ESC Heart & Brain Workshop

The role of vascular surgeon in stroke prevention

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The role of vascular surgeon in stroke prevention

in patients with symptomatic and asymptomatic stenosis of the internal carotid artery

> PD Dr. Barbara Rantner, PhD Department of Vascular Surgery Medical University Innsbruck Austria





From "From Hippocrates to Palmaz-Schatz, The history of carotid surgery" Robicsek et al., Eur J Vasc Endovasc Surg 27, 389-397, 200年



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Any Ipsilateral Stroke, 70-99% Stenosis

From "Benefit of carotid endarterectomy in patients with symptomatic moderate or severe stenosis. North American Symptomotic Stroke Carotid Endarterectomy Trial Collaborators." Barnett et al. N Engl J Med 1998 Nov 12;339(20):1415-25

ESC



Any Ipsilateral Stroke, 70-99% Stenosis







Why is the management of asymptomatic carotid disease so controversial?

A. Ross Naylor*

THE SURGEON 13 (2015) 34-43

The 2011 AHA Guidelines are based upon Level I evidence from large randomised trials

80% of strokes are not preceded by a TIA or minor stroke. Strokes due to a carotid stenosis harboured a treatable asymptomatic lesion prior to the event

Selective screening could identify patients with significant asymptomatic stenoses, thereby enabling early intervention to prevent avoidable stroke

The AHA already recognises that only 'highly selected' patients should undergo intervention

The risks of CEA/CAS are now much lower and this will make interventions even more effective

The recent (apparent) decline in stroke on medical therapy is based upon flawed data



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The recent (apparent) decline in stroke on medical therapy is based upon flawed data ACAS and ACST are now too historical to be relevant in the modern era

Even if you could identify and operate on every patient with a significant asymptomatic stenosis, 95% of all strokes would still occur in the community

The US Preventive Services Task Force has concluded that there were no eligible studies providing direct evidence that screening reduced fatal or disabling stroke

AHA did not define 'highly selected' and there is little evidence that this caveat influences case selection

Even if the procedural risk could be reduced to 0%; 93% of all interventions would still be ultimately unnecessary

The decline in stroke appears real and is evident in both randomised and non-randomised studies



@ Stroke risk in the natural course....1986

Outcome in patients with asymptomatic neck bruit (n=500), Chambers et al. N Engl J Med 1986; 315:860–5

1 yea • Severe carotid-artery stenosis (P<0.0001),

- + Cer Progressing ICA stenosis (P<0.0005)
- + Stre Heart disease (P<0.0005)
 - patie Men (P<0.025)
- + Caronac ischemic events: 7%
- + Death: 4%



@ Stroke risk in the natural course....2010

Low Risk of Ipsilateral Stroke in Patients With Asymptomatic Carotid Stenosis on Best Medical Treatment A Prospective, Population-Based Study

Lars Marquardt, MD; Olivia C. Geraghty, MRCP; Ziyah Mehta, PhD; Peter M. Rothwell, PhD *Stroke*. 2010;41:e11-e17.

Table 3. Average Annual Risk of Vascular Events and DeathsDuring Follow-Up

Events	Average Annual Risk, % (95% Cl)
Ipsilateral stroke	0.34 (0.01–1.87)
Ipsilateral TIA	1.78 (0.58–4.16)
Other territory stroke	8.32 (5.08–12.85)
Other territory TIA	5.15 (2.74-8.81)
Myocardial infarction	4.70 (2.50-8.04)
Unstable angina	1.03 (0.21–3.01)
Vascular death	7.70 (5.79–12.98)
Nonvascular death	2.01 (0.82-4.76)



Asymptomatic Carotid Artery Stenosis Treated with Medical Therapy Alone: Temporal Trends and Implications for Risk Assessment and the Design of Future Studies

Cerebrovasc Dis 2014;38:163-173

Meta - analysis of 41 studies (1978-2009)

Summary incidence rate of ipsilateral stroke 1.7% With a clear time dependence Last recruitment year from 2000 onwards: 1% stroke incidence VS 2.3% in earlier studies (p<0.001)

Stroke





From Hadar et al. Cerebrovasc Dis 2014;38:163-173





or

CEA plus BMT vs BMT alone:

Veteran's Affairs Co-operative Study (VACS): n=444 males with 50-99% ICA stenosis between 1983-1987, follow up until 1991 **ALL** patients underwent **intraarterial anigography PRIOR to randomization**

Asymptomatic Carotid Atherosclerosis Study (ACAS): n=1662 patients with 60-99% ICA stenosis between 1987-1993, follow up until 1997 – patients randomized to CEA then underwent intraarterial angiography (any angiographic related stroke were included in the ITT analysis fo surgical morbidity and mortality)

CAVEAT: ABOUT HALF OF THE PERIOPERATIVE STROKES IN CEA PATIENTS IN VACS AND ACAS FOLLOWED ANGIOGRAPHY!!!



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Asymptomatic Carotid Surgery Trial (ACST-1): n=3120 patients with 70-99% ICA stenosis between 1991-2003, follow up until 2008





Halliday et al. Lancet 2010;376:1074-84

Council Stroke

Figure 8: First non-perioperative stroke by current medical treatment

	Events/persor	n-years and Im	nmediate CE	A events			
	annual ever	nt rate (%)	Logran	k	Ratio of annua	event rates	
Category	Immediate CEA	Deferral	O-E V	/ar	Immediate C	EA:Deferral	[95% CI]
On lipid-low	vering therapy before any st	roke?					
Yes	45/6623 (0.7%)	88/6568 (1.3%)	-21.89 33	3.24	_	0.52	[0.33-0.81]
No	54/2959 (1.8%)	100/2988 (3.3%)	-22.49 38	3.48	⊨	0.56	[0.37-0.84]
On both lipi	id-lowering and antithrombo	otic therapy before a	any stroke?				
Yes	45/6615 (0.7%)	88/6561 (1.3%)	-21.88 33	3.24	_	0.52	[0.33-0.81]
No	54/2967 (1.8%)	100/2995 (3.3%)	-22.53 38	3.48	_	0.56	[0.37-0.84]
On lipid-low	vering, antithrombotic and a	ntihypertensive the	erapy before	any stroke	e?		
Yes	43/6254 (0.7%)	79/6111 (1.3%)	-18.84 30).48	+	0.54	[0.34-0.86]
No	56/3328 (1.7%)	109/3445 (3.2%)	-25.00 41	1.21		0.55	[0.36-0.81]
Total	99/9582 (1.0%)	188/9556 (2.0%)	-44.57 71	.74		0.54	[0.43-0.68]
- 99% or	95% confidence interval			0.0	0.5 1.	0 1.5	< 0.0001
				In	mediate CEA better	Immediate C worse	EA

ound

Stroke

Halliday et al. Lancet 2010;376:1074-84

CEA plus BMT vs CAS plus BMT:

TRIAL	Technique, n	Death/Stroke	
Lexington	CEA, 42	0%	
	CAS, 43	0%	
CREST-1	CEA, 587	1.4%	
	CAS, 364	2.5%	
ACT-1	CEA, 364	1.7%	
	CAS, 1089	2.9%	
SPACE-2	CEA, 203	2.0%	
	CAS, 197	2.5%	
	BMT, 113	0%	
Mannheim	CEA, 68	1.5%	ES
	CAS, 68	2.9%	Council Stroke





Naylor et al. Eur J Vasc Endovasc Surg 2018;55,3-81



@ Patient selection in 2017....



Silent infarction on CT	yes=3.6% vs. no=1.0%	OR=3.0 (1.46-6.29)
Stenosis progression 70-99% stenoses	Progression 1 stenosis grade Progression 2 stenosis grade	OR=1.6 (1.1-2.4) OR=4.7 (2.3-9.6)
Plaque area on CT-analysis	40-80mm ² = 1.4% >80mm ² = 4.6%	HR=2.08 (1.05-4.12) HR=5.81 (2.67-12.67)
Intra-plaque haemorrhage on MRI, 50-99% stenoses	yes vs. no	OR=3.66 (2.77-4.95)
Plaque lucency on Duplex US, 50-99% stenoses	Predominantly echolucent 4.2% Predominantly echogenic 1.6%	OR=2.61 (1.47-4.63)

Silent infarction on CT

yes=3.6% vs no=1.0%

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OR=6.14 (1.27-29.5) Impaired CVR yes vs. no 70-99% stenoses Contralateral TIA/Stroke OR=3.0 (1.9-4.73) yes = 3.4% $n_0 = 1.2\%$



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Impaired CVR 70-99% stenoses yes vs. no

OR=6.14 (1.27-29.5)

Contralateral TIA/Strokeyes = 3.4%50-99% stenosesno = 1.2%

OR=3.0 (1.9-4.73)



SUMMARY

- 1. CEA still has a high stroke prevention benefit in patients with symptomatic stenosis of the internal carotid artery.
- 2. Incidence rates of strokes/TIAs significantly decreased over the last decades under improved BMT.
- Invasive treatment (CAS and CEA) must be performed with low periprocedural complication rates (presumably <3%) BUT outcome of CAS and CEA might also improve with BMT.
- 4. There are meanwhile several criteria known which define "patients at risk" for a stroke under BMT alone.



Medicine's much hailed ability to help the sick is fast being challanged by its propensity to harm the healthy.

Moyníhan, Doust and Henry

