
Symptomatic Carotid Lesions Should be Operated on 4-7 Days Following Neurologic Event

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DISCLOSURE

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**No Relevant Financial
Relationship Reported**



Background

CEA has been demonstrated to reduce the risk of recurrent ischemic stroke in patient with recent ipsilateral symptomatic carotid stenosis

The optimal timing of surgical intervention following ischemic event remains unclear

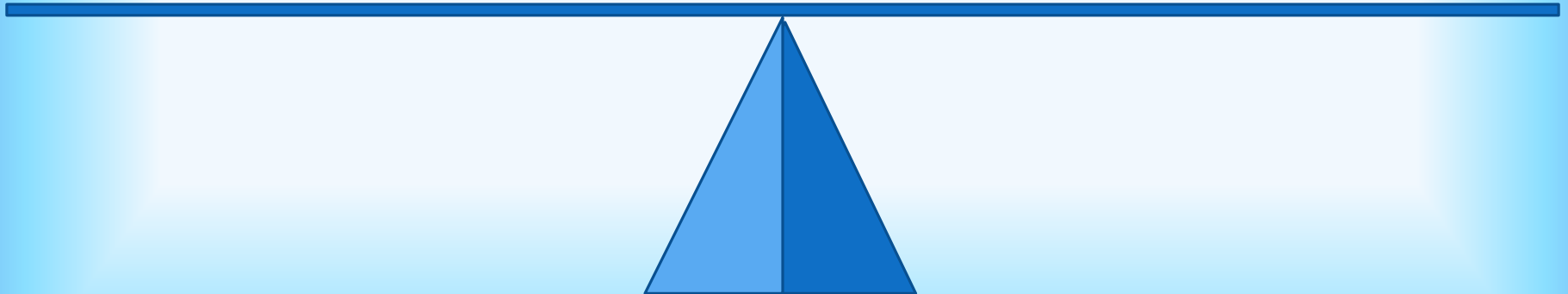
Timing of CEA following Stroke/TIA

Early Intervention

**Risk of perioperative
complication/stroke/death**

Late Intervention

**Risk of recurrent
stroke/death**



Background

CEA has been demonstrated to reduce the risk of recurrent ischemic stroke in patient with recent ipsilateral symptomatic carotid stenosis

The optimal timing of surgical intervention following ischemic event remains unclear

Current guidelines recommend CEA within 2 weeks following ipsilateral carotid-related neurologic event (Grade 1)

Few studies have examined outcomes for CEA performed within the first days of ischemic event

Objectives:

To quantify the post-operative outcomes of stroke and death in relation to timing of CEA for symptomatic carotid stenosis

To define the optimal window for CEA following neurologic event

Methods:

Retrospective review of a prospectively-collected database

Study population: all symptomatic patients who underwent CEA from 2010-2016 in a prospective, single-institution database

Symptomatic status was defined as transient ischemic attack (TIA) or stroke within 180 days of CEA

Primary outcomes of 30-day stroke and mortality were compared in cohorts stratified by timing from symptom onset to CEA



Results: Demographics

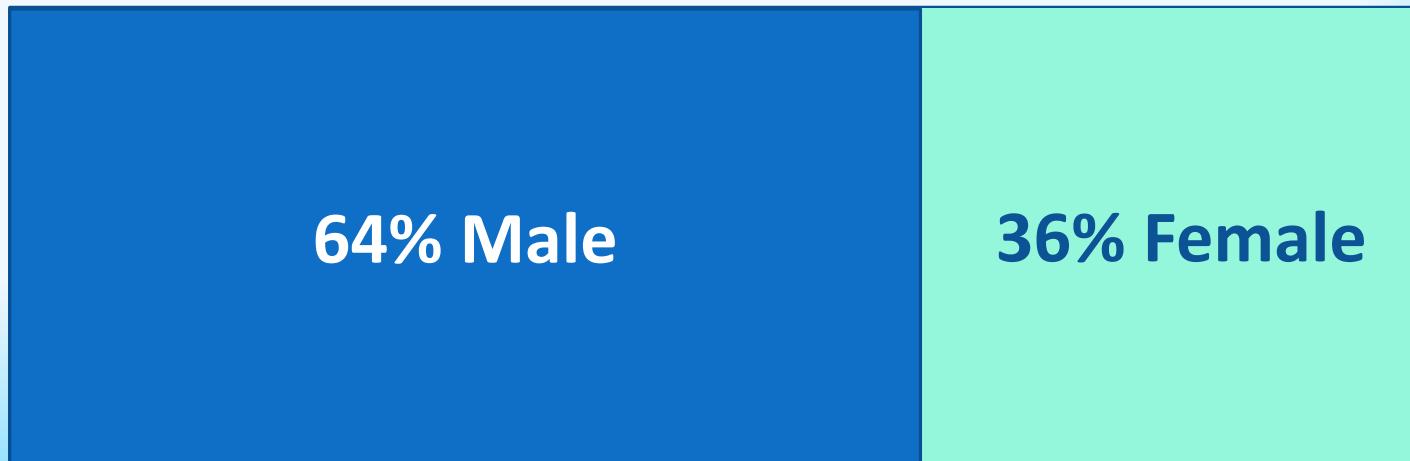
Total 367 CEAs performed in symptomatic patients

226 (62%) were performed for TIA and 141 (38%) for stroke

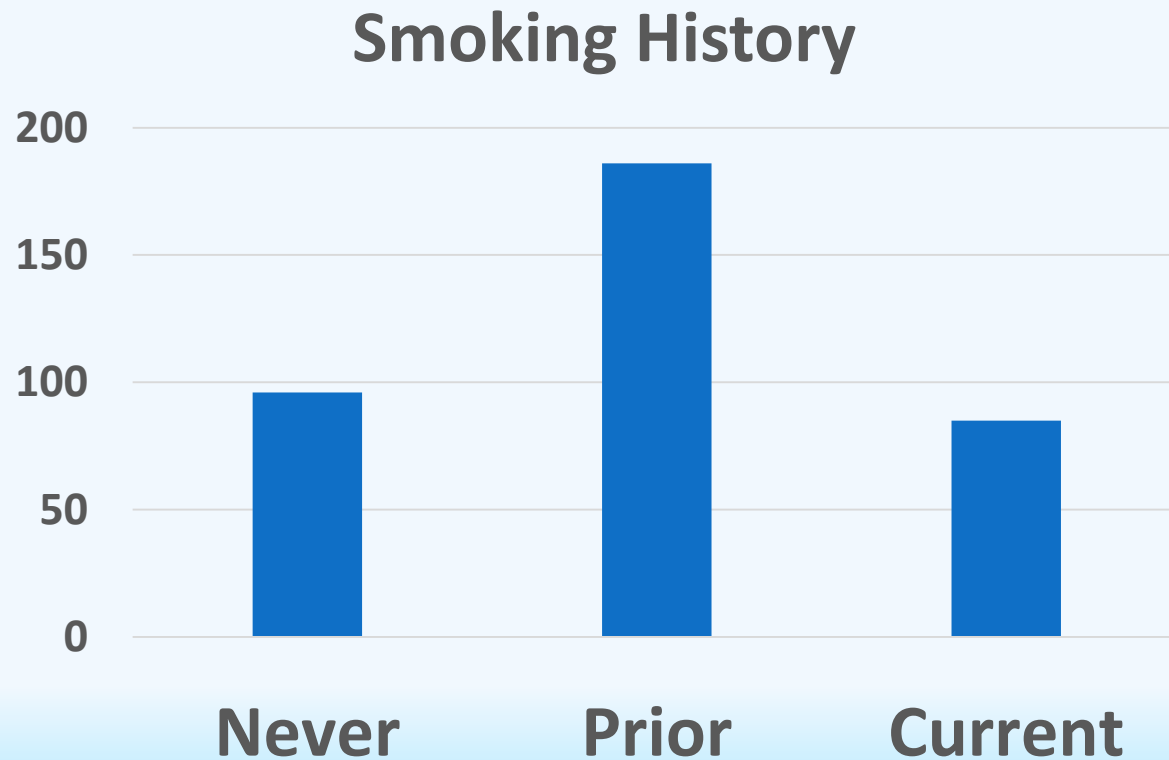
Average age of patients at time of CEA was 71.8 years (43-94 years)

64% of CEAs were performed in male patients (n=236)

97% of patients were White; 98% were Non-Hispanic

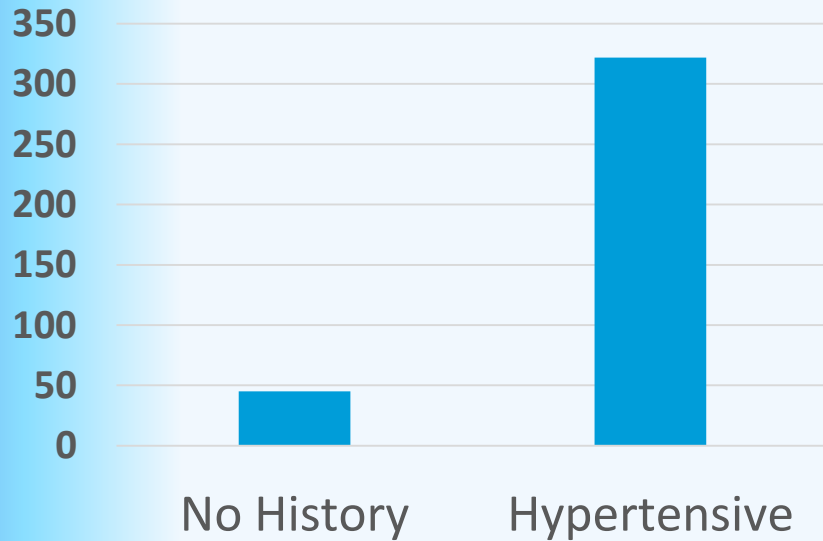


Results: Comorbidities

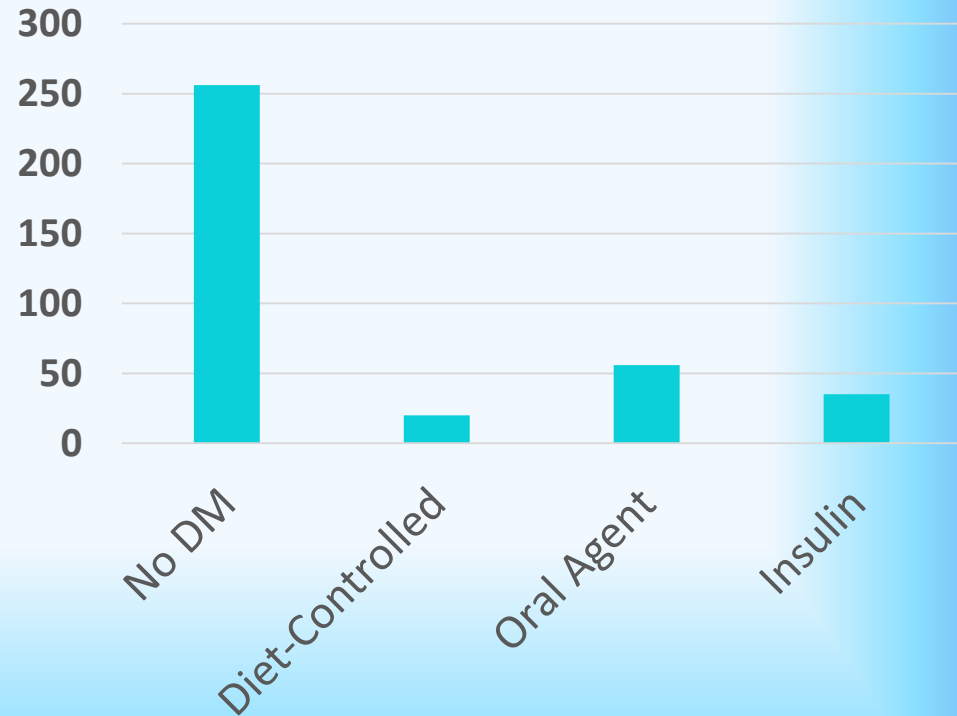


Results: Comorbidities

Hypertension

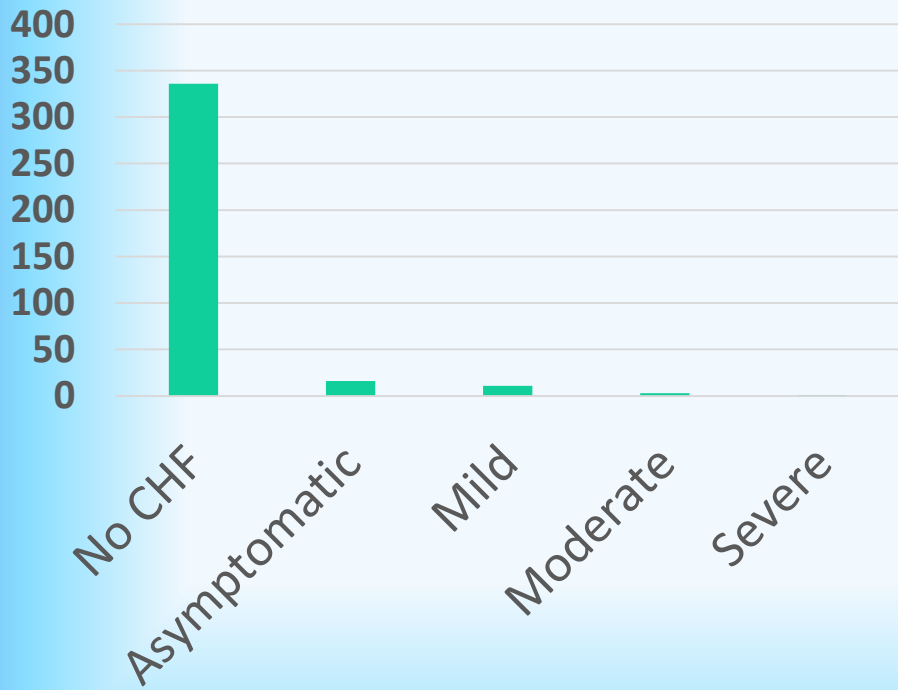


Diabetes

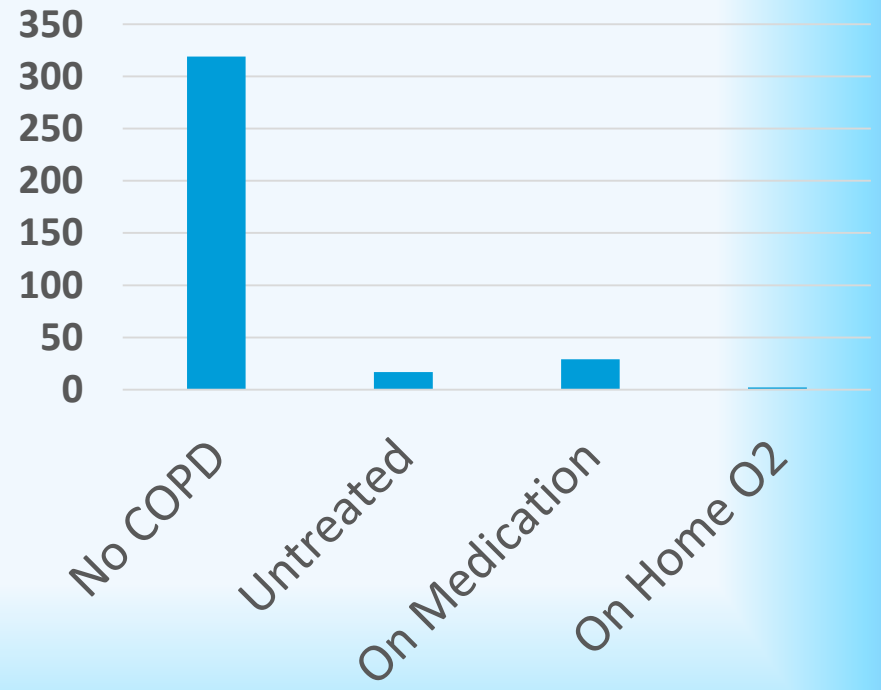


Results: Comorbidities

CHF

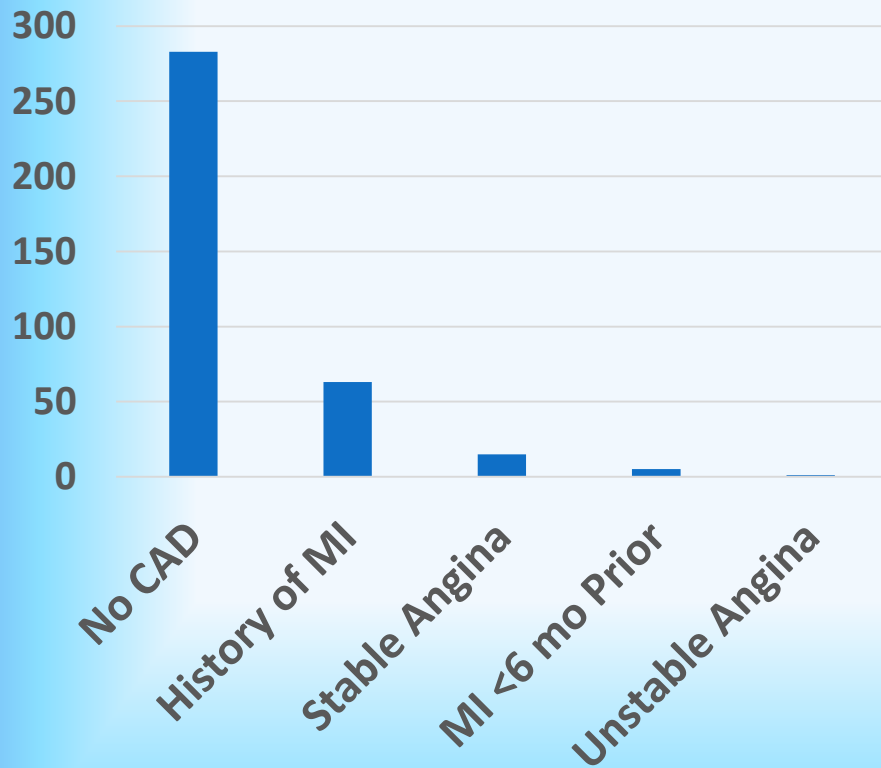


COPD

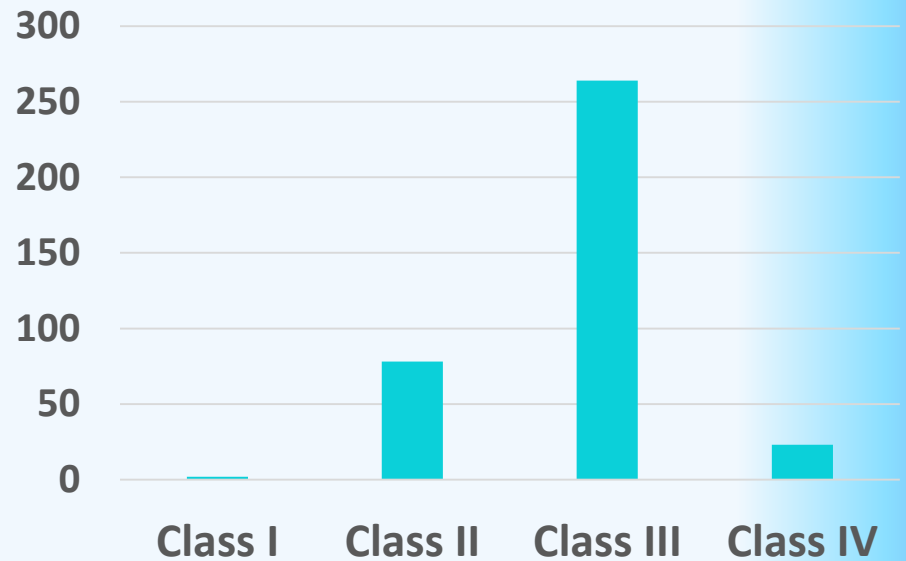


Results: Comorbidities

Coronary Artery Disease



ASA Class

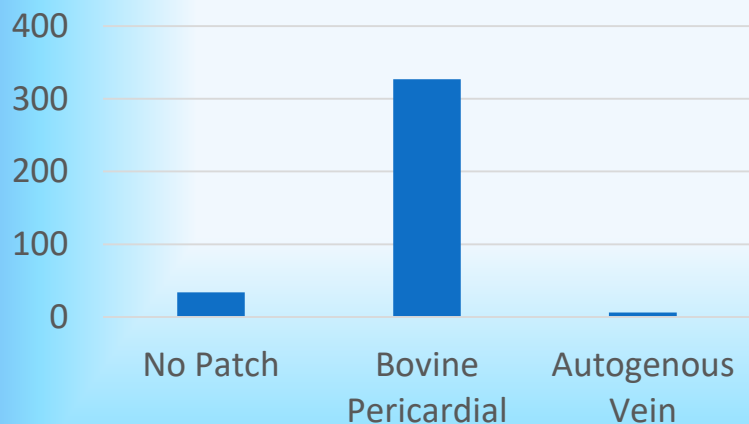


Results: Operative Characteristics

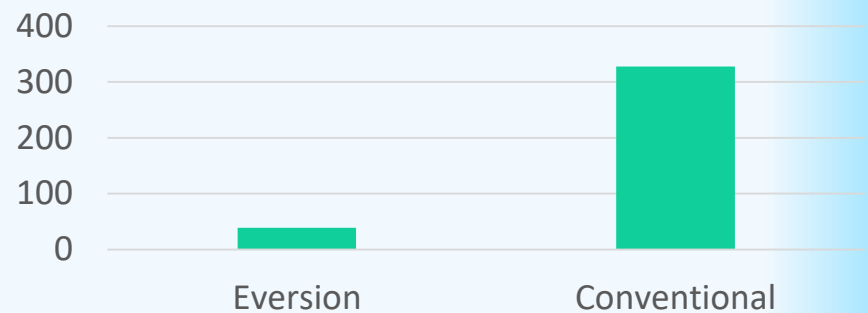
184 (50.5%) Right-Sided CEAs

363 (98.9%) General Anesthesia

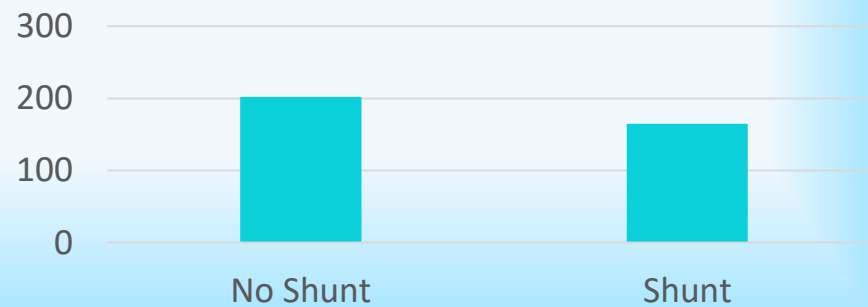
Patch Type



Endarterectomy Type

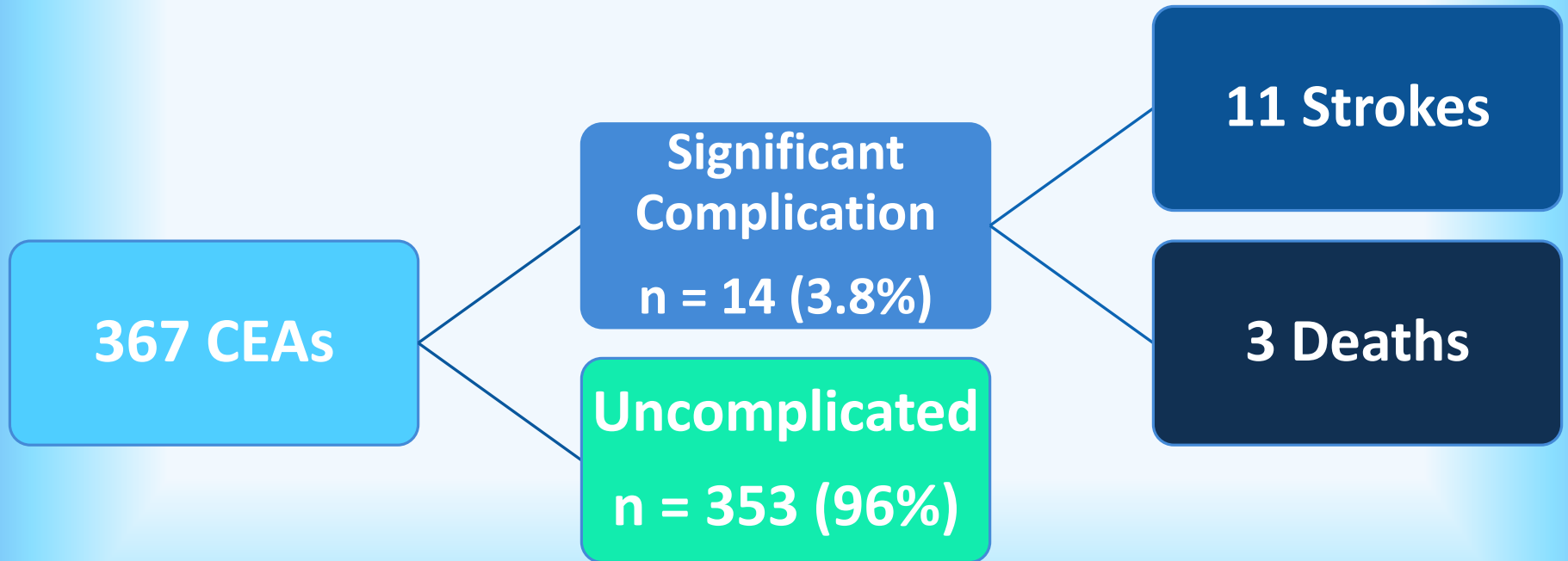


Shunting



Results: Outcomes

Combined perioperative stroke and death rate was 3.8%



Results: Stroke and Mortality

Of the 11 post-operative strokes, all but one were noted immediately upon arrival to the PACU or the surgical floor

No deaths occurred during the same hospitalization



Results: Other Complications

Cranial Nerve Injury:	<u>n = 4 (1.1%)</u>
Post-operative Hypertension:	<u>n = 60 (16.3%)</u>
Post-operative Hypotension:	<u>n = 34 (9.3%)</u>
Post-operative MI:	<u>n = 2 (0.5%)</u>
New Dysrhythmia:	<u>n = 5 (1.4%)</u>
Post-operative CHF:	<u>n = 4 (1.1%)</u>
Wound Infection:	<u>n = 1 (0.3%)</u>

Results: Primary Outcomes

	Primary Outcome Post-Operative Stroke			Primary Outcome Post-Operative Stroke or Mortality		
	No Stroke n (%)	Stroke n (%)	P- value	No Stroke or Mortality n (%)	Stroke or Mortality n (%)	P- value
CEA Timing						
0-3 Days	93 (26%)	5 (45%)	0.62	93 (26%)	5 (36%)	0.52
4-7 Days	64 (18%)	1 (9%)		64 (18%)	1 (7%)	
8-30 Days	84 (24%)	2 (18%)		84 (24%)	2 (14%)	
>30 Days	115 (24%)	3 (27%)		112 (32%)	6 (43%)	

Results: Primary Outcomes

CEA performed within 0-3 days of neurologic event was associated with 3.3-fold increased risk of peri-operative stroke compared to CEA performed at 4-7 days (5.1% vs 1.5%, $p=0.616$)

CEA performed at 4-7 days had a 2.8-fold lower risk of combined stroke and death when compared to CEA performed at any other time (4.3% vs 1.5%, $p=0.521$)

Demographic Factors						
	Primary Outcome Stroke			Primary Outcome Stroke or Mortality		
	No stroke n (%)	Stroke n (%)	P- value	No stroke or mortality n (%)	Stroke or mortality n (%)	P- value
Gender (Male)	228 (64%)	8 (73%)	0.753	228 (65%)	8 (57%)	0.521
Age			0.164			0.210
<59 years	43 (12%)	0 (0%)		42 (12%)	1 (7%)	
60-79 years	215 (60%)	5 (45%)		214 (61%)	6 (43%)	
>80 years	98 (28%)	6 (55%)		97 (27%)	7 (50%)	
Race (Caucasian)	345 (97%)	10 (91%)	0.310	342 (97%)	13 (93%)	0.378
Diabetes	109 (31%)	2 (18%)	0.516	107 (30%)	4 (29%)	1.000
CAD	83 (23%)	1 (9%)	0.468	82 (23%)	2 (14%)	0.745
Prior CABG	26 (12%)	0 (0%)	1.000	26 (12%)	2 (14%)	0.745
Prior PCI	33 (15%)	0 (0%)	0.594	32 (15%)	1 (13%)	0.594
CHF	31 (9%)	0 (0%)	0.609	31 (9%)	0 (0%)	0.609
COPD	47 (13%)	1 (9%)	1.000	46 (13%)	2 (14%)	0.703
Dialysis	1 (0%)	0 (0%)	1.000	1 (0%)	0 (0%)	1.000
Wheelchair usage	21 (10%)	0 (0%)	1.000	20 (9%)	1 (13%)	0.560

Demographic Factors						
	Primary Outcome Stroke			Primary Outcome Stroke or Mortality		
	No stroke n (%)	Stroke n (%)	P- value	No stroke or mortality n (%)	Stroke or mortality n (%)	P- value
Ipsilateral stenosis			1.000			0.651
Mild	17 (10%)	0 (0%)		16 (10%)	1 (17%)	
Moderate	40 (24%)	1 (25%)		40 (24%)	1 (17%)	
Severe	111 (66%)	3 (75%)		110 (66%)	4 (67%)	
Urgency	197 (55%)	6 (55%)	1.000	194 (55%)	9 (64%)	0.491
Preoperative aspirin	329 (92%)	9 (82%)	0.212	326 (92%)	12 (86%)	0.305
Preoperative statin	301 (85%)	6 (55%)	0.021	298 (84%)	9 (64%)	0.046
Preoperative anticoagulant	26 (12%)	2 (33%)	0.171	26 (12%)	2 (25%)	0.272

Operative Factors						
	Primary Outcome Stroke			Primary Outcome Stroke or Mortality		
	No stroke n (%)	Stroke n (%)	P- value	No stroke or mortality n (%)	Stroke or mortality n (%)	P- value
Shunt	159 (45%)	4 (36%)	0.764	157 (45%)	6 (43%)	1.000
Patch type prosthetic	313 (89%)	9 (82%)	0.348	312 (90%)	10 (71%)	0.057
Eversion endarterectomy	36 (10%)	3 (27%)	0.070	35 (10%)	4 (29%)	0.050
Heparin	351 (99%)	11 (100%)	1.000	348 (99%)	14 (100%)	1.000
Protamine	246 (69%)	7 (64%)	0.700	245 (69%)	8 (57%)	0.331
Dextran	110 (31%)	2 (18%)	0.515	110 (31%)	3 (14%)	0.243

Post-operative Factors						
	Primary Outcome Stroke			Primary Outcome Stroke or Mortality		
	No stroke n (%)	Stroke n (%)	P- value	No stroke or mortality n (%)	Stroke or mortality n (%)	P- value
Operative re-exploration	3 (1%)	3 (18%)	0.000	3 (1%)	3 (21%)	0.000
Discharge Rankin Score	35 (17%)	5 (83%)	0.001	35 (17%)	5 (63%)	0.006
Postoperative hypertension	54 (15%)	5 (45%)	0.007	52 (15%)	7 (50%)	0.000
Postoperative hypotension	32 (9%)	2 (18%)	0.271	32 (9%)	2 (14%)	0.379
Postoperative MI	2 (1%)	0 (0%)	1.000	2 (1%)	0 (0%)	1.000
Postoperative CHF	4 (1%)	0 (0%)	1.000	4 (1%)	0 (0%)	1.000

Limitations

Single-institution experience may not be generalizable to general population

Sample population lacked racial diversity and ethnic diversity

Statistic analysis demonstrated trends toward improved outcomes for CEA at 4-7 days, but this did not reach statistical significance

Conclusion

There is a trend toward increased risk of stroke for CEA performed within 72 hours of neurologic event

This study suggests that the “sweet spot” for performing CEA with lowest risk of peri-operative stroke and mortality (1.5%) is 4-7 days following neurologic event

Citations

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Thank you for your time and consideration.
