



Neurovascular Service: Carotid Artery Angioplasty and Stent Procedure

Angioplasty and stenting for the treatment of carotid stenosis has developed over several decades. It is known that patients with symptomatic carotid stenosis of more than 70% benefit from intervention. Carotid endarterectomy (CEA) has been the gold standard for treatment with a 9% stroke rate compared to 26% with medical treatment over 2 years and a 3.3 % risk of cerebrovascular event according to the North American Symptomatic Carotid Endarterectomy Trial (NASCET). The Carotid Revascularization: Endarterectomy versus Stent Trial (CREST) has shown that angioplasty and stent is as safe as open surgery, 7.2 and 6.8% respectively for each group during four years of follow up. The peri-procedural risk of stroke was 4.1% for stent vs. 2.3% for endarterectomy while the myocardial infarct was 1.1% for stent vs. 2.3% for endarterectomy. In high risk patients, the Stenting and Angioplasty in Patients with Protection in Patients at High Risk for Endarterectomy (SAPPHIRE) Trial has shown that carotid stenting with a distal protection device is safer than CEA with a Major Adverse Event rate of 11.9% vs. 19.9% at one year. Patients in this group include those with previous neck surgery, radiation treatment, high carotid artery bifurcation, cardiac or pulmonary disease and poor general anesthesia risk. Stenoses of the carotid artery origins, vertebral arteries or intracranial arteries are specifically accessible to Neurointerventionalists.

Patients are screened for this procedure by a team of physicians including Interventional Neuroradiology, Neurosurgery and Neurology. This insures a patient is selected by proper criteria and receives long-term follow up. Typically, a patient should be symptomatic and have at least 70% stenosis of the affected carotid artery. Patients may have had previous stroke or TIA's. Most will have undergone MRI/MRA or CTA and carotid/Transcranial Doppler Ultrasound to determine if an artery is narrow. If a patient has had a stroke, the procedure may be done several weeks afterward to limit the chances of bleeding from the anticoagulation regimen used in stenting. Medication instituted prior to the procedure includes Aspirin and Clopidogrel with Heparin used during the procedure itself. This prevents clot from developing on the catheters or stent and causing a stroke.

The procedure is done under monitored anesthesia care with the patient sedated but awake and with general anesthesia for intracranial stenosis. A sheath is placed in the femoral artery through which a catheter is placed for diagnostic angiography. This shows the Neurointerventionalist the precise location and degree of narrowing in the artery and the collateral circulation around the brain. Under direct fluoroscopic visualization a small guide wire is passed beyond the stenosis. This wire has a built in protection device to collect any debris from the first step of angioplasty. The next step is placement

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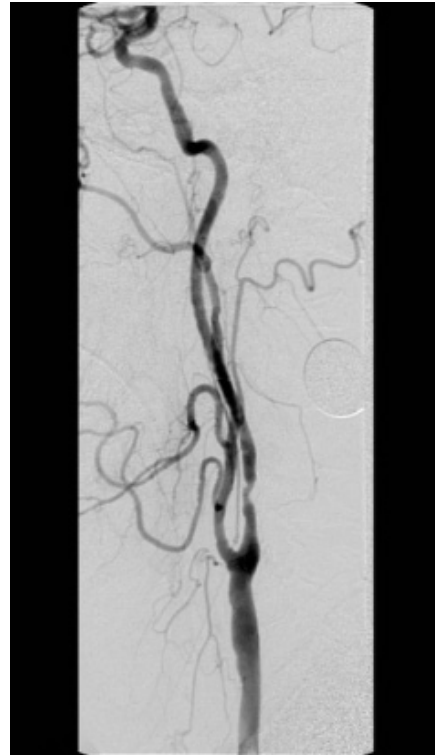
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of the stent over this guide wire and possibly a second angioplasty to optimize the artery lumen. Finally, the protection device is retrieved, and the catheters are removed. Patients usually spend 1-2 days in the hospital the first of which is in the Neuro-intensive care unit. Patients continue Aspirin and Clopidogrel and are followed by the care team following discharge from the hospital. Follow up medical care and imaging with carotid ultrasound is done in clinic at standard intervals to evaluate patients post-procedure.



CT angiogram shows severe narrowing of the internal carotid artery.



Catheter angiogram confirms the stenosis.



Roadmap angiogram shows the balloon angioplasty to re-establish the lumen of the artery.



Angiogram following angioplasty and stent placement shows reconstruction of the artery.

The Neurovascular Service at Massachusetts General Hospital provides a multidisciplinary approach to patient care that combines neurosurgery, neurology and interventional neuroradiology. Based in the Department of Radiology, the Neurovascular Service's Interventional Neuroradiology Program uses minimally invasive procedures to treat a range of neurovascular disease and spinal disorders. For more information, visit www.mgh-interventional-neurorad.org

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