JACC: CARDIOVASCULAR INTERVENTIONS VOL. 7, NO. 2, 2014

ISSN 1936-8798/$36.00
PUBLISHED BY ELSEVIER INC. http://dx.doi.org/10.1016/j.jcin.2013.11.004

Carotid Artery Stenting for Recurrent Carotid Artery Restenosis After Previous Ipsilateral Carotid Artery Endarterectomy or Stenting

CME

A Report From the National Cardiovascular Data Registry

Brian G. Hynes, MD,* Kevin F. Kennedy, MS,† Nicholas J. Ruggiero, II, MD,‡ Thomas J. Kiernan, MD,* Ronan J. Margey, MD,* Kenneth Rosenfield, MD,* Joseph M. Garasic, MD*

Boston, Massachusetts; Kansas City, Missouri; and Philadelphia, Pennsylvania

JACC: CARDIOVASCULAR INTERVENTIONS CME

This article has been selected as this issue's CME activity, available online at http://interventions.onlinejacc.org/ by selecting the CME tab on the top navigation bar.

Accreditation and Designation Statement

The American College of Cardiology Foundation (ACCF) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The ACCF designates this Journal-based CME activity for a maximum of 1 *AMA PRA Category 1 Credit(s)*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Method of Participation and Receipt of CME Certificate

To obtain credit for this CME activity, you must:

1. Be an ACC member or *JACC: Cardiovascular Interventions* subscriber.
2. Carefully read the CME-designated article available online and in this issue of the journal.
3. Answer the post-test questions. At least 2 out of the 3 questions provided must be answered correctly to obtain CME credit.
4. Complete a brief evaluation.
5. Claim your CME credit and receive your certificate electronically by following the instructions given at the conclusion of the activity.

CME Objective for This Article:

At the completion of this article, the learner should be able to: 1) discuss the relationship between carotid artery restenosis and the risk of ipsilateral stroke in patients who have undergone carotid artery revascularization; 2) compare the outcomes of patients undergoing carotid artery stenting for ipsilateral restenosis to those undergoing stenting for de novo lesions; and 3) evaluate the effectiveness of carotid artery stenting for patients who have previously undergone carotid artery revascularization and developed restenosis.

CME Editor Disclosure: *JACC: Cardiovascular Interventions* CME Editor Habib Samady, MB, ChB, FACC, has research grants from the Wallace H. Coulter Foundation, Volcano Corp., St. Jude Medical, Forrest Pharmaceuticals Inc., and Pfizer Inc.

Author Disclosure: National Cardiovascular Data Registry (NCDR) of the American College of Cardiology Foundation. Dr. Ruggiero is a consultant for St. Jude Medical. Dr. Margey is a Physician Proctor for Edwards LifeSciences. Dr. Rosenfield has received research grants from Abbott Vascular, Bard Peripheral Vascular, Medtronic/Invatec, Lutonix Bard, and Atrium; has received consulting/advisory board fees from Abbott Vascular, Boston Scientific, Complete Conference Management, Harvard Clinical Research Institute, Contego, Micell, The Medicines Company, and Becker Ventures; has equity in Lumen Biomedical, Medical Stimulation Corp., Angioguard (Cordis), and Micell; and has served on the board of directors of VIVA Physicians (501C3). Dr. Garasic has received consulting/advisory board fees from and has an equity interest in Access Closure, Inc. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Medium of Participation: Print (article only); online (article and quiz).

CME Term of Approval:

Issue Date: February 2014
Expiration Date: January 31, 2015

From the *Cardiology Division, Department of Medicine, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts; †Saint Luke's Mid America Heart Institute, Kansas City, Missouri; and the ‡Department of Interventional Cardiology, Jefferson University Hospitals, Philadelphia, Pennsylvania. This research was supported by the National Cardiovascular Data Registry (NCDR) of the American College of Cardiology Foundation. The views expressed in this paper represent those of the authors and do not necessarily represent the official views of the National Cardiovascular Data Registry or its associated professional societies identified at http://www.ncdr.com. Dr. Ruggiero is a consultant for St. Jude Medical. Dr. Margey is a Physician Proctor for Edwards LifeSciences. Dr. Rosenfield has received research grants from Abbott Vascular, Bard Peripheral Vascular, Medtronic/Invatec, Lutonix Bard, and Atrium; has received consulting/advisory board fees from Abbott Vascular, Boston Scientific, Complete

Carotid Artery Stenting for Recurrent Carotid Artery Restenosis After Previous Ipsilateral Carotid Artery Endarterectomy or Stenting

A Report From the National Cardiovascular Data Registry

Objectives The purpose of this study was to evaluate and compare outcomes of patients undergoing carotid artery stenting (CAS) for ipsilateral restenosis, after either previous CAS or carotid artery endarterectomy (CEA) (CAS-R group), with those of patients who had CAS performed for de novo carotid atherosclerotic stenosis (CAS-DN group).

Background Therapeutic revascularization strategies to reduce stroke include CAS and CEA. Limited data exist concerning the outcomes of CAS in the setting of previous ipsilateral carotid revascularization.

Methods Patients enrolled in the CARE (Carotid Artery Revascularization and Endarterectomy) registry who underwent CAS were identified and separated into 2 groups: those undergoing CAS after previous ipsilateral CEA or CAS (CAS-R group, n = 1,996) and those who had CAS performed for de novo atherosclerotic carotid stenosis (CAS-DN group, n = 10,122). We analyzed the clinical and procedural factors associated with CAS-R and CAS-DN between January 1, 2005, and October 8, 2012. Propensity score matching using 19 clinical and 9 procedural characteristics was used, yielding 1,756 patients in each CAS cohort.

Results The primary endpoint composite of in-hospital death or stroke or myocardial infarction (MI) occurred less often in the CAS-R compared with CAS-DN patients (1.9% vs. 3.2%; p = 0.019). In-hospital adverse cerebrovascular events (stroke or transient ischemic attack) occurred less frequently in the CAS-R cohort (2.2% vs. 3.6%; p < 0.001). However, there was no significant difference in the composite of death, stroke, or MI at 30 days between both groups.

Conclusions Patients who underwent CAS for restenosis after previous ipsilateral revascularization had lower periprocedural adverse event rates and comparable 30-day adverse event rates compared with CAS for de novo carotid artery stenosis.
(J Am Coll Cardiol Intv 2014;7:180–6)

Carotid artery revascularization strategies include carotid artery endarterectomy (CEA) and carotid artery stenting (CAS) (1). However, the optimal management strategy of obstructive atherosclerotic carotid artery disease after previous ipsilateral revascularization, with either CEA or CAS, remains unclear. Severe carotid artery restenosis or occlusion after previous surgical or endovascular treatment is associated with an increased risk of adverse cerebrovascular events (2). Revascularization may be indicated for CAS in-stent restenosis, failure of CEA, or progression of stenosis adjacent to the previous operative or endovascular interventional site. The purpose of this study, using CARE (Carotid Artery Revascularization and Endarterectomy) registry data, was to evaluate and compare outcomes of patients undergoing CAS for ipsilateral restenosis, either after previous CAS or CEA (CAS-R group), with those of patients who had CAS performed for de novo carotid atherosclerotic stenosis (CAS-DN group). We identified clinical and procedural characteristics of patients requiring CAS after previous ipsilateral carotid revascularization. Within these 2 groups (CAS-R and CAS-DN), we also examined outcomes stratified by the presence of symptomatic carotid artery disease.

Methods

The CARE registry is an initiative of the American College of Cardiology Foundation, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, American Academy of Neurology, American Association of Neurological Surgeons/Congress of Neurological Surgeons, Society for Vascular Medicine, and Society of Vascular and Interventional Neurology.

Details pertaining to the CARE registry have been described in depth elsewhere (3). Briefly, this registry was established to document and review clinical outcomes for patients undergoing carotid artery revascularization. Data relating to clinical characteristics, procedural appropriateness, and 30-day outcomes are included. Independent neurological assessment using the National Institutes of Health Stroke Scale performed immediately before and after

Conference Management, Harvard Clinical Research Institute, Contego, Micell, Medicines Company, and Becker Ventures; has equity in Lumen Biomedical, Medical Stimulation Corp., Angioguard (Cordis), and Micell; and has served on the board of directors of VIVA Physicians (501C3). Dr. Garasic has received consulting/advisory board fees from and has an equity interest in Access Closure, Inc. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Manuscript received July 3, 2013; revised manuscript received November 1, 2013, accepted November 7, 2013.