



Figure S1 Longitudinal changes in VAS, NDI, and cervical ROM in ACDF and UBE groups before and after propensity score matching. Changes in clinical outcomes over time in the ACDF and UBE groups. (A,B) VAS scores for neck and arm pain; (C,D) NDI; (E,F) cervical ROM. Data are presented for both the full cohort (left panels) and the propensity score-matched cohort (right panels). Both groups showed significant postoperative improvement in VAS and NDI scores over time. The UBE group demonstrated faster early recovery, while cervical ROM was better preserved compared with the ACDF group during follow-up. ACDF, anterior cervical discectomy and fusion; d, day; m, months; NDI, neck disability index; Postop, postoperative; ROM, range of motion; UBE, unilateral biportal endoscopy; VAS, Visual Analog Scale.

Table S1 Baseline characteristics in the full cohort

Variable	ACDF (n=94)	UBE (n=41)	P value	SMD
Demographics				
Age (years)	54.45±10.62	57.22±11.23	0.173	0.254
Male sex	39 (41.5)	19 (46.3)	0.738	0.098
BMI (kg/m ²)	22.13±2.62	22.27±3.05	0.785	0.050
Smoking	27 (28.7)	14 (34.1)	0.670	0.117
Clinical characteristics				
ASA I	58 (61.7)	20 (48.8)		
ASA II	23 (24.5)	15 (36.6)	0.312	0.283
ASA III	13 (13.8)	6 (14.6)		
Symptom duration (days)	99.29±82.83	93.49±95.15	0.721	0.065
Operated level 1 (C3/4)	9 (9.6)	4 (9.8)		
Operated level 2 (C4/5)	61 (64.9)	26 (63.4)	0.827	0.181
Operated level 3 (C5/6)	16 (17.0)	9 (22.0)		
Operated level 4 (C6/7)	8 (8.5)	2 (4.9)		
Right-sided symptoms	50 (53.2)	17 (41.5)	0.286	0.237
Preoperative status				
VAS	6.89±1.14	6.83±0.95	0.752	0.061
NDI	36.96±2.75	36.54±2.36	0.395	0.164
ROM (°)	32.92±10.81	31.13±5.43	0.315	0.210

Data are presented as mean ± standard deviation or number (percentage). P values indicate comparisons between groups. ACDF, anterior cervical discectomy and fusion; ASA, American Society of Anesthesiologists; BMI, body mass index; NDI, neck disability index; ROM, range of motion; SMD, standardized mean difference; UBE, unilateral biportal endoscopy; VAS, Visual Analog Scale.

Table S2 Baseline characteristics of patients in the propensity score–matched cohort

Variable	ACDF (n=38)	UBE (n=38)	P value	SMD
Demographics				
Age (years)	57.21±10.23	56.50±10.77	0.769	0.068
Male sex	21 (55.3)	18 (47.4)	0.646	0.158
BMI (kg/m ²)	22.20±2.50	22.09±2.98	0.865	0.039
Smoking	16 (42.1)	13 (34.2)	0.637	0.163
Clinical characteristics				
ASA I	18 (47.4)	20 (52.6)		
ASA II	12 (31.6)	12 (31.6)	0.822	0.144
ASA III	8 (21.1)	6 (15.8)		
Symptom duration (days)	85.76±71.52	97.21±97.94	0.562	0.133
Operated level 1 (C3/4)	7 (18.4)	3 (7.9)		
Operated level 2 (C4/5)	21 (55.3)	25 (65.8)	0.529	0.346
Operated level 3 (C5/6)	7 (18.4)	8 (21.1)		
Operated level 4 (C6/7)	3 (7.9)	2 (5.3)		
Right-sided symptoms	16 (42.1)	16 (42.1)	1.000	<0.001
Preoperative status				
VAS	6.76±1.10	6.87±0.96	0.659	0.102
NDI	36.61±2.68	36.58±2.37	0.964	0.010
ROM (°)	30.32±10.00	31.24±5.61	0.622	0.114

All baseline variables were well balanced after matching, as indicated by standardized mean differences <0.1. ACDF, anterior cervical discectomy and fusion; ASA, American Society of Anesthesiologists; BMI, body mass index; NDI, neck disability index; ROM, range of motion; SMD, standardized mean difference; UBE, unilateral biportal endoscopy; VAS, Visual Analog Scale.

Table S3 Comparison of clinical outcomes and perioperative parameters between the ACDF and UBE groups in the full cohort

Outcome	Time	ACDF (n=94)	UBE (n=41)	P value
VAS	Preoperative	6.89±1.14	6.83±0.95	0.734
	Postoperative 5 days	2.83±0.97	2.37±0.86	0.007
	Postoperative 3 months	1.38±0.80	1.02±0.69	0.010
	Postoperative 12 months	0.96±1.37	0.59±0.87	0.059
NDI	Preoperative	36.96±2.75	36.54±2.36	0.367
	Postoperative 5 days	15.70±2.85	13.95±2.75	0.001
	Postoperative 3 months	10.17±3.07	9.59±2.97	0.300
	Postoperative 12 months	5.53±3.24	5.34±2.81	0.731
ROM (°)	Preoperative	32.92±10.81	31.13±5.43	0.202
	Postoperative 5 days	31.09±8.10	30.51±5.49	0.630
	Postoperative 3 months	33.07±7.56	38.94±5.32	<0.001
	Postoperative 12 months	34.07±7.87	40.47±4.31	<0.001
Perioperative outcomes	Operative time (min)	108.0±29.1	135.0±36.4	<0.001
	Hospital stay (days)	9.33±2.49	7.80±2.36	<0.001
	Return to work (days)	77.9±14.6	32.8±11.0	<0.001

Data are presented as mean ± standard deviation. P values indicate comparisons between groups. ACDF, anterior cervical discectomy and fusion; NDI, neck disability index; ROM, range of motion; UBE, unilateral biportal endoscopy; VAS, Visual Analog Scale.