

Late Results with Eversion Carotid Endarterectomy: Technical Details That Make It a Better Way

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R. Clement Darling III, MD, Albany, NY

Eversion endarterectomy was introduced into our institution in 1993. Since that time, we have performed nearly 7,000 procedures (6,951 of 7,600 [91%] of carotid endarterectomies were performed using the eversion technique). Interestingly, all surgeons at our institution have adopted this approach to carotid endarterectomy. The indications for operation were symptomatic disease in 28% and asymptomatic stenosis in 72%. Regional anesthesia was preferentially employed in 97% of the patients. There were 805 cases performed under general anesthesia mainly because of simultaneous coronary artery bypass grafting in 560 patients. Shunts were placed for neurologic deterioration in 200 of 6,335 (3.6%) cases. Of the 6,951 eversion endarterectomies, major postoperative complications occurred in 205 (3.2%). These included 72 strokes and 58 deaths. In addition, there was a low rate of minor complications including hematoma requiring operative drainage (1.5%), cranial nerve injury (0.4%), and asymptomatic early occlusion (0.4%). In the 6,951 eversion endarterectomies, there were 95 patients who suffered stroke or death resulting in stroke mortality of 1.6%. Interestingly, there was no difference in gender as far as stroke mortality (1.8% male, 1.4% female) or restenosis (1.0% men, 1.4% women).

Over the past 5 years, we performed eversion CEA in high-risk patients such as patients with acute strokes, patients with contralateral occlusion, patients greater than 80 years old, combined CEA/coronary artery bypass graft (CABG), and possibly the female gender. In patients undergoing combined CABG/carotid procedures, we had an operative mortality of 3.4% and stroke mortality of 4.6%. In a multivariate analysis of patients with preoperative strokes, we identified two factors associated with improved outcome—smaller infarct size and the use of the eversion technique. In the 329 patients with contralateral occlusion, shunts were used 12% of the time, mortality was 2.5%, nonfatal stroke occurred in 1.5% of patients, and nonfatal cardiac events were identified in 1.8% for a total major adverse outcome of <5%. In this subgroup comparing gender, the mortality was similar at 1.1% in males and 0.9% in females; cardiac complications were seen in 1.26% of males and 1.21% of females and stroke was identified in 0.8% of males and 0.7% of females, with a restenosis at a mean of 3 years of 0.98% in males and 1.41% in females. In the elderly patients, our mortality was 1.84%, with nonfatal stroke in 0.94%, nonfatal cardiac event in 1.6%, and a major adverse outcome in 3.2%.

The primary advantage of eversion endarterectomy of the carotid artery is that the closure of the arteriotomy does not require the use of a patch. Additionally, the internal carotid artery reanastomosis onto the common carotid artery can be performed more quickly and simply. With the anastomosis on the larger part of the two major vessels, there is no longitudinal end point closure on the distal and obviously smallest part of the internal carotid artery and less artery needs to be exposed proximally and distally to perform the surgery. These seemingly small advantages can relate to shorter carotid artery cross-clamp time (usually on the average of 12 minutes) and shorter total operative time. In our hands, 85% of the procedures are less than 1 hour in duration. Similarly, in 1997, Entz compared eversion CEA versus patch closure in 715 patients. The stroke mortality was 0.95% in eversion and 2.9% in standard CEA. Carotid clamp time was 22.4 minutes with eversion and 34.9 minutes with standard CEA. Total operating room time was 52.8 minutes in eversion and 90.9 minutes in standard CEA.

Although it is always difficult to improve on a well-accepted technique, we believe that eversion endarterectomy is truly an advance in carotid surgery and one that we have adopted enthusiastically. We hope that other surgeons try this technique as we believe that with a little experience, they will be equally positive about the advantages that eversion endarterectomy offers.