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Table II. Cox proportional hazards regression analysis

Outcome	Clinical management	Number of events	Person-years	HR (95% CI)[a]	*P*-value[a]	HR (95% CI)[b]	*P*-value[b]
Ipsilateral cerebrovascular event	Group 1	61	2699	3.9 (1.7-9.3)	.003	4.05 (1.74-9.43)	.003
	Group 2	5	486	2.1 (0.6-6.6)		2.1 (0.7-6.7)	
	Group 3	6	1122	1.0 (ref)		1.00 (ref)	
Ipsilateral stroke	Group 1	28	2699	3.5 (1.1-11.5)	.11	3.6 (1.1-11.6)	.09
	Group 2	3	486	2.6 (0.6-11.9)		2.7 (0.6-12.8)	
	Group 3	3	1122	1.0 (ref)		1.00 (ref)	
Overall mortality	Group 1	393	2954	2.2 (1.8-2.8)	<.001	1.6 (1.3-2.0)	<.001
	Group 2	54	650	1.3 (0.9-1.8)		1.2 (0.9-1.6)	
	Group 3	72	1159	1.0 (ref)		1.0 (ref)	
Stroke-specific mortality	Group 1	29	2954	2.6 (0.9-7.3)	.18	1.8 (0.6-4.83	.41
	Group 2	5	650	2.5 (0.7-9.1)		2.4 (0.6-9.1)	
	Group 3	4	1159	1.0 (ref)		1.0 (ref)	

CI, Confidence interval; *HR*, hazard ratio.
Group 1: medical management throughout follow-up; Group 2: medical management with intervention during follow-up; Group 3: intervention early after initial diagnosis.
Cox proportional hazards regression analysis, accounting for multiple observations for patients with bilateral severe carotid artery stenosis using a jackknife-based robust variance estimate.
[a]Univariate.
[b]Multivariate, adjusted for age, gender, CHF, atrial fibrillation, and COPD.

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IP213

Optimal Revascularization Method After Carotid Artery Stenting Restenosis

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Objectives: Restenosis following carotid artery stenting (CAS) is a complicated clinical scenario where data is notably sparse. The study's principal aim is to compare the current postoperative outcomes of transfemoral carotid artery stenting (TFCAS), transcarotid artery stenting (TCAR), and carotid endarterectomy (CEA) in patients with prior stenting, thereby filling this gap in existing research.

Methods: A retrospective analysis of the Vascular Quality Initiative (VQI) database spanning 2016 to 2023 was conducted on patients who had previously undergone CAS and subsequently received CEA, TFCAS, or TCAR due to restenosis. To account for potential confounders and baseline differences among the cohorts, multivariable logistic regression was employed. Main outcomes of the study included: The composition of stroke/death, stroke/death/myocardial infarction (MI), mortality rates at 30 days and 1 year, as well as the length of hospital stay (LOS) and cranial nerve injury (CNI).

Results: The study included 2394 patients with a prior ipsilateral CAS, among whom 508 (21.2%) underwent CEA, 1109 (46.3%) received TFCAS, and 777 (32.4%) were treated with TCAR (Table I). In the adjusted analysis comparing to CEA, TCAR was significantly associated with lower rates of stroke/death (OR, 0.43; 95% CI, 0.20-0.92; $P = .031$), stroke/death/MI (OR, 0.45; 95% CI, 0.21-0.97; $P = .041$), and CNI (OR, 0.09; 95% CI, 0.03-0.30; $P < .001$). LOS was significantly shorter in TCAR and TFCAS compared to CEA (OR, 0.48 and 0.50; 95% CI, 0.36-0.64 and 0.35-0.73, respectively; $P < .001$ for both). In comparing TCAR with TFCAS, TCAR was associated with significantly reduced incidences of stroke/death (OR, 2.45; 95% CI, 1.14-5.30; $P = .022$) and stroke/death/MI (OR, 2.08; 95% CI, 1.02-4.25; $P = .042$) (Table II).

Conclusions: Within this multi-institutional study, TCAR outperformed both TFCAS and CEA in terms of stroke/death and stroke/death/MI

Table I. Univariate analysis of postoperative outcomes in patients with prior carotid stenting undergoing CEA, TFCAS, or TCAR

	TCAR	CEA	*P*	TFCAS	TCAR	*P*	TFCAS	CEA	*P*
N (%)	777 (60.47)	508 (39.53)		1109 (58.80)	777 (41.20)		1109 (68.58)	508 (31.42)	
Stroke/death	9 (1.16)	15 (2.95)	.020	28 (2.52)	9 (1.16)	.035	28 (2.52)	15 (2.95)	.620
Stroke/death/MI	11 (1.42)	18 (3.54)	.012	30 (2.71)	11 (1.42)	.059	30 (2.71)	18 (3.54)	.357
30-day mortality	9 (1.16)	11 (2.17)	.154	21 (1.89)	9 (1.16)	.209	21 (1.89)	11 (2.17)	.716
1-year mortality	32 (4.12)	28 (5.51)	.247	61 (5.5)	32 (4.12)	.172	61 (5.5)	28 (5.51)	.993
LOS	203 (26.13)	232 (45.67)	<.001	233 (21.01)	203 (26.13)	.009	233 (21.01)	232 (45.67)	<.001
CNI	3 (0.48)	17 (3.35)	<.001						

CEA, Carotid endarterectomy; *CNI*, cranial nerve injury; *LOS*, length of stay; *MI*, myocardial infarction; *TCAR*, transcarotid artery stenting; *TFCAS*, transfemoral carotid artery stenting.
Data are presented as number (%).
Outcomes include stroke/death, stroke/death/MI, LOS, and 30-day and 1-year mortality. Data on CNI (exclusive to CEA and TCAR) is also presented.

Table II. Adjusted HR for 1-year mortality following CEA vs TCAR vs TFCAS

	TCAR vs. CEA		TFCAS vs. TCAR		TFCAS vs. CEA	
	OR/HR	*P* value	OR/HR	*P* value	OR/HR	*P* value
Stroke/death	0.43 [0.20-0.92]	.031	2.45 [1.14-5.30]	.022	1.11 [0.58-2.15]	.750
Stroke/death/MI	0.45 [0.21-0.97]	.041	2.08 [1.02-4.25]	.042	1.72 [0.82-3.63]	.153
30-day mortality	0.51 [0.21-1.25]	.140	1.60 [0.72-3.53]	.245	0.90 [0.43-1.89]	.779
1-year mortality	0.97 [0.55-1.70]	.919	1.10 [0.71-1.71]	.662	1.36 [0.84-2.20]	.210
LOS	0.48 [0.36-0.64]	<.001	0.72 [0.56-0.94]	.014	0.50 [0.35-0.73]	<.001
CNI	0.095 [0.03, 0.30]	<.001				

CEA, Carotid endarterectomy; *CI*, confidence interval; *CNI*, cranial nerve injury; *HR*, hazard ratio; *LOS*, length of stay; *MI*, myocardial infarction; *OR*, odds ratio; *TCAR*, transcarotid artery stenting; *TFCAS*, transfemoral carotid artery stenting.
Adjusted OR for postoperative outcomes of stroke/death, stroke/death/MI, 30-day mortality, LOS, and CNI.

outcomes. TCAR had also shorter LOS compared to CEA. Notably, the incidence of CNI was substantially lower in the TCAR cohort, exceeding a tenfold increase in frequency with CEA. The 30-day and 1-year survival rates did not significantly differ across the three evaluated modalities. Despite the inherent limitations of a retrospective design, this study suggests that the TCAR is the safest modality for the treatment of in-stent stenosis in the carotid artery.

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IP215

30-day Outcomes of Carotid Endarterectomy in Patients With Chronic Obstructive Pulmonary Disease

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Objectives: Carotid endarterectomy (CEA) is an effective treatment for carotid stenosis. Chronic obstructive pulmonary disease (COPD) has been identified as a strong predictor of carotid atherosclerosis. However, the impact of COPD on the postoperative outcomes of CEA remains unclear. This study aimed to evaluate the 30-day postoperative outcomes in patients with COPD who underwent CEA, utilizing data from a large national registry.

Methods: Patients with and without COPD who went under CEA were identified in the ACS-NSQIP targeted database from 2011-2022. Patients with age less than 18 years old were excluded. Patients with symptomatic and asymptomatic carotid stenosis were examined separately. A 1:1 propensity-score matching was used to match all preoperative differences. Thirty postoperative outcomes were examined.

Results: There were 1791 (9.91%) COPD and 16,282 (90.09%) non-COPD patients who went under CEA for symptomatic carotid stenosis. Meanwhile, 2251 (10.20%) COPD and 19,815 (89.80%) non-COPD asymptomatic patients who had CEA. Patients with COPD exhibited a higher comorbid burden. All COPD patients were 1:1 matched with their non- COPD counterparts in the symptomatic and asymptomatic groups, respectively. Between COPD and non-COPD patients, the 30-day postoperative mortality (symptomatic 2.01% vs 1.79%; $P = .71$; asymptomatic 1.02% vs 0.71%; $P = .33$), stroke (symptomatic 3.74% vs 3.41%; $P = .65$; asymptomatic 1.64% vs 1.64%; $P = 1.00$), and other morbidity after CEA were comparable in both symptomatic and asymptomatic cohorts, except that COPD patients had a higher rate of 30-day readmission (11.61% vs 8.43%; $P < .01$) in symptomatic patients (Tables 1 and 2).

Conclusions: While COPD is a potential risk factor for the development of carotid atherosclerosis, it does not independently increase the risk of 30-day adverse outcomes following CEA. Nonetheless, COPD often coexists with various other comorbidities, which may increase the likelihood of higher mortality and complications, particularly in patients with symptomatic carotid stenosis.

Table I. Thirty-day perioperative outcomes of COPD and non-COPD patients with symptomatic carotid stenosis who underwent CEA after 1:1 propensity-score matching

	COPD (n = 1791)	Non-COPD (n = 1791)	*P* value
Mortality	36 (2.01)	32 (1.79)	.71
Stroke	67 (3.74)	61 (3.41)	.65
TIA	23 (1.28)	22 (1.23)	1.00
Cardiac complications	55 (3.07)	49 (2.74)	.62
Pulmonary complications	68 (3.8)	53 (2.96)	.20
Renal dysfunction	15 (0.84)	13 (0.73)	.85
Sepsis	16 (0.89)	11 (0.61)	.44
DVT	16 (0.89)	9 (0.5)	.23
Bleeding events	55 (3.07)	44 (2.46)	.31
Wound complications	11 (0.61)	12 (0.67)	1.00
Cranial nerve injury	44 (2.46)	39 (2.18)	.66
Restenosis	10 (0.56)	5 (0.28)	.30
Distal embolization	5 (0.28)	8 (0.45)	.58
Unplanned operation	61 (3.41)	67 (3.74)	.65
30-day readmission	208 (11.61)	151 (8.43)	<.01
Operation time, minutes	122.10 ± 51.98	122.40 ± 54.15	.89
LOS, days	4.38 ± 5.37	4.38 ± 5.61	.91
Time from admission to operation, days	1.69 ± 3.03	1.94 ± 9.34	.28

CEA, Carotid endarterectomy; *COPD*, chronic obstructive pulmonary disease; *DVT*, deep vein thrombosis; *LOS*, length of stay; *TIA*, transient ischemia attack.
Data are presented as number (%) or mean ± standard deviation.