

Elective Anterior Cervical Discectomy and Fusion (ACDF) Versus Cervical Artificial Disc Replacement (C-ADR): A Comparison of Perioperative Morbidity and Early Outcomes

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Introduction/ Methods

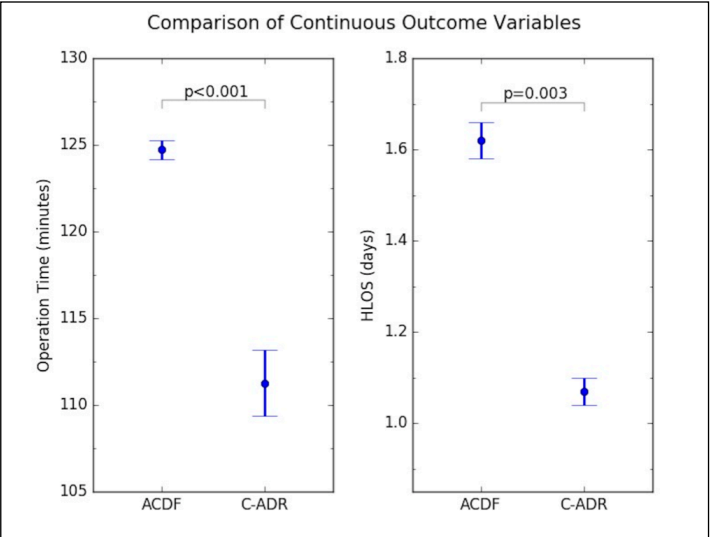
We conducted a retrospective cohort analysis of early outcomes after elective anterior cervical discectomy and fusion (ACDF) versus cervical artificial disc replacement (C-ADR) using the National Surgical Quality Improvement Program database. Adult patients undergoing elective ACDF or C-ADR were abstracted from American College of Surgeons National Surgical Quality Improvement Program years 2011-2014. Univariate analyses were performed by surgery cohort for each outcome, and multivariable regression was used to corrected for demographic/clinical variables.

Table 1. Demographic and clinical characteristics by surgery cohort			
Descriptive variable	ACDF (n=16,826)	C-ADR (n=771)	Sig. (p)
Age			< 0.001
Mean (SD)	53.5 (11.3)	45.1 (9.8)	
<65-years	13827 (82.1%)	748 (97.0%)	
≥65-years	2999 (17.8%)	23 (2.9%)	
Sex			0.005
Male	8131 (48.3%)	412 (53.4%)	
Female	8695 (51.6%)	359 (46.6%)	
Body mass index (kg/m²)			< 0.001
Underweight (<18.5)	279 (1.6%)	12 (1.6%)	
Non-obese (18.5-29.9)	8259 (49.0%)	470 (61.0%)	
Obese class I (30-34.9)	4498 (26.7%)	196 (25.4%)	
Obese class II/III (≥35)	3790 (22.5%)	93 (12.0%)	
ASA classification			< 0.001
ASA 1-2	10387 (61.7%)	633 (82.1%)	
ASA 3-4	6439 (38.3%)	138 (17.9%)	
Functional status			0.002
Independent	16460 (97.8%)	767 (99.5%)	
Partially or totally dependent	366 (2.2%)	4 (0.5%)	

Results-Demographic Characteristics

Of 17,597 subjects (ACDF=16,826, C-ADR=771), C-ADR subjects were less elderly or physically burdened (p<0.001), and presented with fewer comorbidities (8.3%; 25.0%; p<0.001). Univariate analyses showed C-ADR had shorter operation time (111.27±1.89-minutes; 124.73±0.53-minutes; p<0.001), shorter HLOS (1.07±0.03 days; 1.62±0.04-days; p=0.003), and higher likelihood of returning home (99.5%; 97.0%, p=0.001)

Results- Perioperative Outcomes



Univariate analyses showed C-ADR had shorter operation time 111.27±1.89 minutes vs. 124.73±0.53 minutes; p<0.001) , shorter HLOS (1.07±0.03 days; 1.62±0.04 days, p=0.003), and higher likelihood of being discharged to home (99.5% vs. 97.0%, p=0.001).

Multivariable analysis confirmed C-ADR association with shorter operation time (B= -8.55 minutes, 95% CI [-13.46, -3.65], p=0.001) and with greater likelihood of returning home (OR 2.76 [1.02, 7.48], p=0.047), while a nonsignificant statistical trend was demonstrated for HLOS (B=-0.36 days [-0.75, 0.02], p=0.066). Incidences of early complications did not differ between C-ADR and ACDF (1.5% vs. 2.4%, p=0.620).

Key Points

The ACS-NSQIP database (2011- 2014) was used to identify risk factors for prolonged operation times, early complications, increased hospital length of stay (HLOS), and discharge disposition after elective anterior cervical discectomy and fusion (ACDF) versus cervical artificial disc replacement (C-ADR).

Patients undergoing elective C-ADR were generally younger, less physically burdened, and presented with fewer comorbidities compared to elective ACDF.

C-ADR was associated with decreased mean operation time and HLOS, and increased likelihood of being discharged to home, without differences in mortality or early complications on univariate analyses.

C-ADR was associated with decreased mean operation time and increased likelihood of returning home on multivariable analyses, controlling for demographic/clinical variables and medical comorbidities.

Our data provide an evidence based rationale for broadening the indications for C-ADR; surgeons should be aware of the clinical relevance of C-ADR as a viable alternative to ACDF to optimize outcomes in the setting of elective surgery for degenerative cervical spine injuries.

Conclusions

Patients selected for elective C-ADR demonstrate lower comorbidity profiles than ACDF. Compared to ACDF, C-ADR is associated with decreased operative times and increased likelihood of being discharged home. Future studies are needed to confirm these findings.