Management of Anticoagulants and Antiplatelet Therapy in TCAR Patients

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Disclosures

Consultant agreements
Terumo
SilkRoad Medical
W.L. Gore & Associates
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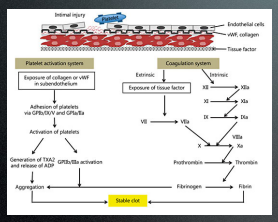
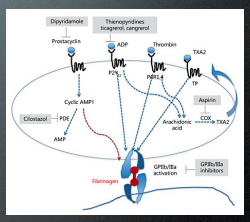
W.L. Gore & Associates
Terumo
Medtronic
Cook
Carestream

Pharmacology and TCAR

- Role of anti-platelet therapy
- Chronic anticoagulation population
- Acute anticoagulation and reversal
- Alternate agents





Interventional Neurology. 2013;1(3-4):151-163.

TF-CAS RCT

Table 3. Randomized trial compared with aspirin plus anticoagulant therapy and dual antiplatelet therapy

First author	Outcome	Aspirin + heparin	Aspirin + clopidogrel	p value
McKevitt [25]	30-day incidence of adverse neurological events	25%	0%	0.02
	Bleeding complication	17%	9%	0.035
Dalainas [26]	30-day incidence of adverse neurological events	16%	2%	<0.05
	Bleeding complication	4%	2%	NS
	Subacute stent thrombosis	2%	0%	NS

Eur J Vasc Endovasc Surg 2005;29:522-527.
Cardiovasc Intervent Radiol 2006;29:519-521.

All Patients	ITT (n=632)	PP (n=632)
Death	3 (0.4%)	1 (0.2%)
Stroke	13 (1.9%)	4 (0.6%)
Stroke/death	16 (2.3%)	5 (0.8%)
Myocardial infarction	6 (0.9%)	6 (0.9%)
Stroke/death/myocardial infarction	22 (3.2%)	11 (1.7%)
Cranial nerve injury	10 (1.4%)	8 (1.3%)
Technical success	690 (99.7%)	
Procedural success*	668 (96.5%)	
Symptomatic patients	ITT (n=182)	
Death	1 (0.6%)	
Stroke	8 (4.4%)	1 (0.6%)
Stroke/death	9 (5.0%)	1 (0.6%)
Myocardial infarction	1 (0.6%)	1 (0.6%)
Stroke/death/myocardial infarction	10 (5.6%)	2 (1.2%)
Asymptomatic patients	ITT (n=512)	PP (n=467)
Death	2 (0.4%)	1 (0.2%)
Stroke	5 (1.0%)	3 (0.6%)
Stroke/death	7 (1.4%)	4 (0.9%)
Myocardial infarction	5 (1.0%)	5 (1.1%)
Stroke/death/myocardial infarction	12 (2.3%)	9 (1.9%)

DAPT non-compliance

CLINICAL TRIAL

Early Outcomes in the ROADSTER 2 Study of Transcarotid Artery Revascularization in Patients With Significant Carotid Artery Disease

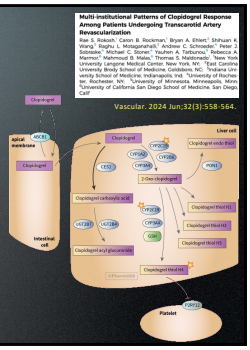
- *n* = 632 high-risk
- 70% operators TCAR-naïve
- Medical therapy protocol deviation most common
- Neurologist or NIHSS-trained RN evaluation
- Demonstrates low penalty learning curve

Preoperative

- Standard best medical therapy
  - High-dose statin (atorvastatin 80 mg qd equivalent)
  - Dual antiplatelet therapy
- TEG platelet mapping or Plavix VerifyNow / Aspirin inhibition testing
- Verify compliance day of surgery
- Defer non-compliant asymptomatic cases

Plavix Non-Responder

- Clopidogrel - P2Y12 pro-drug
- 30-64% of patients with sub-therapeutic result
- VerifyNow versus platelet-mapping TEG



Clopidogrel versus ticagrelor for antiplatelet therapy in transcarotid artery revascularization in the Society for Vascular Surgery Vascular Quality Initiative

Ahmed K. Ghamraoui, DO, MS,[a] Heepeel Chang, MD,[b] Thomas S. Maldonado, MD,[c,d] and Joseph J. Ricotta II, MD, MS, DFSVS, FACS,[a,b] *Boca Raton, Fla; Valhalla, NY; New York, NY; and Delray Beach, Fla*

Outcome	All	Clopidogrel	Ticagrelor	*P* value
Cranial nerve injury	15/10,211 (0.1)	14/9832 (0.1)	1/379 (0.3)	.545
Major bleeding event	297 (2.4)	291 (2.4)	6 (1.4)	.175
Stroke/death	176 (1.4)	172 (1.4)	4 (0.9)	.335
Stroke	155 (1.3)	153 (1.3)	2 (0.5)	.14
Ipsilateral stroke	131 (1.1)	129 (1.1)	2 (0.5)	.227
Death	38 (0.3)	36 (0.3)	2 (0.5)	.536
TIA	67 (0.5)	61 (0.5)	6 (1.4)	**.013**
Ipsilateral TIA	58 (0.5)	52 (0.4)	6 (1.4)	**.004**
Stroke/TIA	216 (1.7)	208 (1.7)	8 (1.9)	.828
Stroke/MI/death	234 (1.9)	227 (1.9)	7 (1.6)	.706
MI	70 (0.6)	66 (0.6)	4 (0.9)	.294
Acute CHF	47 (0.4)	46 (0.4)	1 (0.2)	.622
Dysrhythmia	184 (1.5)	177 (1.5)	7 (1.6)	.792
Reperfusion syndrome	23 (0.2)	23 (0.2)	0 (0)	.365
Access site complication requiring intervention	328 (2.6)	321 (2.7)	7 (1.6)	.189
Postoperative LOS >1 day	3699 (30)	3553 (30)	146 (34)	**.042**
Postoperative LOS >2 days	1831 (15)	1760 (15)	71 (17)	.261

CHF, Congestive heart failure; LOS, length of stay; MI, myocardial infarction; TIA, transient ischemic attack.
Data are presented as number (%).
Boldface *P* values indicate statistically significant findings.

Use of Glycoprotein IIb-IIIa Inhibitors in Patients Undergoing Carotid Artery Stenting in the Vascular Quality Initiative

Satinderjit Lochan, Mark D. Bakoyiak, Matthew Byrne, Timothy Hoang, Doran Mix, Katrina Newhall, Adam Doyle, and Michael Stoner, Rochester, New York

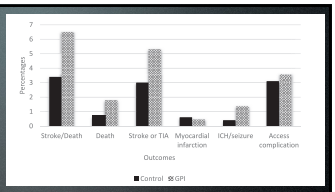
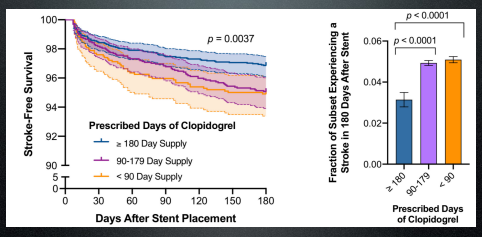


Table III. Logistic regression analysis comparing control (reference) versus glycoprotein IIB/IIIA inhibitors of major outcomes in patients undergoing transfemoral carotid artery stenting (TFCAS) and transcarotid artery revascularization using flow reversal (TCAR)

	TFCAS		TCAR	
Major outcomes	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Stroke/death	1.77 (1.25–2.51)[a]	0.001	1.06 (0.70–1.61)[a]	0.79
Death	1.67 (1.07–2.61)[a]	0.03	1.23 (0.46–3.28)[a]	0.68
Stroke or TIA	1.65 (1.09–2.51)[a]	0.02	1.05 (0.68–1.63)[a]	0.81
ICH/seizure	2.13 (1.23–3.68)[a]	0.007	1.22 (0.37–3.96)[b]	0.74

Dual antiplatelet therapy after carotid artery stenting: trends and outcomes in a large national database

Eric S Sussman ,[1] Michael Jin,[1] Arjun V Pendharkar,[1] Benjamin Pulli ,[2] Austin Feng,[1] Jeremy J Heit ,[3] Nicholas A Telischak[2]



Chronic AC and DAPT

- Known strong benefit to DAPT in TF-CAS and TCAR patients (like PCI)
- Increased hemorrhagic risk to long-term DAPT / AC
- Limit duration of triple therapy to 30 days
- Aspirin dose less than 100 mg qd
- Patient and risk-specific
- Antiplatelet therapy loading kinetics

J Am Coll Cardiol. 2021 Feb 9;77(5):629-658.

BRIDGE Trial

- RCT perioperative bridge with LMWH versus placebo
- VKA therapy
- Non-valvular atrial fibrillation
- Undergoing elective operations or invasive procedure

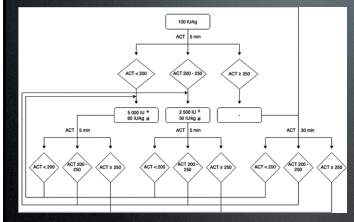
Table 3. Study Outcomes.

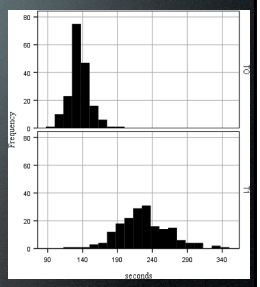
Outcome	No Bridging (N = 918)	Bridging (N = 895)	P Value
	number of patients (percent)		
Primary			
Arterial thromboembolism	4 (0.4)	3 (0.3)	0.01*, 0.73†
Stroke	2 (0.2)	3 (0.3)	
Transient ischemic attack	2 (0.2)	0	
Systemic embolism	0	0	
Major bleeding	12 (1.3)	29 (3.2)	0.005†
Secondary			
Death	5 (0.5)	4 (0.4)	0.88†
Myocardial infarction	7 (0.8)	14 (1.6)	0.10†
Deep-vein thrombosis	0	1 (0.1)	0.25†
Pulmonary embolism	0	1 (0.1)	0.25†
Minor bleeding	110 (12.0)	187 (20.9)	<0.001†

* P value for noninferiority.
† P value for superiority.

N Engl J Med 2015;373:823-33.

Procedural AC





Ann Vasc Surg 2022; 84: 327–335.

Reversal

	No protamine (n = 944), No. (%)	Protamine (n = 944), No. (%)	Relative risk (95% CI)	*P* value
Primary outcomes				
Access site bleeding complication	78 (8.3)	26 (2.8)	0.33 (0.21-0.52)	<.001
Interventional treatment	34 (3.6)	9 (1.0)	0.26 (0.13-0.54)	<.001
Blood transfusion	37 (3.9)	11 (1.2)	0.30 (0.15-0.58)	<.001
Stroke or death	21 (2.2)	15 (1.6)	0.71 (0.37-1.39)	.32
Secondary outcomes				
Stroke	19 (2.0)	10 (1.1)	0.53 (0.24-1.13)	.09
Death	7 (0.7)	5 (0.5)	0.71 (0.23-2.25)	.56
Transient ischemic attack	10 (1.1)	4 (0.4)	0.40 (0.13-1.28)	.11
Myocardial infarction	8 (0.8)	4 (0.4)	0.50 (0.15-1.66)	.25
Congestive heart failure	3 (0.3)	4 (0.4)	1.33 (0.30-5.96)	.71
Hemodynamic instability				
Hypotensive	121 (14.9)	129 (16.1)	1.06 (0.83-1.35)	.50
Hypertensive	138 (16.7)	148 (18.1)	1.13 (0.90-1.43)	.45

CI, Confidence interval.

J Vasc Surg. 2020 Dec;72(6):2079-2087.

Summary

- Targeted DAPT with inhibition assay testing or consider switch to ticagrelor
- Limit triple therapy to 30 days
- Seldom bridge patients, wound check prior to restart AC (same as CEA)
- Protamine = better outcomes
- Integrate medical management into perioperative protocols, testing and service