



## Selected Abstracts from the August Issue of the Journal of Vascular Surgery<sup>☆</sup>

**Editors: Anton N. Sidawy and Bruce A. Perler**

### The role of open and endovascular treatment with fenestrated and chimney endografts for patients with juxtarenal aortic aneurysms

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**Objective:** To present endovascular techniques in the treatment of juxtarenal aortic aneurysms (JAAs) in relation to surgical repair; this is the “gold standard.”

**Methods:** Between January 2008 and December 2010, 90 consecutive patients were diagnosed with primary degenerative JAAs ( $\geq 5.0$  cm) and assigned prospectively to different operative strategies on the basis of morphologic and clinical characteristics. In particular, 59 patients were treated by endovascular means such as fenestrated endovascular abdominal aortic repair (f-EVAR,  $n = 29$ ) or chimney endovascular abdominal aortic repair (ch-EVAR,  $n = 30$ ) endografting, and 31 patients underwent open repair (OR,  $n = 31$ ).

**Results:** Early procedure-related and all-cause (30-day) procedure-related mortality was 0% for the endovascular group and 6.4% ( $n = 2/31$ ) for the OR group, due to systemic inflammatory response syndrome with consecutive multi-organ failure ( $P = .023$ ). Persistent postoperative hemodialysis occurred only after OR (2/31; 6.4%). The overall estimated pre- and postoperative median estimated glomerular filtration rate and creatinine values were similar in the three subgroups. There was one left renal artery occlusion for each endovascular subgroup presented with flank pain and treated by iliaco-renal bypass in both cases. Transfusion requirements and length of hospital stay were significantly less in the endovascular group ( $P = .014$  and  $P = .004$ , respectively).

**Conclusions:** Endovascular treatment of JAA is a safe alternative for the short-term management of JAA.

### Long-term results after accessory renal artery coverage during endovascular aortic aneurysm repair

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**Objective:** Current information regarding coverage of accessory renal arteries (ARAs) during endovascular aneurysm repair (EVAR) is based on small case series with limited follow-up. This study evaluates the outcomes of ARA coverage in a large contemporary cohort.

**Methods:** Consecutive EVAR data from January 2004 to August 2010 were collected in a prospective database at a University Hospital. Patient and aneurysm-related characteristics, imaging studies, and ARA coverage versus preservation were analyzed. Volumetric analysis of three-dimensional reconstruction computed tomography scans was used to assess renal infarction volume extent. Long-term renal function and overall technical success of aneurysm exclusion were compared.

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**Results:** A cohort of 426 EVARs was identified. ARAs were present in 69 patients with a mean follow-up of 27 months (range, 1 to 60 months). Forty-five ARAs were covered in 40 patients; 29 patients had intentional ARA preservation. Patient and anatomic characteristics were similar between groups except that ARA coverage patients had shorter aneurysm necks ( $P = .03$ ). Renal infarctions occurred in 84% of kidneys with covered ARAs. There was no significant deterioration in long-term glomerular filtration rate when compared with patients in the control group. No difference in the rate of endoleak, secondary procedures, or the requirement for antihypertensive medications was found.

**Conclusions:** This study is the largest to date with the longest follow-up relating to ARA coverage. Contrary to previous reports, renal infarction after ARA coverage is common. Nevertheless, coverage is well tolerated based upon preservation of renal function without additional morbidity. These results support the long-term safety of ARA coverage for EVAR when necessary.

### High prevalence of abdominal aortic aneurysms in brothers and sisters of patients despite a low prevalence in the population

Anneli Linné, David Lindström, Rebecka Hultgren

**Objective:** Population-based screening for abdominal aortic aneurysms (AAAs) in elderly men is organized in many regions and countries in the Western world, and the prevalence of disease is reported to decline. Whether the prevalence among those with a family history also is declining is unknown. The primary purpose of this study was to assess the prevalence of AAAs among siblings of persons with AAAs and to investigate the proportion of siblings already diagnosed by opportunistic screening.

**Methods:** Patients treated for AAAs from January 2008 through December 2010 ( $n = 412$ ) in Stockholm, Sweden, were screened for siblings. Seven hundred seventy-nine siblings were identified. All siblings  $< 80$  years residing in Stockholm County were considered eligible and were invited to participate in the study ( $n = 174$ ). Deceased siblings were not included in the study, regardless of the cause of death. One hundred fifty siblings were enrolled in the study after informed consent was provided. One hundred thirty-four siblings were screened for AAAs with ultrasound scan and maximum aortic, infrarenal, anteroposterior, external (outer-to-outer) aortic diameter was measured. Characteristics of siblings with and without AAAs were compared.

**Results:** The mean age of the screened siblings was 66.4 years (standard deviation, 7.1). Of the siblings, 11% were found to have an AAA, 17% ( $n = 11$ ) of the brothers, and 6% ( $n = 5$ ) of the sisters. Only 11% of the siblings were screened for AAAs before the study. One of 16 siblings with AAAs was  $< 65$  years. Ever smoking was evident in 81% of the AAA siblings compared to 59% in the non-AAA siblings. Factors associated with increased risk of AAAs in the multivariate regression analysis were: male sex (odds ratio, 3.4; 95% confidence interval, 1.1–10.8;  $P = .04$ ) and age  $> 65$  (odds ratio, 10.8; 95% confidence interval, 1.3–86.4;  $P = .03$ ). Ever smoking was not statistically significant as a risk.

**Conclusions:** A strikingly high prevalence of AAAs in siblings was found as compared to the reported declining aneurysm prevalence in elderly men in the Western world. Systematic improvements regarding screening of first-degree relatives is mandated and selective screening of siblings is an underused tool to prevent death from aneurysm disease, both among men and women.

#### Analysis of Florida and New York state hospital discharges suggests that carotid stenting in symptomatic women is associated with significant increase in mortality and perioperative morbidity compared with carotid endarterectomy

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**Background:** Although large randomized studies have established the efficacy and safety of carotid endarterectomy (CEA) and, recently, carotid artery stenting (CAS), the under-representation of women in these trials leaves the comparison of risks to benefits of performing these procedures on women an open question. To address this issue, we reviewed the hospital outcomes and delineated patient characteristics predicting outcome in women undergoing carotid interventions using New York and Florida statewide hospital discharge databases.

**Methods:** We analyzed in-hospital mortality, postoperative stroke, cardiac postoperative complications, and combined postoperative stroke and mortality in 20,613 CEA or CAS hospitalizations for the years 2007 to 2009. Univariate and multiple logistic regression analyses of variables were performed.

**Results:** CEA was performed in 16,576 asymptomatic and 1744 symptomatic women and CAS in 1943 asymptomatic and 350 symptomatic women. Compared with CAS, CEA rates, in asymptomatic vs symptomatic, were significantly lower for in-hospital mortality (0.3% vs 0.8% and 0.4% vs 3.4%), stroke (1.5% vs 2.6% and 3.5% vs 9.4%), and combined stroke/mortality (1.7% vs 3.1% and 3.8% vs 10.9%). In cohorts matched by propensity scores, the same trend favoring CEA remained significant in symptomatic women. There was no difference in cardiac complication rates among asymptomatic women, but among symptomatic woman cardiac complications were more frequent after CAS (10.6% vs 6.5%;  $P = .0077$ ). Among symptomatic women, the presence of renal disease, coronary artery disease, or age  $\geq 80$  years increased the risk of CAS over CEA threefold for the composite end point of stroke or death. For asymptomatic women only in those with coronary artery disease or diabetes, there was a statistical difference in the composite mortality/stroke rates favoring CEA (1.9% vs 3.3% and 1.7% vs 3.4%, respectively). After adjusting for relevant clinical and demographic risk factors and hospital annual volume, for CAS vs CEA, the risk of the composite end point of stroke or mortality was 1.7-fold higher in symptomatic and 3.4-fold higher in asymptomatic patients. Medicaid insurance, symptomatic patient, history of cancer, and presence of heart failure on admission were among other strong predictors of composite stroke/mortality outcome.

**Conclusions:** Databases reflecting real world practice performance and management of carotid disease in women suggest that CEA compared with CAS has overall better perioperative outcomes in women. Importantly, CAS is associated with significantly higher morbidity in certain clinical settings and this should be taken into account when choosing a revascularization procedure.

#### The impact of gender on outcome after infrainguinal arterial reconstructions for peripheral occlusive disease

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**Objective:** The role of gender on the outcome of infrainguinal arterial revascularization (IAR) for peripheral arterial occlusive disease remains uncertain. This study analyzed the outcome of IARs performed over 15 years, stratifying the results by sex.

**Methods:** Details of consecutive patients undergoing primary IAR for peripheral arterial occlusive disease from 1995 to 2009 at our institution were prospectively stored in a vascular registry. Demographics, risk factors, indications for surgery, inflow sources, outflow target vessels,

types of conduit, and adverse outcomes were analyzed. Postoperative surveillance included clinical examination supplemented with duplex scans and ankle-brachial index measurements in all patients at discharge, 30 days, 6 months, and every 6 months thereafter. End points of the study, ie, patency, limb salvage, and survival rates, were assessed using Kaplan-Meier life-table analysis. The  $\chi^2$  or Fisher exact, Student t, and log-rank tests were used to establish statistical significance.

**Results:** Our sample consisted of 1459 IARs performed in 1333 patients, comprising 496 women (37.2%; 531 IARs), who were a mean 3 years older than the men (74 vs 71 years;  $P < .001$ ) and had a higher incidence of diabetes mellitus (52% vs 46%;  $P = .03$ ) and surgery for limb salvage (91% vs 87%;  $P = .02$ ). An autogenous vein conduit (great or small saphenous, or both, spliced, arm, or composite veins) was used in 87% of the IARs. No deaths occurred perioperatively (30 days). The major and minor complication rates were comparable between men and women. At 10 years, the primary patency rate was 47% in women vs 49% in men ( $P = .67$ ), the assisted primary patency rate was, respectively, 53% vs 50% ( $P = .69$ ), the secondary patency rate was 61% vs 61% ( $P = .66$ ), limb salvage rate was 93% vs 91% ( $P = .54$ ), and survival rate was 43% vs 49% ( $P = .65$ ). Stratifying by type of conduit revealed no differences in patency or limb salvage rates.

**Conclusions:** Despite an older age and more advanced stages of disease on presentation in women, IAR performed in women can achieve patency and limb salvage rates statistically no different from those recorded in their male counterparts, supporting the conviction that sex per se does not influence the outcome of lower extremity revascularization.

#### Development and validation of a risk calculator for prediction of mortality after infrainguinal bypass surgery

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**Objective:** For peripheral arterial disease, infrainguinal bypass grafting (BPG) carries a higher perioperative risk compared with peripheral endovascular procedures. The choice between the open and endovascular therapies is to an extent dependent on the expected periprocedural risk associated with each. Tools for estimating the periprocedural risk in patients undergoing BPG have not been reported in the literature. The objective of this study was to develop and validate a calculator to estimate the risk of perioperative mortality  $\leq 30$  days of elective BPG.

**Methods:** We identified 9556 patients (63.9% men) who underwent elective BPG from the 2007 to 2009 National Surgical Quality Improvement Program data sets. Multivariable logistic regression analysis was performed to identify risk factors associated with 30-day perioperative mortality. Bootstrapping was used for internal validation. The risk factors were subsequently used to develop a risk calculator.

**Results:** Patients had a median age of 68 years. The 30-day mortality rate was 1.8% ( $n = 170$ ). Multivariable logistic regression analysis identified seven preoperative predictors of 30-day mortality: increasing age, systemic inflammatory response syndrome, chronic corticosteroid use, chronic obstructive pulmonary disease, dependent functional status, dialysis dependence, and lower extremity rest pain. Bootstrapping was used for internal validation. The model demonstrated excellent discrimination (C statistic, 0.81; bias-corrected C statistic, 0.81) and calibration. The validated risk model was used to develop an interactive risk calculator using the logistic regression equation.

**Conclusion:** The validated risk calculator has excellent predictive ability for 30-day mortality in a patient after an elective BPG. It is anticipated to aid in surgical decision making, informed patient consent, preoperative optimization, and consequently, risk reduction.

#### Use of a postoperative insulin protocol decreases wound infection in diabetics undergoing lower extremity bypass

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**Objective:** Strict glucose control in patients undergoing coronary bypass grafting has been shown to decrease infectious complications,

arrhythmias, and mortality. Our objective was to determine if strict glucose control reduced morbidity after lower extremity bypass (LEB).

**Methods:** A prospective pilot study at a single institution within the Vascular Study Group of New England was conducted from January 2009 to December 2010. Patients with diabetes and without undergoing LEB were placed on an intravenous (IV) insulin infusion for 3 days after surgery with titration of blood glucose from 80 to 150 mg/dL. The IV insulin study group (n = 104) was compared to a historic control group (n = 189) that received standard insulin treatment from the preceding 3 years. The Fisher exact test, t-tests, Wilcoxon rank-sum tests,  $\chi^2$ , and logistic regression analyses were used to compare in-hospital morbidity. Stratified analyses were conducted to determine if findings differed based on the presence or absence of diabetes.

**Results:** There was no difference in postoperative complications between the two groups with regard to graft infection, myocardial infarction, dysrhythmia, primary patency at discharge, or mortality. Patients in the IV insulin group had significantly fewer in-hospital wound infections (4% vs 11%; odds ratio [OR], 0.32; 95% confidence interval [CI], 0.11–0.96;  $P = .047$ ). This association strengthened after adjusting for potentially confounding baseline differences in gender, body mass index, and smoking status (adjusted OR, 0.22; 95% CI, 0.05–0.84;  $P = .03$ ). When stratified by presence of diabetes, wound infections were decreased in the IV insulin group (0/44 [0%] vs 9/90 [10%];  $P = .03$ ). In patients without diabetes treated with IV insulin, there was no significant difference in wound infections (7% vs 12%;  $P = .42$ ).

**Conclusions:** Strict glucose control with a postoperative insulin infusion protocol significantly decreased the incidence of postoperative in-hospital wound infection in the diabetic population. These previously unreported findings from this single-institution prospective study warrant further investigation.

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#### Long-term results of femoral vein transposition for autogenous arteriovenous hemodialysis access

Pierre Bourquelot, Marek Rawa, Olivier Van Laere, Gilbert Franco

**Introduction:** When all access options in the upper limbs have been exhausted, an autogenous access in lower limb is a valuable alternative to

arteriovenous grafts. We report our experience of transposition of the femoral vein (tFV).

**Methods:** From June 1984 to June 2011, 70 patients underwent 72 tFV in two centers (Paris and Meknès) with the same technique. All patients had exhausted upper arm veins or had central vein obstructions. Patients were followed by serial duplex scanning. All complications were recorded and statistical analysis of patency was performed according to intention to treat using the life-table method.

**Results:** The mean interval between initiation of dialysis and creation of the tFV was 10 years. The sex ratio was even (one female/one male). Mean age was 48 years (range, 1–84 years), and there were no post-operative infections. Duplex measurements in 33 patients indicated high-flow: mean =  $1529 \pm 429$  mL/min; range, 700–3000 mL/min. Two immediate failures were observed and four patients were lost to follow-up soon after the access creation. Ten patients (14%) experienced minor complications (hematoma, five; lymphocele, one; delayed wound healing, two; distal edema, two) and 30 patients (42%) experienced mild complications (femoral vein and outflow stenosis, 16; treated by percutaneous transluminal angioplasty, 13; or polytetrafluoroethylene patch, three; puncture site complications, three [ischemia, two; infection, one]; reversible thrombosis, three [two surgical and one percutaneous thrombectomy]; abandoned thrombosis, eight [11%] after a mean patency of 8.1 years). Thirteen patients (18%) experienced major complications necessitating fistula ligation (ischemic complications in five diabetic patients with peripheral arterial occlusive disease [one major amputation included], lower leg compartment syndrome, one; acute venous hypertension, two; secondary major edema, two; high-output cardiac failure, one; bleeding, two). All the patent accesses (59/72) were utilized for dialysis after a mean interval of  $2 \pm 1$  months (range, 1–7 months) resulting in an 82% success rate. According to life-table analysis, the primary patency rates at 1 and 9 years were  $91\% \pm 4\%$  and  $45\% \pm 11\%$ , respectively. The secondary patency rates at 1 and 9 years were  $84\% \pm 5\%$  and  $56\% \pm 9\%$ , respectively.

**Conclusions:** Femoral vein transposition in the lower limb is a valuable alternative to arteriovenous grafts in terms of infection and long-term patency. Secondary venous percutaneous angioplasties may be necessary. High flow rates are frequently observed and patient selection is essential to avoid ischemic complications.