Analysis of Infection Risk Following Covered Stent Exclusion of Pseudoaneurysms in Prosthetic Arteriovenous Hemodialysis Access Grafts

Conclusion: Covered stent exclusion of intragraft dialysis access graft pseudoaneurysms is correlated with a high rate of eventual graft infection.

Summary: Prosthetic arteriovenous (AV) grafts are prone to develop pseudoaneurysms that are thought related to graft material degeneration secondary to repeated cannulation at specific sites. Such pseudoaneurysms may be particularly prone to develop infection in the face of outflow obstruction. Endovascular treatment can be used to treat prosthetic AV graft pseudoaneurysms with reports of high technical success and acceptable patency rates (Vesely TM, J Vasc Interv Radiol 2005;16:1301-7; Najib S et al, J Surg Res 2002;106:15-19). However, the authors of this report indicated an anecdotal impression that incorporating this technique into their practice resulted in a higher incidence of prosthetic AV graft pseudoaneurysms. They therefore sought to study whether stent graft treatment of prosthetic AV graft pseudoaneurysms influenced the incidence of AV graft infection. When covered stents were used to treat intragraft pseudoaneurysms, the subsequent rate of graft infection increased compared with bare-metal stents or covered stents deployed within the graft for other reasons (42.1% vs 18.2%, P = .011). When stents were deployed at an intragraft location, there was a higher grade of infection compared with those deployed at a venous anastomosis or in an outflow vein (26.9% vs 6.9%, P < .001).

Comment: Pseudoaneurysms of prosthetic dialysis grafts are usually associated with a history of repeated punctures at the site where the pseudoaneurysm developed. More punctures in a specific site will likely increase the risk of contamination, and the more the risk of contamination the more the risk of infection. It follows, as shown above, that placing an additional prosthetic under such circumstances is not likely to have favorable outcomes.

Cognition After Carotid Endarterectomy or Stenting: A Randomized Comparison

Conclusion: Despite a substantially higher rate of new ischemic lesions after carotid artery stenting (CAS) compared with carotid endarterectomy (CEA), changes in cognition after CAS or CEA are not statistically significant.

Summary: Diffusion-weighted (DWI) magnetic resonance imaging (MRI) shows there is a three times incidence of new ischemic lesions after CAS compared with CEA (Schnaudigel S et al, Stroke 2008;39:1911-9). In elderly people, free of dementia and baseline stroke, “silent” infarcts more than double the risk of dementia and are related to a steeper decline in cognitive function (Vermeer SE et al, N Engl J Med 2003;348:1215-22). This study compares effects on cognition of CAS and CEA in patients with symptomatic carotid artery stenosis. A secondary goal was to compare the occurrence of new cerebral ischemic lesions on DWI-MRI in CAS and CEA patients. Patients were derived from two specific participating centers of the International Carotid Stenting Study (ICSS). Patients in these centers underwent detailed neuropsychologic examinations before and after CEA or CAS revascularization. DWI was performed before the revascularization procedure and ≤3 days after revascularization. Patients underwent a cognitive testing, and results were standardized into z scores. From this a cognitive sumscore was calculated. The primary outcome end points were changes in cognitive sumscores between baseline and follow-up in CAS and CEA patients. ICSS included 1,713 patients. The two centers that participated in this study enrolled 177 patients. Of the 177 patients, 140 had a neuropsychologic examination (NPE) at baseline and 120 had an NPE at follow-up. CAS was associated with a larger decrease in cognition than CEA, but between-group differences were not statistically significant (–0.17, 95% confidence interval, –0.38 to 0.03; P = .092). There were 89 patients who had a pretreatment MRI and 64 who had a MRI ≤3 days after revascularization with CAS or CEA. New ischemic lesions were found twice as often after CAS than after CEA (relative risk, 2.4; 95% confidence interval; 1.0-4.4; P = .041).

Abstracts

Gregory L. Moneta, MD, Section Editor

Sirolimus-Eluting Stents vs. Bare-Metal Stents for Treatment of Focal Lesions in Infrapopliteal Arteries: A Double-Blind, Multi-Centre, Randomized Clinical Trial

Conclusion: Stent treatment of focal infrapopliteal arterial lesions can be improved with the use of sirolimus-eluting stents compared with bare-metal stents.

Summary: Below the knee balloon angioplasty is the mainstay of endovascular treatment of infrapopliteal disease. Stents are generally placed only after suboptimal results with angioplasty alone. The success of drug-eluting stents for treatment of coronary arteries has led to interest in using drug-eluting stents for treatment of infrapopliteal lesions in infrapopliteal arteries. The authors conducted a prospective, randomized, multicenter, double-blind trial comparing polymer-free sirolimus-eluting stents with a placebo-coated bare-metal stent in 161 patients with intermittent claudication or critical limb ischemia and a primary infrapopliteal athereosclerotic lesion. The mean target lesion length was 31 ± 9 mm. The mean main point was the 1-year primary patency rate, defined as freedom from in-stent restenosis (luminal narrowing of ≥50%) detected with duplex ultrasound imaging with angiography if duplex was nondiagnostic or not technically feasible. Secondary end points included 6-month primary patency rates, secondary patency rates, and changes in the Rutherford classification system after 1 year. During follow-up, 25 patients (15.8%) died, and 125 patients reached the 1-year examination point. Primary patency at 1 year was higher in the sirolimus-eluting stent group (80.6%) than in the bare-metal stent group (55.6%; P = .004). Secondary patency rates at 1 year were 91.9% and 71.4%, respectively (P = .005). Median (interquartile range) change in Rutherford classification after 1 year was −2 (−3 to −1) in the sirolimus-eluting stent group and −1 (−2 to 0) in the bare-metal stent group (P = .004). Event-free survival, defined as survival free from target lesions revascularization, major and minor amputation, myocardial infarction, and death, was no different between the two groups at 12 months (P = .2).

Comment: It does not follow that because drug-eluting stents have purported advantages in the coronary circulation that they will also be useful in small peripheral arteries. After all, the coronary and tibial circulations have entirely different flow dynamics, and intimal hyperplasia and atherosclerosis seem to be influenced by patterns of shear stress. Therefore, studies such as this are necessary to evaluate potential useful translation of technology from one vascular bed to another. Determining clinical utility is another matter. Half the patients in this series were treated for claudication. The very large majority of patients with claudication are not going to significantly benefit from endovascular treatment of an isolated, short tibial artery stenosis or occlusion.

A Propensity Score-Matched Comparison of Deep vs Mild Hypothermia During Thoracoabdominal Aortic Surgery

Conclusion: Deep hypothermic circulatory arrest (DHCA) results in improved postoperative adverse outcome rates compared with non-DHCA techniques in the repair of descending thoracic aortic (DTA) and thoracoabdominal aortic aneurysms (TAAA).

Summary: DTAs and TAAAs are often treated with open surgery. Several adjunctive perfusion techniques are used with open repair of DTAs and TAAAs. These include no distal perfusion (clamp and sew), mild hypothermia with atrial-femoral or femoral-femoral bypass, and DHCA. DHCA for DTA and TAAA repair is, however, largely restricted to high-volume centers and used selectively. In this study, the authors compared outcomes of DTA and TAAA surgery with non-DHCA techniques for complex thoracic aorta. They examined the effect of distal ischemic time and temperature...
ature on intra-abdominal reversible adverse outcomes and permanent adverse outcomes after DTA and TAA repair. This was a retrospective review of patients at the authors’ institution who underwent open DTA and TAA repair between January 2002 and December 2008. The authors included relevant preoperative, intraoperative, and postoperative data and performed a propensity score-matched analysis. Data sufficient to permit analysis were available for 240 of 262 patients, with 90 suitable for the propensity-matched study. Reversible adverse outcomes included analysis for renal failure, temporary hemodilution, and liver failure. Permanent adverse outcomes included permanent hemodilution, 30-day mortality, and paraplegia. The 30-day mortality was 7.1% (17 of 240). Reversible adverse outcomes developed in 40.8% of patients and permanent adverse outcomes in 10%. Propensity score analysis identified decreased odds of developing reversible adverse outcomes in patients undergoing DHCA (odds ratio, 0.32; 95% confidence interval, 0.12-0.85). Rates of acute renal failure (22% vs 46%; P = 0.03) and liver failure (17% vs 24%, P = 0.04) were lower in patients who underwent DHCA compared with the non-DHCA group.

Comment: Regionalization of complex procedures makes sense, and in vascular surgery, open thoracoabdominal surgery should be regionalized. Patients may not like to travel for care, but they do not want to die or become paralyzed as a result of their care either. Only a small minority of hospitals have the patient volume, technical expertise, and institutional resources to really do open AAA surgery well. That number will be even smaller for those using DHCA to facilitate AAA surgery. If DHCA is truly a useful adjunct in TAA surgery, it is still another reason to argue for regionalization of TAA surgery.

Combination Oral Antiplatelet Therapy may Increase the Risk of Hemorrhagic Complications in Patients With Acute Ischemic Stroke Caused by Large Artery Disease

Conclusion: The incidence of hemorrhagic complications is likely increased in patients with acute ischemic stroke secondary to large artery disease who are treated with combination antiplatelet therapy.

Summary: It is recommended oral antiplatelet therapy be administered immediately after acute ischemic stroke to prevent recurrence and progression of stroke as well as to prevent other vascular events. It is known that monotherapy with aspirin does not reduce stroke progression (Markus HS et al. Circulation 2005;111:2235-40). However, it is thought that combination antiplatelet therapy, such as that provided by clopidogrel and aspirin, may have a role in reducing stroke progression in patients with stroke secondary to large artery disease (Wong KS et al. Lancet Neurol 2010;9: 489-97; Diener HC et al. Lancet 2004;64:331-7). There is an increased risk of hemorrhagic complications with long-term secondary preventative therapy with combination antiplatelet agents (Bhatt DL et al. N Engl J Med 2006;354:1706-17; Gasparyan AT et al. J Am Coll Cardiol 2008;51:1829-45). The role of combination antiplatelet therapy in the short-term treatment of acute stroke is not well understood. This retrospective study evaluated bleeding complications associated with antiplatelet therapy in patients with ischemic stroke secondary to large artery disease who were felt to be at high risk for stroke recurrence or progression. The authors reviewed 1385 consecutive patients admitted ≥7 days of an ischemic stroke or transient ischemic attack between April 2003 and November 2009. There were 167 patients with >50% stenosis or occlusion of a culprit major vessel treated with antiplatelet agents ≥48 hours of admission. Hemorrhagic complications were classified according to the bleeding severity index. Of the 167 patients studied, 108 were treated with combination antiplatelet agents and 59 with one antiplatelet agent. Three major and 11 minor hemorrhagic complications occurred in 14 patients. All major hemorrhagic complications occurred in patients administered combination antiplatelet therapy. The proportion of patients receiving combination agents was higher in those with significant hemorrhagic complications. Older age and receiving combination antiplatelet agents were independent predictors of a significant in-hospital hemorrhagic complication.

Comment: Despite the retrospective study design and the small number of end points, this study raises questions about the overall safety of combination antiplatelet therapy in the treatment of ischemic stroke caused by large artery disease. It is important to keep in mind that antiplatelet agents work through different mechanisms of action. It is therefore not surprising that the untoward effects of the sum may be greater than that observed with individual agents. This study will help determine appropriate statistical power for larger more definitive clinical trials with respect to end points and safety monitoring.

Defining Perioperative Mortality after Open and Endovascular Aortic Repair: the US Medicare Population

Conclusions: Comparisons of in-hospital mortality overestimate the benefit of endovascular aortic aneurysm (AAA) repair. The authors compared 30-day or combined 30-day and in-hospital mortality. The comparison of highest mortality risk extends longer for open repair, and the true mortality impact of AAA repair is not realized until 3 months after repair.

Summary: Perioperative mortality is an important measure of quality for surgical procedures. Definitions of the “perioperative” period differ. Perioperative mortality may be defined as death during the initial hospitalization, ≤30 days of surgery, or all deaths ≤30 days plus any deaths >30 days that occur before hospital discharge. In addition, ongoing risks due to surgery may persist >30 days and beyond hospital discharge. The authors investigated the effects and implications of various methods of calculating “perioperative mortality” with respect to EVAR vs open AAA repair. They used propensity-scoring models to create matched cohorts of U.S. Medicare beneficiaries undergoing EVAR (n = 22,830) or open repair (n = 22,830) from 2001 to 2004. Perioperative mortality was calculated using in-hospital mortality, 30-day mortality, and combined 30-day and in-hospital mortality. The authors also calculated biviscosity interval death rates for 12 months to define the duration of increased risk for death after AAA repair. In-hospital, 30-day, and combined 30-day and in-hospital mortality for open repair and EVAR were 4.6% vs 1.1%, 4.3% vs 1.6%, and 5.3% vs 1.7%, respectively. Relative rates of death (95% confidence interval) were 4.2 (3.6-4.8), 3.1 (2.7-3.4), and 5.2 (2.8-3.5). Biviscosity interval death rates were highest during the first month after CAS (0.6%) and during the first 2.5 months (0.5% to 2.1%) after open repair. After 2.5 months, rates were similar for both repairs (<0.5%) and were stabilized after 3 months. The 90-day mortality rates were 7.0% for open repair and 4.0% for EVAR.

Comment: The main point here is not that AAA patients undergoing EVAR or open repair continue to experience procedure-related morbidity beyond their hospital stay or the first 30 postoperative days. We all have seen long-term procedure-related complications in our patients. However, it is more important as surgeons, by focusing on 30-day and/or in-hospital morbidity and mortality, underestimate in the surgical literature the effect of our procedure on our patients. Perhaps, for procedures of greater magnitude, such as AAA repair, journal editors should encourage reporting of perioperative morbidity and mortality data out to 3 months.

Microembolization During Carotid Artery Stenting in Patients With High-Risk, Lipid-Rich Plaque: A Randomized Trial of Proximal Vascular Distal Cerebral Protection

Conclusion: In patients undergoing carotid artery stenting (CAS) who have a lipid-rich plaque, the use of a proximal cerebral protection system during CAS results in lower numbers of microemboli compared with distal cerebral protection with a filter wire during CAS.

Summary: It is well recognized distal cerebral protection during CAS does not fully prevent embolic complications. The reasons for this are manifold but may include unintentional manipulation, incomplete apposition of the device to the arterial wall, emboli smaller than the filter pore size, and loss of debris with filter recapture. Proximal endovascular occlusion using balloons to occlude the common carotid artery, or a distal filter wire, is a common cerebral artery, resulting in blood flow arrest in the internal carotid artery during CAS, may be a better technique for providing cerebral protection. Although the proximal occlusion technique has several potential drawbacks, including patient intolerance to occlusion, potential dissection of the external carotid artery, and need for a larger sheath (8F/9F), the potential to decrease microembolic events during CAS is intriguing. Increased numbers of microembolic signals (MES) detected with transcranial Doppler (TCD) have been associated with a greater prevalence of silent ischemic cerebral lesions detected on post-CAS magnetic resonance diffusion-weighted imaging (DWI). The significance of silent DWI-detected ischemic lesions after CAS is not well understood, but there is some suggestion they could be associated with late cognitive decline. Patients with lipid-rich plaque appear to be at higher risk because they have an increased prevalence of DWI-detected lesions after CAS. The authors studied the use of the proximal occlusion technique during CAS in patients with lipid-rich plaque undergoing CAS who were randomized to a proximal protection device (n = 26) or distal protection (n = 27) with a filter wire. MES were assessed with TCD before and after intervention. The proximal occlusion technique during CAS was performed before dilation, stent crossing, stent deployment, stent dilation, and during device retrieval/detachment. DWI was performed before CAS and after CAS at 48 hours and 30 days. Patients treated with the proximal cerebral protection device had a higher rate of permanent neurological deficit (2.6% vs 0.7%) compared with the filter wire protection provided with a filter wire (35% vs 7.4%; P < 0.019). Compared with the filter wire, the proximal cerebral protection device reduced the mean number of MES detected during crossing of the lesion (18 vs 2, P < .001), stent crossing (23 vs 0), stent deployment (30 vs 0), stent dilation (16 vs 0), and the total number of MES detected (93 vs 16). Multivariable analysis showed the type of cerebral protection was the only independent predictor of total MES. There was no significant difference in the number of patients with new post-CAS embolic lesions in the