Abstracts

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Influence of Race on the Management of Lower Extremity Ischemia: Revascularization vs Amputation

Durazzo TS, Frencher S, Gusberg R. JAMA Surg 2013;148:617-23.

Conclusions: Black patients have greater odds of undergoing amputation than white patients. This is even after correcting for an array of confounding parameters. Disparity is magnified in settings where resources are greatest.

Summary: A number of studies have suggested that among patients with critical lower extremity ischemia (CLI), white patients are more likely to undergo an attempt at limb salvage with revascularization than nonwhite patients, who are more likely to undergo amputation (Gornick ME et al, N Engl J Med 1996;335:791-9; and Feinglass J et al, J Vasc Surg 2005;41:823-9). Possible explanations for these differences in patterns of care have been broadly categorized as institutional-level, patient-level, and health care provider-level factors. Differences in amputation rates between white and nonwhite patients have largely been attributed to differences in access to care. The suggestion is that nonwhite patients have less access to hospitals and physicians capable of providing high-quality revascularization procedures. The authors sought to investigate factors that may contribute to a racial disparity in amputation rates. They focused on several questions: (1) Are there significant differences in the type of hospital with respect to capacity to perform advanced revascularization procedures at which white and nonwhite patients with lower extremity ischemia receive care? (2) Are there differences in hospital capabilities that independently effect racial disparity in treatment? And using wealth of zip code areas as an indicator of local resources, (3) Do local resources have an independent impact on racial disparities in care of the patient with CLI? The authors used all hospital discharge records from the Nationwide Inpatient Sample of adult patients with a primary diagnosis of CLI from 2002 to 2008. There were 774,399 records examined with multiple logistic regression analysis. Controlling for confounding factors, black patients had 1.77 times the odds of receiving an amputation compared with white patients (95% confidence interval [CI], 1.72-1.84; $P < .001$). Paradoxically, additional analysis revealed the black-to-white odds ratio increased with increasing revascularization capacity of the treating hospital, from a low of 1.43 (95% CI, 1.23-1.65) to a high of 1.98 (95% CI, 1.83-2.24). Surprisingly, amputation disparity by race also increased for patients living in wealthier zip codes.

Comment: In this study of patients with CLI, being black, independent of other variables, increased the odds of amputation by 78%. White patients, those with private insurance, those living in the wealthiest zip codes, and those cared for at teaching hospitals all independently had increased odds of revascularization. However, racial disparity between amputations in black and white patients was highest within hospitals with the greatest capacity for revascularization and was greater among those residing in wealthier zip codes. The final conclusion is that it is not necessarily access to health care but race-specific factors with respect to CLI that are most important in determining amputation rate. Although there are certainly problems with data dredging from large multi-institution databases, the concept that biologic rather than social differences contribute to outcomes in patients with vascular disease, particularly those with lower extremity ischemia, deserves further investigation.

Comparison of Outcomes for Open Abdominal Aortic Aneurysm Repair and Endovascular Repair in Patients With Chronic Renal Insufficiency

Nguyen BN, Neville RF, Rahbar R, et al. Ann Surg 2013;258:394-9.

Conclusions: Endovascular aneurysm repair (EVAR) should be preferred over open aneurysm repair (OPEN) in patients with moderate renal dysfunction provided there is appropriate anatomy for EVAR. High postoperative complications in patients with abdominal aortic aneurysm (AAA) treated with either OPEN or EVAR suggest the need for a higher threshold for AAA repair in patients with renal insufficiency.

Summary: Renal insufficiency is an independent predictor of early and late mortality after OPEN AAA repair and EVAR (Ohrlander T et al, Vasc Med 2011;16:422-7; and Mills JL Sr, et al, J Vasc Surg 2008;47:1141-9). Use of intra-arterial contrast with EVAR and in follow-up is also postulated to result in up to a 10% decrease in creatinine clearance after the first year (Alsac JM et al, J Vasc Surg 2005;41:926-30). However, up to 20% of AAA patients with OPEN repair also have a decrease in renal function postoperatively (Nathan DP et al, J Vasc Surg 2011;54:1237-43). In this study, the authors used the National Surgical Quality Improvement Program (NSQIP) database to determine which approach, EVAR or OPEN, for AAA repair is preferable in patients with renal insufficiency. The NSQIP database from 2005 to 2010 was used to identify patients who underwent EVAR and OPEN repair for infrarenal AAA during that time period. The preoperative estimated glomerular filtration rate (eGFR) was calculated by the Chronic Kidney Disease Epidemiology Collaboration equation. Patients with chronic renal insufficiency were stratified into two groups: moderate (eGFR = 30-60 mL/min) and severe (eGFR <30 mL/min) renal dysfunction. A multivariate regression model was used for data analysis. There were 13,191 patients identified who underwent AAA repair, 9877 who underwent EVAR, and 3314 who underwent OPEN repair. The eGFR in 40% of patients was <60 mL/min. Overall, EVAR patients had lower 30-day mortality (odds ratio, 3.74; 95% confidence interval, 2.63-5.32; $P < .001$). EVAR patients were also less likely to have renal, pulmonary, or cardiovascular events and less likely to have combined postoperative events (odds ratios of 3.0, 5.5, 2.0, and 4.3, respectively; $P < .001$ for all). In patients with moderate renal dysfunction, OPEN repair had a 3.6-times higher risk of postoperative renal impairment and a 5.1-times higher risk of dialysis than EVAR. In patients with severe renal dysfunction, there was no benefit of EVAR over OPEN repair, with both methods of repair having significantly higher complication rates than in patients with moderate renal dysfunction.

Comment: The discussants of the paper at the Annual Meeting of the American Surgical Association pointed out two key questions relevant to the paper. The first was without knowing the anatomy of the aneurysms in the OPEN and EVAR groups, it is difficult to compare the two groups, in that, presumably, there may be anatomic reasons why OPEN repair was performed over EVAR that could influence postoperative complication rates. The relative safety of EVAR vs OPEN repair in patients with renal insufficiency therefore may be exaggerated by differences in anatomy. Nevertheless, as Dr Ricotta points out, this paper does indicate that one can safely perform EVAR in patients with moderate renal insufficiency.

Association Between Advanced Age and Vascular Disease in Different Arterial Territories: A Population Database of Over 3.6 Million Subjects

Savji N, Rockman CB, Skolnick AH, et al. J Am Coll Cardiol 2013;61:1736-43.

Conclusions: More than 20% and 30% of octogenarians and nonagenarians, respectively, have vascular disease in at least one arterial territory.

Summary: Much of the data concerning the epidemiology of vascular disease derives from meta-analysis or from small screening studies that have only small numbers of octogenarians and nonagenarians. However, increasing age is a well-known risk factor for atherosclerosis. The precise association of advanced age with vascular disease of different peripheral arterial locations has not been studied in detail. The authors used a group of >3.6 million individuals to determine the relationship between advanced age and vascular disease with respect to lower extremity peripheral arterial disease (PAD), carotid artery stenosis, and abdominal aortic aneurysm, with prevalence stratified by decade of life. The study was based on data provided by Life Line Screening Inc (Independence, Ohio) to the Society for Vascular Surgery for research purposes. Participants in Life Line Screening are self-referred individuals who pay out-of-pocket for vascular screening tests. The data incorporated screenings from 2003 to 2008 from >20,000 sites nationwide. Individuals being screened completed a medical and lifestyle questionnaire and were evaluated by ankle-brachial indices, with <0.90 indicating PAD, ultrasound imaging for carotid artery stenosis >50%, and abdominal aortic aneurysm, defined as an abdominal aorta ≥3 cm. Multivariate logistic regression analysis was used to estimate odds of disease in different age categories. Overall, prevalence of PAD,

carotid artery stenosis, and abdominal aortic aneurysm was 3.7%, 3.9%, and 0.9%, respectively. Prevalence of vascular disease increased with age (40-50 years: 2%, 51-60 years: 3.5%, 61-70 years: 7.1%, 71-80 years: 13.0%, 81-90 years: 22.3%, 91-100 years: 32.5%; $P < .0001$). The prevalence of vascular disease in each vascular territory also increased with age. After adjustment for sex, race-ethnicity, body mass index, family history of cardiovascular disease, smoking, diabetes, hypertension, hypercholesterolemia, and exercise, the odds of PAD (odds ratio [OR], 2.14; 95% confidence interval [CI], 2.12-2.15), carotid artery stenosis (OR, 1.8; 95% CI, 1.79-1.81), and abdominal aortic aneurysm (OR, 2.33; 95% CI, 2.30-2.36) increased with each decade of life.

Comment: Age is a well-known risk factor for atherosclerosis. The data here, if anything, are likely to underestimate the prevalence of vascular disease. Patients who present for screening studies, the so-called worried well, may be more health oriented and live healthier lifestyles than those who do not. After all, patients known to have vascular disease are not really candidates for "screening" studies and, theoretically, would not be included in the database. It seems they would be unlikely to pay for an examination to confirm what they already know.

Fistula First Is Not Always the Best Strategy for the Elderly

DeSilva RN, Patibandla BK, Vin Y, et al. J Am Soc Nephrol 2013;24: 1297-304.

Conclusions: Fistula first is not clearly superior to graft first in very elderly patients. Each strategy is associated with similar mortality outcomes in octogenarians and nonagenarians.

Summary: In patients requiring hemodialysis, one-third of fistulas fail to mature (Allon M et al, Kidney Int 2002;62:1109-24). In addition, patients aged >65 years have twice the failure rate of younger patients (Lok CE et al, J Am Soc Nephrol 2006;17:3204-12). A higher rate of fistulas that fail to mature may contribute to greater use of catheters. Indeed, from the mid-1990s until recently, incident use of arteriovenous (AV) grafts in elderly patients decreased from 28.2% to 4.2%, but at the same time, incident catheter use increased from 56.8% to 82.3% (DeSilva RN et al, Hemodial Int 2012;16:233-41; and Lacson E Jr et al, Am J Kidney Dis 2009;54:912-21). Along with this, it is noted that the incident hemodialysis population is aging, with an annual increase of 8% to 16% in patients aged >75 years. In this paper, the authors sought to determine mortality rates in the elderly population according to the initial type of vascular access placed rather than the access used at initiation of hemodialysis. The specific question was whether fistula first, as an intention-to-treat strategy might not be the clearly superior predialysis vascular access placement strategy in octogenarians. The paper analyzed data from a cohort of 115,425 incident hemodialysis patients who were aged ≥65 years. Data were derived from the US Renal Data System with linked Medicare claims. This allowed identification of the first predialysis vascular access placed rather than just the first access used for hemodialysis. All-cause mortality outcomes based on the first vascular access placed were evaluated using proportional hazard models. The fistula group was the reference. In the study population, 21,436 patients had fistulas as the first predialysis access placed, 3472 had grafts as the first predialysis access, and 90,517 had catheters as the first predialysis access. Patients with catheters as their first predialysis access demonstrated inferior survival compared with patients with a fistula (hazard ratio [HR], 1.77; 95% confidence interval [CI], 1.73-1.81; $P < .001$). There was no significant difference in mortality between patients with a graft as the first access placed and those with a fistula as the initial access (HR, 1.05; 95% CI, 1.00-1.11; $P = .06$). Patients with grafts as their first predialysis access had inferior mortality outcomes compared with fistulas for the group aged 67 to ≤79 years (HR, 1.10; 95% CI, 1.02-1.17; $P = .007$). However, differences between graft-first and fistula-first groups were not statistically significant for the groups aged 80 to ≤89 years those aged >90 years. Overall, only 50.7% of elderly patients with an AV fistula placed first used an AV fistula at the time of hemodialysis initiation. A higher percentage of those patients within the AV fistula-first group used catheters at dialysis initiation compared with the AV graft-first group (43% vs 25%).

Comment: It is becoming increasingly evident that a fistula-first strategy as a blanket strategy may not be appropriate for all patients approaching hemodialysis. The authors' data argue strongly for the fact that perhaps what is more important is avoiding a catheter in the elderly patient rather than whether hemodialysis is initiated with a fistula or a graft. The observational data here suggest placing an AV graft first decreases the chance of initiating hemodialysis with a catheter compared with a fistula-first strategy. The clinical implication is that a fistula-first strategy should be used in elderly patients who have a high chance for a successful fistula but that the remainder of patients should be considered for a graft to initiate hemodialysis.

Systematic Review and Meta-Analysis of Additional Technologies To Enhance Angioplasty for Infrainguinal Peripheral Arterial Occlusive Disease

Simpson EL, Michaels JA, Thomas SM, et al. Br J Surg 2013;100: 1128-37.

Conclusions: Among technologies available to enhance conventional percutaneous transluminal balloon angioplasty (PTA), self-expanding stents, drug-eluting stents, and drug-coated balloons appear to be the most promising technologies for future study.

Summary: There are a number of modifications of balloon angioplasty aimed at improving success of the initial recanalization and prevention of late restenosis in the percutaneous treatment of infrainguinal peripheral arterial occlusive disease. These technologies include stents, laser angioplasty, arthrectomy devices, drug-eluting stents, drug-coated balloons, endovascular radiotherapy, and brachytherapy. This review is part of a larger project looking at enhancements to angioplasty (Simpson EL et al, http://www.hta.ac.uk/project/2324.asp). The purpose of the review was to evaluate the range of available additional technologies to enhance results of infrainguinal PTA. The authors searched relevant electronic databases in May 2011. The patient population studied was those with symptomatic peripheral arterial occlusive disease undergoing endovascular treatment for disease distal to the inguinal ligament. Interventions were additional techniques compared with conventional PTA. Need for reintervention and restenosis were the main outcome measures. Randomized clinical trials were assessed for quality, and data were extracted to determine clinical effectiveness. Where appropriate, meta-analysis was undertaken to produce risk ratios (RRs). There were 40 randomized clinical trials selected. Meta-analysis showed a significant benefit at 6 months in reducing restenosis for self-expanding stents (RR, 0.49) and drug-coated balloons (RR, 0.40) and at 12 months for endovascular brachytherapy (RR, 0.63). Stent grafts also significantly reduced stenosis compared with PTA, as did drug-eluting stents compared with bare-metal stents. The meta-analysis showed drug-coated balloons were associated with lower reintervention rates than PTA alone at 6 months (RR, 0.24) and at 24 months (RR, 0.27). Self-expanding stents at 6 months also appeared to result in lower reintervention rates. Other techniques did not show significant treatment effects for restenosis or reintervention.

Comment: It seems that every few months there is a new "wonder technique" to reduce restenosis and reintervention in patients undergoing percutaneous treatment of infrainguinal arteries. Although the conclusions of this review must be tempered by small sample sizes and, frequently, by lack of clinical outcome measures permitting direct comparison between trials, it does appear not all adjuncts to balloon angioplasty are equal. Because there are limited resources available for study of these adjuncts, the value of this review is to identify those adjuncts most likely to have benefit when studied with respect to patient-oriented outcomes such as measures of quality of life, reintervention, and symptomatic recurrence.

Myocardial Injury After Noncardiac Surgery and its Association With Short-Term Mortality

van Waes JAR, Nathoe HM, de Graaff JC, et al; and the Cardiac Health After Surgery (CHASE) Investigators. Circulation 2013;127:2264-71.

Conclusions: Postoperative myocardial injury is an independent predictor of 30-day mortality after noncardiac surgery.

Summary: In high-risk surgical patients, isolated troponin elevations are strong independent predictors of mortality within the first year after surgery (Levy M et al, Anesthesiology 2001;114:796-806). The VISION study (Vascular Events in Noncardiac Surgery Patients Cohort Evaluation) included >15,000 surgical patients and showed a strong association between peak troponin levels postoperatively and 30-day mortality (Devereaux PJ et al, JAMA 2012;307:2295-304). On the basis of the VISION study, it has been suggested that routine postoperative troponin monitoring could be implemented as standard of care in appropriate patients undergoing noncardiac surgery to provide better risk stratification and long-term patient management. The authors therefore sought to determine the predictive value of postoperative troponin elevation with respect to 30-day mortality after noncardiac surgery. This was an observational single-center cohort study of 2232 noncardiac surgical patients considered intermediate-risk to high-risk. Patients were aged ≥60 years and underwent surgery in 2011. Troponin was measured for the first 3 postoperative days. The association between postoperative myocardial injury (troponin I level >0.06 μg/L) and all-cause 30-day mortality was determined using log binomial regression analysis. Of the 1627 patients in whom troponin was measured, 315 (19%) had myocardial injury as indicated by an elevated troponin I level. All-cause death occurred in 56 patients (3%). The relative risk of a minor increase in troponin (0.07-0.59 μg/L) was 2.4 (95% confidence interval, 1.3-4.2; $P < .01$). The relative risk of a 10- to 100-fold