

Skin to Skin Transfemoral Carotid Angiography and Stenting

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KEYWORDS

- Carotid artery stenting • Carotid endarterectomy • Carotid artery disease
- Transfemoral carotid angiography

KEY POINTS

- Carotid artery stenting (CAS) continues to have improving results in both standard-risk and high-risk patients with carotid artery disease.
- This successful, low-risk carotid stenting occurs when CAS is performed by experienced, appropriately trained operators who use good patient and lesion selection, sound judgment, and meticulous attention to procedural technique.
- With careful attention to these principles, CAS can be appropriately applied to help a large number of patients with carotid artery disease.

In addition to operator experience and careful case selection, meticulous attention to procedural technique is essential to successful, low-risk carotid artery stenting (CAS). This article reviews CAS procedural techniques, sharing advice and lessons learned, in the hope of providing a reference for CAS techniques. Patient preparation and the procedure from angiography through stenting are described. In addition, proximal and distal embolic protection is discussed, including advantages and nuances of technique. Also discussed are unique situations encountered, including brachiocephalic lesions, common complications of CAS, and techniques for challenging anatomy.

The author hopes that his experience of more than 1700 CAS procedures, coupled with expert opinions of many skilled CAS operators, will serve as a valuable reference for interested CAS operators.

BACKGROUND

Stroke is a devastating problem, occurring approximately 800,000 times annually in the United

States and Europe.¹ A significant proportion of these strokes is due to atherosclerotic carotid artery disease. CAS has emerged as an attractive alternative to carotid endarterectomy (CEA), especially in patients at high risk for CEA. In both standard-risk and high-risk CEA patients, results of carotid stenting continue to improve, such that the last 4 major investigational exemption (IDE) trials show less than or equal to 3% stroke and death rates, even in patients at high risk for CEA (Figs. 1 and 2).^{2–8} These improving results are likely secondary to increased operator experience, translating into better case selection and better procedural technique, as well as advances in carotid stent technology. Here the author shares his experience, hoping to provide insights into optimal techniques for CAS.

It is important to emphasize that the improving CAS results do not translate to all carotid stent operators. These results, like results in CEA procedures, are seen in centers with experienced operators. Some background considerations are critically important in relation to a description of CAS techniques. There are several important

The author has nothing to disclose.

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Intervent Cardiol Clin 3 (2014) 37–49

<http://dx.doi.org/10.1016/j.iccl.2013.09.007>

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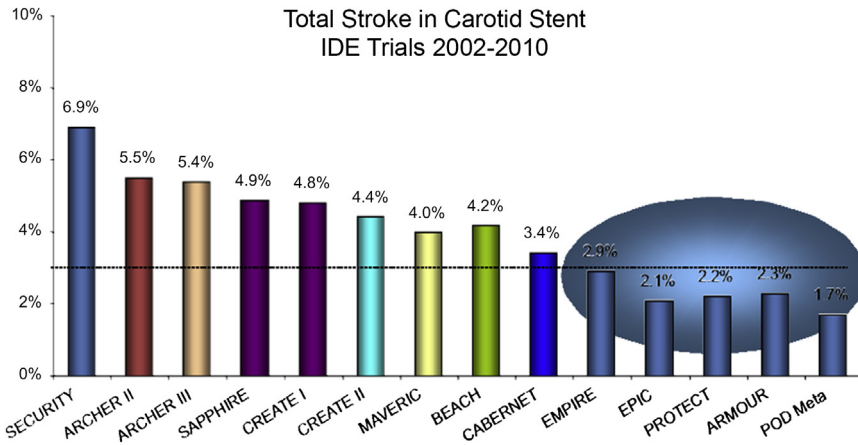


Fig. 1. Improving results in carotid artery stenting trials. IDE, investigational exemption. (From Bersin RM, Stabile E, Ansel GM, et al. A meta-analysis of proximal occlusion device outcomes in carotid artery stenting. *Catheter Cardiovasc Interv* 2012;80:1072-8; with permission.)

determinants for optimal CAS results, the first being operator experience. Before starting any independent CAS training, operators should be board certified in an interventional specialty (eg, vascular surgery, interventional radiology, neuroradiology, or interventional cardiology). Moreover, they should satisfy their society's position paper for carotid stenting, and have experience with non-CAS endovascular procedures (>50 independent endovascular procedures). Furthermore, in addition to a thorough understanding of neuroanatomy and function, an absolute minimum of 50 diagnostic

carotid angiograms and 25 hands-on proctored cases should be performed with an experienced, credentialed operator before embarking on an independent CAS career. Throughout one's CAS career, case selection cannot be overemphasized: this includes patient selection (avoiding carefully patients with decreased cerebral reserve; eg, patients with dementia; octogenarians and patients with renal insufficiency also need to be approached carefully^{9,10}). Patients' lesion characteristics are also important, and cases with severe calcification, severe carotid or

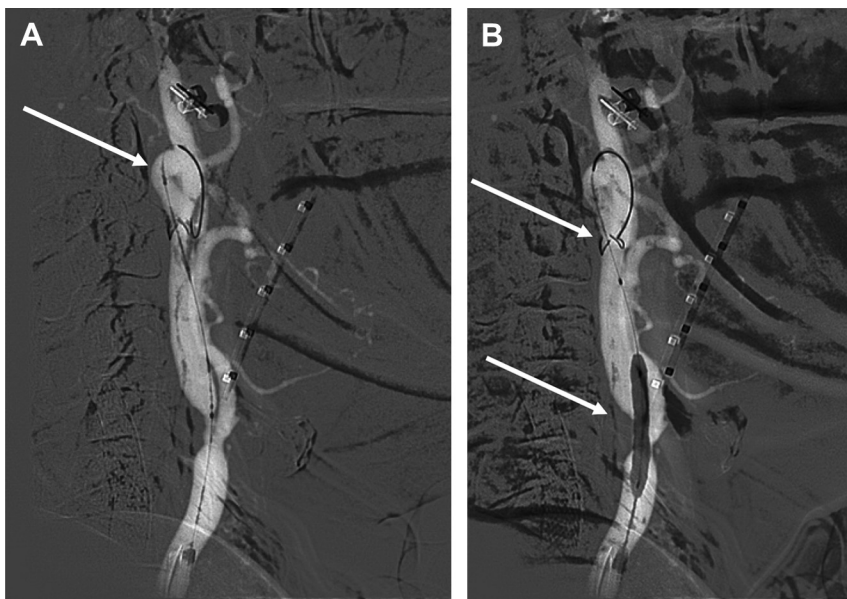


Fig. 2. (A) Roadmap for wiring lesion. Arrow indicates wire in place. (B) Roadmap for EPD placement (*higher arrow*) and predilation angioplasty (*lower arrow*).

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