

CAROTID ARTERY DISEASE

NATIONAL STROKE CONFERENCE FOR NURSES
09/11/2018



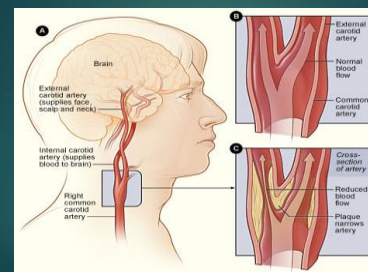
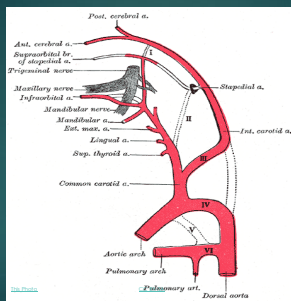
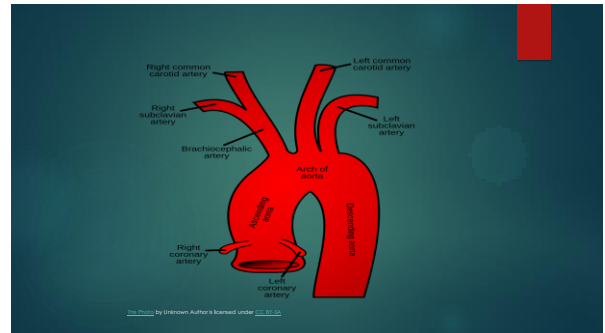
- ▶ Second commonest cause of death (1.1 million deaths annually)
- ▶ 1.4 million strokes in Europe annually
- ▶ > 50% survivors dependent on others for some aspect of everyday activities
- ▶ Annual cost in Europe > 38 billion euros



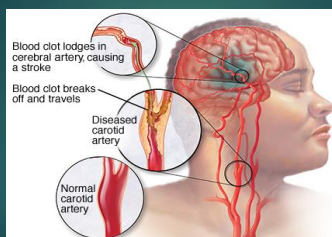
What Do We Already Know?



- ▶ Ischemic Stroke accounts for > 80% of all stroke cases
- ▶ Thromboembolism from ICA or MCA: 25%
 - ▶ 10-15% follow thromboembolism from a previously asymptomatic ICA stenosis > 50%
- ▶ Small vessel intracranial disease: 25%
- ▶ Cardiac embolism: 20%
- ▶ Other rarer causes: 5%
- ▶ Unknown despite investigation: 25%



Focusing on Ischaemic Stroke...



<https://www.mayoclinic.org/ischemic-stroke>

Who Is At Risk?



So What Do We Want to Achieve?



Prevention

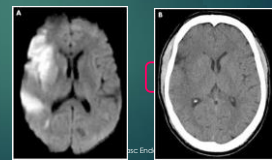
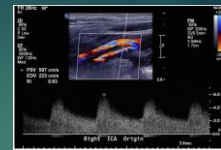
- ▶ 1°: aims to prevent carotid artery disease from developing
- ▶ 2°: aims at reducing the clinical impact of asymptomatic carotid artery stenoses
- ▶ 3°: aims to reduce the risk of recurrent TIA or stroke in patients with TIA/stroke secondary to carotid artery stenoses

So How Are We Going To Achieve This?



Diagnosis

- ▶ **Duplex**
 - ▶ Non-invasive exam of choice
 - ▶ Limited to extracranial carotid
- ▶ CTA
 - ▶ Radiation & contrast exposure
- ▶ MRA
 - ▶ Overestimates stenoses at the carotid bifurcation
 - ▶ With or without gadolinium
- ▶ **DSA**
 - ▶ Usually reserved for when non-invasive imaging modalities are discordant (disagreeing)
 - ▶ Small stroke risk- 1%



Calculating Disease Severity...

- ▶ 0 – 40% low degree of stenosis
- ▶ 50 – 60% moderate degree of stenosis
- ▶ > 70% relevant degree of stenosis (70%, 80%, 90%)
- ▶ Occluded ICA
- ▶ Plaque..... (Stable/unstable, fibrous/calcified, haemorrhagic/echo lucent/ulcerated)

So Now What?



- ▶ BMT (Aspirin, Statin, BP control)

- ▶ CEA (1951, gold standard)

- ▶ CAS (first carotid angioplasty 1980, CAS 90's)



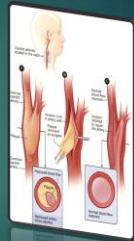
Best Medical Therapy

- ▶ Risk Factor modification (smoking cessation, exercise, diet etc.)
- ▶ Aspirin
- ▶ Statin
- ▶ BP Control

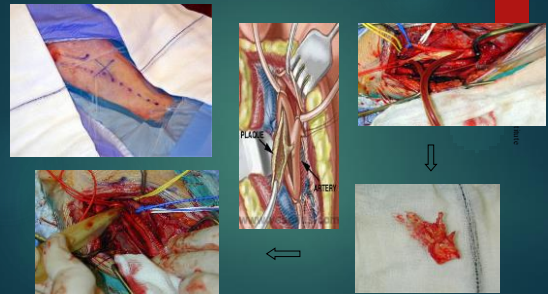


Carotid Endarterectomy

- ▶ Surgical procedure to remove plaque
- ▶ Gold Standard
- ▶ Complications (Stroke, MI, Neck Haematoma, Nerve Injury)

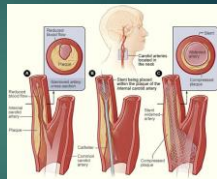


Carotid Endarterectomy



Carotid Artery Stenting

- ▶ Relatively new (1990's)
- ▶ Grain Access for Sheath(wires, catheters, self expanding stent)
- ▶ Complications (more strokes than MI's)



Evidence for CEA

CEA for Asymptomatic Disease

- ▶ Cochrane Review, 2005
 - ▶ >5000 patients
 - ▶ VA Asymptomatic Trial, 1993
 - ▶ ACAS, 1995 (NNT = 17)
 - ▶ ACST, 2004
- ▶ Implications for practice
- ▶ In patients with asymptomatic carotid stenosis, the absolute risk reduction of CEA & BMT is small (~1% per annum)
- ▶ Whilst there is clear benefit for men, CEA did not appear to help women

Peri-op stroke/death/ any subsequent stroke	60-99% ICA stenosis
RRR from CEA	31%
RR	0.69 (CI 0.57-0.83)
ARR (VA Trial)	~1% over 4 years

CEA reasonable in asymp pts with ICA stenosis > 80%
ACC/ AHA/ SVM/ SVS Guidelines 2011

Chambers BK, Dorman G. Cochrane Database of Systematic Reviews 2005, Issue 4.

Evidence for CEA

CEA for Symptomatic Disease

- Cochrane Review, 2017
- NASCET 1991 (NNT < 6)
- VA Symptomatic Trial 1991
- ECST 1998

Implications for practice

- These trials were performed in the 1980s and '90s
 - Prior to the widespread use of statins...
- It is now possible that BMT is superior to CEA & BMT for 50-69% symptomatic stenosis
 - The ongoing ECST-2 trial is addressing this question


Stroke is ~ twice as likely on BMT alone in symptomatic patients, with 70-99% ICA stenosis

Intervention	50-69% ICA stenosis	≥70% ICA stenosis
BMT group risk	23/100	15/100
CEA & BMT group risk	10/100	12/100
RR	0.43 (0.15-0.88)	0.84 (0.60-1.18)
No. of patients	1095	1549
Quality of Evidence	Moderate	Moderate
In plain language...	CEA is highly beneficial	CEA is of benefit. No benefit in women. Little evidence of benefit if surgery is delayed by > 2 weeks

Chapman S, Benkeisen E. Cochrane Database of Systematic Reviews 2017, Issue 6

Timing...

- Benefit from CEA depends not only on the degree of carotid stenosis, but also on several other clinical characteristics such as delay to surgery after the presenting event
- Ideally, the procedure should be done within 2 weeks of the patient's last symptoms




Is CAS as Safe & Efficient as CEA? Multiple RCT's Including...

- EVA-3S**
 - ~500 pts (all symptomatic)
 - Stroke/ death within 30d
 - 9.6% CAS V 3.9% CEA; trial stopped prematurely
- SPACE**
 - ~1000 pts (all symptomatic)
 - Stroke/ death within 30d
 - 6.84% CAS V 6.34% CEA
- ICSS**
 - ~1700 pts (all symptomatic)
 - Stroke/ death/ MI @ 120d
 - 8.5% CAS V 5.2% CEA
- CORIS**
 - >2000 pts (~50% symptomatic)
 - Risk of 30d stroke
 - 4.1% CAS V 2.3% CEA



What do the Guidelines say?



Eur J Vasc Endovasc Surg (2018) 55, 3–81

Editor's Choice – Management of Atherosclerotic Carotid and Vertebral Artery Disease: 2017 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)

Writing Group¹; A.R. Naylor, J.-B. Ricco, G.J. de Borst, S. Debus, J. de Haro, A. Halliday, G. Hamilton, J. Kakkis, S. Lepidi, H.S. Markus, D.J. McCabe, J. Roy, H. Sillesen, J.C. van den Berg, F. Vermeulen, ESVS Guidelines Committee²; P. Kolh, N. Chakfe, R.J. Hinchliffe, I. Koncar, J.S. Lindholt, M. Vega de Ceniga, F. Verzi, ESVS Guideline Reviewers³; J. Archie, S. Bellmont, A. Chaudhuri, M. Koelemay, A.-K. Lindahl, F. Padberg, M. Venermo

Evidence Levels

Level of Evidence A	Data derived from multiple randomised clinical trials or meta-analyses
Level of Evidence B	Data derived from a single randomised clinical trial or large non-randomised studies
Level of Evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries

Recommendation Classes

Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy
Class IIb	Usefulness/efficacy is less well established by evidence/opinion
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful

Diagnosis

Recommendation	Class	Level
Recommendation 1 Duplex ultrasound (as first-line), computed tomographic angiography and/or magnetic resonance angiography are recommended for evaluating the extent and severity of intracranial carotid stenoses	I	A
Recommendation 2 When carotid endarterectomy is being considered, it is recommended that Duplex ultrasound stenosis estimation be corroborated by computed tomographic angiography or magnetic resonance angiography, or by a repeat Duplex ultrasound performed by a second operator	I	A
Recommendation 3 When carotid stenting is being considered, it is recommended that any Duplex ultrasound study be followed by computed tomographic angiography or magnetic resonance angiography which will provide additional information on the carotid arch, as well as the extra- and intracranial circulation	I	A
Recommendation 4 Units who base management decisions on Duplex ultrasound stenosis measurement should state which measurement method is being used	I	C
Recommendation 5 Intra-arterial digital subtraction angiography should not be performed in patients being considered for revascularisation, unless there are significant discrepancies or non-invasive imaging	III	A

Best Medical Therapy

Recommendation	Class	Level
Recommendation 8 A healthy diet, smoking cessation, and physical activity are recommended for all patients with asymptomatic carotid disease	I	B

- Moderate/high physical activity: 25% relative risk reduction in ischaemic stroke
- Obesity: significant increase in stroke prevalence

Recommendation	Class	Level
Recommendation 9 Low-dose aspirin (75–325 mg) is recommended in patients with asymptomatic carotid stenoses for prevention of late myocardial infarction and other cardiovascular events	I	A
Recommendation 10 Clopidogrel 75 mg daily should be considered in asymptomatic carotid stenosis patients if aspirin intolerant	IIa	C

- Conflicting antiplatelet evidence for asymptomatics
- Monotherapy with NSA is first-line; clopidogrel for aspirin-intolerant patients

Recommendation	Class	Level
Recommendation 11 Statin therapy is recommended for long-term prevention of stroke, myocardial infarction and other cardiovascular events in patients with asymptomatic carotid disease	I	A

Cochrane r/v 2013: significant reduction in all-cause mortality, stroke, and revascularisation procedures in patients randomised to statins

Recommendation	Class	Level
Recommendation 12 Antihypertensive treatment is recommended for patients with hypertension and asymptomatic extracranial internal carotid artery stenoses to maintain long-term blood pressure <140/90 mmHg	I	A

- Hypertension increases the risk of carotid disease
 - Treatment reduces stenosis progression & promotes regression

Asymptomatic Disease

Recommendation 17	Class	Level	References
In "average surgical risk" patients with an asymptomatic 60–99% stenosis, carotid endarterectomy should be considered in the presence of one or more imaging characteristics that may be associated with an increased risk of late ipsilateral stroke, provided documented perioperative stroke/death rates are <3% and the patient's life expectancy exceeds 5 years.	IIa	B	13,35,34,84–94, 96,97
Recommendation 18			
In "average surgical risk" patients with an asymptomatic 60–99% stenosis in the presence of one or more imaging characteristics that may be associated with an increased risk of late ipsilateral stroke, carotid stenting may be an alternative to carotid endarterectomy, provided documented perioperative stroke/death rates are <3% and the patient's life expectancy exceeds 5 years.	IIb	B	80,84–94
Recommendation 19			
Carotid stenting may be considered in selected asymptomatic patients who have been deemed by the multidisciplinary team to be "high-risk for surgery," and who have an asymptomatic 60–99% stenosis in the presence of one or more imaging characteristics that may be associated with an increased risk of late ipsilateral stroke, provided documented perioperative stroke/death rates are <3% and the patient's life expectancy exceeds 5 years.	IIIa	B	84–94,104,105

Symptomatic Disease

Recommendation 35	Class	Level	References
Carotid endarterectomy is recommended in patients reporting carotid territory symptoms within the preceding 6 months and who have a 50–99% carotid stenosis, provided the documented procedural death/stroke rate is <6%.	I	A	172–174,205
Recommendation 36			
Carotid endarterectomy should be considered in patients reporting carotid territory symptoms within the preceding 6 months and who have a 50–99% carotid stenosis, provided the documented procedural death/stroke rate is <6%.	IIa	A	172–174,205
Recommendation 37			
It is recommended that most patients who have suffered carotid territory symptoms within the preceding 6 months and who are aged >70 years and who have 50–99% stenosis should be treated by carotid endarterectomy, rather than carotid stenting.	I	A	186
Recommendation 38			
When revascularization is indicated in patients who have suffered carotid territory symptoms within the preceding 6 months and who are aged <70 years, carotid stenting may be considered an alternative to endarterectomy, provided the documented procedural death/stroke rate is <6%.	IIb	A	186
Recommendation 39			
Carotid endarterectomy or carotid stenting are not recommended in symptomatic patients with a chronic internal carotid near-occlusion, unless associated with recurrent ipsilateral symptoms (despite optimal medical therapy) and following multidisciplinary team review.	IIIc	C	172

Timing of interventions after onset of symptoms

Recommendation 40	Class	Level	References
When revascularization is considered appropriate in symptomatic patients with 50–99% stenosis, it is recommended that this be performed as soon as possible, preferably within 34 days of symptom onset.	I	A	172,173
Recommendation 41			
Patients who are to undergo revascularization within the first 14 days after onset of symptoms should undergo carotid endarterectomy, rather than carotid stenting.	I	A	224,225

The SJH 10yr Experience

- ▶ 436 CEA (2007-2016)
- ▶ 74% Symptomatic Stenosis
- ▶ 69% Male
- ▶ Mean Age 68



The SJH Experience

Early (<30 day) stroke rates for entire study population	
Entire study group	2.98% (13 of 436)
Symptomatic	3.08% (10 of 324)
Asymptomatic	2.68% (3 of 112)

The SJH Experience

Mortality cause	Patched	Primary Closure	P-value
Stroke	1	1	
Hematoma	1	1	
Cardiac	1	1	
Total	3	3	0.758
1.37% mortality rate for entire study population			

TAKE HOME MESSAGE



Timing Is Everything....

