Ultrasound assessment of Internal Carotid Stenosis Pre- and Post-Endarterectomy of Contralateral Near-occluded Carotid

Yusuf Nawras[1*], Vaishnavi Aradhyula[1], Lauren Workman[1], Fedor Lurie[2]

[1]College of Medicine and Life Sciences, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

[2]ProMedica Health System, Jobst Vascular Institute, 2109 Hughes Drive, Suite 400, Toledo OH 43606

Email: yusuf.nawras@rockets.utoledo.edu

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Introduction: Internal carotid artery (ICA) stenosis often presents bilaterally and is a major cause of stroke. Carotid duplex ultrasound is used for stenosis estimation via peak systolic velocity (PSV), end diastolic velocity (EDV), and ICA/common carotid artery (CCA) ratio. Carotid endarterectomy (CEA) is a common surgery for ICA stenosis and carries a high risk of stroke and mortality.

Objectives: We hypothesize that estimating velocities of the unoperated ICA pre- and post CEA of the contralateral near-occluded ICA, can lead to the proper development of a new criterion of diagnosis that would provide more accurate estimates of the presence of bilateral ICA stenosis.

Methods: A retrospective study was conducted on 239 patients, >18 years old, who underwent routine carotid duplex ultrasound during 2 years at a single institution. Qualified patients had bilateral carotid stenosis with ICA near occlusive disease on one side and more than 70% stenosis on the other side underwent unilateral CEA on the near occluded side.

Results: Post-CEA of near occluded ICA, the PSV, EDV, and ICA/CCA ratio of contralateral unoperated ICA significantly decreased (PSV pre-CEA=145±80 vs. post-CEA=128±67, p<0.001; EDV pre-CEA=42±28 vs. post-CEA=36±230, p<0.001; ICA/CCA pre-CEA 1.85±1.2 vs. 1.75±1.2, p=0.032). If we classify unoperated ICA stenosis as <50%, there was an 81.6% increase in cases pre- to post-CEA. If we classify stenosis as 50-69%, pre- to post-CEA cases decreased by 72.2%. If we classify stenosis as >70%, pre- to post-CEA cases decreased by 26.7%. Finally, classifying stenosis as 80-99%, pre- to post-CEA cases decreased by 100%.

Conclusions: The contralateral PSV, EDV, and ICA/CCA ratio are elevated in the presence of innate near occlusion, artificially elevating stenosis (Fig. 1). This study provides novel insight into revision of duplex ultrasound criteria for accurate estimation of unoperated ICA stenosis to avoid unnecessary high-risk surgery.

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