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# Feasibility and Safety of Simultaneous Carotid Endarterectomy and Carotid Stenting for Bilateral Carotid Stenosis

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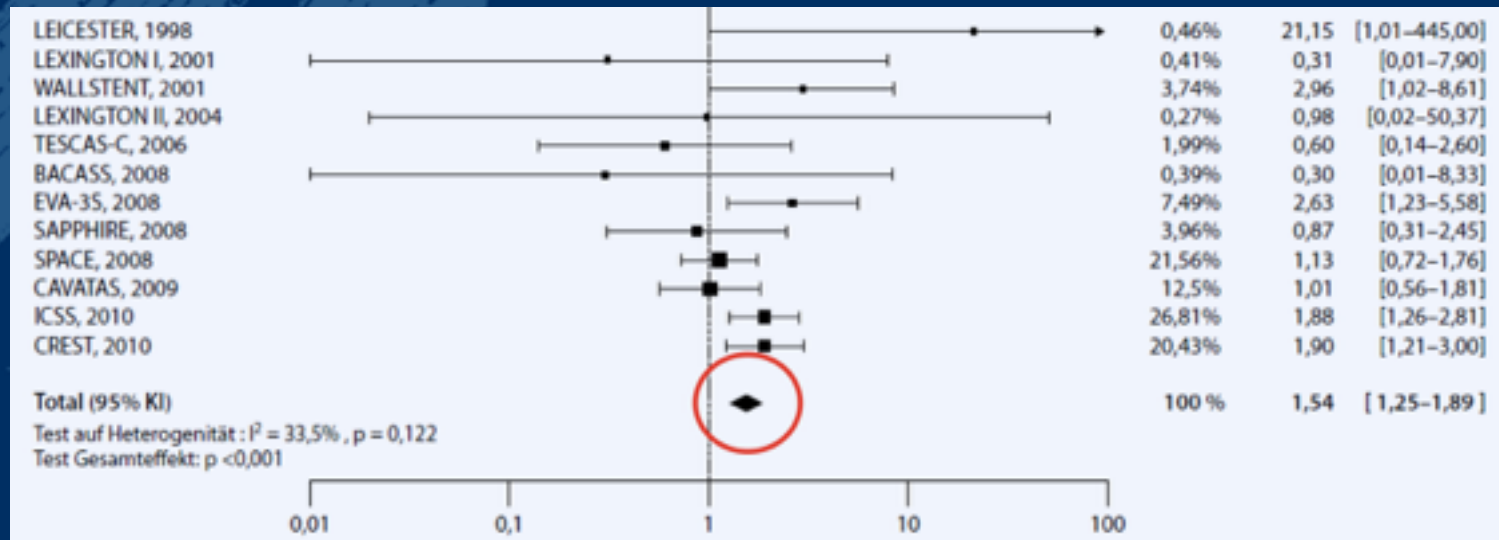
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# Disclosure

# No Conflicts of interest



# Patients with carotid A stenosis are benefit from CEA and CAS



NASCET

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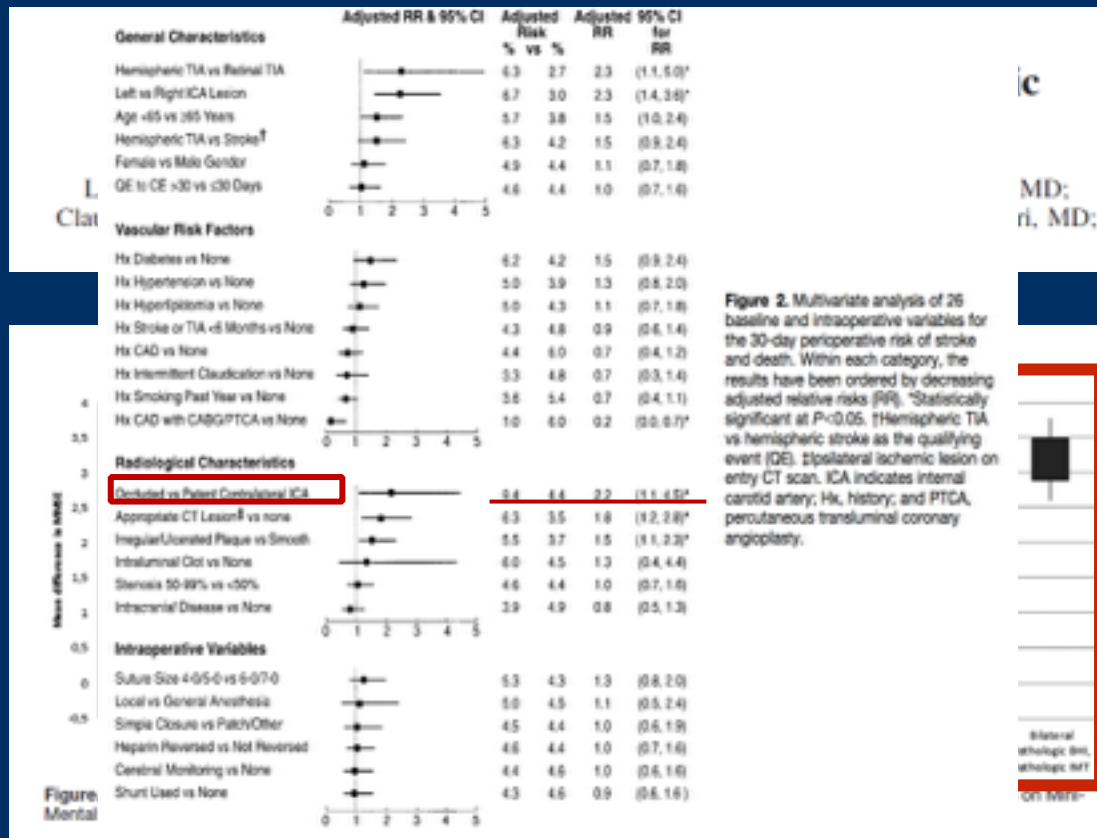
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# Bilateral Carotid A Stenosis

- The prevalence of significant bilateral carotid stenosis was uncertain and varies from 7.5% to 18.8% in patients undergoing carotid revascularization
- Cerebral function are vulnerable in BCS
  - cognitive deterioration was severe in BCS patients
- Risk of stroke is higher in bilateral carotid stenosis



**Figure 2.** Multivariate analysis of 26 baseline and intraoperative variables for the 30-day perioperative risk of stroke and death. Within each category, the results have been ordered by decreasing adjusted relative risks (RR). \*Statistically significant at P<0.05. †Hemispheric TIA vs hemispheric stroke as the qualifying event (QE). ‡ Ipsilateral ischemic lesion on entry CT scan. ICA indicates internal carotid artery; Hx, history; and PTCA, percutaneous transluminal coronary angioplasty.

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# Coronary A disease usually coexist with severe carotid A stenosis and more in BCS

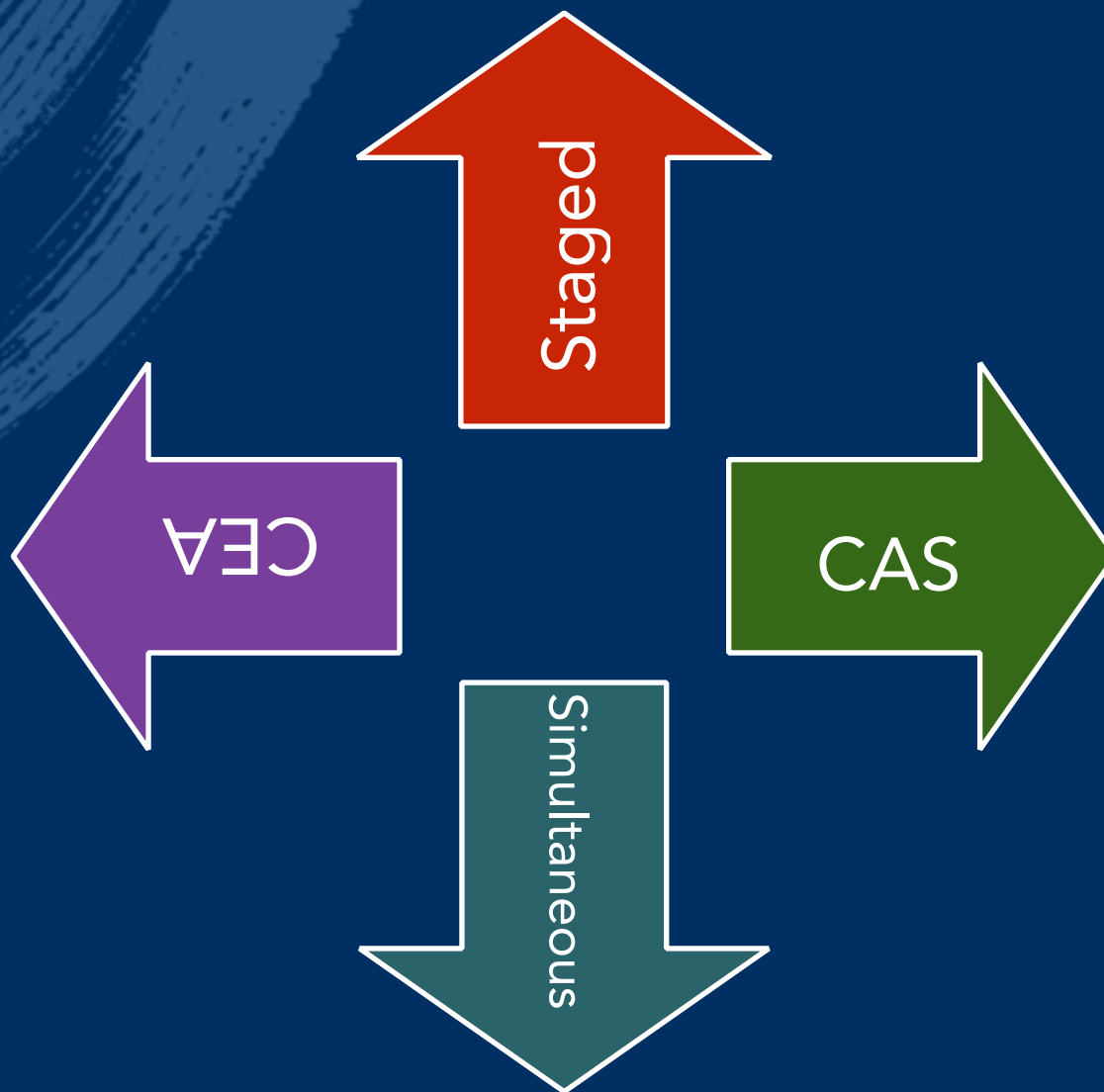
- Wang, G. J. enrolled 51,001 CEA patients, and the incidence of CAD is 28.6%.

Variable	Overall (N = 51,001)
Age, years	70.2 ± 9.4
Female gender	39.6
White race	93.1
Transfer status	5.2
Diabetes	34.7
BMI	28.3 ± 5.6
CHF	9.8
Hypertension	88.7
CAD	28.6



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# Therapeutic Strategy for BCS

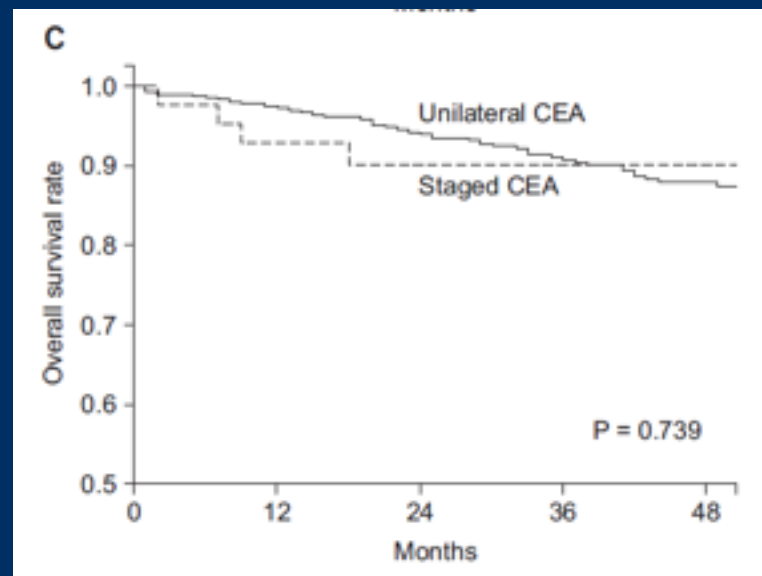




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# Staged Procedure

- Staged procedure is main treatment for BCS
  - symptomatic site, severe stenotic site, dominant blood supply site
  - contralateral treatment after 2-4 weeks
- Stroke may occur during interval
- Delay of life-saving treatment (CABG)



- Hokari, M., et al., Surgical Outcomes for Cervical Carotid Artery Stenosis: Treatment Strategy for Bilateral Cervical Carotid Artery Stenosis. *J Stroke Cerebrovasc Dis*, 2015. 24(8): p. 1768-74
- Fukuda, H., et al., *Staged carotid stenting and carotid endarterectomy for bilateral internal carotid artery stenosis. Preliminary experience.* *Interv Neuroradiol*, 2003. 9(Suppl 1): p. 143-8



# Simultaneous Procedure

- Simultaneous CEA
  - several small studies have reported its safety and effectiveness
  - no more risk than staged CEA
- Simultaneous CAS
  - safety has been confirmed recently
  - no more adverse events than staged or unilateral CAS

Journal	Key point	Sample size/group	Main endpoint	HPS	HD
<b>Cardiovascular Vol. 8, No. 1, 17, 2000</b>	J Endovasc Ther. 2016 Apr;23(2):258-66	Simultaneous bilateral vs. unilateral CAS	Stroke, MI, or death within 30 days or ipsilateral stroke within 1-year: No significant difference between groups	sibilateral -2.5%(3/120) unilateral -1.5%(8/517) p>0.05	sibilateral -30.8%(37/120) unilateral -21.9%(113/517) P=0.042
<b>Ann Thorac Ca Surg Vol. 7, (2001)</b>	Catheter Cardiovasc Interv. 2005 Mar;64(3):275-82	Simultaneous bilateral vs. unilateral CAS	Stroke, TIA, MI, or death within 30 days: Sibilateral-2/17 Unilateral- 0/40	sibilateral -5.8%(1/17) 1 death of hemorrhage unilateral -3.5%(1/40)	25/40 (64%) All transient
<b>Intemational Angiology Vol. 1</b>	J Thromb Thrombolysis (2014) 37:202-209	Simultaneous vs. staged bilateral CAS	HPS, stroke, TIA MI, or death within 30 days: Simultaneous -2/42 (4.8%) (1HPS, 1HPS-Stroke) Staged -2/26 (7.7%) P=0.663	Simultaneous -2/42(4.8%) Staged -0/26 P=0.521	Simultaneous -57.7% Staged -57.1% P=0.957
<b>Arch Surg-Vol 1 1976</b>	AJNR Am J Neuroradiol 31:1113-17	Simultaneous bilateral vs. unilateral CAS	Stroke [minor and/or major stroke] or death within 6 months: Simultaneous bilateral-2/24 Staged bilateral-0/6 Unilateral-8/175	Simultaneous bilateral -4/24(16.7%) Staged bilateral -0/6(2.9%) Unilateral -5/175	Simultaneous bilateral-7/24 Staged bilateral-3/6 Unilateral-40/175 P=0.505

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# Simultaneous: bilateral CEA

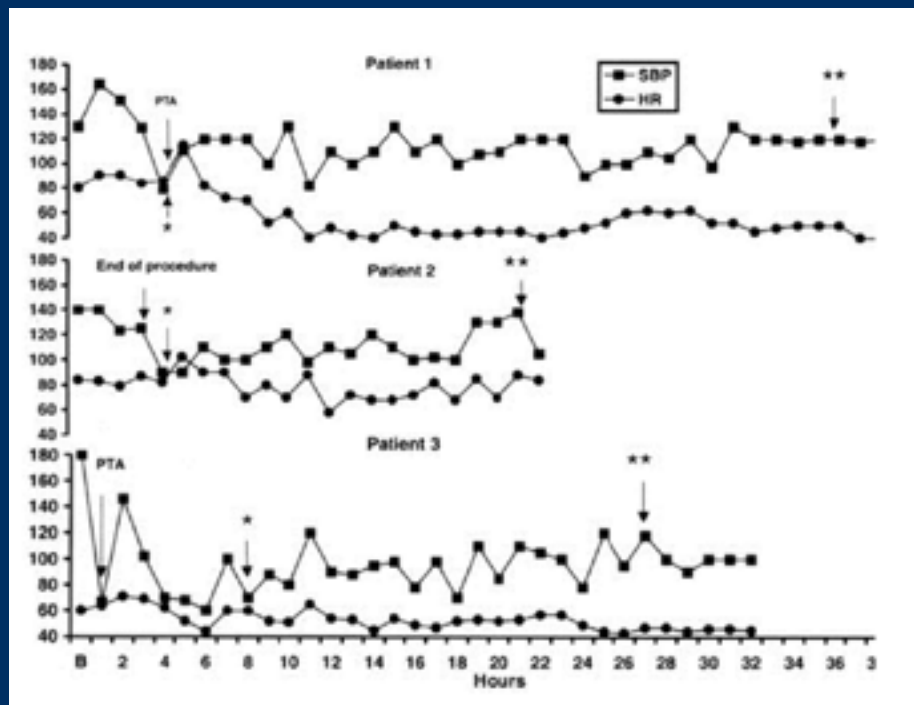
**Table III.** Postoperative management of patients based on length of stay

Postoperative complications	LOS $\leq$ 1		LOS $>$ 1		P value
	<i>n</i>	%	<i>n</i>	%	
Reperfusion symptoms	0	0	1	1	0.18
New neurological event	0	0	5	6	0.01
Cranial nerve injury	1	1	4	5	0.04
Return to operating room	0	0	5	6	0.01
Postoperative hypertension (requiring vasoactive medication)	19	14	21	27	0.02
Postoperative hypotension (requiring vasoactive medication)	6	4	9	11	0.04
Myocardial infarction	0	0	6	8	<0.001
Dysrhythmia	0	0	6	8	<0.001
Wound complication	0	0	0	0	1
Discharged on aspirin	130	93	71	90	0.44
Discharged on Plavix	34	24	26	33	0.17
Discharged on statin	116	83	63	80	0.57
Discharged on beta blocker	83	59	56	71	0.09
Discharged on ACE inhibitor	48	34	21	27	0.24
Discharged on anticoagulant	6	4	3	4	0.86
Thirty-day mortality	2	1	2	2	0.28
Twelve-month mortality	3	2	4	5	0.05



# Simultaneous: Bilateral CAS

- Safety has been confirmed recently
- Be careful of renal function
- **Haemodynamic depression**



- Widecka-Ostrowska, K., A. Modrzejewski, and J. Goracy, *Haemodynamic depression during carotid angioplasty and stenting*. Pol J Radiol, 2010.
- Qureshi, A.I., et al., Postoperative hypotension after carotid angioplasty and stenting: report of three cases. Neurosurgery, 1999. 44(6): p. 1320-3



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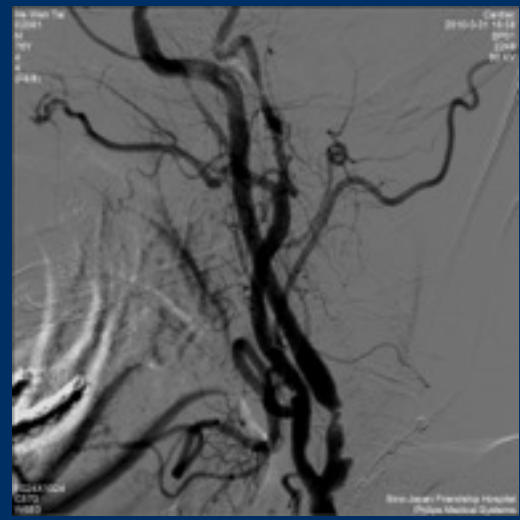
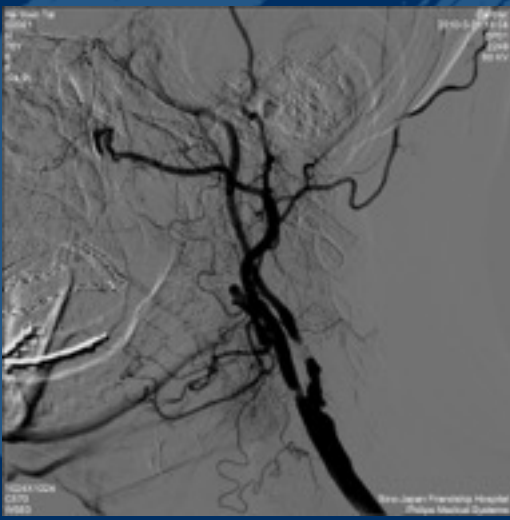
# Is CEA+CAS feasible ?



CAS



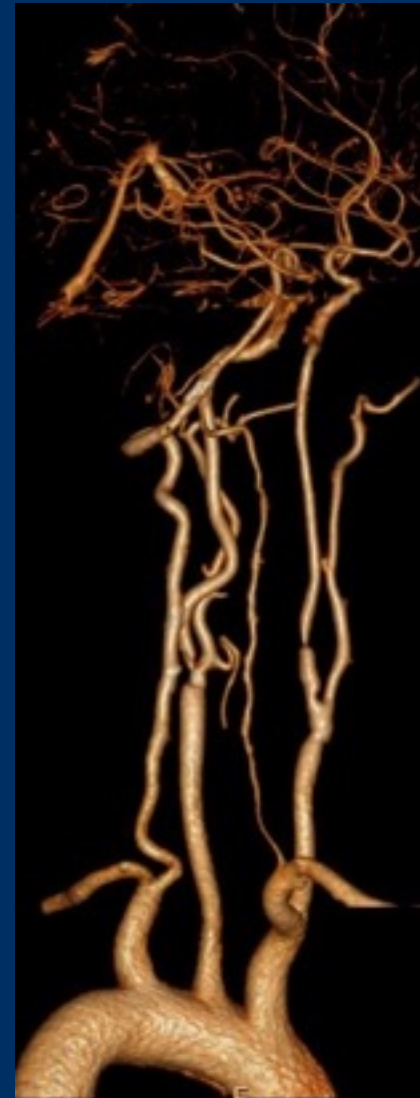
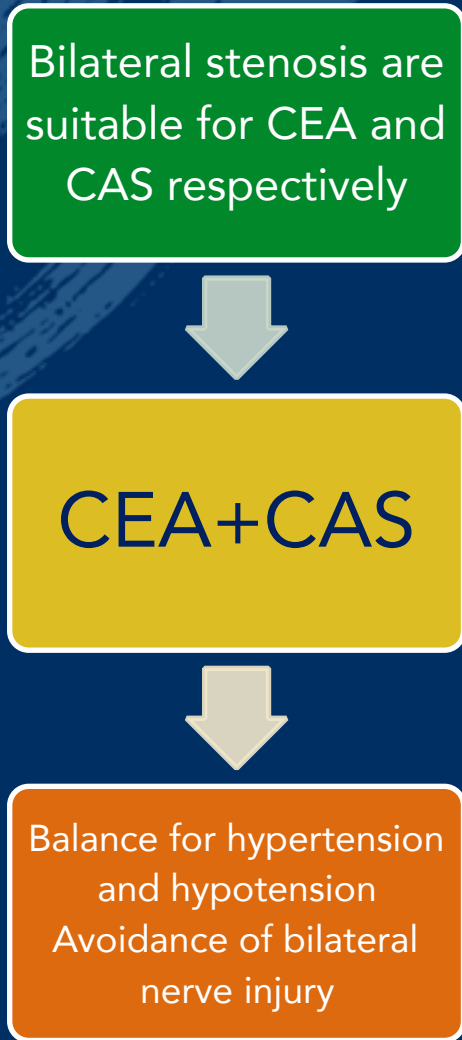
CEA





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# How CEA+CAS Simultaneously?





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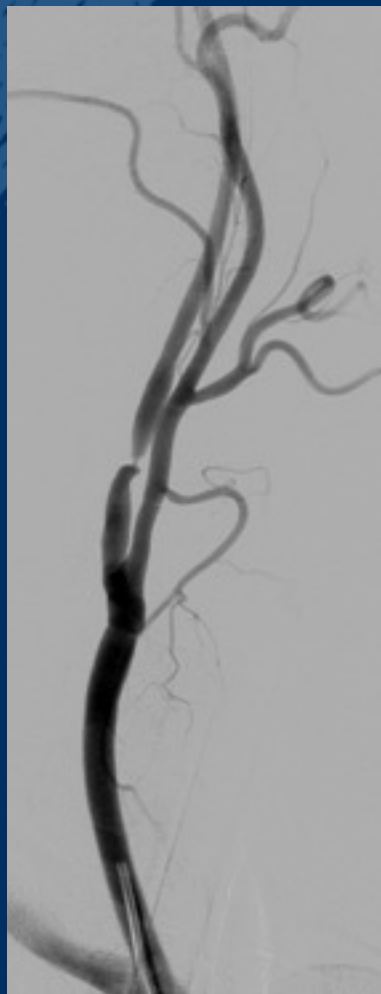
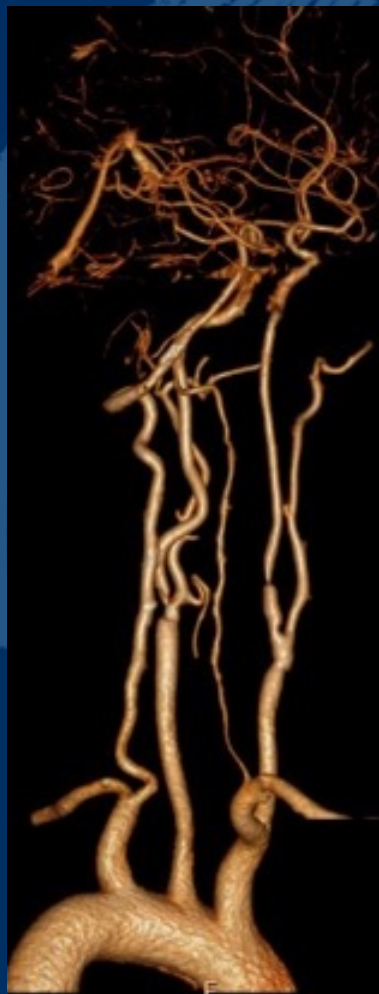
# Respective Study

- Simultaneous CEA and CAS for BCS which is suitable for CEA and CAS respectively
- From October 2010 and August 2014, 8 consecutive patients with BCS
- P-CEA with shunt and CAS performed under distal embolic protection
- Primary endpoint: death, stroke, MI within 30 days



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# Case Example





# Baseline Characteristic

Patient	Age	Risk factors	Symptomatic	Stenosis	Procedure
1	72	HTN,DM,CAD(previous PCI)	+	L-60% R-95%	RCEA-LCAS
2	67	HTN,DM,CAD(previous PCI),previous stroke	+	L-85% R-90%	RCEA-LCAS
3	65	DM,CAD,smoking	+	L-70% R-85%	RCEA-OPCAB-LCAS
4	69	Previous stroke	+	L-80% R-99%	RCEA-LCAS
5	82	HTN,CAD(previous PCI),PAD,smoking	+	L-99% R-50%	RCAS-LCEA
6	53	DM,HL,previous stroke,smoking	+	L-95% R-60%	RCAS-LCEA
7	78	DM, previous stroke,smoking	+	L-60% R-95%	LCAS-RCEA
8	66	HTN, DM,HL	+	L-80% R-99%	RCEA-LCAS



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# 30-day Results

<b><i>Procedural success rate</i></b>	<b>100%</b>
<b><i>Prestenosis</i></b>	<b>CEA 94.6%, CAS 68.1%</b>
<b><i>Poststenosis</i></b>	<b>CEA 0.0%, CAS 3.8%</b>
<b><i>Procedural time (min)</i></b>	<b>188,13</b>
<b><i>Cranial nerve injury</i></b>	<b>0</b>
<b><i>HPS</i></b>	<b>1</b>
<b><i>HD</i></b>	<b>0</b>
<b><i>TIA</i></b>	<b>0</b>
<b><i>Stroke</i></b>	<b>0</b>
<b><i>MI</i></b>	<b>0</b>
<b><i>Death</i></b>	<b>0</b>





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# Summary

- Optimal treatment for bilateral carotid stenosis is contraversal
- BCS treated simultaneously with CEA for unilateral and CAS for contralateral seems feasible and effective in highly selected patients in short term period
- This treatment strategies should be dependent on the patient's anatomic and lesion condition
- Long-term results and RCTs need to studied further



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