With crescendo TIAs and thrombus overlying a plaque what is the best invasive treatment and when should it be performed.

KING'S COLLEGE HOSPITAL - CELEBRATING 100 YEARS

King's College Hospital NHS Foundation Trust

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King's College Hospital London

VEITH SYMPOSIUM
Sponsored by The Veith Foundation
Tuesday, November 19 - Saturday, November 23, 2024

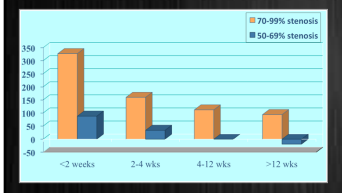
DISCLOSURES

Firm believer in carotid endarterectomy

CEA performed rapidly

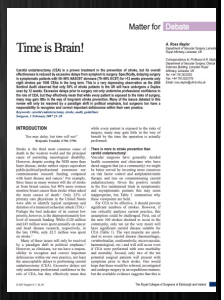
NASCET+ECST+VA

strokes prevented /1000 CEAs @ 5 years



Delay to surgery

With permission A.R. Naylor

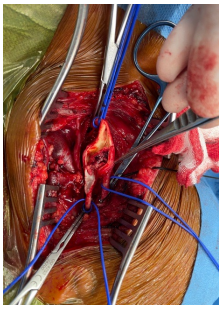


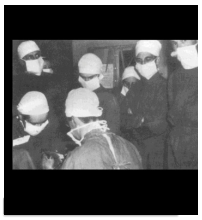
CETC Lancet 2004

Crescendo transient ischemic attacks: A surgical imperative

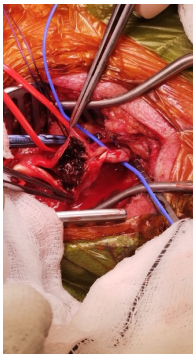
Samuel E. Wilson, MD, Marc R. Mayberg, MD, Frank Yatsu, MD, David G. Weiss, PhD, and the Veterans Affairs Trialists, *Long Beach, Calif., Seattle, Wash., Houston, Texas, and Perry Point, Md.*

Purpose: In a randomized, prospective, multicenter trial at 16 medical centers, 189 of 5000 patients screened with cerebrovascular disease were identified as having angiographic internal carotid artery stenosis (>50%) corresponding to presenting symptoms of transient ischemic attacks (TIAs), transient monocular blindness, or recent, minor completed stroke.
Methods: Patients were randomly assigned to carotid endarterectomy plus the best medical care (n = 91) versus the best medical care alone (n = 98).
Results: After 1 year there was a significant reduction in stroke or crescendo attacks in the 91 patients who received carotid endarterectomy (7.7%) compared with 98 patients who did not undergo operation (19.4%) (p = 0.011). Twelve (12%) of the 98 patients with symptomatic carotid stenosis treated medically had crescendo TIAs, four had minor strokes, and three had major strokes. Crescendo TIAs were defined as disabling, recurrent transient cerebral or retinal ischemia characterized by an increased frequency, duration, or severity of events. The average time from randomization until the onset of crescendo TIAs was 2 months. Seven of the 12 patients in whom crescendo TIAs developed had stenosis greater than 90%, one had greater than 80% stenosis, and four had between 70% and 80% stenosis, with one of these four having contralateral occlusion. Another three patients had 50% or greater contralateral occlusion. Patients with crescendo TIAs were offered carotid endarterectomy, and all 12 had an uncomplicated, urgent procedure. On follow-up the 12 patients were symptom free at the study conclusion.
Conclusions: Crescendo TIAs are disabling symptoms that occur in patients with high-grade carotid stenoses often within 3 months of the initial symptoms of ischemic cerebrovascular disease. The 12% of medically treated patients in whom crescendo TIAs developed had carotid endarterectomy, which abolished symptoms on follow-up. (J VASC SURG 1993;17:249-56.)





Eastcott, et al., 1954



Clinical Practice Guidelines

CLINICAL PRACTICE GUIDELINE DOCUMENT

Editor's Choice – European Society for Vascular Surgery (ESVS) 2023 Clinical Practice Guidelines on the Management of Atherosclerotic Carotid and Vertebral Artery Disease

Recommendation 47		Unchan
For patients with 50–99% stenoses who present with stroke in evolution or crescendo transient ischaemic attacks, urgent carotid endarterectomy should be considered, preferably within 24 hours.		
Class	**Level**	**References**
IIa	C	Munster *et al.* (2015)[80], Rerkasem *et al.* (2009)[592], Capoccia *et al.* (2012)[593], Gajin *et al.* (2014)[594]

Clinical Practice Guidelines
Eur J Vasc Endovasc Surg (2023) 65, 7–111

CLINICAL PRACTICE GUIDELINE DOCUMENT

Editor's Choice – European Society for Vascular Surgery (ESVS) 2023 Clinical Practice Guidelines on the Management of Atherosclerotic Carotid and Vertebral Artery Disease

Recommendation 58 — New

For patients presenting with recent carotid territory symptoms and evidence of free floating thrombus within the carotid artery, therapeutic anticoagulation is recommended.

Class	Level	References	ToE
I	C	Bhatti *et al.* (2007)[49], Fridman *et al.* (2019)[54]	

Recommendation 59 — New

For patients presenting with recent carotid territory symptoms and free floating thrombus who develop recurrent symptoms whilst receiving anticoagulation therapy, surgical or endovascular removal of the thrombus may be considered.

Class	Level	References
IIb	C	Consensus

Urgent Carotid Surgery in Patients with Crescendo Transient Ischaemic Attacks and Stroke-in-Evolution: A Systematic Review

C.D. Karkos [a,b,*], I. Hernandez-Lahoz [c], A.R. Naylor [a]

Eur J Vasc Endovasc Surg (2009) 37, 279–288

Table 1 Series (in chronological order) of patients undergoing surgery for CTIAs

First author and year	Study quality				Pts (M/F)	Mean age (range)	Carotid stenosis/ occlusion	Median delay to surgery	Additional medical therapy	Technique	Shunt	Stroke	Stroke and mortality	Stroke, mortality and major cardiac events
	P/R	Selection bias	Information bias	Multivariate analysis										
Diaz[6] 1985	P	Unclear	Yes	No	8 (4/4)	58 (40–72)	4/4	NA	NA	EC–IC bypass	NA	1 (12%)	1 (12%)	*1 (12%)*
Ricotta[7] 1985	R	Unclear	Yes	No	3 (NA)	NA	NA	NA	NA	CEA	NA	0	0	*0*
Wilson[17] 1993	P	Yes	Unclear	No	12 (NA)	61 (42–69)	12/0	NA	Heparin	CEA	12	0	0	*0*
Nehler[18] 1993	P	No	Yes	No	29 (26/3)	63 (51–83)	29/0	5 days	Heparin	24 CEA, 5 BP	24	1 (3%)	2 (6%)	*4 (13%)*
Greenhalgh[19] 1993	R	Yes	Yes	No	7 (5/2)	62 (55–72)	6/1	"Emergency CEA"	NA	CEA	7	1 (14%)	1 (14%)	*1 (14%)*
Golledge[24] 1996	P	No	No	Yes	26 (6/20)	65 (38–82)	NA	NA	NA	CEA	19	4 (15%)	7 (27%)	*7 (27%)*
Schneider[28] 1999	R	Yes	Yes	No	31 (NA)	NA	31/0	NA	Heparin	Most CEA	NA	0	0	*0*
Paterson[29] 2000	R	Yes	Yes	No	2 (2/0)	66 (63–69)	2 aneurysms	1 day	Heparin	BP (PTFE)	No	0	0	*0*
Brandt[30] 2001	R	Unclear	No	No	7 (6/1)	69 (60–84)	7/0	1 day	Heparin	CEA	7	1 (14%)	1 (14%)	*1 (14%)*
Kasper[31] 2001	R	Yes	Yes	No	7 (NA)	NA	0/7	NA	NA	CEA	7	0	0	*0*
Kobayashi[27] 2007	R	Yes	Yes	No	1 (1/0)	68	1/0	3 days	Argatroban and edaravone	CEA	No	0	0	*0*
Karkos[18] 2007	R	Yes	No	No	43 (34/9)	66 (48–87)	43/0	3 days	Heparin in 41; clopidogrel in 2	40 CEA, 3 BP (vein)	41/43	2 (5%)	3 (7%)	6 (14%)
Total					**176 (84/39)**	**64 (40–87)**	**132/12/2 aneurysms**					**158 CEA (91%)**	**118/134 (71%)**	**10 (6%)**	**12 (7%)**	**20 (11%)**

Study quality was assessed based on whether this was prospective or retrospective, whether there was suspicion of selection bias (yes/no/unclear) or information bias (yes/no/unclear) and whether multivariate analysis had been employed. P: prospective; R: retrospective; NA: information not available; Pts: patients; M: male; F: female; EC–IC bypass: extracranial–intracranial bypass; CEA: carotid endarterectomy; BP: bypass; PTFE: polytetrafluoroethylene.

Urgent Carotid Surgery in Patients with Crescendo Transient Ischaemic Attacks and Stroke-in-Evolution: A Systematic Review
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Eur J Vasc Endovasc Surg (2009) 37, 279–288

Table 2 Definition of CTIA across the 12 studies

Author	Definition of CTIA
Diaz[6]	TIAs which were increasing in frequency, severity and duration in the preceding day
Ricotta[7]	NA
Wilson[17]	Recurrent, transient, cerebral or retinal ischaemia in the distribution of the carotid artery, characterised by definite worsening in symptom pattern whether in terms of event frequency, duration or severity
Nehler[18]	Ocular or cerebral hemispheric events of increasing frequency (>2 events/24 h) and/or severity (subsequent events of longer duration or greater neurologic deficit than prior events) and lasting <24 h with return to neurologic baseline between events
Greenhalgh[19]	A succession of TIAs in which succeeding TIAs are more severe or more frequent
Golledge[24]	A succession of TIAs in which succeeding TIAs are more severe or frequent
Schneider[28]	NA
Paterson[29]	NA
Brandt[30]	TIAs increasing in severity or frequency to at least once a day
Kasper[31]	Multiple similar ipsilateral hemispheric neurologic events with the deficit continuing to resolve within 24 h
Kobayashi[27]	NA
Karkos[18]	Three or more TIAs within the preceding 7 days

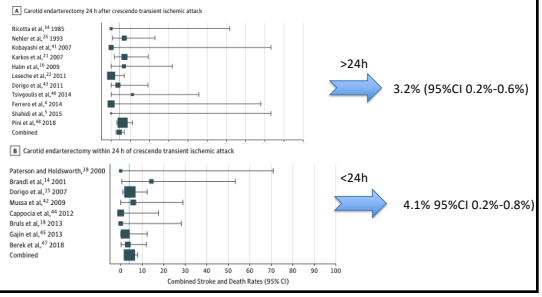
JAMA Surgery | Review

Carotid Endarterectomy and Carotid Artery Stenting for Patients With Crescendo Transient Ischemic Attacks
A Systematic Review

JAMA Surg. 2019;154(11):1055-1063. doi:10.1001/jamasurg.2019.2952

Arash Fereydooni, MS; Jolanta Gorecka, MD; Jianbiao Xu, MD; Joseph Schindler, MD; Alan Dardik, MD, PhD

Figure. Plots for Combined Stroke and Death Rates After Surgery for Crescendo Transient Ischemic Attack



>24h → 3.2% (95%CI 0.2%-0.6%)

<24h → 4.1% 95%CI 0.2%-0.8%)

Original Article
Vascular
The different scenarios of urgent carotid revascularization for crescendo and single transient ischemic attack
Rodolfo Pini[1], Gianluca Faggioli[1], Mauro Gargiulo[1], Enrico Gallitto[1], Laura M Cacioppa[1], Andrea Vacirca[1], Emilio Pisano[2], Alessandro Pilato[2] and Andrea Stella[1]
SAGE

Table 2. Perioperative (30-day) outcome of patients submitted to carotid endarterectomy for single and crescendo transient ischemic attack.

	sTIA % (n: 365)	cTIA % (n: 150)	P
Stroke	1.6 (6)	5.3 (8)	.02
Death	0.5 (2)	2.0 (3)	.12
Stroke/death	2.2 (8)	6.0 (9)	.03

sTIA: single transient ischemic attack; cTIA: crescendo transient ischemic attack.

Table 3. Perioperative (30-day) outcome according timing of intervention single and crescendo transient ischemic attack.

cTIA	<48 hrs (n: 87)	>48 hrs (n: 63)	P
Stroke	1.1 (1)	11.1 (7)	.01
Death	1 (1.1)	3.2 (2)	.57
Stroke/death	2.3 (2)	11.1 (7)	.03
sTIA	**<48 hrs (n: 56)**	**>48 hrs (n: 309)**	**P**
Stroke	3.6 (2)	1.3 (4)	.21
Death	0 (0)	0.6 (2)	.54
Stroke/death	3.6 (2)	1.9 (6)	.44

sTIA: single transient ischemic attack; cTIA: crescendo transient ischemic attack; hrs: hours.

- Retrospective study 2007-2017
- 3866 CEAs
- 888 (23%) symptomatic ICA stenosis
- 515 TIAs
- **365(71%) single TIA**
- **150(29%) crescendo TIA**

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Vascular 2019, Vol. 27(1) 11–19

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journals.sagepub.com/home/vas
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CRESCENDO TIA

There is more to this than meets the eye...

1) Unknown natural history
2) Heterogenous definition of cTIA
3) **No evidence from randomized trial supporting the use of emergency CEA in clinical practice**
4) No reliable data available for systematic review

Crescendo transient ischemic attacks: A surgical imperative

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Crescendo TIAs are generally considered a precursor to stroke largely based on Impressive, although anecdotal clinical information. We cannot predict that patients in VA Cooperative Study 309 declared treatment failures on the basis of crescendo symptoms would have progressed inevitably to stroke. S E Wilson 1993

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Cerebral Nitinol Stenting in Progressive Stroke and in Crescendo TIAs

Or Cohen-Inbar[1] Yaaqov Amsalem[2]

[1]Department of Neurosurgery, Rambam Health Care Campus, Haifa, Israel
[2]Department of Interventional Neuroradiology, Rambam Health Care Campus, Haifa, Israel

Address for correspondence: Or Cohen-Inbar, MD, PhD, Department of Neurosurgery, Rambam Health Care Campus, Haifa 31096, Israel (e-mail: orcohen@tx.technion.ac.il).

J Neurol Surg A 2015;76:499–507.

Abstract

Background Acute ischemic stroke (AIS) is the third leading cause of death. Arterial stenosis is a common cause of stroke, with a high risk of recurrent stroke. Treatment guidelines for AIS and transient ischemic attack (TIA) are still under debate. Treatment guidelines for progressive stroke or crescendo TIAs do not exist. Percutaneous transluminal angioplasty and stenting (PTAS) is an increasingly attractive treatment option, whose efficacy is yet to be proven. However, stent placement poses both short- and long-term risks such as immediate ischemic events, in-stent stenosis, and stent breakage. Thus the choice of stent type is critical. We report our experience with the LEO + (Balt Extrusion, Montmorency, France) nitinol flexible self-expanding stent for the treatment of progressive cerebrovascular accident or crescendo TIAs.

Methods Twelve patients, presenting with a clinical picture of a crescendo TIA or progressive stroke in evolution not halted by optimal medical care, were treated. Patients had a corresponding major cerebral arterial narrowing and evidence of cerebral infarction on imaging. Patients were followed clinically and radiographically.

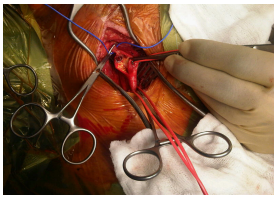
Results Twelve patients 17 to 80 years of age were treated during the study period (20 months). Sixteen nitinol flexible self-expandable stents (LEO +) were placed. All patients showed moderate to substantial improvement in neurologic functions after the procedure.

Conclusion PTAS should be considered a treatment option in case of progressive stroke or crescendo TIAs coupled with appropriate anatomical findings. This may allow for a substantial improvement in functional and neurologic status.

Keywords
- nitinol stenting
- acute ischemic stroke
- transient ischemic attack

King's College Hospital London Experience 2022-2023

- No. of CEA's : 92
- TIAs: 48 (52.1%)
- Stroke: 41 (44.5%)
- Amaurosis Fugax : 1 (1%)
- Crescendo TIA: 2 (2.2%)
- No. of CEAs done <48 h of symptoms = 3 (3.2%)
- No. of CEAs done in 7 days of symptoms = 45 (48%)
- Thrombus = 8 (8.7%)

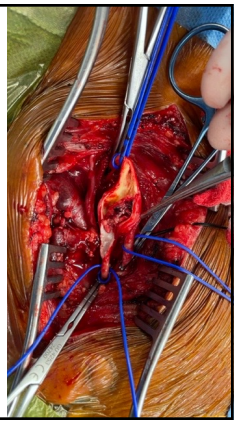


Overall Stroke/Death rate 2.1%

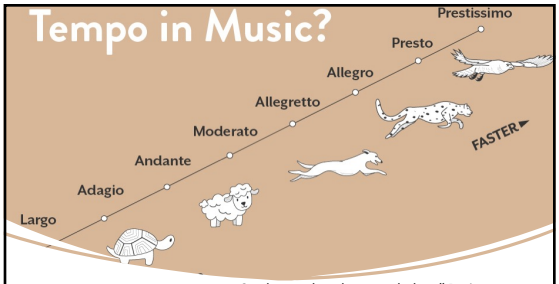
King's College Hospital NHS Foundation Trust

STANDARDISED OPERATIVE APPROACH

- **DAPT +LMWH**
- **Dedicated anesthetist**
- **Minimal neck manipulation under GA**
- **Early IV Heparin**
- **Early ICA clamping**
- **Long arteriotomy**
- **Patch angioplasty**
- **Completion duplex**



Tempo in Music?



CONCLUSIONS

- Stroke needs to be regarded as "*Brain Attack*" but the right timing of CEA after crescendo TIA remains an important but unresolved question.
- ***Allegro*** rather than ***prestissimo*** surgery
- Standardization of the definition is needed
- Time for international Registry?