative healthcare costs when compared to ACDF. Longer follow up may be required to demonstrate a significant difference in reoperation rates between the two procedures.

Table 1. Patient demographics

	Total	ACDF	CDA	P-value
N	2,304	1,723	581	
Levels				
1	1,890 (82.0%)	1376 (79.9%)	514 (88.5%)	<.001
2	414 (18.0%)	347 (20.1%)	67 (11.5%)	
Age (years)	49.0 ± 9.4	50.4 ± 9.2	44.9 ± 8.7	<.001
Gender				
Female	1,149 (49.9%)	854 (49.6%)	295 (50.8%)	.610
Male	1,155 (50.1%)	869 (50.4%)	286 (49.2%)	
Region				
Northeast	204 (8.9%)	160 (9.3%)	44 (7.6%)	
Midwest	548 (23.9%)	428 (24.9%)	120 (20.8%)	<.001
South	1,225 (53.7%)	1011 (58.8%)	314 (54.3%)	
West	219 (9.5%)	119 (6.9%)	100 (17.3%)	

Table 2. Costs of patients undergoing each surgery

	Total	ACDF	CDA	P-value
Surgery	\$26,601 ± 22,767	\$26,919 ± 23,449	\$25,954 ± 20,620	0.429
Global				
30-day	\$33,357 ± 25,381	\$34,411 ± 26,965	\$31,024 ± 19,762	.005
90-day	\$36,994 ± 29,411	\$37,317 ± 31,732	\$33,064 ± 26,742	.002
Two-year	\$64,988 ± 62,736	\$68,113 ± 68,238	\$55,723 ± 40,988	<.001
Postoperative treatments				
Physical therapy	\$1,240 ± 3,033	\$1,271 ± 3,287	\$1,150 ± 2,109	.406
Injections	\$291 ± 1,387	\$312 ± 1,339	\$231 ± 1,520	.227
Medication	\$539 ± 4,439	\$596 ± 4,955	\$370 ± 2,305	.389
Psychological treatment	\$379 ± 1,257	\$389 ± 1,220	\$350 ± 1,340	.516
Subsequent spine surgeries	\$2,439 ± 10,345	\$2,658 ± 10,782	\$1,789 ± 8,900	.080

Table 3. Subsequent spine surgeries after ACDF/CDA

	Total	ACDF	CDA	P-value
Number of patients who underwent at least one subsequent spine procedure	328 (14.2%)	259 (15.0%)	69 (11.9%)	.060
Average cost of subsequent spine surgery within one year of primary surgery for those who underwent procedures	\$17,119 ± 22,390	\$17,679 ± 22,569	\$15,065 ± 21,740	.390