THE ANATOLIAN JOURNAL OF CARDIOLOGY

Official journal of the TURKISH SOCIETY OF CARDIOLOGY

Reply to Letter to the Editor: "The Predictors of Asymptomatic Cerebral Embolism After Carotid Artery Stenting"

LETTER TO THE EDITOR REPLY

To the Editor,

Deciding to treat carotid stenosis with stenting or endarterectomy is very important and requires a serious clinical experience.[1] The most important periprocedural complication associated with carotid artery stenting (CAS) is cranial embolism. Periprocedural embolism due to CAS has many causes that have been demonstrated so far. Complex vascular anatomy, type III aortic arch, vascular tortuosity, prolonged CAS duration, stent type, plague morphology, inexperienced operator... to name a few.[2,3] In particular, investigating the causes of periprocedural asymptomatic cranial embolism related to CAS increases the reliability of CAS. The aim of many studies such as ours is to reveal the causes and solutions of cranial embolism due to CAS.

In our study,[4] many patients and lesion groups who have cranial embolism due to CAS were excluded (Table 1, Supplement Table 1). Therefore, we did not include

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria

- Symptomatic ICA stenosis ≥ 50% on DSA;
- Asymptomatic ICA stenosis ≥ 80% on DSA;
- The ipsilateral external carotid artery is not totally occluded;
- Patent contralateral ICA;
- A complete circle of Willis (assessed by CTA);
- Filter able to pass through the lesion without the need for predilation (assessed by CTA);
- Presence of adequate landing zone for the filter (4 cm) (assessed by CTA);
- Informed consent form for the procedure signed by patients.

Exclusion criteria

- Patients who are symptomatic after CAS (21 patients);
- Periprocedural haemodynamic instability (>10 minutes) (16 patients);
- Distal ICA spasm (12 patients);
- >30% residual stenosis (11 patients);
- Procedure time > 45 minutes (10 patients);
- Diffusion limitation in the watershed area of the collateral carotid artery on cranial DW-MRI after CAS, bilateral diffusion limitation, and watershed diffusion limitation (24 patients);
- Need for repeated pre/post dilation (9 patients);
- Balloon dilation under an atmosphere pressure 20% greater than the nominal balloon pressure (5 patients);
- CEA restenosis, history of radiotherapy, routine use of anticoagulants (34 patients);
- Tip III aortic arch (84 patients);
- Ischemic stroke in the past 48 hours (14 patients);
- Poor image quality of cranial DWMRI, contraindication for DWMRI (pacemaker, claustrophobia) (21 patients).

CAS, carotid artery stenting; CEA, carotid endarterectomy; CTA, computed tomography angiography; DSA, digital subtraction angiography; ICA, internal carotid artery; DWMRI, diffusion-weighted magnetic resonance imaging.

Erkan Köklü

Department of Cardiology, University of Health Sciences, Antalya Training and Research Hospital, Antalya, Turkey

Corresponding author:
Erkan Köklü
✉ drerkankoklu07@gmail.com

Cite this article as: Köklü E. Reply to letter to the editor: "the predictors of asymptomatic cerebral embolism after carotid artery stenting". *Anatol J Cardiol.* 2022;26(7):595-596.

DOI:10.5152/AnatolJCardiol.2022.1953

many groups with a high risk of cranial embolism due to CAS, which the authors mentioned. While doing this, we aimed to reveal the stent type and the risk of cranial embolism due to CAS more clearly in our selected patient group. For example, we did not include the cases mentioned by the authors such as ulcerated and thrombotic lesions, tortuous vascular anatomy, prolonged procedure time (procedure time > 45 minutes), type III aortic arch, etc.

Our study differs from other studies in some aspects. First of all, our study was conducted in a very special group (Table 1, Supplement Table 1). In our patients, not only the distal embolism protection method but also the proximal embolism protection method was used. All cases were multidisciplinary and followed up by an invasive cardiologist and an interventional vascular neurologist. Antiaggregant resistance was studied in all patients before the CAS procedure.

In our study, the duration of fluoroscopy was not given. Because cases with long and complicated CAS procedures such as those with a prolonged procedure time (>45 minutes), those who required repetitive balloon inflation, those with distal internal carotid artery spasm, and those with hemodynamic instability were not included in our study.

The fact that the serum biochemical or physiological indicator suggested by the authors was not used in our study is a shortcoming. Intravascular ultrasound or magnetic resonance imaging may have been more beneficial to evaluate carotid plaque morphology and plague locations.

REFERENCES

1. Köklü E, Arslan Ş, Sarıönder Gencer E, Bayar N, Avcı R, Özgünoğlu EC. Six-year outcomes of carotid artery stenting performed with multidisciplinary management in a single center. *Anatol J Cardiol*. 2021;25(6):385-394. [CrossRef]
2. Köklü E, Gencer ES. Plaque morphology effect on periprocedural asymptomatic cerebral embolism in carotid artery stenting using first-generation carotid stents: A diffusionweighted magnetic resonance imaging study. *Kardiol Pol*. 2022;80(3): 307-314. [CrossRef]
3. Bijuklic K, Wandler A, Varnakov Y, Tuebler T, Schofer J. Risk factors for cerebral embolization after carotid artery stenting with embolic protection: a diffusion-weighted magnetic resonance imaging study in 837 consecutive patients. *Circ Cardiovasc Interv*. 2013;6(3):311-316. [CrossRef]
4. Köklü E, Arslan Ş, Sarıönder Gencer E, et al. Asymptomatic Cerebral Emboli Following Carotid Artery Stenting: A Diffusion-Weighted MRI Study. Anatol J Cardiol. 2022;26(4):298-304. [CrossRef]

Supplement Table 1. Patients who were at risk for carotid artery stenting and thus underwent CEA
Patient or lesion characteristics
• Femoral access problem • Arcus aorta is severely atherosclerotic or calcified • Common carotid artery is severely tortuous • Carotid artery lesion length > 40 mm • Diameter of carotid artery closer to the bifurcation > 10 mm • Dense calcification in the carotid artery in the area of stenosis (Gray- Weale Type IV) • Carotis artery plaque is severely ulcerated or densely thrombotic • GFR < 30 mL/min/1.73 m^2 • Resistance to acetylsalicylic acid and clopidogrel

CEA, carotid endarterectomy; GFR, glomerular filtration rate