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What Is The Proof That CAS Is Ever Indicated For ACS: The Evidence Does Not Yet Support It

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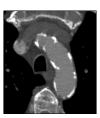
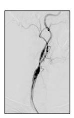
No financial disclosure

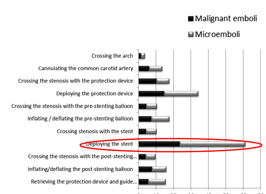
Clinical disclosure: TCAR not available in Europe

INTRODUCTION

SOURCES OF DISTAL EMBOLIZATION DURING CAS

- Aortic arch manipulation
- Stenotic lesion crossing
- Stent deployment
- Ballooning
- Device retrieval

INTRODUCTION

The Society for Vascular Surgery implementation document for management of extracranial cerebrovascular disease

Ali F. AbuRahma, MD,[a] Efthymios D. Avgerinos, MD, PhD,[b] Robert W. Chang, MD,[c] R. Clement Darling III, MD,[d] Audra A. Duncan, MD,[e] Thomas L. Forbes, MD,[f] Mahmoud B. Malas, MD, MHS,[g] Bruce Alan Perler, MD, MBA,[h] Richard J. Powell, MD,[i] Caron B. Rockman, MD,[j] and Wei Zhou, MD,[k] *Charleston, WV; Pittsburgh, Pa; San Francisco and La Jolla, Calif; Albany and New York, NY; London and Toronto, Ontario, Canada; Baltimore, Md; Lebanon, NH; and Tucson, Ariz*

- CAS should be considered for >70% asymptomatic carotid stenosis in high risk patients, if the patient has a >3 years life expectancy and the perioperative stroke/death risk is <3%
- There are insufficient data to support CAS as primary therapy
- CAS should be avoided in presence of high-risk factors for CAS:
  - Age > 75 years old
  - Heavily calcified carotid stenosis
  - Complex bifurcation stenosis >15 mm length
  - Tortuous ICA
  - Tortuous CCA
  - Type 3 or tortuous aortic arch
  - Heavy atherosclerotic burden of arch

Table II. High-risk surgical risk for carotid endarterectomy (*CEA*) based on the Medicare National Coverage Decision (20.7) on PTA including carotid artery stenting (CAS)

Physiologic risks	Anatomic risks
Age ≥75	Prior head/neck surgery or irradiation
Congestive heart failure	Spinal immobility
Left ventricular ejection fraction ≤35%	Restenosis after CEA
Two diseased coronaries with ≥70% stenosis	Surgically inaccessible lesion
Unstable angina	Laryngeal palsy; laryngectomy; permanent contralateral CNI
MI within 6 weeks	Contralateral occlusion
Abnormal stress test	Severe tandem lesions
Need for open heart surgery	
Need for major surgery (including vascular)	
Uncontrolled diabetes	
Severe pulmonary disease	

CNI, Cranial nerve injury; *MI*, myocardial infarction.

INTRODUCTION

Why the proof in favor of CAS may be considered poor:
- Inconsistent perioperative stroke rates (0.6-4%)
- Excessively high stroke rates in randomized trials (SAPPHIRE)
- Fail to randomized of up to 50% eligible patients in randomized trials

However, the evidence may be misleading, as it fail to consider:
- **Who** is performing CAS (operators' characteristics)
- **Why** is performing CAS (indications and patient selection)
- **How** is performing CAS (technical aspects)

Comparison of Perioperative Safety of Carotid Artery Stenting and Endarterectomy in the Treatment of Carotid Artery Stenosis: A Meta-Analysis of Randomized Controlled Trials

Wenkui Li[1,2], Chuyue Wu[1-3], Rong Deng[1,2], Li Li[1,2], Qingyuan Wu[1-3], Lina Zhang[1-3], Tao Yan[4], Shengli Chen[1] 2024

Perioperative stroke

Study or Subgroup	CAS Events	CAS Total	CEA Events	CEA Total	Weight	Risk Ratio M-H, Fixed, 95% CI
BACASS 2008	0	10	1	10	1.3%	0.33 [0.02, 7.32]
Beijing 2013	2	28	1	35	0.8%	2.50 [0.24, 26.17]
CREST 2010	9	1262	11	1240	9.5%	0.80 [0.33, 1.93]
EVA-3S 2006	24	261	9	259	7.8%	2.65 [1.25, 5.58]
Halliday 2021	61	1811	41	1814	35.2%	1.49 [1.01, 2.20]
Houston 2014	1	27	0	28	0.4%	3.11 [0.13, 73.11]
Kentucky 2001	0	53	0	51		Not estimable
Leicester 1998	5	7	0	10	0.4%	15.13 [0.97, 236.14]
Mannheim 2017	2	68	1	68	0.9%	2.00 [0.19, 21.54]
Ostrava 2014	2	77	1	73	0.9%	1.90 [0.18, 20.47]
Rosenfield 2016	30	1089	5	364	6.4%	2.01 [0.78, 5.13]
SAPPHIRE 2004	6	167	5	167	4.3%	1.20 [0.37, 3.86]
SPACE 2006	44	607	37	589	32.2%	1.15 [0.76, 1.76]
Total (95% CI)		**5467**		**4708**	**100.0%**	**1.48 [1.18, 1.87]**
Total events	186		112			

Heterogeneity: Chi² = 10.21, df = 11 (P = 0.51); I² = 0%
Test for overall effect: Z = 3.34 (P = 0.0008)

Risk Ratio M-H, Fixed, 95% CI — 0.005 0.1 1 10 200 — Favours [CAS] Favours [CEA]

WHO IS PERFORMING CAS

Operators' characteristics have an important impact on CAS outcomes:
- Operator's experience: directly correlated with perioperative stroke and death.
- Medical Specialty (interventionalist vs Surgeon): less important, but depends on background training

Table III. A descriptive report of postoperative outcomes in the sample

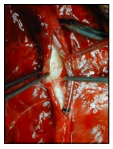
Variable	*Surgeon (n = 15,305)*	*Interventionalist (n = 5358)*	P *value*
CVA[b]	662 (4.33)	222 (4.14)	.57
MI[b]	322 (2.10)	114 (2.13)	.91
Mortality[b]	129 (0.84)	55 (1.03)	.21
LOS, days[a]	2.81 ± 4.29	3.08 ± 4.70	<.01
Total hospital charge, $[a]	48,087.61 ± 44,668.80	51,718.77 ± 49,787.21	<.01

- The goal as a vascular center should be not to offer the patient what we are able to do (CAS or CEA, depending on our training, experience, or specialty), but to offer what is truly best according to the patient's characteristics

AbuRahma et al, JVS 2017
Calvet et al, Stroke 2014
Vogel et al, JVS 2009
Sgroi et al, JVS 2015
Nallamothu et al, JAMA 2011

WHY IS CAS PERFORMED

Correct indication to CAS over CEA are of mainstay importance to optimize CAS outcomes

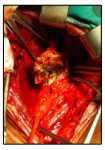


DOs

Hostile neck
Recurrent stenosis
Fibrocalcific plaque
Ulcerated plaque

DON'Ts

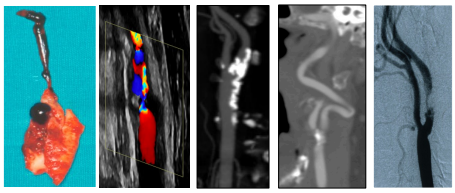
Soft plaque
Heavily calcified plaque
Stenosis >15 mm in length
Tortuous ICA
Tortuous CCA
Type 3 or tortuous aortic arch
Heavy atherosclerotic arch



WHY NOT TO PERFORM CAS

Effect of plaque morphological characteristics on the outcomes of carotid artery stenting

Francesco SQUIZZATO *, Michele PIAZZA, Alessandra TURCATEL, Elda C. COLACCHIO, Franco GREGO, Michele ANTONELLO JCVS, 2023



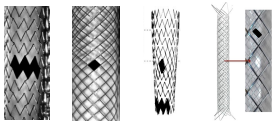
Carotid thrombus | Soft Plaques | Calcification | Kinking | Near occlusion

HOW IS CAS PERFORMED

CAS technique is also important to optimize operative outcomes:

- Routine use of embolic protection device

- Type of stent

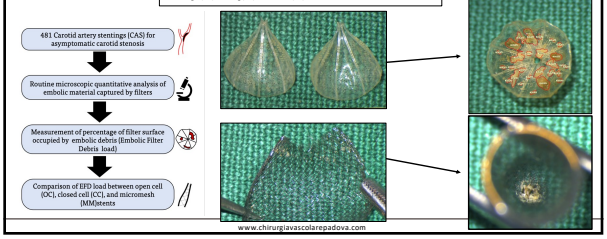


Stroke

ORIGINAL ARTICLE

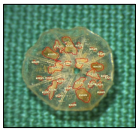
Impact of Carotid Stent Design on Embolic Filter Debris Load During Carotid Artery Stenting

Francesco Squizzato, MD; Michele Piazza, MD; Edoardo Forcella, MD; Elda Chiara Colacchio, MD; Marny Fedrigo, MD, PhD; Annalisa Angelini, MD; Franco Grego, MD; Michele Antonello, MD, PhD



ANALYSIS OF EMBOLIC FILTER DEBRIS

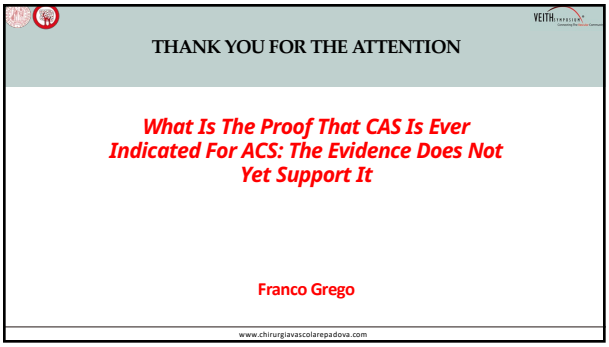
Filter quantitative analysis in asymptomatic patients with carotid stenosis > 70%



	OCS; n=171 (mean±SD or median [IQR])	CCS; n=68 (mean±SD or median [IQR])	MMS; n=242 (mean±SD or median [IQR])	Total; n=481 (mean±SD or median [IQR])	*P* value
Overall					
Free from any EFD load	51 (29.8)	9 (13.2)	99 (40.9)	159 (33.0)	<0.001*
EFD load, %					
Mean ± SD	9.1±14.5	7.9±14.0	5.0±9.1	7.5±12.7	<0.001*
Median (IQR)	1 (0–10)	1 (1–5)	1 (0–5)	1 (0–5)	<0.001*

CONCLUSION:
What Is The Proof That CAS Is Ever Indicated For ACS

- Current proof should more adequately consider important factors that are related to CAS outcomes:
  - Who performs CAS (Who)
  - Selection Criteria (Why)
  - Operative technique and materials (How)
- Optimization of outcomes derives from:
  - Appropriate patient selection
  - Routine embolic protection
  - New-generation dual layer stents


THANK YOU FOR THE ATTENTION
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