



Early Carotid Artery Stenting for Symptomatic Carotid Artery Stenosis

Kyung Sun Song; Chang Wan Oh MD, PhD; Jae Seung Bang MD; O-Ki Kwon MD
Department of Neurosurgery, Seoul National University College of Medicine, Bundang Hospital



Introduction

The aim of present study is to assess safety and efficacy of early CAS in patients with symptomatic carotid artery stenosis compared with delayed CAS.

Learning Objectives

- 1) The carotid stenting is different with Carotid endarterectomy
- 2) it may be a dangerous concept to apply the same early treatment timing policy as CEA for CAS for symptomatic carotid stenosis

Methods

Treatment outcomes of CAS in 156 patients with symptomatic carotid stenosis in single institute from May 2003 to March 2010 were analyzed. Patients were divided into early and delayed group by the time interval from the last ischemic attack to CAS. Early group is symptomatic patient group who underwent CAS within 2 weeks after the last ischemic attack. Fifty-eight patients were included in the early group and 100 CASs in the delayed group. We compared two groups in terms of procedural complication and any ipsilateral stroke or death at 30 days and 365 days after CAS.

Table 1. General patient characteristics

	Early CAS (n=58)	delayed CAS (n=100)	p-value
Sex			0.274
Women	12 (20.7%)	14 (14.0%)	
Men	46 (79.3%)	86 (86.0%)	
Age			0.049
Mean±SD	71.7±8.9	69.3±8.5	
<65years	8 (13.8%)	28 (28.0%)	
≥65years	50 (86.2%)	72 (72.0%)	
Hypertension	47 (81.0%)	84 (84.0%)	0.633
Diabetes	18 (31.0%)	44 (44.0%)	0.108
Hyperlipidemia	20 (34.5%)	30 (30.0%)	0.559
Smoking	39 (67.2%)	61 (61.0%)	0.433
Congestive Heart Failure	7 (12.1%)	7 (7.0%)	0.280
MI	6 (10.3%)	7 (7.0%)	0.461
Pulmonary disease	1 (1.7%)	1 (1%)	0.695
Weighted index of comorbidity			0.607
0-1	37 (63.8%)	58 (58%)	
2-3	15 (25.8%)	33 (33%)	
4~	6 (10.4%)	9 (9%)	
Degree of ipsilateral carotid stenosis			0.448
Moderate (50-69%)	18 (31.0%)	37 (37.0%)	
Severe (70-99%)	40 (69.0%)	63 (63.0%)	
Type of most recent ipsilateral ischemic event			0.375
Transient ischemic attack	12 (20.7%)	27 (27.0%)	
Hemispheric stroke	46 (79.3%)	73 (73.0%)	

Results

There was no difference in periprocedural complication between early and delayed groups. Procedural complications occurred in 4 cases (6.9%) in early group and 8 cases (7.9%) in delayed group (p=0.992). However, there was definite difference in any ipsilateral stroke or death at 30 days and 365 days after CAS. The 30-day any ipsilateral stroke or death rate was 10.3% (6 patients) in early group, but 1% (1 patients) in delayed group (HR=10.140, p=0.034). Also, the 365-day any ipsilateral stroke or death rate was 13.8% (8 patients) in early group, but 4% (4 patients) in delayed group (HR=3.661, p=0.041).

Table 2. Primary End point and other events, According to timing of CAS

	Early CAS (n=58)	Delayed CAS (n=100)	Hazard Ratio for Early CAS vs. Delayed CAS (95%CI)	P value
Periprocedural complications	4 (6.9%)	8 (7.9%)	0.994 (0.292-3.379)	0.992
Minor complications	2 (3.4%)	7 (7.0%)	0.536 (0.108-2.665)	0.446
Ipsilateral stroke	2 (3.4%)	1 (1.0%)	3.387 (0.287-40.025)	0.333
Any death	0	0	N/A*	N/A*
Any ipsilateral stroke or death at 30 days after CAS	6 (10.3%)	1 (1.0%)	10.140 (1.194-86.129)	0.034
Ipsilateral stroke	2 (3.4%)	1 (1.0%)	3.387 (0.287-40.025)	0.333
Any death	4 (6.9%)	0	N/A*	N/A*
Any ipsilateral stroke or death at 365 days after CAS	8 (13.8%)	4 (4.0%)	3.661 (1.054-12.712)	0.041
Ipsilateral stroke	2 (3.4%)	2 (2.0%)	1.941 (0.249-15.148)	0.527
Any death	6 (10.3%)	3 (3.0%)	4.185 (0.908-19.278)	0.066

All hazard ratios were adjusted for age, HTN, hyperlipidemia, smoking, DM, Weighted index of comorbidity, degree of stenosis, and type of most recent ipsilateral ischemic event. Fatal stroke was counted as both a death and a stroke. * Hazard ratio and P value for any death at 30 days were not available (N/A) because of no event in any CAS group, resulting in unreliable estimates.

Conclusions

In early CAS group, the risk of the 1-year outcome of stroke or death was significantly higher than that of delayed group. The early CAS appears to a dangerous procedure in carotid artery stenosis patients with acute neurologic symptoms.

References

1. Setacci C, Cremonesi A. SPACE and EVA-3S trials: the need of standards for carotid stenting. *Eur J Vasc Endovasc Surg* 2007;33:48-49.
2. Mas JL, Trinquart L, Leys D, et al. Endarterectomy Versus Angioplasty in Patients with Symptomatic Severe Carotid Stenosis (EVA-3S) trial: results up to 4 years from a randomised, multicentre trial. *Lancet Neurol* 2008;7:885-892.
3. Grolitzer M, Froeschl A, Puschign D, et al. Is the urgent carotid endarterectomy in patients with acute neurological symptoms a safe procedure? *Interact Cardiovasc Thorac Surg* 2009;8:534-537.
4. Gladstone DJ, Oh J, Fang J, et al. Urgency of carotid endarterectomy for secondary stroke prevention: results from the Registry of the Canadian Stroke Network. *Stroke* 2009;40:2776-2782.
5. Bartoli MA, Squarcioni C, Nicoli F, et al. Early carotid endarterectomy after intravenous thrombolysis for acute ischaemic stroke. *Eur J Vasc Endovasc Surg* 2009;37:512-518.
6. Randomised trial of endarterectomy for recently symptomatic carotid stenosis: final results of the MRC European Carotid Surgery Trial (ECST). *Lancet* 1998;351:1379-1387.
7. Rothwell PM, Eliasziw M, Gutnikov SA, Warlow CP, Barnett HJ. Endarterectomy for symptomatic carotid stenosis in relation to clinical subgroups and timing of surgery. *Lancet* 2004;363:915-924.
8. Golledge J, Cuming R, Beattie DK, Davies AH, Greenhalgh RM. Influence of patient-related variables on the outcome of carotid endarterectomy. *J Vasc Surg* 1996;24:120-126.
9. Sugg RM, Malkoff MD, Noser EA, et al. Endovascular recanalization of internal carotid artery occlusion in acute ischemic stroke. *AJNR Am J Neuroradiol* 2005;26:2591-2594.
10. Groschel K, Knauth M, Ernemann U, Pilgram SM, Schnaudigel S, Kastrup A. Early treatment after a symptomatic event is not associated with an increased risk of stroke in patients undergoing carotid stenting. *Eur J Neurol* 2008;15:2-5.
11. Imai K, Mori T, Izumoto H, Watanabe M, Majima K. Emergency carotid artery stent placement in patients with acute ischemic stroke. *AJNR Am J Neuroradiol* 2005;26:1249-1258.