

Our Experience in Carotid Endarterectomy. A Retrospective Study

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Abstract

Introduction: Carotid endarterectomy (CEA) operations have been more frequent in our practice in recent years, primarily for asymptomatic patients. In this article, we present our experience in this field.

Objectives: Primary endpoints were death and stroke within 30 days of the procedure for asymptomatic patients. Secondary endpoints were acute myocardial infarction within 30 days of the process and peripheral nerve injury in all patients.

Patients and Method:

This is a retrospective review of our recent experience. Data of 219 consecutive CEA, 177 in asymptomatic patients, operated on from January 2004- February 2009 by our equip are collected; all the patients were diagnosed with Duplex scanner and confirmed with multi-slice CT scanner angiography. Endarterectomy was performed either with loco-regional or general anesthesia with selective use of a shunt. Combined anti-aggregation with Clopidogrel and Aspirin was the rule at discharge. Patients were controlled for new neurological and cardiac events 30 days after the operation.

Results: One asymptomatic patient had a major stroke and died. In this group, the stroke and mortality rate is 1,69%. No peri-operative new acute myocardial infarction happened in any patient. Peripheral nerve lesions occurred in 2,7 % of all procedures.

Conclusions: CEA is a safe treatment for asymptomatic internal carotid stenoses in the hands of an experienced vascular surgeon. Our results for asymptomatic carotid stenoses are according to international guidelines' recommendations.

Keywords: carotid endarterectomy; CEA; asymptomatic carotid stenosis;

Introduction

Carotid endarterectomy (CEA) in Albania began in 1988. Several patients were treated in the service of vascular surgery until 1998. However, the patient selection and timing of surgery for cerebral symptoms still needed to be better established, and therefore, the results were not very satisfactory. After a pause, we began the new era of carotid

surgery, this time being careful to follow, at best, the actual guideline recommendations on the subject. We usually treat asymptomatic patients diagnosed during screening workups for other atherosclerosis diseases or risk factors.

Patients and Method

This article presents the results of CEA performed by our equipment during nine years. Patient data are collected from clinical records and postoperative control 30 days after the procedure. This is an article observational retrospective study.

Primary endpoints were death and stroke within 30 days of the procedure. Secondary endpoints were peripheral nerve injury and acute myocardial infarction within 30 days of the procedure in all patients. From January 2004 to February 2009, we realized 219 CEA in 216 patients, 180 men (83 percent) and 36 Women. 177 (180 CEA), 138 men

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and 36 women, were asymptomatic. Only 42 symptomatic men were operated on, 21 patients simultaneously with coronary artery bypass and one simultaneously with a femoral-politeal bypass. Fifty-one patients were scheduled for coronary surgery, and CEA was performed as the first stage procedure.

Patients were aged 50-80, mean age 64 years. The diagnosis was made with Duplex scans and confirmed in all cases with Angio-CT.

The first 30 interventions, 27 for asymptomatic and 3 for symptomatic disease were performed under loco-regional anesthesia. The latter cases, 153 for asymptomatic and 39 for symptomatic disease, were performed under general anesthesia. We did not use any cerebral activity or oxygenation monitoring equipment but constantly measured the retrograde perfusion pressure in the internal carotid artery we were operating on. Mean retrograde pressure > mmHg was considered optimal for CEA without shunting. Based on this consideration, an intra-carotid shunt was used in 60 cases (27%), 54 asymptomatic. The others were considered high-risk patients for CEA without protection. Different reconstructing techniques were used. In asymptomatic patients, there was direct suture in 57 cases, patch angioplasty in 111 (72 Poliuretane, 27 Dacron, and 12 veins), and 9 cases with eversion endarterectomy.

In symptomatic patients, direct suture was used in 12 cases, and patch was used in 30 (Pliuretan 18; PTFE 6; Dacron 3; vein 3).

Results

Only three asymptomatic patients had a peri-operative stroke, and he died on the fourth postoperative day. Thus, the stroke and death rate for this group is 1,69%. The patient was operated on under local anesthesia, without shunting, and had direct suture closure. Among the few symptomatic patients we had, 6 developed nonfatal strokes (6/42), two in the local infiltrative and four in the general anesthesia group; two were operated on with a shunt and four without, and all three had patch angioplasty. No other stroke happened during the follow-up period.

Six of 216 patients (2.7% of all CEA procedures) had peripheral nerve deficits (one facial and one laryngeal), and three were in each anesthetic group. No acute myocardial infarction occurred during the 30-day follow-up period.

Discussion

CEA should be a routine procedure for vascular surgeons, but in our recent experience, it makes up less than 5% of surgical interventions for arterial disease. This results from a need for more knowledge among medical practitioners about the preventive value of this procedure on stroke. On the other hand, cardiologists and cardiac surgeons are more interested in preventive CEA in their patients. 35% of our patients were

sent to us by them. It is well known that the more procedures a surgeon performs, the better his results.[1]

We were careful to fulfill the actual guidelines of the larger International Vascular Society for carotid surgery. All our asymptomatic patients had ICA stenosis >70% and symptomatic patients >50%. [2]

Our death and significant stroke rates for asymptomatic patients of 1.69% are well within the limits of 3% accepted by substantial studies and guidelines. [2, 3, 4, 5, 6, 7]

We can not say the same for our small group of symptomatic patients. However, three strokes and the only death happened in the first 30 patients of this cohort (2004-2005).

In the following 189 cases (2006- 2009), we had no stroke or death among asymptomatic patients and only three strokes and no death among 39 symptomatic patients, resulting in a better stroke rate for symptomatic cases. Our results are promising and encouraging based on the limited number of operations. We have chosen to use intra-carotid shunting for cerebral protection in selective cases based on retrograde internal carotid pressure, as recommended in the recent guidelines. [2]

No stroke rate difference resulted in the cohort's shunt usage. 3 in 60 CEA performed with a shunt, and 9 in 159 operated without it had postoperative strokes. CEA has been proven to be very effective in preventing stroke and related death in symptomatic and non-symptomatic patients with more than 60-70% internal carotid artery stenosis.[3,4,5,6,7]

There is also good evidence that CEA is an effective preventive measure in cases with less significant stenosis but with ulcerated plaques. [8, 9] So, generally speaking, the indication for CEA is related to nine main items: the presence of symptoms, the grade of stenosis, and the presence of ulcerated plaques.

This last item is essential since ulcerative lesions, irregular surfaces, and vulnerable plaques predispose to thrombus formation and thromboembolic TIAs or small brain infarcts. In our experience, we have frequently encountered specimens of endarterectomy with adherent thrombus. It remains unclear the timing of CEA in patients with indications for coronary artery bypass surgery.[10]

In our experience, 21 patients had simultaneous carotid and coronary surgery with CEA executed as the first step, and 51 patients had staged procedures with coronary surgery postponed for 4-6 weeks after CEA.

In total, we have performed CEA before or concurrent with coronary artery surgery in 72 patients (1/3 of cases) with no new myocardial infarction or peri-operative death. Both loco-regional and general anesthesia are indifferent regarding post-procedure stroke, myocardial infarction, or death.

AGALA study very recently has confirmed this [11]. In our experience, we have used both techniques without any difference in the results, although lately, we have favored general anesthesia as it is most comfortable for the patient. Loco-regional anesthesia may be more reliable in cases with occlusion or high-grade stenosis of the contralateral carotid artery.

Conclusions

CEA in asymptomatic patients is a safe procedure in the hands of an experienced vascular surgeon.

Our results are comparable with those recommended by international guidelines for stroke, death, cardiac event, or peripheral nerve damage. Still, long-term follow-up studies in our patients in the future should clarify the efficacy of CEA for stroke prevention over 3-5 years and the rate of restenoses. Increasing numbers of CEA procedures is crucial for surgeons to refine the technique to ensure better results, even for symptomatic patients.

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References:

1. Mas JL, Trinquart L, Leys D, Albucher JF, Rousseau H, Viguier A, et al. Endarterectomy Versus Angioplasty in Patients with Symptomatic Severe Carotid Stenosis (EVA-3S) trial: results up to 4 years from a randomized, multicentre trial. *Lancet Neurol.* 2008 Oct. 7 (10):885-92. [QxMD MEDLINE Link].
2. Wiesmann M, Schöpf V, Jansen O, Brückmann H. Stent-protected angioplasty versus carotid endarterectomy in patients with carotid artery stenosis: meta-analysis of randomized trial data. *Eur Radiol.* 2008 Dec. 18 (12):2956-66. [QxMD MEDLINE Link].
3. Brown K, Itum DS, Preiss J, Duwayri Y, Veeraswamy RK, Salam A, et al. Carotid artery stenting has an increased risk of external carotid artery occlusion compared with carotid endarterectomy. *J Vasc Surg.* 2015 Jan. 61 (1):119-24. [QxMD MEDLINE Link].
4. Hye RJ, Mackey A, Hill MD, Voeks JH, Cohen DJ, Wang K, et al. Incidence, outcomes, and effect on quality of life of cranial nerve injury in the Carotid Revascularization Endarterectomy versus Stenting Trial. *J Vasc Surg.* 2015 May. 61 (5):1208-14. [QxMD MEDLINE Link].
5. Brott TG, Calvet D, Howard G, Gregson J, Algra A, Becquemin JP, et al. Long-term outcomes of stenting and endarterectomy for symptomatic carotid stenosis: a preplanned pooled analysis of individual patient data. *Lancet Neurol.* 2019 Apr. 18 (4):348-356. [QxMD MEDLINE Link].
6. Naazie IN, Magee GA, Mathlouthi A, Elsayed N, Dakour-Aridi H, Malas MB. Primary mechanism of stroke reduction in transcarotid artery revascularization is dynamic flow reversal. *J Vasc Surg.* 2021 Jul. 74 (1):187-194. [QxMD MEDLINE Link].
7. Kwolek CJ, Jaff MR, Leal JI, Hopkins LN, Shah RM, Hanover TM, et al. Results of the ROADSTER multicenter trial of transcarotid stenting with dynamic flow reversal. *J Vasc Surg.* 2015 Nov. 62 (5):1227-34. [QxMD MEDLINE Link].
8. Malas MB, Leal Lorenzo JI, Nejim B, Hanover TM, Mehta M, Kashyap V, et al. Analysis of the ROADSTER pivotal and extended-access cohorts shows excellent 1-year durability of transcarotid stenting with dynamic flow reversal. *J Vasc Surg.* 2019 Jun. 69 (6):1786-1796. [QxMD MEDLINE Link].
9. Schermerhorn ML, Liang P, Dakour-Aridi H, Kashyap VS, Wang GJ, Nolan BW, et al. In-hospital outcomes of transcarotid artery revascularization and carotid endarterectomy in the Society for Vascular Surgery Vascular Quality Initiative. *J Vasc Surg.* 2020 Jan. 71 (1):87-95. [QxMD MEDLINE Link].
10. Malas MB, Dakour-Aridi H, Wang GJ, Kashyap VS, Motaganahalli RL, Eldrup-Jorgensen J, et al. Transcarotid artery revascularization versus transfemoral carotid artery stenting in the Society for Vascular Surgery Vascular Quality Initiative. *J Vasc Surg.* 2019 Jan. 69 (1):92-103.e2. [QxMD MEDLINE Link].
11. Schermerhorn ML, Liang P, Eldrup-Jorgensen J, Cronenwett JL, Nolan BW, Kashyap VS, et al. Association of Transcarotid Artery Revascularization vs Transfemoral Carotid Artery Stenting With Stroke or Death Among Patients With Carotid Artery Stenosis. *JAMA.* 2019 Dec 17. 322 (23):2313-2322. [QxMD MEDLINE Link].