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## LETTER TO THE EDITOR

### Rate of complications due to carotid angioplasty in a tertiary university hospital

**Isabella Sales de Macêdo, Rafaela Almeida Alquères, Lorena Souza Viana,  
Paulo Puglia Jr, Adriana Bastos Conforto**

Extracranial internal carotid artery stenosis  $\geq$  50% causes up to 8% of all ischemic strokes<sup>1</sup>. According to guidelines from the American Heart Association/American Stroke Association<sup>2</sup>, patients with stroke and absent or mild disability should be submitted to carotid artery endarterectomy (CAE) or carotid artery stenting (CAS). CAS is considered an alternative to CAE for symptomatic patients when the rate of periprocedural stroke or death is  $<$ 6% (Recommendation Class IIa, Level B). Most of the data about risks of CAS has been collected in developed countries<sup>3-9</sup>. There is limited information about rates of complications in developing countries<sup>10,11</sup>.

The primary aim of this study was to assess rates of periprocedural major complications (stroke, myocardial infarction or death) of ICA-CAS in patients with symptomatic carotid stenosis at a reference academic hospital in São Paulo, Brazil. The secondary aims were to evaluate other major and minor complications of this procedure.

In this single-center retrospective study, we evaluated medical records of consecutive patients treated for symptomatic carotid stenosis at *Hospital das Clínicas / Sao Paulo University* in Brazil between April 2011 and March 2016. Patients aged 18 years old or more who underwent CAS according to the institutional protocol, were admitted to the Neurology Ward and followed-up by neurologists until discharge, were included.

We analyzed charts of 73 patients and included 65 in the study. The following information was retrieved

from medical records: age, gender, ethnicity, comorbidities (hypertension, diabetes, cardiopathy, coagulopathy, smoking, prior stroke), interval between the onset symptoms and the procedure, use of antiplatelet or anticoagulant drugs, type of cerebrovascular event (stroke or transient ischemic attack), blood creatinine levels and National Institutes of Health Stroke Scale (NIHSS) scores.

The primary outcome was the frequency of any stroke, myocardial infarction (MI) or death during the periprocedural period (until discharge from the hospital). The secondary outcomes were classified in major or minor complications based on guidelines of the European Society of Cardiology<sup>12</sup>. Major complications were: intracranial hemorrhage, hyperperfusion syndrome, carotid artery perforation, acute stent thrombosis and complications at the site of vascular puncture. Minor complications were transient ischemic attacks, hypotension, vasospasm, bradycardia and ICA dissection. In addition, we also assessed the secondary outcome of relevant worsening in renal function (increase in creatinine blood levels of at least 1.5 baseline levels)<sup>13</sup> as a minor complication.

The main finding in the study was a rate of periprocedural stroke, MI or death of 4.6% (3/65). There were two ischemic ipsilateral recurrent strokes (3.6%). One patient (1.5%) had a haemorrhagic stroke and died. There were no myocardial infarctions. The rate of minor complications was 21.5% (14/65) and there were no permanent clinical, physical or neurological impairments.

Taken together, our results show a rate of

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Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazil.

periprocedural complications due to CAS below the maximum recommended rate of 6% for revascularization procedures. Thus, CAS was safe when performed as a

revascularization strategy in clinical practice at a high-volume reference Brazilian center.

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